

Water Brings No Harm

Contents

List of Illustrations		ix
Acknowledgments		xi
Abbreviations		xv
<i>Introduction</i>		1
<i>Chapter 1</i>	The Giver of Abundance and Peace <i>Water and Society on the Slopes of Kilimanjaro</i>	33
<i>Chapter 2</i>	The Mountains of Jagga <i>Encountering Africa's Olympus in the Nineteenth Century</i>	67
<i>Chapter 3</i>	Do Not Believe That Every Cloud Will Bring Rain <i>Water Cooperation in the Era of German Colonialism, 1885–1918</i>	91
<i>Chapter 4</i>	From Abundance to Scarcity <i>Rethinking the Waterscape and Local Knowledge, 1923–48</i>	118
<i>Chapter 5</i>	Water Brings Harm <i>Transformations in Household Water Management, 1930–50</i>	143
<i>Chapter 6</i>	More and Better Water <i>Emerging Nationalisms and High Modernist Management, 1945–85</i>	166

<i>Chapter 7</i>	Water Is Our Gift from God! <i>Devolution and Cost Recovery in the Neoliberal Era</i>	199
<i>Chapter 8</i>	It Is God's Will, and Also Deforestation <i>Global versus Local in the Disappearance of the Glaciers</i>	230
<i>Conclusion</i>		254
Glossary		261
Notes		263
Bibliography		305
Index		325

Introduction

IN JULY 1937, several prominent *wamangi* (chiefs) from Mount Kilimanjaro wrote the colonial governor of Tanganyika to express the most pressing problems facing the mountain.¹ The peoples of Kilimanjaro, known to the administration as the Chagga, had recently emerged as a success story, with a thriving economy based on coffee cultivation and a population that was eagerly investing in education, health, agriculture, and infrastructure. Yet these developments sparked their own challenges that the *wamangi* sought to address. Their memo focuses on two issues they see as crucial: land and water. “The Wachagga are mainly agriculturalists and such work is good and profitable to us all,” they state, “but, for this, two things are necessary – room to cultivate and an adequate supply of water to our farms.” They thank the government for providing “progressive agricultural methods” that allowed them to “progress beyond our own vision.” To ensure future prosperity, they ask the government that their “soil be conserved and, moreso, our water supplies which are the blood in the veins of agriculture. Without water our farms will be as bodies without blood.” They conclude by pleading with the government to “consider and apply the best methods of soil and water conservancy.”

At first glance, these words seem straightforward. The memo identifies land and water as critical issues on the mountain, and it calls on the government to be more involved in ensuring access to both. A deeper reading of the source, however, indicates the *wamangi*’s carefully constructed rhetorical strategy. While they extol the government for bringing progressive methods, their analogy of water and land as akin to blood and the body emphasizes the importance of irrigation, which the government had criticized for being harmful and wasteful. Further, neither the *wamangi* nor the colonial administration held effective control over water. Rather, local specialists closely guarded their power over the

mountain's rivers, streams, and *mifongo* (irrigation canals or furrows²) and vehemently denied attempts by others to engage in water issues. The words of the wamangi were an attempt to usurp power from the specialists by acquiescing to state control. What emerges from the memo is that water is more than a physical necessity for the peoples of the mountain. It is a resource with multiple layers of importance and meaning, and it is a focal point of struggle among competing groups.

Water is a fundamental building block of life, essential to the chemical and biological processes that make all living things possible. At the same time, it is among the most elusive of resources. This can be seen vividly in the steppe plateau of East Africa. Much of the semiarid region is unsuitable for crop agriculture or high-density populations and has historically been home to nomadic peoples such as the Maasai. In the midst of these plains, and in stark contrast to them, rise a number of mountain ranges and freestanding peaks, the most famous of which is Kilimanjaro. These highland areas feature dense forests and generate large amounts of precipitation. This rainfall gives rise to rivers and streams that reach far beyond the physical space of the peak. The combination of ample rainfall and cooler temperatures allows these montane areas to support sedentary living and larger populations.

While it is clear that water is vital for life and livelihood, the importance of water transcends its utility. Peoples in East Africa and elsewhere have long recognized the power of water to give life, and this is reflected in beliefs about human origin, religion, and spirituality. Therefore, water has become a crucial part of cultural practices and rituals including celebrations of birth, initiations into adulthood, and funerary rites. As a scarce resource vital to biological, spiritual, and community life, water has influenced the development of social institutions and power structures. Those who possess specialized knowledge of water management, such as how to produce rain or construct *mifongo*, wield power within their communities. In addition to its physical utility, water has long had powerful political and social dimensions, generating and sustaining relationships among people and defining and reinforcing hierarchies.

This book is about water. More pointedly, it is about how communities manage water and about the struggles that ensue when differing ideas regarding water management come into conflict. It focuses on the historical experiences of the mountain peoples of Kilimanjaro.

Since the 1850s, these communities have been influenced increasingly by outside groups that include Swahili traders; European explorers, missionaries, and settlers; German and British colonial officials; the independent Tanzanian state; development agencies; and climate scientists. This study explores how these actors have perceived the waters of Kilimanjaro and examines the struggles that transpired as they attempted to impose new forms of water management. In doing so it provides a powerful look at water as a social, cultural, and political construct and shows the multiplicity of ways in which struggles over the resource play out.

This book advances three main arguments. First, water management on Kilimanjaro has long been defined by distinct, interconnected bodies of knowledge: hydrological, technical, cultural, spiritual, and political. The peoples of the mountain depend on water to irrigate farms, form mud blocks, refresh livestock, cook food, brew ritual beer, clean homes, and bathe children. These waters came from a multiplicity of sources: rainfall, streams, springs, waterfalls, rivers, and mifongo. Each of these could vary in volume and clarity seasonally or year to year. Water also figured into numerous spiritual rites and cultural practices. The many uses of water, as well as the multiplicity of sources, meant that numerous people on the mountain possessed knowledge about how to manage it. Therefore, water management consisted of a diverse, dynamic set of practices that were inherently local and politically decentralized. Those who possessed expertise held positions of authority in their communities, and much of their knowledge was bound by social status, gender, and age. This meant that water knowledge shaped local politics as people with different expertise negotiated—and often competed—with one another over whose knowledge was most salient. Rival chiefdoms and clans even fought over control of watercourses, especially during droughts. Though specialists possessed a great deal of water knowledge, everyday users held expertise as well. Most men knew how to clean mifongo, and most women knew how to locate sources and use water for the home. Across Kilimanjaro, communities developed a shared sense of the value of water and its connection to the physical space of the mountain.

