

Introduction

Community and Environment

Changes in structures for controlling water transformed the Indus basin in the century and a half from 1850 to 2000. A largely arid region with a historical mix of varying forms of agricultural and pastoral production, the Indus basin became, by the second half of the twentieth century, one of the globe's most heavily irrigated river basins. At the time of the British departure in 1947, there were some twenty-six million acres of irrigated land within the Indus basin, which encompassed by then the largest integrated, state-controlled irrigation system in the world—and one that had made the region one of the most agriculturally productive in India.¹ Divided between India and Pakistan by the subcontinent's partition, the Indus basin's irrigation expansion nevertheless continued apace after 1947—on both sides of the border. The Indus basin today supports a dense agricultural population whose size would be unthinkable without the transformations that extensive irrigation wrought.

The story of irrigation in the Indus basin is one of modern history's great stories of large-scale environmental transformation, but it is also a story of changing relationships between Indus basin society and the state. A large-scale environmental history of the Indus basin has yet to be written. If it were, it would focus on many of the critical processes that have transformed South Asia more generally. An environmental narrative of the Indus basin would of necessity incorporate long-term interactions among pastoralism, migration, agriculture, and trade. It would lay out changes in patterns of land use as agriculture expanded (and sometimes contracted) in response to technological and political changes, focusing on the dramatic expansion in the production of commercialized cash crops (particularly wheat, cotton, and rice) that came in the twentieth century. Yet it would also offer

something more. It would detail how the very process of environmental transformation was linked with changes in the imagining of the human communities—defined by relationships to nature—that bound visions of state power and the people of the Indus basin together.

The relationship between changing natural environments and changing structures of community lies at the heart of this book. As the British colonial state transformed the landscape of the Indus basin, it also redefined its claims to legitimacy through its reformulation of communities defined in relationship to nature. On one level, the construction of massive new physical works underscored the state's new claims to legitimacy, framed by its role as the mediator of an imagined community of producers dependent on new, scientific technologies of water control. But, on another level, the state also molded and manipulated forms of indigenous community whose relationships to nature had long shaped forms of community organization and imagining. These included not only communities of production but also communities of “blood,” newly reordered through programs of large-scale settlement and of property delimitation. “Blood” and “water” came to be intimately linked, and in ways that were to have a profound impact on the state's relationship to Indus basin society. The story of the transformation of the environment is also the story of the transformation of community and of the forms of state legitimacy with which this was intimately connected.

DEBATING THE POLITICS OF NATURE'S TRANSFORMATION

As the framework for a story of modern agricultural expansion, the Indus basin's history has long been the subject of historical attention. With the region the most important focus for state investment in irrigation in British India, the degree to which the expansion of irrigation laid the groundwork for capitalist transformation—particularly in the Punjab—has been a staple of historical debates, and one that has often focused on the impact of colonial policies in either facilitating or retarding this process.² But the history of the state's relationship to nature and production is important for more than the history of capitalism. Environmental history provides a critical ground for exploring the relationship between community, environment, and the structuring of legitimate political authority on a much deeper level.

The close connection between irrigation projects and state legitimacy was never far from the surface in British thinking as they undertook the major projects of environmental transformation that changed the Indus basin. This was captured nowhere more clearly than in a review of colonial irrigation undertaken for the British Council by Gerald Lacey, one of the most eminent twentieth-century British Indian water engineers, shortly after partition. Lacey, though hardly oblivious

to the problems associated with British irrigation, detailed the vast transformations in land use that had irrevocably changed the Indus basin at the time of the British departure in 1947. This was a story told in part through the numbers of new works constructed by the British and the millions of acres brought under canal command. But “when irrigation is conducted on so vast a scale and works of such magnitude are involved,” he wrote, “the mere repetition of figures and statistics falls on a dulled imagination.”³ Rather, the deeper significance of British irrigation lay in its links to the larger modern “epic” (as Sir Douglas Harris put it in his foreword to Lacey’s account)⁴ of man’s conquest of nature for productive human advantage. With scientific knowledge of nature serving as a touchstone for the legitimacy of rule, this was a story that transcended the bounds of colonialism and, as Lacey saw it, ultimately encompassed both colonial and national forms of rule. It was a saga brought to fruition in the Indus basin by “generations of engineers,” British and Indian alike. “The Indian Service of engineers in which the British and their Indian colleagues laboured for so many years has passed away,” Lacey wrote, but, in independent South Asia, “the tradition remains and is a living force,” continuing to shape the ongoing expansion of Indus basin irrigation in India and Pakistan.⁵ “The irrigation works of India and Pakistan, down to the smallest distributary channel, and the loneliest canal ‘inspection-house,’ must always remain,” Lacey declared—evoking a modern archetype of nationalist sacrifice, but linked here to the disinterested profession of scientific control over nature—“a monument to the unknown engineer.”⁶

This image of irrigation patronage as a selfless and beneficent gift to the people was, for all its modern, scientific (and propaganda) emphases, one with well-established links to notions of ruling legitimacy in precolonial India.⁷ Cultural assumptions about the legitimizing significance of water control can be seen in the many indigenous, colonial-era ballads celebrating the exploits of British water engineers and casting them as water patrons, much in the mold of earlier rulers. Anand Pandian has thus described the persisting, heroic image of one colonial engineer, the man responsible for the Periyar dam in South India. Large-scale irrigation patronage found deep resonance in popular thinking, he notes, and was associated with the sympathetic delivery of nature’s bounty to the people.⁸ Similar attitudes emerge in the Indus basin (whatever the regional differences in their cultural framing), as evidenced by Punjabi praise poems to nineteenth-century colonial irrigation builders and entrepreneurs, such as Popham Young, the administrator most associated with the settling of the Punjab canal colonies,⁹ or Captain L. J. H. Grey, who personally supervised the construction of a network of canals in the Punjab’s Ferozepore district in the 1870s. Grey “was terrible to look at like a king,” a balladeer wrote in praise, but “he performed all his works by kindness to the people.” With a formerly dry country watered, he was, the poet proclaimed, “like a hundred Alexanders.”¹⁰

If such works showed beneficence, they also reveal irrigation patronage as an act of power, bound up with all the moral ambiguities that the direct exercise of state power over nature inherently involved. The flip side of a vision of beneficent rule rooted in irrigation patronage was thus a vision of water control as a source of the most potentially oppressive authority. If men like Grey were praised for bringing arid lands under productive command, they were also the focus of deep controversy and complaint both from other colonial officials and from the local people.¹¹ The operation of large-scale water control as a form of potentially overbearing state power was the subject of intense debate in the mid-twentieth century, extending well beyond the Indus basin. The relationship of water control (and, more broadly, of state-directed control over nature) to the dangerous authoritarian tendencies of the modern state was argued forcefully by Karl Wittfogel in the 1950s. The historical roots of modern despotisms in state-managed irrigation works lay at the root of Wittfogel's focus on what he came to call "oriental despotisms." Reliance on large-scale water works removed power from local hands and vested it in the hands of authoritarian managers, who controlled the knowledge, the powers of labor mobilization, and the military means to protect these works. Such concentrations of power in turn led to hierarchical class divisions and to the ideological structures needed to legitimize such authority. Although Wittfogel's arguments drew heavily on ancient examples, they were intended primarily as a critique of authoritarian state power in his own day and its relationship to the forms of power that water control in arid environments—and scientific control over nature—seemed to legitimize.¹²