Second, water management became a focal point of conflict during the colonial period. The struggles that ensued can best be understood as a clash between conflicting knowledges of water. This did not occur

initially, nor was it necessarily inevitable. For seventy years, Europeans considered Kilimanjaro (fig. I.1) to be a place of water abundance, and this led them to embrace local hydrological and technical expertise. This changed in the 1930s amid rising populations, skyrocketing demand, and fears of increasing aridity and soil erosion. In response, colonial actors began to criticize local knowledge as harmful, unscientific, primitive, wasteful, and prodigal. Rather than use overt coercion, they undermined local knowledge by introducing “modern” ideas and practices grounded in “scientific” management. Initially, colonial actors disseminated new water management through political and legal tools and educational efforts. Starting in the 1950s, they employed new technologies such as pipelines and dams. Since the rise of the independent Tanzanian state, the government and development agencies have used all three (political tools, educational efforts, and new technologies) to push for changes in water management, ostensibly to provide people with more and better water. These interventions have promoted two major shifts in thinking about the resource: toward a centralized, technocratic model of management and toward a commodified notion of water as something for which people should pay.

Lastly, this book argues that the peoples of Kilimanjaro have responded in ways that reflect the diversity and dynamism of water-management knowledge. Communities proved adept at negotiating new ideas and practices, allowing them to take advantage of new opportunities and react to new challenges. Yet the introduction of new technologies, along with changing economic and social realities, gradually eroded many aspects of local knowledge, reduced the roles of local experts, and made people dependent on government-controlled water resources. This fractured the interconnected nature of water knowledge, which in turn sped the decline of local control and the shared sense of responsibility. Today, people still believe that water is their divine right, but most are detached from its everyday management. This fracturing of water-management knowledge has led to a situation where many have poorer access to water than their parents or even their ancestors. Government actors have struggled to provide water both because they lack resources and because they pursue inconsistent and contradictory development strategies. They are also hindered by their lack of appreciation for the cultural dimensions of water, their contempt for traditional technologies and customary community-based water

management, and their belief that commoditization is essential to building sustainable water systems. Though neoliberal reform speaks of integrating local communities in water management, it offers users little effective power. This neglect of local opinions and knowledge is especially evident in recent discussions over global climate change and its relationship to the recession of the mountain's glaciers.



FIGURE 1.1. Kilimanjaro from Moshi Town (*Matthew V. Bender*)

WATER AND SOCIETY IN LITERATURE

In the past decade, water has emerged as a critical topic of study in the social sciences. Most published work has come from scholars and activists concerned with current or impending water scarcity.³ Works in this genre tend to approach the topic similarly. For one, they almost exclusively discuss water in terms of its physical properties and its necessity for sustaining life, focusing on specific cases in which the available water supply is inadequate due to excessive use, lack of investment, pollution, global water trading, or political manipulation. They also emphasize conflict that will arise from competition over water, the impending “water wars.” Many focus on the countries of the Global South that face the greatest challenges to accessing clean water. While

such literature draws attention to rising scarcity in many parts of the world, it depicts water in limited terms: water's physical utility and the conflicts over access. Such studies detach water from cultural specificity, suggesting that most people think of water in essentially the same way. A notable exception is Vandana Shiva's *Water Wars*, which shows the spiritual and traditional role of water in communities in India, as well as the importance of culture in ensuring access to water.⁴

Historical scholarship that examines water in the context of social and political development actually predates this literature by decades. One of the earliest studies to examine this intersection was Karl Wittfogel's 1957 book *Oriental Despotism*.⁵ In this work, Wittfogel sees the control of water, in particular large-scale irrigation works, as crucial to the rise of despotic power in Eastern societies such as dynastic China. Defining such societies as "hydraulic societies," he argues that the development of waterworks and the bureaucratic structures needed to maintain them was critical to the development of large bureaucracies and despotic state power. *Oriental Despotism* broke ground as one of the first works to analyze the relationship between water management and political power. As such, it has become required reading in the field of water history. The book has inspired fierce criticism from historians concerned with Wittfogel's Marxist interpretation of Asian history and from those who question the extent to which water was a critical factor in the rise of state power. Today, scholars consider the book as a piece that has raised important questions but whose conclusions no longer hold water.

In the years since *Oriental Despotism*, scholars have examined the relationship between water and power in various contexts. Their work has done much to extend the analysis beyond the physical, looking at how water control and management have intersected with broader social, cultural, and political issues. Donald Worster's *Rivers of Empire* examines the centrality of water control to the rise of the American West. In this arid region, the control of water resources by political actors, and its manipulation by engineers, led not only to radically transformed landscapes but also to the economic rise of the region.⁶ Richard White's seminal work on the Columbia River, *The Organic Machine*, eloquently shows how human and natural history are intertwined, to the point where one cannot be understood without the other.⁷ More recent works such as Paul Gelles's *Water and Power in Highland Peru*,

Stephen Lansing's *Priests and Programmers*, and David Mosse's *The Rule of Water* have gone further, looking at the intersection of politics and culture as related to irrigation works in Peru, Bali, and South India, respectively.⁸

Scholarship on water in African history has developed more slowly than scholarship on water in other regions, which is surprising given the continent's struggles with water scarcity. The continent has, however, been the focus of a wealth of scholarship in the fields of agricultural and environmental history, but while much of this work touches on water issues, it tends to focus on land spaces. James McCann's work on agriculture in Ethiopia, for example, discusses the importance of water by showing how farmers developed techniques specially adapted to the natural cycles of rainfall.⁹ Rain is an important factor influencing farmers, but the core unit of analysis is the land. Likewise, the work of scholars of Tanzania such as Chris Conte, James Giblin, Isaria Kimambo, Helge Kjekshus, and Gregory Maddox has shown the importance of water in shaping patterns of settlement, agriculture, and disease control.¹⁰ Scholarship that touches on water has extended beyond agriculture as well. Richard Grove's work has shown the influence of water in forming colonial island "Edens" that shaped early conservationist thinking.¹¹ Robert Harms's study of the Nunu shows how the Congo River shaped the lives of those living along its banks.¹² Steven Feierman's *Peasant Intellectuals* discusses rainmakers, along with other community intellectuals, in Shambaa society.¹³ These works, and others on topics such as drought and boreholes, do not focus on water per se but rather on broader cultural, economic, and political issues that relate to water.¹⁴ Though engaging, they discuss water in a way that obscures its dimensionality and uniqueness.

In recent years, studies have emerged that feature water more centrally. A good example is the scholarship on the development of African rivers. Heather Hoag's *Developing the Rivers of East and West Africa* examines the role of waterways in the continent's economic, social, and political development.¹⁵ Hoag treats water as the "lead actor" in her narrative, which allows her to examine the centrality of watercourses to the lives of those who live near them and to see the broader impact of colonial attempts to harness rivers through damming. Allen and Barbara Isaacman's *Dams, Displacement, and the Delusion of Development* examines the Zambezi in the context of the development of the

Cahora Bassa Dam.¹⁶ By focusing on the river, they demonstrate the disconnect between the rhetoric and the actual political, economic, and environmental impacts of the project. Another area that has featured water centrally is the study of irrigation. John Sutton's work on the Engaruka irrigation system in the Rift Valley of Northern Tanzania is some of the earliest and most noteworthy.¹⁷ More recently, Monica van Beusekom's work on the Office du Niger's irrigation project in Mali has shown the importance of water development in relationships between colonial experts and local farmers.¹⁸ Maurits Ertsen's recent book on irrigation in colonial Sudan focuses a bit more on water itself. He sees irrigation as a process that generated "continuous negotiations" between farmers and the colonial state.¹⁹

Although these recent works have broken new ground in analyzing the deeper significance of water, many important areas have yet to receive attention. There has been virtually no scholarship on how communities of Africans manage water. Each day, people use water in myriad ways, in their homes and on their farms. Each of these actions reveals much about their understandings of the resource and about broader social and political relationships. Furthermore, much of the existing work examines rivers, dams, or irrigation systems. The focus on single manifestations of water—naturally occurring or human engineered—allows the authors to dissect their political, social, and cultural dimensions and the conflicts that they have generated among users, between specialists and users, and between locals and outside actors. The drawback is that this makes it more difficult to get a holistic perspective as to how people think about water. It assumes that the water system in question is—or is perceived to be—discrete from other forms of water, such as rainfall, clouds, glaciers, wells, or neighboring systems. The question of where such boundaries are drawn is highly relative and culturally contingent. Yet in colonial contexts, such boundaries are often contested.

KILIMANJARO AS WATERSCAPE

This book approaches water in an innovative way. It examines how a community of people—the residents of Kilimanjaro—has managed its water resources amid a changing world and strong external pressures. Rather than focusing on a particular manifestation of water, it uses the concept of waterscapes to analyze multiple water resources in tandem

and their intersections with society. What is a waterscape? In short, it is a term that describes how people see water. Many water features, such as rain and rivers, appear naturally. Others, such as irrigation canals and dams, are engineered by people. Most are visible to the eye, while others, such as underground rivers, are not. Water features show tremendous dynamism. Rain and surface water resources move, often covering very large distances. They vary seasonally and with long-term shifts in climate. What people see, therefore, depends on time, place, and perspective. Furthermore, the impression of these watercourses and their relationships with one another are socially and culturally constructed. When people describe places as lush or arid, or employ terms such as abundant or scarce, they are seeing water through their own beliefs, needs, and expectations. All of these change over time as societies use water in new ways and in greater quantities, which in turn influences how people choose to use, manage, and engineer those resources. Waterscapes thus provide a conceptual framework for understanding how water sources intersect with the expectations and needs of those who depend on them.

The term waterscape is relatively recent, and its value and meaning have been subject to debate among scholars. It derives from work looking at landscapes as socially constructed, or “anthropogenic, the result of the interaction between natural processes and human action.”²⁰ However, it brings water, rather than land, to the fore. Some scholars of water have started to embrace this term,²¹ while others consider waterscapes to be mere watery landscapes. I see the concept as illuminating the uniqueness of water and its impact on human societies. As noted by Hoag, “whereas *landscape* can evoke stationary images of expanses of dry land, *waterscape* implies fluidity, motion, and dynamism.”²² This is particularly important for places like Kilimanjaro, where water is the defining natural feature. Waterscape also emphasizes the socially constructed nature of water. Geographer Erik Swyngedouw, who has written extensively on water in Spain, sees waterscapes as “hybrid socio-natures” produced by the intersection of people and environment.²³ They are a “liminal landscape . . . [that] is embedded in and interiorizes a series of multiple power relations along ethnic, gender, and class lines.” These power relations “operate at a variety of interrelated geographical scale levels, from the scale of the body upward to the political ecology of the city to the global scale of uneven development.”²⁴

Swyngedouw sees waterscapes as shaping relationships and hierarchies of power from the local to the global.

By centering my analysis on waterscapes, I am able to analyze the multiplicity of water sources on Kilimanjaro based on how different actors saw them over time. This emphasizes the dynamic nature of the resource and the knowledge produced about it, which in turn shows the uniqueness of water compared to other resources. For the peoples of the mountain, water was the defining feature of the space they inhabited. Water features shaped the topography and gave life to flora and fauna, and they defined culture, politics, and belonging. People therefore imagined these water sources in a way that reflected their culture and history. Those who encountered Kilimanjaro from the outside in the nineteenth and twentieth centuries, as colonizers, missionaries, settlers, government officials, and scientists, constructed different visions of the waterscape that reflected their own impression of the water sources as well as their social and cultural contexts. Waterscapes emphasize how people's impressions of water are constructed by their circumstances. The groups of people who have encountered Kilimanjaro since 1850 may have been looking at the same space, but they were not seeing the same thing.

WATER BRINGS NO HARM

Water Brings No Harm draws on waterscapes to examine struggles over water both among the mountain populations of Kilimanjaro and between them and outside groups. These struggles center on competing knowledges of water shaped by different imaginings of the waterscape. Furthermore, the views of these various groups changed over time in response to environmental conditions, consumption patterns, and the availability of new knowledge and technologies. A commonality of these struggles is that they came to be articulated in a language of harm. This book analyzes these struggles and the impact they have had on the peoples of the mountain.