As a guide to the actual operation of large-scale irrigation systems, Wittfogel's arguments have proved generally unhelpful.¹³ But in directing attention to the moral ambiguities inherent in state control over irrigation, they have exerted an important influence over the debates modern irrigation has engendered. As Erik P. Eckholm noted in the 1970s, in a work inspired by the 1972 U.N. sponsored Stockholm Conference on the environment, the great irrigation works of modern times had come to dramatize the dangers inherent in efforts to expand large-scale control over nature without sufficient attention to the "ecological requisites" of nature itself.¹⁴ In the 1990s, Sandra Postel underscored these moral ambiguities in her discussion of the "irrigation miracle" of the twentieth century, a world-wide phenomenon in which the Indus basin's transformation played an exemplary early role.¹⁵ The twentieth-century explosion of irrigation transformed world agriculture on an unprecedented scale, she writes, promising a plenty of agricultural production previously unimagined. But it also entailed a vast "Faustian bargain" with nature, in which state power—and the hubris of state knowledge—was deeply morally implicated. "In return for transforming deserts into fertile fields and redirecting rivers to suit human needs," Postel suggests, nature has written its own counter-narrative, "exact[ing] [its] price in myriad forms,"¹⁶ a price paid by the

people who have borne the brunt of ongoing environmental deterioration.¹⁷ Perhaps the most explicit linking of a critique of large-scale irrigation with a moral critique of the modern state is found in the work of the American environmental historian Donald Worster on the western United States. Wittfogel's central question, as Worster restates it, was "How, in the remaking of nature, do we remake ourselves?" Worster's answer followed the critique Wittfogel laid out, though he linked the rise of authoritarian control over nature not to "oriental despotism" but to modern capitalism itself. Modern large-scale irrigation works, in which the state has become a tool of the capitalist and instrumental desire to dominate nature, were, in Worster's argument, fundamentally inimical to freedom. "Democracy cannot survive," he wrote, "where technical expertise, accumulated capital, or their combination is allowed to take command."¹⁸ Large-scale control over nature could, in such a view, only have a corrupting effect on the morality (and reciprocity) of power itself.

Such environmental critiques have, of course, come to be inflected in distinctive ways in the South Asian context—and with respect to the Indus basin—by the history of colonialism, and the forms of statecraft and community organization it encouraged.¹⁹ Indeed, while debates on the costs and benefits of large-scale irrigation in the Indian subcontinent have in some ways tracked debates about the environmental history of water control elsewhere,²⁰ the political implications of India's irrigation development have come to be grounded in distinctive analyses of the nature of colonial rule as a political system. Such questions have taken on particular force in South Asian history precisely because large-scale projects of control over nature—such as the transformation of the Indus basin—have become touchstones for assessing the relationship between the colonial past and the new, national—and democratic—identities that succeeded, as Lacey's comments on the transition from colonial to national rule in 1947 suggested. The critique of large-scale irrigation has thus been linked for many in the South Asian context to a search for indigenous, small-scale models of adaptation to nature as an alternative genealogy for national identity to that deriving from colonialism, independent of the grand epic of large-scale scientific control of nature that in the Indus basin seemingly legitimized the colonial state—and whose legitimizing mantle was bequeathed to the "developmental" states that succeeded it.

It is in this context that much has been written on local, "community-based" irrigation works, on the "local knowledge" these entail, and on the ways in which they have declined under the onslaught of state-based irrigation works.²¹ Narratives of environmental decline—in the face of capitalism, "expert" knowledge, and the hubris of the modern state—though at one time a staple of environmental narratives more generally, have taken on their own distinctive valences in South Asia not only as a critique of "post-colonial governmentality"²² but also as a plea for more attention to be paid to South Asia's local, seemingly more "authentic"

traditions of environmental adaptation. In the works of more polemical writers, such as Vandana Shiva, this narrative of decline in the face of large-scale state action has embodied the call for a more communitarian (and feminist) national ethos.²³ But even for more mainstream environmental historians, such as Madhav Gadgil and Ramachandra Guha,²⁴ this narrative of environmental decline in the face of state-based technicalism offers an alternative to the grand epic of state-based science, thus suggesting the possibility of an alternative environmental morality with perhaps more democratic and participatory potential—and a less evident colonial genealogy. Indeed, such ideas exerted widespread influence in both India and Pakistan in the years after 1980 in calls for more participatory, “grassroots” developmental initiatives across a range of settings.²⁵

Yet such highly moral uses of environmental history have also provoked their own reactions. As many historians (and historically minded anthropologists) have pointed out, such environmental narratives of decline can easily romanticize small-scale irrigation, ignoring the power relations that have shaped water control on all levels and at all times, long before the great projects of the colonial era. Many recent works have thus challenged the underlying assumptions in such narratives in fundamental ways. As David Mosse has shown in his careful study of tank irrigation in South India, neither the state nor the local community can be easily understood as bounded, alternative entities in the morally charged ways that more populist environmental narratives have tended to present them. Mosse’s work explores with great sophistication the history of water control as a facet of “statecraft” in the broadest sense, involving multiple players on many levels, linked historically to shifting structures of power, governance, and legitimating ideology.²⁶ From such a perspective, the dichotomy of “state” versus “local community” largely dissolves—and can be seen to be as problematic as the simple dichotomy between the “indigenous” and the “colonial” as a framework for understanding different forms of management. Attacks on such dichotomies—and on the fixed boundaries of analysis they enable—have proved central in undermining both triumphalist narratives of colonial progress and the romanticized counter-narratives of autonomous, authentic, community-based irrigation development that arose in their place.²⁷

As Mosse’s work suggests, the juxtaposition of opposing images of large-scale, bureaucratized irrigation, on the one hand, and of works locally adapted to structures of local “community,” on the other, developed in the context of “150 years of state making” in South Asia since the mid-nineteenth century.²⁸ The way these images were juxtaposed was itself a product of the structure of colonial thinking. To understand the larger political dynamics of the Indus basin’s transformation, it is thus critical to begin with a historical examination of the roots of these dichotomies themselves. Indeed, it is the argument here that, if the history of “statecraft” is central to the history of irrigation, then the intellectual history of the relationship between “state” and “community” (and the “environment”) as *concepts* must

be at the heart of the history of nature's transformation under the colonial regime, for only in this context can we trace the intertwined history in the Indus basin of irrigation and modern forms of statecraft. However inadequate intellectual history may be as a framework for fully understanding the history of irrigation in all its myriad local details, the conceptual history of terms like "community" and "environment" is central to linking the large story of the Indus basin's dramatic transformation under colonial rule in the nineteenth and twentieth centuries to the great redefinitions of state power—and its morality—that have marked the modern era. Indeed, to analyze the historical saga of Indus basin irrigation, it is necessary, I would argue, to begin with the concept of "community" itself—and the ways that its meanings were fundamentally intertwined with the state and with changing ideas about nature.

Indus Basin Irrigation and the Concept of Community

The relationship between community and water control can, of course, be examined on multiple levels, because the term "community" has multiple meanings. In its most common usage, "community" in matters of water control is often used to refer to the collective interests and actions of local irrigators in contradistinction to the dictates of bureaucratic or state-level water control. But to embed the environmental transformation of the Indus basin in its political context, it is critical to take a larger view of community and to ground its meanings in the nineteenth-century debates in Britain about social order and the role of man's relationship to nature more broadly. "Community" was not just a local thing but a concept central to modern reformulations of the legitimacy of power on a broad scale.

As Raymond Williams notes in his classic, *Keywords*, "community" in its modern usage (and in its relation to modern statecraft) was a concept grounded in the nineteenth century in the uncertainties of a European social order undergoing rapid economic and social change.²⁹ For a range of late nineteenth-century social theorists, the concept of community was deeply intertwined with the search for a stabilizing sense of belonging—often through relationships to nature—in the face of the loss, alienation, and atomization associated with capitalism and "modernity" (a concern, of course, still reflected in the narratives of "loss" surrounding many accounts of "traditional" irrigation today).³⁰

However—and this is necessary to understanding the story of the Indus basin—the linking of "community" to nature took at least two broad, contrasting forms, suggesting antithetical conceptions of how man's relationships to nature generated such a stabilizing sense of common community and belonging. Two oppositional visions of man's relationship to nature, both deeply rooted in the broad currents of late nineteenth-century intellectual history, were central to colonial definitions of community in the Indus basin—and to community's role in the stabilization of the state's authority during the region's great environmental transformations.

The first vision of community was one predicated on the autonomous actions of man on nature, with man conceptualized as a rational actor standing apart from nature and turning it to his productive benefit. This was a vision lying at the heart of the worldview of many nineteenth-century engineers, and it was central to the eventual emergence of technical “development.” Yet it was a vision also imbued with the imagination of a common community of producers—a community rooted in the common need of *all* producers to adapt to nature’s unifying laws. The shared requirements of wresting production from nature forged, in other words, a utilitarian, “public” community of rationalizing individuals transcending self-interested competition.

This conception of community was perhaps articulated most clearly in the high colonial period by William Willcocks, one of the most influential late nineteenth-century British Indian water engineers; he was trained in India but spent much of his career in Egypt. If the story of modern irrigation was an “epic” in the sense discussed earlier, then for Willcocks this was precisely because it created a sense of common community that, even amid the conflicts of capitalist modernity, was dictated ultimately by nature’s overarching laws. This was, for Willcocks, a form of community as old as civilization itself. “When hundreds and thousands of families had at first to learn the laws of nature, then apply them, and then live in accord with one another, in order to ensure the irrigation and drainage of their individual holdings,” Willcocks wrote, “true civilization took its birth.”³¹ Such a vision of civilization—rooted in the productive control of nature—had gained all the more importance in modern times. Whatever men’s varying interests, nature’s laws dictated, as Willcocks put it, that men “work in accord with each other, . . . respect each other’s rights, . . . combine together, and finally . . . exercise their intelligence to the full.”³² Here the autonomy of nature’s energy—to which men, as active, economic agents (and as rationalizing actors) were forced by the basic requirements of modern production to collectively respond—shaped the idea of a community defined by a commonality of rational action upon nature.

Yet, if the unity of nature’s laws themselves called into existence a powerful imagined community of producers, this was also a conception of community with its own, potentially divisive, internal tensions. On one level, with knowledge of nature’s autonomous—and unifying—processes at its center, this was a vision that self-consciously transcended the potential internal tensions associated with the differing claims of land, labor, and capital—and individual interest. But, on another level, with the common discipline of nature’s laws at its root, it was also a vision that gave pride of place to those with the greatest control of technical, scientific knowledge. As we have seen, in the eyes of some critics such as Wittfogel (and his later followers), such a vision was less a recipe for large-scale “community” than for an authoritarianism of expertise backed by the state, a vision easily juxtaposed against the seemingly more organic community of the localities. Yet the key to Willcocks’s

vision lay not in the juxtaposition of bureaucratic expertise against local knowledge or local community but in the incorporation of all those whose engagement with production was regulated by the rational, productive exploitation of nature, on whatever level of scale, into an overarching utilitarian “public” (a usage of “public” captured in the nineteenth-century development of the concept of “public works”). The “river basin,” imagined as a “natural” unit—and one conceptually prior to the marketplace—thus represented a particularly clear frame for the incorporation of communities on multiple levels of scale into a “natural” whole.³³ Indeed, in this context, the river basin could come to be imagined, as Richard White has put it, as an “organic machine” of many interlocking parts, shaped both by nature and by a rationalizing, overarching human community generated by the common needs of production (or “work,” as White puts it) on all levels.³⁴

This was a vision of community juxtaposed in the late nineteenth century against a second, powerful form of community that was projected as quite contrary to this one—that is, as the *antithesis* of productive instrumentality. In this view, the search for stabilizing forms of community in the face of the potentially disordering power of capitalism required that men turn to bonds generated entirely outside the realm of processes of production, because—contra engineers like Willcocks—only there could men generate a sense of belonging transcending the peculiarly powerful, and atomizing, stresses that modern production and environmental change generated. This alternative vision of community—generated not by man’s rational, productive action upon nature but rather by the reverse, nature’s nonproductive impact upon man—also gained an increasingly important place in late nineteenth-century social theorizing. Indeed, in some ways the imagining of a community defined by man’s rationalizing capacities as a producer (standing apart from nature) authorized (even, perhaps, required) the imagining of an alternative type of community rooted in the opposing impulses of human nature—impulses dictated to man by nature, rather than a product of man’s rational actions (such as shaped the laws of political economy). In such a framing, community arose in part from the commonalities of sympathy, awe, and worship generated by nature’s powerful emotional and aesthetic influence on man’s internal, affective nature; it arose in part from the ties of heredity and race that defined the individual as an intrinsically biological, racialized, and gendered being; and it arose in part from the reification of a language of kinship, or “blood,” derived from the assumed primacy of the family (or, in the colonial context, of the lineage and “tribe”) as “natural” units.³⁵ These forms of community represented not simply “local” alternatives to larger communities of production but also alternative *conceptions* of the meaning of community. They could operate, like communities of production, on multiple levels of scale, ranging from the “family,” to the “clan,” to the “race,” to the “nation.” But, perhaps most critically, they were seen by many nineteenth-century thinkers as antidotes to the political dangers of a world defined simply by productive instrumentalism.

The juxtaposition of these opposing community forms profoundly shaped colonial statecraft during the time of the Indus basin's transformation. The colonial world was a prime site for projects of capitalist action and exploitation, a central venue for action in controlling nature, as the history of the Indus basin illustrates. Comments by engineers such as Lacey and Willcocks suggest clearly the importance of a model of community linked to transformative action upon nature (we might even say scientific "mission") as a legitimizing foundation for the colonial state as a "modern" institution. The Indus basin's transformation was, in this sense, only the most spectacular of many such examples of action upon nature in the colonial world. But this was commonly juxtaposed in colonial statecraft against an alternative, politically stabilizing vision of community with antithetical roots. Colonized countries like India were widely projected in colonial writing as lands where nature's influence upon the ordering of community and society was deep-seated and widespread—and where nature acted upon man far more than the reverse.³⁶ A vision of India as the land of "natural" communities—observable in a form pre-dating (and therefore in their origins entirely distinct from) capitalist development—thus provided a compelling countervailing image that most nineteenth-century colonial administrators projected as critical to social order in India (and, indeed, in most Asian and African colonial contexts), even as they also saw their rule in the subcontinent as bringing India under the sway of the laws of modern political economy.