In the late nineteenth century, Chagga-speaking peoples resided in over twenty chiefdoms on the southern and eastern slopes of Kilimanjaro. They drew from the mountain's streams, rivers, and rainfall to establish a thriving agrarian economy, one that exemplifies Sara Berry's observation of African agricultural systems as "fluid, dynamic, and ambiguous."²⁵ These resources were utilized for irrigating crops such

as bananas, yams, and eleusine; for livestock; and for domestic needs such as cooking, bathing, and brewing. To more effectively use water for these purposes, local people developed mifongo to channel water into settlements. In addition to its utility, water was crucial to notions of origin and spirituality. It appeared in numerous adages, proverbs, and fables. It shaped ideas of community belonging and defined social boundaries along clan, gender, and generational lines. Knowledge of the tangible and intangible properties of water empowered a variety of community specialists who managed water systems or performed rituals and offerings.

This book's title, *Water Brings No Harm*, demonstrates the centrality of waterscapes to local thinking. A translation of *mringa uwore mbaka voo*, this adage was common on southeast Kilimanjaro in the years before colonialism. It indicates belief in the inherent purity and goodness of water. It also implies a specific notion of harm as well as practices for managing any harms that relate to the resource. Before the twentieth century, the most common water-related harms were attributed to human action or malevolent spirits. To ensure that water would bring no harm, people in the community actively managed the resource. In the case of a broken mfongo, canal specialists known as *meni mifongo* worked with the society of users to restore the water. This involved not merely fixing the physical canal but also making offerings to the relevant spirits. In cases of drought or excessive rain, those with expertise in rainmaking medicine and spirit divination made offerings to the spirits and the creator god Ruwa to make it rain or make it stop. Though spirits or human action could bring these harms to the water supply, people generally believed that water, in and of itself, was the source of life and brought no harm. Keeping it that way involved careful management that tied together technology, spirituality, and community.

On Kilimanjaro, water was a fluid resource whose significance shifted in response to environmental, political, and social conditions. It often inspired debate between various specialists and between specialists and other community leaders, such as the wamangi and clan heads. After 1890, these debates became more pronounced. Colonial rule introduced new actors to Kilimanjaro who settled on the mountain and made demands on its resources. At first, these individuals believed that water existed abundantly, and they embraced local

knowledge of the resource, in particular the mifongo. This persisted until the late 1920s. By that point, the rising population and increasing demand for water from users on the mountain and in the lowlands led Europeans to reimagine the waterscape as scarce. At the same time, they became concerned with dangers such as contamination and soil erosion. The tandem led colonial agents to embrace a discourse that challenged local water management as harmful to the landscape, the water supply, and the people themselves. Colonial scientists, district officers, and wamangi criticized the mifongo as wasteful of water and destructive to the land. Midwives and schoolteachers promoted the idea of water being contaminated with bacteria and therefore harmful to those who consumed it. They joined with the missionaries and Christian converts, who had long criticized diviners and rainmakers for promoting spiritually harmful beliefs and practices. These actors in turn promoted new knowledge of water that was grounded in allegedly modern, science-based thinking. Only by adopting new knowledge, and rejecting the old, could communities save their resource and build a better future. Colonial attempts to influence mountain peoples included the creation of new laws and regulations, the manipulation of chiefly authority, and the educational efforts of European and African colonial officers, clergy, teachers, and midwives. In the 1950s, the government became involved in providing water by constructing pipelines intended to replace the mifongo. These efforts challenged not only a host of social and political relationships on the mountain but also the position of water specialists.

Struggles over water did not ease with independence. In 1967, Tanzania embarked on a program of socialist economic development, Ujamaa, that defined water as a national resource that should be provided by the state as a public good, for free. Ujamaa policies, along with new development projects such as water pipelines, effectively challenged the idea of local water management by considering it to be harmful to the nation. In the mid-1980s, the government switched course again as it abandoned African socialism in favor of structural adjustment. In this era, the national government embraced a new strategy called Integrated Water Resources Management (IWRM), devolved oversight of water to regional basin authorities, and adopted the policy that water should be treated as a commodity and that people should pay for it. In recent years, the most intense conflict over water has involved the

shrinking of the mountain's venerable ice cap, which is predicted to vanish entirely by the year 2030. Scientists are heatedly debating about the causation of this phenomenon and its potential linkage to global climate change. This has made Kilimanjaro a visible icon of broader debates over global environmental issues, while ignoring the opinions of the mountain's own peoples.

Water Brings No Harm asks important questions about the relationship between water-management knowledge and political power. Since the 1920s, colonial officers, missionaries, the postcolonial state, development agencies, and scientists have criticized local water management, yet they have rarely used force or heavy-handed policy to make mountain communities alter their practices. Rather, they have used science and technology as political tools, extolling the virtues of modern management and its superiority to traditional or customary management. In most cases, local actors have negotiated these interventions or rejected them outright, demonstrating that the relationship between knowledge, authority, and power is far from linear. Many Africanist scholars have challenged the binaries (traditional versus modern, customary versus scientific) that defined colonial thinking about knowledge, and they have shown the extent to which everyday Africans negotiated these interventions. Paul Richards, in his work on West African agriculture, shows how peasant farmers are adept at producing new knowledge through experimentation and innovation, hallmarks of the scientific method.²⁶ Locals possess expertise that outsiders do not, and this is due to their long-standing interaction with the land. Likewise, Timothy Mitchell's work on Egypt reveals how modern states rely on discrete categories of knowing—fields such as engineering, chemistry, and economics—that are led by so-called experts.²⁷ This separation effectively excludes locals from participating in processes for which they are deemed lacking in knowledge. More recently, Helen Tilley's work on science in colonial Africa has shown not only how science-based knowledge has held the power to both coerce and liberate but also that the application of such knowledge can be used by local communities for subversive purposes.²⁸

Water Brings No Harm builds on these studies by complicating our understanding of what constitutes expert knowledge of water as well as who can possess that knowledge. For much of its history, management knowledge on Kilimanjaro has consisted of hydrological and technical

expertise that was very much scientific, derived from centuries of observation and experimentation. Early colonizers admitted as much by embracing local expertise for nearly seventy years. It was only when their vision of the waterscape shifted that they rejected local knowledge. This study also shows how adept local communities proved to be at negotiating knowledge from the outside, which stemmed in part from their belief that outsiders had little legitimate authority over water. This belief enabled them to negotiate outside actions by embracing elements of knowledge they found useful while rejecting the assertions of power that accompanied that knowledge. Local communities also benefited from the power of geography. By being the most upstream users in the watershed, they had an inherent power to resist outside interventions.