The developing intellectual framework for this juxtaposition in India in the late nineteenth century can perhaps be most clearly seen in the thinking of Sir Henry Maine, who served as the legal member on the Viceroy's Council in the 1860s.³⁷ It was Maine who first laid out the vision of evolutionary progress from communities defined by "status" to those defined by "contract." For him, communities based on "contract," rooted in an abstracted vision of a "rational man," provided the bedrock for rationalized visions of human community. Indeed, Maine himself played a critical role in embedding this vision of community in the provisions of the most important statute that came to govern colonial Indus basin irrigation projects in the late nineteenth century, the 1873 Canal Act (described in chapter 4), in whose drafting he had an important hand. But Maine was also deeply impressed while he was in India with the social importance of the distinctive, and countervailing, forms of natural community (or community shaped by nature's actions upon man) that he observed there. "There can be no question of the scientific propriety of [political economy's] method, or of the greatness of some of its practical achievements," he wrote. "Yet only its [political economy's] bigots assert that the motives of which it takes account are the only important human motives, or that whether they are good or bad, they are not seriously impeded in their operation by counteracting forces."³⁸ The power of such "counteracting forces," particularly as they were manifested in natural, kinship-based communities, was a central lesson that

Maine took from India. Indeed, Maine saw India as a window on Europe's own, precapitalist past and thus as a guide to how such "status"-based communities had historically developed and evolved. But, for Maine, a vision of historical evolution (or progress) did not simply consign such communities to the past; it also provided a frame for hierarchizing them as they were juxtaposed with productive communities in the present.³⁹ Even as they were ranked in an evolutionary hierarchy, *both* forms of community were projected as critical to the modern colonial state.

This perspective is also significant in understanding how the concept of "environment" came to play an important role in colonial statecraft. The term "environment" (in the sense of a "natural environment") was only in process of emerging in its modern usage in the late nineteenth century, and its direct usage in the Indus basin was quite limited until well into the twentieth century. But the *concept* of a natural environment is nevertheless relevant to the Indus basin's story precisely because its emergence was closely intertwined with the rise of these two antithetical, yet interacting, concepts of community in British thinking: one a product of nature acting upon man, the other of man acting upon nature. Indeed, the critical significance of "environment" as an evolving concept lay in its giving these forms of community an increasingly *spatialized* framing in the late nineteenth century, a framing critical to the territorialized development of colonial administration more broadly—and one within which different forms of community could be structurally brought together.⁴⁰

The larger evolution of the term "environment" as a frame for spatialized visions of nature is complex and well beyond our treatment of the Indus basin here. That there was an important colonial backdrop to this evolution has been argued persuasively by Richard Grove, who traces the history of environment as a spatial concept to colonial writings about the interactions between people and nature within the distinctive contexts provided by bounded colonial islands.⁴¹ But it was the larger development of Darwinian thinking in late nineteenth-century Europe that first pushed the term toward its distinctive modern usage, critically linking the spatialization of nature to the spatialization of community. The mutually defining character of the terms "environment" and "community" can be seen, for example, in the emerging, late nineteenth-century concept of a "biological community" (*lebensgemeinschaft*, or "living community," in its German origin), a community of organisms defined precisely by its dynamic, evolutionary relationship to its spatialized "natural" surroundings, its "environment," a relationship at once defined by the action of nature upon a "community" of organisms and by the actions of such organisms upon nature itself.⁴²

Relations between environment and community were thus bound up in the same reformulations of community marking the rise of political economy in British thinking more generally. But to track debates within the British administration

is not, of course, to describe how these played out on the ground. Among most Indus basin peoples, the action of “blood” (kinship), on the one hand, and the search for productive livelihoods dependent on water, on the other, intersected in complex ways that were shaped by influences often quite distinct from the debates marking the application of colonial political economy. Tribe and territory had long been viewed as operating in mutually constitutive ways in the Indus basin, and central to their interaction was the Indus basin’s most fundamental environmental reality, its productive *uncertainty*, a reality that operated on both the organization of production and the evolution of tribal community and that rendered their full conceptual separation impossible. In the context of Indus basin nature, it was thus the embedding of tribal calculation in the uncertainties of multiple, often unsettled modes of productive adaptation to arid environments that provided a critical backdrop to the operation of colonial ideas and policies, even as the new conceptual dichotomies of modern political economy took hold.

In such circumstances, the relationship between environment and community shaped the fundamentals of British statecraft on two intersecting levels. On one level, statecraft was powerfully molded by the multiple (and sometimes conflicted) meanings of community operating *within* British thinking (and state administration), meanings arising from the internal tensions of modern political economy itself. But colonial statecraft was shaped also, on another level, by the ongoing tensions *between* British framings of community and those of the Indus basin’s peoples themselves. The tensions defining British thinking were significantly complicated by the varied forms of community that they found on the ground. Although British projects for environmental change and settlement often forced indigenous groups to adapt to colonial structures, the internal fissures within colonial statecraft—particularly relating to the relationship of production and community—provided openings for Indus basin peoples to carve out for themselves significant arenas of independent action. These processes came together to define blood (a product of nature’s action in shaping “natural” communities) and water (a natural resource central to the construction of communities of production) as critical, intersecting elements in shaping the politics of the Indus basin’s great environmental transformation.

Telling the Story

In this book, we will trace these dynamics through the many phases of the Indus basin’s transformation in the years after 1850. We will begin with a case study of irrigation on the Indus basin’s Baloch frontier, where interactions between British ideas on political economy and existing forms of “tribalism” shaped an emerging imperial statecraft in the mid-nineteenth century (chapter 2). Here we can see the critical intersection between visions of tribal kinship and the construction of productive community in shaping colonial policy. The analysis then moves to the con-

flicting ideas about community and production that shaped the establishment of a distinctive, spatialized colonial property order in the Punjab, an order adapted to the two conceptually distinct forms of community emerging as central to colonial thinking. This was a property order shaped both by late nineteenth-century intellectual dynamics and by the reality of water scarcity and the constraints it imposed on production, particularly in the more arid regions of western Punjab (chapter 3). The critical intersections between conceptions of community and of environment were evident also in the development of new structures of water law in the region, which grew out of the same underlying dynamics shaping the property order. These structures of water law were to exercise a powerful, long-term influence on water development (chapter 4). Each of these chapters tracks the negotiations, both *within* the state and *between* state and society, that defined a developing colonial statecraft with respect to the control of water.

In the 1880s, the British began to move toward the large-scale irrigation projects that ultimately transformed the Indus region's landscape irrevocably. The construction of large perennial canals in the late nineteenth century defined a newly emerging environmental vision centered on a conception of the "river basin" itself as a technicalized, spatial entity, defined both by science and by nature. The story of this vision, and the conflicts it evoked, lies at the heart of the narrative of early twentieth-century irrigation expansion told in chapter 5. This was the era of the great Punjab canal colonies and the conquest of "wastelands" that they entailed. But it was also the era that crystalized the internal contradictions marking colonial statecraft and produced significant popular resistance, particularly during the canal colony protests of 1907. Those protests, and the official response to them, subsequently defined the distinctive frames for water politics that marked the years after 1920, when the evolving vision of the river basin as a spatialized environment came to intersect with new forms of colonial administration and electoral politics to influence new visions of provincial and "national" identity. These were processes that significantly shaped the national division of the Indus basin in 1947 (whatever its roots also in all-India politics), which divided not only the territory but also the waters of the river basin itself—a division formalized more than a decade later by the Indus Waters Treaty of 1960 (chapter 6).

Subsequently, the history of water control in the river basin evolved on two sides of an international border. But the history of water development in the last decades of the twentieth century hardly left behind the tensions between competing visions of community that had marked the colonial era. This was evident both in the structuring of internal, particularly provincial, water conflict (in India and Pakistan alike) and in continuing state-based debates about the relationship between politics and water development. These debates were deeply inflected by new intellectual currents within the field of knowledge that had been known in the nineteenth century (but was no longer) as political economy. Central to the

structuring of the Indus basin's irrigation works remained the conflicted question of the role of "community" in the imagining of a structure of control over, and adaptation to, nature—and specifically to the dynamics of water—as the key to the politics of productive environmental transformation (chapter 7).

THE SETTING: THE INDUS BASIN

However much the history of the Indus basin's modern transformation tracks the large-scale tensions associated with modern ideas about production, community, and nature, it is also a history tightly bound to the distinctive, natural particularities of one, large, very specific South Asian region, the Indus basin. Aridity was the region's defining feature—and, as a result, nothing was more important to its long history than the role of water in defining the relationship of community to the land. Yet water is the most fluid of elements, as the British, like many before them, readily discovered. As Lacey put it in the 1950s, whatever the constant talk of "taming" the Indus basin's rivers, these "rivers were at all times very much alive."⁴³ They had, in a sense, minds of their own. Long before the arrival of the British, water's history provided a key to the structure of production and community in the region, even as its autonomous energy—a key also to the imagining of community—always lay, like the power of God, beyond man's full control.

The region drained by the Indus river and its tributaries is a large one (encompassing almost 1.2 million square kilometers), marked by considerable internal regional variation, particularly between the large, mountainous area drained by the Indus basin rivers in the north and the vast alluvial plains of the Punjab and Sind. The latter are the main focus of this study. Rainfall on these plains is very limited, diminishing as one moves toward the southwest away from the Himalayan foothills in the north. As a result, water from rivers has long been central to the history of agriculture. The greater part of the water in the Indus system comes from the annual monsoon runoff from the hills and from snow/glacial melt in the Himalayas. The waters of the five rivers of the Punjab—the Sutlej, Beas, Ravi, Chenab, and Jhelum—join the Indus from the east, whereas the Kabul river, draining snowmelt from the Hindu Kush, flows into the Indus from the west (see map 1). All these rivers show similar patterns of flow, and their vicissitudes have dictated much in the region's history.

Water's history in this region has largely been determined by high seasonal variation. With the bulk of the water in the system coming from rainfall and snowmelt in the mountains, slightly over 50 percent of the annual flow in the Indus rivers, on average, comes in the three months from July to September, when snowmelt is joined by flow from monsoon rains. An additional 30 percent comes from early melt in the period from April to June. Flow in the rivers in the six months from October to March is therefore minimal, constituting, on average, only 16

percent of the total annual flow. As a result, floods in the summer months were historically substantial, spreading, according to H. L. Uppal, on average twenty to twenty-five kilometers annually in the era before embanking on either side of the rivers, though this varied significantly from year to year.⁴⁴

Floods and Wells

Given this picture, the annual Indus floods have been a determinant factor in the history of the region. These floods were undoubtedly central to the earliest agriculture in the region, and they remained so until the early twentieth century, when perennial canals began to dominate the irrigation system. The Indus floods, though enabling agriculture, also constrained the ways that agriculture could spread and develop. This was due not only to the floods' variability but also to the Indus rivers' extremely high silt load. On the one hand, silt was central to the fertilizing capacity of the rivers, which helped to sustain agriculture for millennia. On the other hand, the heavy silt load of the rivers, carried down from the hills, had been responsible for the marked instability of the channels of the major Indus rivers on the plains, and thus for many of the problems in channeling Indus basin flows for irrigation.

The major rivers of the basin have shifted their courses repeatedly, sometimes dramatically, which has had a profound impact on the history of irrigation. We have no comprehensive history of these shifts, though evidence of ancient settlement on the now-disappeared course of the Ghaggar-Hakra, which flowed at one time parallel to the Indus all the way to the Arabian Sea, suggests the antiquity of the process. More recent evidence can be found in the still-visible evidence of old river beds, such as the old bed of the Beas running through the high bar of the Bari Doab in the Punjab, which was abandoned by the river when its flow was captured by the Sutlej in the second half of the eighteenth century, after many changes in course over the previous centuries.⁴⁵ Such old river beds are readily apparent in Sind, where a series of Indus courses, both to the east and to the west of the present bed, have been tracked through on-site inspection (and core samples) and aerial photography.⁴⁶ All of this suggests a highly dynamic process in which large-scale deposits from silt-laden floods were often associated with significant shifts in river course.

Indeed, modern accounts of flood-based agriculture suggest that it was rarely entirely fixed but was based on the shifting attempts to trap flood waters in enclosed basins, usually through the construction of small basin embankments (bunds). Such techniques, as observed in modern times, allowed cultivation to shift readily into new beds when flood basins were drained. The very nature of these techniques generally rendered the sowing of summer *kharif* (or hot weather) crops difficult in the most arid parts of the region, allowing usually only a single *rabi* (or cold weather) crop after flood waters subsided and saturated the ground.⁴⁷

Such flood-based agricultural techniques were also probably supplemented early on by irrigation from wells. The presence of brick-lined wells in ancient Indus valley cities suggests the advanced state of well-building technology from a very early time. Yet there seems to be little evidence that such wells were actually used for irrigation. Rather, *kaccha* (unlined) wells were probably dug to supplement receding flood waters. As one official noted at the end of the nineteenth century, “[T]hese wells are quickly and inexpensively made and roughly fitted with a rope and bucket. The principal crop grown on them is barley, and when this has been reaped the wells are deserted and often fall in.” The connection with shifting flood waters was critical: “The area irrigated from wells varies considerably from year to year. When the floods fail the people devote all their energy to their wells, but again when the floods are favorable they sow a great deal of land with the help of the floods and then irrigate a large proportion of it from the wells, and the best crops are most easily got on land which has been moistened and rendered fit for sowing by the river floods and has afterwards had its supply of moisture kept up by irrigation from a well.”⁴⁸

Such wells played an important role in relations between agriculture and pastoral animal herders. Pastoral movements in the Indus basin have historically taken many forms and included transhumant migrations between plains and hills.⁴⁹ But circulation with flocks between the interior areas of the plains, away from the rivers, and the riverine areas was also common and was largely dictated by the same seasonality of the floods that shaped agriculture.⁵⁰ Herders circulated in the higher interfluvial plains (the *bar*), following the best grass in the cold weather, but moved back toward the rivers during the hot weather. They too dug wells to water their herds as flood waters receded and grass appeared in the extensive areas left behind. Although there have undoubtedly been wide variations in such relationships over time—and in different parts of this large area—the close relationship between pastoralism and agriculture within an arid environment defines one of the most important long-term determinants of the Indus basin’s history.

The relationship is also critical to the complex history of wells in the region. The importance of technical innovation in wells for the history of the Indus basin has been forcefully argued by Irfan Habib, who contends that the introduction and diffusion of the Persian wheel in the pre-Mughal period was responsible for a dramatic transformation in relationships to the Indus basin environment, “leading in due course to the considerable influx of previously pastoral elements into the ranks of the peasantry;” particularly the Jats, who had over the centuries migrated from the lower Indus basin into the Punjab. The key to this transformation lay in the linking of animal power to irrigation, which made possible a shift in relations to the land toward permanent agricultural settlement.⁵¹ Central to Habib’s argument is the assumption that the constraints on extending cultivation outside river flood zones (or onto lands with marginal availability of rainfall in the north, where

rainfall was higher) had lain in the limitations of human labor in working wells to produce enough water to make full-time agriculture on such lands a paying proposition. New well technologies that tapped into labor-saving animal power thus proved critical in fostering what could be called the Indus basin's increasing "peasantization" in the centuries preceding the arrival of the British.