This book also encourages us to think more deeply about the meaning of development in Africa and the Global South. In the 1950s, colonial officials began working with the *wamangi* to develop new water systems, such as canals and pipelines, for the communities of Kilimanjaro. Though extolled as a way to provide more and better water, these projects also reflected the desire of colonial actors to assert political power over communities and reshape local knowledge of water. This use of development continued largely unaltered into the postcolonial period, with projects promoted by the socialist and neoliberal regimes and a host of development agencies. The relationship between development and state power has been analyzed in depth by scholars such as James Ferguson, James Scott, and Monica van Beusekom. Ferguson, in his study of Lesotho, notes that development “is a machine for reinforcing and expanding the exercise of bureaucratic state power.” This can happen almost invisibly because of the attractive nature and seemingly “neutral, technical mission” of the project itself. Development discourses promote “technical solutions to technical problems” in a way that allows the state to ignore or deliberately exclude local communities.²⁹ There are echoes of this on Kilimanjaro, where development is both implicitly and explicitly linked to attempts to impose state authority. Scott’s work on high modernism indicates how the hegemonic nature of large-scale state-sponsored projects contributes to their failure. Such projects fail by dismissing “local knowledge and know-how” in favor of “formal schemes of order.”³⁰ Van Beusekom argues that development became more effective once colonial actors recognized the value of local knowledge. Her work on the Office du

Niger's irrigation project in Mali shows that output and productivity improved once French officials started paying attention to local knowledge, resulting in development that was a hybrid of the colonial, or Western, and the local.³¹ Colonial and postcolonial attempts to develop water on Kilimanjaro echo these cases and indicate the drawbacks of top-down, state-driven development.

Water Brings No Harm expands the existing literature in three respects. First, it pushes us to think about development over a longer timeframe. Debates about how to develop water resources, by whom and using what technologies, did not arise with colonial rule. They had preoccupied local experts for centuries, just as they preoccupied colonial scientists and engineers working for the Tanzanian state. Second, it shows that development has involved a larger toolbox than is commonly assumed. Most studies of development center on a case study, and many of these are specific projects, like dams or irrigation schemes. By focusing on developing a resource rather than a technology, this book shows that the toolbox used by development actors has included legal, scientific, and cultural interventions as well as political and technical ones. Lastly, this book shows that development struggles in the absence of social resonance and engagement with local knowledge. Community water management thrived for centuries because the diverse forms of management knowledge linked together to create a shared sense of responsibility and ownership. Though the *mifongo* may have become antiquated in light of alternative technologies and the changing needs of users, the social networks they engendered could have been embraced to make new technologies more effective and sustainable. Yet colonial and postcolonial development deliberately excluded local communities for decades. In recent years, the Tanzanian government and development agencies have engaged with local communities, but they have done so only in limited ways and under the assumption that local knowledge has little to offer. This book indicates that the key to successful development is not just engaging the local, but incorporating the local in meaningful ways that builds social connectivity and engages local knowledge and expertise.

THE UNIQUENESS OF KILIMANJARO

Mount Kilimanjaro is an illuminating place for this study, in part because of its physical uniqueness. It is the tallest mountain in Africa,

the world's fourth tallest in geographic prominence, the tallest of volcanic origin, and the tallest that does not lie in a range. It stretches 95 kilometers from east to west, 65 kilometers from north to south, and is separated by at least 30 kilometers from neighboring peaks.³² Two volcanic cones define the massif: Mawenzi (5,149 meters) and the glacier-capped Kibo (5,895 meters). Neighboring peaks—Mount Meru to the west, the Taita Hills to the east, and the Pare Mountains to the southeast—all lie beyond its foothills. The semiarid grasslands of the steppe surround the mountain on all sides and average about 800 meters in elevation. A sky island in a sea of aridity, the mountain features its own unique climate zones with large variations in temperature and precipitation.³³ At the highest points of Kibo lie two ice fields that stretch downward from the peak. Beneath these is a region of alpine desert (4,000–5,000 meters) marked by minimal vegetation and animal life. Next is a zone of heathlands and moorlands (2,800–4,000 meters), a transition zone with minimal precipitation and various heathers and small shrubs. Beyond this point are areas of high precipitation. An alpine rainforest lies between 1,800 and 2,800 meters, featuring abundant water and a wealth of vegetation. Further downhill lies the area of focus for this study, the temperate forest, or agroforest zone. Called home by mountain peoples, it lies between 800 and 1,800 meters and features moderate temperatures, rich soils, and annual rainfall between 750 and 2,500 millimeters. Beyond this lies the lowland steppe, which averages less than 500 millimeters of rain per year and has only scrubby vegetation.

Water features define this mountain landscape. The most renowned is the ice cap at the top of Kibo. The upper reaches also receive seasonal snowfall, giving the whole of Kibo a distinctive white layer during periods of the year. The surface waters that flow from the rainforest through the agroforest zone are generated by the precipitation of two rainy seasons. Rainfall in the forests feeds dozens of rivers and streams that run in deep ravines by the time they reach the settled area. The most voluminous of the rivers are (from west to east) the Kikafu, the Weru Weru, the Karanga, the Himo, and the Lumi. All converge into the Pangani River, which flows southeast along the Pare and Usambara Mountains until it reaches the Indian Ocean. The Pangani Basin is today one of the most crucial watersheds in Tanzania, home to more than 2.3 million people and 17 percent of the country's hydroelectric

capacity. River and stream flow is seasonally dependent, with high rates of flow during and immediately after the rains and low rates of flow in the dry seasons. Though the mountain possesses ample water in contrast to the surrounding steppe, it experiences drought on average every six to eight years. Kilimanjaro's vast water features, and their juxtaposition to the arid steppe, make the region an important place for studying conflicting knowledge about water.

A second factor is the people who for generations have called it home. The peoples now known as the Chagga first settled the lower slopes more than five hundred years ago.³⁴ They formed small clan-based communities on the ridges of the agroforest zone, on the south and east sides. These communities shared cultural and economic similarities and spoke related languages, but they did not possess a single identity. The strongest continuity was a form of agriculture defined by the cultivation of bananas, yams, and vegetables on homesteads called *vihamba*. In the nineteenth century, the clans on each ridge began to consolidate politically, and chieftaincy emerged. Yet the mountain remained a diverse place. What outsiders saw as a uniform Chagga society was actually a place of many societies, with strong linguistic diversity and no sense of political unity. The twentieth century witnessed developments including the rise of coffee cultivation, further political consolidation, and the formation of a shared identity. To this day, the Chagga retain cultural pride that is linked to the mountain as a physical space.