Chetan Singh has critiqued much of Habib's argument, suggesting that the Persian wheel was itself a technology constrained by the need for a relatively high water table. Singh highlights his argument by comparing the Persian wheel with another, older form of Indus basin well irrigation that had also depended on animal power, the *charsa*, which used an ox on a ramp to raise water with a leather bucket linked to a rope and pulley; as Singh argues, this was more effective in raising water from greater depths due to its lighter apparatus.⁵² Singh does not tell us very much about the history of the *charsa* itself as a technological innovation in applying animal power to irrigation, but his critique is nevertheless important in alerting us to the ways that technologies of well irrigation in the Indus basin have long been closely related to the specific circumstances of particular sorts of local environments.⁵³ Persian wheels were hardly effectively adapted to all the Indus basin's water conditions, and they were problematic where water was too deep or where land was subject to floods, which could damage the significant investment involved in the gearing and woodwork of a wheel. But their extensive diffusion in the Indus basin nevertheless indicates their critical importance as a labor-saving device in a region where land remained plentiful whereas water and labor scarcities jointly restricted the practicality of irrigation.⁵⁴ This was particularly true in the regions beyond—but not too far beyond—the limits of the rivers' normal flood action, where the water table was relatively high (and sweet), and it was in this environmental zone, and in areas of higher rainfall toward the mountains and in central Punjab, that the impact of the Persian wheel was greatest.⁵⁵

It would be a mistake, however, to see the history of wells as shaping a one-way shift from pastoralism to agriculture—and toward "peasantization"—for the two were long related in the Indus basin environment, and expanding agriculture hardly ended this relationship. Persian wheels encouraged the expansion of agriculture precisely in areas between the flood zone and the high bar that often abutted grazing zones. Not only did the use of animals on wells therefore link farmers to pastoral cattle suppliers in new ways, but in some areas Persian wheels themselves became an important adjunct to pastoral livelihoods, rather than opening out an *alternative* of "peasant" settlement.⁵⁶ As Neeladri Bhattacharya puts it, even as they "settled villages, cleared forests and ploughed the soil," Jats often maintained connections to pastoral grazing and cattle-keeping "as an integral part of their economic activity."⁵⁷ The very patterns of well construction and land clearance, which were often undertaken by lineage segments of larger pastoral groups, encouraged and shaped these ongoing connections, particularly in central Punjab.

Such evidence suggests the important relations between pastoralism and agriculture in shaping forms of local community in the region. Habib emphasizes that the word Jat itself, a term originally associated with pastoralism (and still so associated in parts of the Indus basin), came ultimately to be synonymous with a “villager” in central Punjab, thus suggesting the ways that an earlier pastoral culture carried over to influence the distinctive culture of settled Jat communities in the Punjab—and may, in fact, have influenced the Punjabi Jat affinity for Sikhism.⁵⁸ Singh has similarly explored the ways that “tribal” cultures of genealogical reckoning in the Mughal period linked pastoral and agricultural communities together across the divide of settlement.⁵⁹ Yet if such connections suggested the powerful influence on settled Indus basin communities of a pastoral history defined by genealogical reckonings, the spread of the Persian wheel may have encouraged new *forms* of productive “community” in the upper Indus basin as well, particularly as collective, share-based investment in Persian wheels probably played an important role in defining joint interests in well water that were linked in many cases more to the business of production than to “tribal” or genealogical connections.⁶⁰ The complex relationship between genealogical identity, “tribal” leadership, and the mitigation of productive uncertainty across multiple, uncertain environments will be examined in more detail in the next chapter on the Baloch frontier. The distinction between productive and nonproductive forms of community is not one that can be easily projected backwards from the colonial intellectual framework (or even that captured effectively the actual operation of well-based shareholding under the British). Yet the complex and conflicted roles of wells in processes of Indus basin settlement, and in collective action, became an important subject in British debates on the relationship between environment and community in the nineteenth century, as we shall see.

Canals

The impact of the spread of the Persian wheel was closely linked to the history of canal building in many parts of the Indus basin, a process with considerable direct state involvement. In fact, the history of canals in the Indus basin before the time of the Mughals is a surprisingly uncertain one. There is little evidence of canal construction in ancient times, possibly because the distinction between canal construction and attempts to channel water within creeks or abandoned river channels as floods rose and fell was a very fine line.⁶¹ Certainly, small canal irrigation works existed early on in lands to the west, particularly on the more stable streams at the higher elevations of Afghanistan and other areas on the fringes of the Indus basin.⁶² There is evidence, for example, of ancient canal works in the Swat valley. It is very likely that small-scale forms of collective action shaped efforts to canalize inundation waters on the plains as well. But it is by no means certain when the first large canals on the Indus plains were constructed. The challenge of large-scale

canal construction in the Indus basin lay in the distinctive conditions of the Indus rivers, including the high seasonal variability in flow, the shifting character of river channels, and the very high silt load of the rivers, which led to the rapid silting of canal channels. All these factors defined serious constraints, particularly in terms of labor, on canal building. Canals of any size required considerable and—most critically—ongoing investment of resources and labor, which often involved state action. As a result their history is, not surprisingly, closely intertwined with the history of state building in the region.

As Iqtidar Husain Siddiqui argues, the earliest evidence of large-scale canal building comes from the Delhi Sultanate period, during which there is some sign of canals in the Multan and Sind regions.⁶³ Delhi Sultanate and Mughal-era canals suggest clearly the imperatives of state building that were involved, particularly in regions close to their capitals. Some of the most important canals of this era, particularly in eastern and central Punjab, involved major state investment for moving water to support important urban building projects that were clearly undertaken to underscore state building and royal power.⁶⁴ This was, at least in part, the case with the fourteenth-century canals of Firoz Shah Tughluq, which took water from both the Sutlej and the Jamuna (in the Ganges basin) to support projects in Delhi and Hissar. The same motives played a role in later Mughal attempts to reconstruct and expand these canals, as it did in Shah Jahan's construction of the important Hasli canal, which brought water from the Ravi river to Lahore in central Punjab for the Shalimar gardens and other projects. Although most of these projects attempted to make use of old river beds and channels, they still involved considerable investments of money and labor.

Similarly, the history of canals in providing irrigation for agriculture was complex. While driven in part by urban projects, it is clear that these canals also involved the significant provision of irrigation water to rural cultivators along their routes. A recognition of the importance of investment in irrigation in order to expand cultivation was deeply embedded in Mughal revenue practice. In part, this took the form of long-term remissions of revenue in order to encourage land grantees to extend cultivation by sinking wells and opening cultivation on new lands, a process that may well have played an important role in some areas in the expansion of irrigation by Persian wheels (though, as Habib notes, evidence on this is limited).⁶⁵ Such policies also extended to the patronage of smaller scale canals, which were sometimes undertaken by local zamindars or local officials, with the encouragement of the state (and with *sanads*, or authorizations, from the Mughal state, sometimes promising revenue concessions in return for such enterprise). One example of such a canal was the Shah Nahr canal in Hoshiarpur district, built by the local enterprise of a zamindar under the authority of a later Mughal, early eighteenth-century sanad.⁶⁶ There is also evidence of regional rulers within a Mughal tributary regime undertaking new initiatives in canal building

farther to the southwest in the Indus basin, such as the Mirranis of Dera Ghazi Khan (who will be discussed in more detail in the next chapter).