What makes these communities unique is the nature of their engagement with water. While all communities in Africa—and the world—depend on water, the peoples of Kilimanjaro developed a unique web of knowledge about the resource that touched nearly every aspect of life. This owed partly to the uniqueness of the mountain, featuring a narrow band of highly fertile soil and ample water wedged between the rainforest and the steppe. As such, waterscapes came to define the identity of mountain peoples and their notions of inclusion and exclusion. Furthermore, the multiplicity of sources enabled many to adopt a multiple-source water economy, in which they gathered water from different locations, at different times of the year, for different purposes. The physical placement of rivers and streams shaped communities, while the importance of water to livelihood shaped social, political, and cultural institutions. Lastly, mountain people have a long history

of active water management. The need to control the multiplicity of resources lent power to specialists, but the availability of alternative sources also empowered a wide range of users. As a result, community water management on the mountain was more decentralized than that of most other places.

Lastly, Kilimanjaro has long fascinated outsiders, largely because of its waterscape. The earliest known allusions to a snowcapped mountain by non-Africans date back to antiquity. In the second century CE, Greco-Egyptian geographer Claudius Ptolemy wrote of a Great Snow Mountain near the spring lake that fed the Nile River. Other classical writers, such as Herodotus, speculated about snow mountains that fed the Nile. In the fifteenth century, Spanish traveler Martin Fernández de Enciso wrote in *Summa de geografía* that west of Mombasa stands the “Ethiopian Mount Olympus, which is exceedingly high.” These accounts were not verified by firsthand observations until the nineteenth century, when missionary Johannes Rebmann became the first European to see the mountain. With its tremendous size, its isolation from other peaks, its seeming abundance of water amid the steppe, and, most notably, its glaciers, Kilimanjaro became the most renowned geographic feature of sub-Saharan Africa. With the emergence of colonial rule, Africa’s Olympus came to be a lucrative piece of territory and a symbol of Europe’s desire to dominate Africa. It even became a powerful literary symbol, as we see in Ernest Hemingway’s “The Snows of Kilimanjaro.” The mountain remains an important symbol to outsiders such as the Tanzanian state, mountain climbers, and scientists concerned with climate change.

The symbolic importance of Kilimanjaro and its waterscape to outsiders makes it a particularly good place for this study. Largely because of its allure, the mountain has attracted an unusually diverse cast of outside actors. As these outsiders have asserted power over the mountain and its people—whether for political domination, economic gain, religious conversion, nation building, alpine conquest, or other goals—the mountain communities have found themselves confronted with new opportunities and challenges. The local population negotiated new ideas about water in everything from religion and politics to health and technology. In the past three decades, numerous scholars have written about aspects of mountain society, including Sally Falk Moore, Emma Hunter, Susan Geiger Rogers, Anza Lema, Robert

Munson, and Ludger Wimmelbücker.³⁵ Some of this work, notably by Alison Grove, Donald Mosgrove, and Mattias Tagseth, has focused on the *mifongo*.³⁶ The last ten years have seen an explosion in scientific discussion of Kilimanjaro, dominated by articles on glacial recession.

By focusing on the intersection of management knowledge and power, this book provides a model for understanding water conflicts not only in Africa, but across much of the Global South. It shows both how local communities produced knowledge about the resource, and what happened when this knowledge confronted new ideas introduced by outsiders. These outsiders attempted to use their “modern” knowledge of water management as a means of attaining power, whether religious, political, or physical, over the resource. In turn, local people negotiated new ideas about water, often rejecting the accompanying power plays by outside actors. In some cases, new knowledge was even used as a tool to refute outside control. This richer understanding of the history of Kilimanjaro and East Africa also provides insights that are relevant to other regions where local communities encountered powerful actors from outside their boundaries. Our understandings of these problems are incomplete if we look at water strictly as a physical commodity to be controlled, divided, and consumed. I aim for this work to encourage those involved in water issues to think more deeply and broadly about the resource, as well as the importance of engaging local communities.

SOURCES AND METHOD

Analyzing the history of community water management on Kilimanjaro presents some distinct challenges. On the one hand, water is a resource that affects everyone and influences a range of thoughts, institutions, and relationships. On the other, everyday management can be routine and mundane, and the knowledge involved in certain practices can be concealed from public view. This means that some issues, like those that garnered the attention of government officials and agencies, are well represented in historical records, while others are scarcely mentioned. The temporal breadth of this book introduces another challenge. Over the 160 years covered, dozens of stakeholders have been important players in managing the waters of the mountain. Though textual sources have become more numerous over time, they do not represent the multiplicity of actors. I therefore draw on a wide range of sources including government and missionary archival records

from Tanzania, Germany, Britain, and France; published reports from government agencies and nongovernmental organizations (NGOs); scientific articles; newspapers; historical linguistics; photographs; survey data and GPS measurements; and travelogues and memoirs. I also conducted oral history interviews on the mountain over three periods between 2002 and 2012. By layering these sources, I have pieced together a comprehensive account of water management that encompasses a wide range of voices.

Interpreting these sources requires careful attention to both context and each author's biases. For the early decades of the book, I rely on travelogues, diaries, and letters written by European explorers and adventurers between the 1850s and the 1930s. These writings reflect how outsiders' personal biases, objectives, and literary goals skewed their narratives of the mountain. Despite such challenges, these sources provide rich descriptions of the mountain and its waterscapes, and they are highly effective at showing how each author's presumptions and experiences intersect and also what features and experiences most preoccupy them. As published volumes, the works also give a sense of the knowledge that made its way back to Europe.

In the early twentieth century, several colonial officials and missionaries published ethnohistorical studies of mountain society. The most prominent authors were Lutheran missionary Bruno Gutmann, Catholic missionary Alexandre Le Roy, and the district officer for Kili-manjaro in the early 1920s, Charles Dundas.³⁷ These individuals lived and worked in close proximity to local communities, and their writings provide a wealth of detail concerning daily life, political and cultural practices, and understandings of history and descent. Gutmann was by far the most prolific. He wrote more than five hundred works during his time as a missionary, dozens of which pertain specifically to Chagga history and cultural practice.³⁸ Water management was a particular point of fascination for these authors, so these practices are well documented. Their works provide a view into mountain life and a tool for reconstructing life in earlier times, yet they require care in interpretation. Marcia Wright, who refers to these kinds of writers as "intimate outsiders," warns that their work "often verges on fiction in that it enters imaginatively into the life circumstances of Africans . . . and transgresses boundaries between observer and the observed."³⁹ These works interpret local life through the eyes and expectations of the writer,

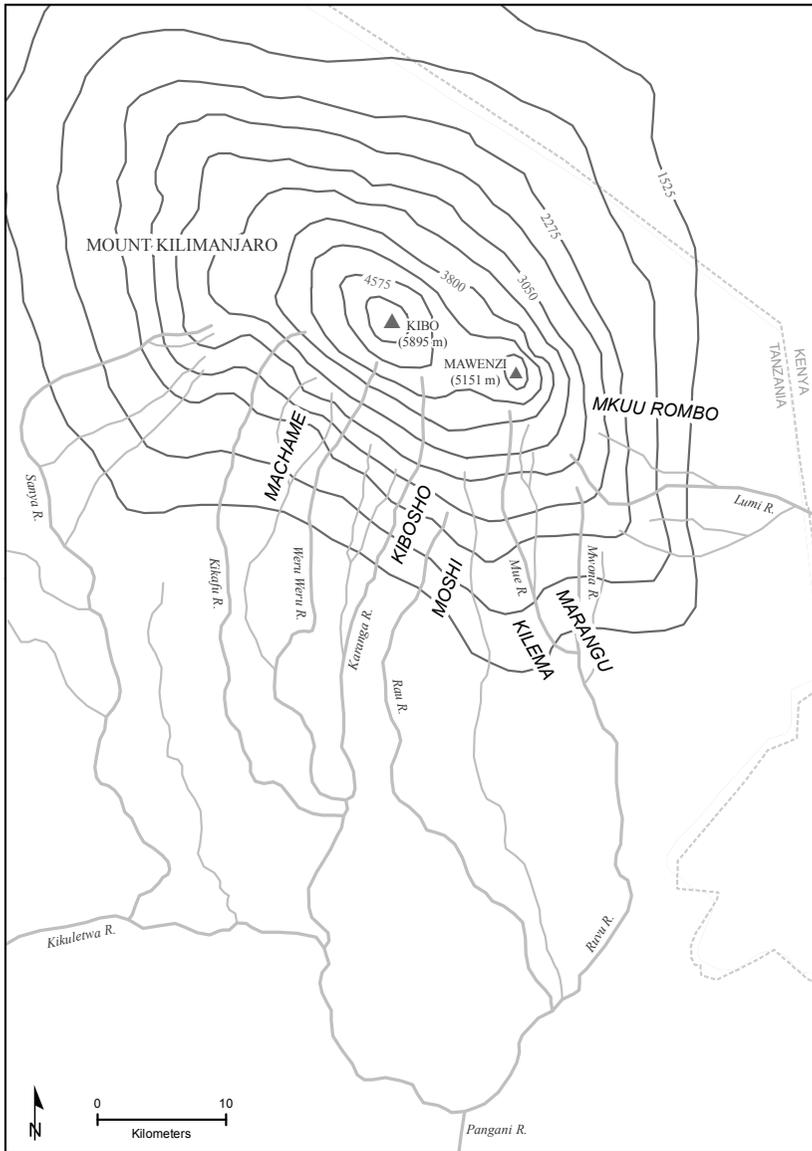
which can lead to distortions. For example, most writers homogenize the experiences of the people, assuming them to be part of the same “tribe,” the Chagga. This assumption of ethnic unity was far from reality, as people identified with clans and chiefdoms and shunned any sense of panmontane identity. These writings also privilege the southeast chiefdoms, in particular Marangu, which had been most receptive to European colonialism and missionary work. The eastern slopes, known as Rombo, are described as resource-poor and impoverished—a reflection of recent environmental conditions and stereotypes held by people in the southeast—despite evidence that they had been prosperous in earlier centuries. If these sources are read alongside others, and with a careful eye to their biases, they can offer a window into late precolonial and early colonial life.

For the colonial and early postcolonial periods, I draw on government archival documents and published reports from government ministries. Most are housed at the Tanzania National Archives in Dar es Salaam, with some additional holdings in Germany and Britain. The archives’ holdings include collections from the German period and the British period: district books, the Secretariat Series, the records of the Moshi District and Northern Province offices (and their successors), and the files of the Ministry of Agriculture, Ministry of Health, and Ministry of Lands, Settlement, and Water Development, among others. These contain annual reports, correspondence, and memoranda, which feature useful information about issues of colonial concern. They tell us less about local communities, as they selectively incorporate the perspectives of the governed. Prominent actors such as the wamangi frequently appear, but they are hardly representative of the views of their subjects, and women’s voices are almost entirely absent. Despite these deficiencies, these documents provide a wealth of detail about policies, laws, and actions that had real effects on community water management, and they reveal the concerns and motivations of the government administrations. We can also get a sense of local perspective by reading these sources against the grain. Numerous documents, for example, reflect on how local communities responded to new policies and procedures. The descriptions of the responses provide useful information, even if the author’s interpretation may be biased. We can then layer these with other sources such as oral narratives to tease out the meanings and motivations behind the responses.

In addition to government documents, there is a wealth of records from the missionary orders, including correspondence between the mission stations and with the head offices, collections of letters from clergy, and serial publications. The richest of these are the journals kept by the mission stations. These provide a daily account of the affairs of the mission, covering issues from baptisms and conversions to interactions with wamangi, elders, and government officials. They also offer detailed observations of the waterscape, including the earliest rainfall data and written accounts of drought in the region. These sources offer different perspectives from those of the government sources, perspectives that are more familiar with local life. Yet despite the fact that many European clergy lived on the mountain for years, even decades, they are still intimate outsiders who interpreted events through a desire to transform. These works need to be read with a careful eye to the objectives of the clergy, but they do offer a tremendous amount of detail and our earliest quantitative data on the waterscape.

Given the limited availability of archival materials for the post-independence period, published works are important for the more recent decades covered by this book. Reports and studies by the Tanzanian government, international agencies, and NGOs provide a wealth of material about water management on Kilimanjaro, in the Pangani Basin, and elsewhere in Tanzania. They document concerns about the water supply, the competing interests in management, and the shift in water policy since the 1960s. The scientific community has likewise published numerous studies, particularly about the glaciers. Some of these date to the nineteenth century, but most come from the past thirty years. These sources provide information for understanding hydrology, the impacts of climate change, and the shifting nature of water management since the colonial era. However, they provide little voice to local communities and either discount or ignore local knowledge.