Such concerns also led to the development of bureaucratic practices for managing canal water. Documents mention in some cases the appointment of canal superintendents (*mir-i ab*) for particular canal projects or particular areas. Habib notes, for example, the existence of a directive appointing a *mir-i ab* for canals in the province of Multan, which empowered him to “dig new channels (*nala*), clear the old channels, and erect bunds on flood-torrents (*band-i sail*)” and to see to the equitable distribution of canal water among cultivators.⁶⁷ But we know little about how (or whether) this was implemented. Closer to Delhi, documents detailing plans for the resuscitation of older canals in Haryana during Akbar’s and Shah Jahan’s reigns mention the role of the *mir-i ab* (assisted by a *maimar*, or architect/mason) in mobilizing zamindars for canal construction, supported by local officials.⁶⁸ Yet, as Habib makes clear, the limited quantity of such evidence suggests, perhaps, the generally limited bureaucratic attention to canals within the overall Mughal system.

The most important evidence with respect to the intersection between state policy and local initiative in canal construction in the precolonial period comes from the post-Mughal period, immediately preceding the arrival of the British, when much of the Indus basin witnessed a significant intensification of canal construction. This was touched off by the emergence of a number of regional Indus basin states in the years after the invasion of Nadir Shah in 1739—states whose resource bases came to be linked far more closely to canal construction and management than was the case with the Mughals. Nadir Shah’s invasion detached all the lands west of the Indus from the Mughal empire and laid the foundations not only for the rise in Afghanistan of the powerful Durrani empire of Ahmad Shah Abdali but also for the emergence of a series of regional frontier states in the Indus valley—the Kalhoras in Sind, the Daudpotras in Bahawalpur, the successors of the Mirranis in Dera Ghazi Khan, and the Afghan Saddozai Nawabs in Multan—all of whom were to become major sponsors of canal building as they sought to consolidate their regional power.

Central to the processes of canal construction in this era were the new economic realities shaping the eighteenth-century Indus basin, which, in combination with existing ecological pressures, created a new framework for inundation canal investment. The rise of the Durrani empire to the west opened up new opportunities for trade with both Afghanistan and Iran, and this had a critical impact on all of these regional states. The emergence of Shikarpur in Upper Sind as the center in the eighteenth century for a far-flung system of trade and finance was associated with the growth of communities of Shikarpuri (and other Hindu) traders in Multan, Bahawalpur, and other regional centers who played important roles in the finances of all the new regional Indus valley states of this period (see map 2). The position of these merchants was also linked to trade and to the local

production of certain commercial crops, most notably indigo, which were grown during the kharif season.⁶⁹ Pressure to expand kharif production for commercial and revenue purposes played a critical role in new inundation canal investment. Rulers whose revenues depended on indigo in the kharif season—and on close relations with Hindu traders—had strong incentives to develop an effective supply of inundation canal water to lands immediately beyond the reach of the floods, since these crops could not be easily grown with floodwater or well water alone during the hot season (as few animal-powered wells could be effectively run in the hot weather in these areas without some additional canal water supplies).⁷⁰ Irrigation canal investment thus went hand in hand with the expansion of commercial cash cropping during this era, as was perhaps most dramatically illustrated by the early nineteenth-century Sikh governor of Multan, Diwan Sawan Mal, who realized, as one British official later put it, that “the successful production of indigo depended on an early, plentiful, and constant supply of water.”⁷¹

Successful canal building depended also—and perhaps most essentially—on effective strategies of labor mobilization, as this was the most significant constraint on canal building in the Indus basin’s arid conditions. And here the relationship of these canals to the Indus basin’s preexisting pastoral and well-based structures of environmental adaptation was critical. The common strategy for canal building in this era was to mobilize labor by offering shares in canal water to those with control of (or claims in) preexisting wells along a new canal’s projected route if they would participate in the process of canal construction. Later British officials sometimes described these processes as mobilizing “the owners of the lands which that section was intended to irrigate,”⁷² but in fact they were less owners of measured quantities of land (which meant little in such extremely arid areas) than men with claims to rights to irrigate based on previous links to fluid processes of well construction. Many of these wells were seemingly abandoned, or they worked intermittently—indeed, many were probably associated with semi-pastoralists who used them both for animals and for temporary or periodic cultivation. But canal builders organized those with such claims into canal sections (usually known as *dakhs*) to provide labor for constructing the canal. “Directly the proprietors of the soil hear” of a proposed canal project, one British official wrote, describing an earlier project on the western bank of the Indus, they begin to return, even though “dispersed over Bahawalpur and elsewhere.”⁷³ Such labor was then “assembled by authority when the excavation of a canal was commenced, and generally supplied either with a certain monthly cash sum or with a seer of flour a day by the state.”⁷⁴ This was hardly a market wage, for the real return on this labor was the right of each participant to claim a share in the water of the finished canals for previously intermittently cultivated (or abandoned) well lands.

Such structures were critical also for providing a framework of rights for incorporating men of capital and key political players into the canal-building process.

Since canal building was closely linked in this era to an expansion of commercialized production, rulers used the processes of demarcating shares for access to water (and for mobilizing labor) to incorporate men with commercial connections into the process. Deeds from the Manka canal on the west bank of the Indus, for example, which was extended in the 1760s, show shareholders admitting Hindus to half shares in wells and canal sections in return for their providing capital to excavate the canal and open cultivation.⁷⁵ Even more common, particularly along the Chenab and Sutlej, were what were known as *chakdari* tenures, whereby investors, usually Hindus, gained productive control over land in return for supplying the capital to open cultivation, paying subsequently only a small yearly proprietary fee. Although such tenures were defined legally by investment in Persian wheels (the name, in fact, literally referring—at least according to some—to the wooden structure of a wheel), they spread rapidly on canal lands, where wells carried rights to canal water, and canal water allowed them to invest in the production of commercial crops.⁷⁶ Such tenures seem to have expanded particularly rapidly in the late eighteenth and early nineteenth centuries in Multan, where Diwan Sawan Mal encouraged Hindu settlement as he linked a direct state role in commercial marketing with a role in encouraging expanding cash crop production on canal lands.⁷⁷ Canal-building arrangements structured around wells thus fostered not only labor mobilization but also the capital needed to make canals paying propositions.

Such technologies of canal construction also served political purposes, accommodating the settlement of state functionaries or grantees, another critical aspect of the relationship of canal construction to state building. This was probably illustrated best by the example of Bahawalpur. The founders of the new Bahawalpur state in the eighteenth century were part of a warrior clan from Shikarpur in Sind, who, after conflicts with the Kalhoras, established themselves in the region south of the confluence of the Sutlej and the Panjnad near the holy city of Uchh. For the Nawabs of Bahawalpur, the establishment of regional authority depended on the control of Daudpotra kinsmen and military elites, which required a rapid expansion of cultivable land for distribution to critical allies and supporters, thus suggesting how critical a tool canal construction was for regional state building.⁷⁸ The earliest Bahawalpur canals were built by competing Daudpotra chiefs, but by the end of the century the nawab of Bahawalpur had consolidated his power largely by settling Daudpotra and other military *jagirdars* (grantees) on new canal lands all along the Sutlej.⁷⁹

Such canal construction processes were important generally for assimilating existing local power holders into these new systems of political authority. Baloch tribal chiefs played roles in canal construction on the west bank of the Indus, for example (as will be discussed further in chapter 2), as did, in a few cases, the custodians of Sufi shrines in the region.⁸⁰ Sufi shrines were important institutions over much of the Indus basin, often located at the intersections between pastoralism

and settlement, or at critical nodes on trading routes. Shrines were thus important fixed points of authority in an only partially settled environment. Perhaps the most interesting case of a Sufi shrine-based leader playing a critical role in canal excavation was that of the *makhdum* of Sitpur, who himself sponsored an important canal in the 1740s. The Sitpur *makhdum* was part of a large group of Bukhari Sayyids, descendants of Sayyid Jalal ud-Din Bukhari of Uchh, whose shrines were found all over southwestern Punjab and Bahawalpur. Although the Sitpur shrine was itself a small one, the family of the *makhdums* had gained an important place in local affairs as counselors to local rulers of Sitpur dating back to the sixteenth century.⁸¹ But, in the wake of the invasions of Nadir Shah, they used the authority of a large land grant direct from the Durranis to build a large canal west of the Indus to water this grant. This was, of course, a way for the Durranis to assert their own authority in the region, extending their authority through the patronizing of a prominent family of locally influential Sayyids. However, in using the demarcation of canal sections to draw local Jats into the canal-building process, the Sitpur *makhdums* were able to greatly extend their own local income and influence, before their lands were later absorbed by the Nawabs of Bahawalpur in the late eighteenth century, a development facilitated by a later shift in the Indus river's course.⁸²

The processes of canal construction that marked this era may not have been entirely new, but their importance in the second half of the eighteenth century and the first half of the nineteenth century provided a critical backdrop to the history of canal building and management under the British. Many of these canals were major undertakings. Although they varied greatly in size, some were relatively large, running twenty miles or more at oblique angles from the rivers to water higher ground. By the early nineteenth century, canal irrigation—though closely integrated with irrigation from wells and with the rivers' annual floods—had thus become central to Indus basin cultivation.

Nevertheless, stabilizing this structure of canal operation proved a very difficult proposition, suggesting once again the critical importance of large-scale labor mobilization—and of state power—to canal operation in this environment. Shifting conditions on the Indus rivers continually threatened canal operation as the annual floods spread and river channels shifted. Major shifts in river courses periodically separated canals altogether from river channels and rendered them useless, as happened ultimately, for example, to the *makhdum* of Sitpur's canal on the Indus. More frequently, shifts in channels required canal heads on the rivers to be repeatedly realigned and reconstructed.⁸³ But the greatest ongoing threat to the operation of canals lay in the annual accumulation of silt in the channels, and it was here that eighteenth- and early nineteenth-century Indus basin rulers proved most effective in developing administrative techniques for ongoing labor mobilization to keep canals in operation.

The key to such mobilization was the continuing administrative replication in the organization of annual silt clearance of those structures that had defined the original act of canal building itself. Filled every spring by the rise of the silt-laden waters of the Indus rivers, such canals required yearly silt clearance when the water receded in winter, otherwise they would slowly—or in some cases, very quickly—silt up and cease to irrigate. The importance of this was magnified by the fact that the commercial return from these canals depended less on the total volume of water that came with the rising rivers in the summer than on the dates from which the canals began to run in the spring and ceased running in the fall as the Indus waters rose and fell. The success of commercial cropping depended on the effectiveness of the silt clearance that took place in the winter.

Labor requirements for annual silt clearances were very large, and such labor was normally supplied through the organization of what was known in many areas as the *chher* system, a levy of unpaid laborers who cleared the canals each winter. Such efforts were generally (though not always) organized under bureaucratized state supervision and generally included state-appointed *mirabs* (watermasters), *darogas* (work superintendents), and *muharrirs* (accountants). But a critical fact was that the responsibility for supplying such labor was apportioned on the irrigators themselves. Distributed according to canal shares (whether calculated by wells, as was most common, or by irrigated area, or by canal sections), silt clearance labor was thus provided by the irrigators or their tenants, or in some cases by laborers who were paid from a fund (*zar-i nagha*) filled by those who chose to pay a commutation fee rather than to supply labor themselves.⁸⁴ This system varied in different areas; in some there were local *panchayats* (or “Moonsiffs or Assessors, selected from among the chief men”) who helped to distribute the demand for labor over the canal.⁸⁵ But canal labor, though normally overseen by state officials, was generally mobilized and legitimized in this system through a conceptual interlinking of labor obligations and annual rights to canal water, a structure of reciprocal obligation that defined, in the eyes of some later observers, a “shareholding community” of irrigators (a concept whose dynamics will be discussed further in chapter 4).

Such systems were, of course, marked by many tensions, both among the irrigators and between the irrigators and the state. The collection of *chhers* (usually in December when flow in canals had ceased) and distribution of *chher* labor along the length of canals was often a subject of conflict, as the process could easily favor irrigators at various places along the canals, particularly those at the head whose labor contribution to canal clearance sometimes ended with the clearance of the upper reaches of a canal. State officials also at times favored for political reasons some irrigators over others.⁸⁶ Still, the basic outlines of the *chher* system represented, arguably, a yearly recreation of the system by which the canal had been originally constructed, expressing not only the importance of the supervisory

authority of the state but also the primary claims of those who had actually built and gained shares in the canal. These, in turn, were embedded not only in the political relations defining the state but also in the distinctive environmental realities of the localities, including levels of aridity, variability of water flows, and the complex relationships between pastoralism and agriculture and between wells and canals, all of which potentially served to facilitate or inhibit local cooperation and community.

CONCLUSION

As the history of canal development in the mid-Indus basin suggests, expanding commercial production, environmental constraints, and state building were thus central to shaping canal development—well before the arrival of the British. Also central were the tensions between state control and direction of canal operation and the reciprocal rights and obligations shaping what might be called local “irrigating communities.” That these tensions sometimes reflected back on the moral authority of precolonial states was suggested by a nineteenth-century folktale about the canals of the nawab of Bahawalpur. Sitting in his court one day, Nawab Bahawal Khan was supposed to have bragged to his courtiers that his canals always ran well—a result of his own superior management. But that night, the great medieval Muslim saint Makhdum Jahanian Jehangasht, the “Traveler,” the grandson of Sayyid Jalal ud-Din Bukhari of Uchh, was supposed to have come to the nawab in a dream, walking up and down the bank of a canal with a spade—the tool of a chher laborer—on his shoulder. Speaking to the nawab, the saint admonished him for his bragging: “My son, you sit in your court and boast that the canals are flowing through your good management,” the saint declared, “but without me [lit., without the kindness of the fakir], what would you know about management?”⁸⁷ On one level, the nawab’s dream could be interpreted in conventional terms as a warning, underscoring that, when it came to the supply of water, no human management could undo nature’s autonomy—or operate independently of God’s will and the grace of the saints. But, on another level, the saint’s admonitions, in the guise of a chher laborer, suggested the morally complex relationship between the authority of the ruler and the local “community” of irrigators (the suppliers of chhers), here seemingly embodied in the saint’s autonomous voice. Without the provision of chher labor—mobilized through the reciprocities shaping the “community” of irrigators themselves—few canals could have effectively functioned, whatever the ruler’s role.

If moral tensions between the authority of the ruler and the bonds of reciprocity shaping canal irrigation were evident even before the arrival to the British, these took on new meaning within the discourses of colonial statecraft in the years after 1850. Indeed, for the British, such tensions came to be caught up in the larger

intersections of state authority and local community shaping intellectual debates in Europe in the second half of the nineteenth century. From the time of their arrival in the Indus basin, the British were engaged in reconciling the management of irrigation systems to their own understandings of state authority and to the differing visions of “community” with which that authority was associated. With its pastoral history, the Indus basin was viewed by the British as the South Asian home of “tribal community” par excellence: communities rooted in kinship and genealogical calculation. But it was also a region in which new technologies of water control, linked to commercial production, offered the keys to new forms of political power (and new visions of political economy). Indeed, conceptualizing the meaning of “community” in respect to irrigation matters came to be a central—and much debated—element in the structuring of colonial statecraft in the region, inescapably linked, as we shall see, to the basic foundations of colonial rule.