A common problem with the textual records is that they do not provide a voice to the peoples of the mountain in the past or the present. To tease out these perspectives, I conducted oral history interviews across Kilimanjaro over a period of ten years. When I began this project, I focused my work in two communities: Kilema and Mkuu Rombo. The former is located on the southeast corner of the mountain and the latter on the east side (see map I.1). Both were marginal places, politically speaking, in the decades before colonial rule, but they rose



MAP I. 1. Prominent chiefdoms and rivers (*Brian Edward Balsley, GISP*)

to prominence in the twentieth century due to the presence of Catholic missions. I spent six months in these two areas conducting interviews with a wide range of individuals. I selected many because of their social position or expertise in water management. I also spoke with men and women from a broad range of occupations, ages, and social

standings, people who had an understanding of the nuances of everyday water management and use. In later research trips, I expanded my geographic scope by interviewing in Kibosho, Machame, Kirua Vunjo, Uru, and Moshi Town.

In reflecting the voices of people in local communities, oral narratives have the power to fill the lacuna created by the textual sources. Yet their collection and use has been a point of debate among Africanist scholars since Jan Vansina's pioneering work in the 1950s.⁴⁰ One challenge of my work stemmed from my position as an interviewer. I asked people about water management in their daily lives, in the past and the present, with questions that often asked about knowledge considered to be protected or intimate. I did so as an outsider in multiple respects: my race, nationality, ethnic heritage, sex, age, education level, and native language. Any of these could have influenced the willingness of my interviewees to share information or have affected the kinds of information they provided or the way they presented it. This is especially true given the long history of outsiders' meddling in water issues and bringing undesired outcomes. Another challenge related to the nature of the information I sought. Just as knowledge can be intimate and protected, it can also be routine. While people often have vivid memories of specific moments, their memories are less reliable when it comes to more mundane aspects of water use, such as changing consumption patterns or irrigation practices. This presents a particular issue for exploring past practices that continue today, since memories are filtered through the lens of contemporary society. Lastly, interviewees were understandably reluctant to discuss issues that are controversial or relate to underground activities such as water stealing or sabotage.

I took several steps to address these issues. I relied on research assistants who were either from those communities or had connections through family or work. Three were men (two in their sixties, one in his thirties), and the other was a woman in her thirties. These individuals had broad knowledge of the area and a firm understanding of local social and political relationships. They not only introduced me to people and assisted with language, but they also acted as intermediaries, explaining my purpose and the nature of my research. This helped facilitate interviews that would otherwise have not been successful, such as those with women that included questions about domestic issues. I conducted all the interviews by opening with greetings in Kichagga,

then switching to Kiswahili or English as appropriate. This helped establish a comfort level with my interviewees and showed my familiarity with the area. Lastly, I developed my question sets with an eye to how they would be perceived by interviewees, relying on the expertise of my research assistants. In my questioning, I worked from the present toward the past, as this helped my interviewees become comfortable with me and think more deeply about water issues.

Another challenge with oral histories lies in interpretation, a question that has informed much of the debate about their value. Some scholars, such as Vansina, hold that oral narratives contain essential truth that can be extracted, allowing them to be reliable historical documents if sufficient care is taken with interpretation. Others, such as Luise White, Stephan Miescher, and David William Cohen, emphasize that oral sources are dynamic and malleable and that they convey discourse and sentiment, allowing us to understand historical viewpoints that may not necessarily be based in truth.⁴¹ Emily Osborn's recent work on statecraft in the Milo River Valley illustrates the potential of employing both interpretive lenses.⁴² My approach is similar to Osborn's in that my interpretation depends largely on the moment to which my interviewees are referring. Questions about current and recent topics tend to be answered accurately, except those pertaining to active water disputes or underground activity. I am able to verify this information by comparing interviews and noting outliers and also by layering the oral sources with textual ones. Questions that probe further back in time, asking about history beyond the lifespan of the interviewee, tend to be less objectively verifiable but no less revealing. For these, I am most concerned with how people choose to remember and speak about the past. The way these stories are told demonstrates a remembering that speaks as much about the present as the past, often coming across in vivid language and phrases such as "water brings no harm." As such, these narratives provide an indispensable tool for seeing how people have constructed waterscapes over time and how these notions have clashed with those held by outsiders. Most of all, they provide voices that are missing from the textual records, ones that illuminate the breadth and depth of water knowledge that these communities have long produced.

Lastly, given the environmental approach of this book, I utilize a number of sources that enable me to read the waterscape. These

include studies of mountain hydrology, surveys of land and water resources, and photographs. I also used a handheld GPS to mark places of significance, calculate changes in altitude between points, and measure distances between locations. These sources enable me to see, at various points in history, the land and water features as they would have been seen by people at that time. They therefore provide additional data points that I compare with the impressions of officials, missionaries, and mountain peoples that appear in other sources. By examining them comparatively, I am able to see the dynamic nature of these features over time.

THE FLOW OF THE BOOK

Water Brings No Harm examines water management by focusing on moments in time when struggles over water became especially pressing. It looks at how actors responded by producing new knowledge and attempting to influence both policy and practice. The first two chapters examine how different groups—mountainside populations, and traders and explorers—developed impressions of the mountain's waters in the nineteenth century. The subsequent chapters flow chronologically, each examining a moment when local knowledge was challenged or shaped by interactions with outside actors. Altogether, the chapters provide a compelling glance into an array of struggles over water that have shaped the modern history of Kilimanjaro.

Chapter 1 establishes 1850 as the chronological starting point for the book. It examines the origins of the agrarian communities on Kilimanjaro and shows how people developed an impression of the waterscape that embodied the dynamism and diversity of the water sources as well as the sources' importance to people's livelihood. The management of these sources became a defining attribute of these communities, shaping social, political, and cultural institutions and relationships. Water provided for an array of physical needs such as cooking, brewing, and irrigation. Just as important, it was a fundamental part of how people understood their surroundings, their identities, their positions in society, and their spirituality. Those with specialized knowledge of water—a diverse group ranging from rainmakers to mifongo managers—held positions of power and esteem. Yet knowledge of water was not limited to elites. Nearly everyone held responsibility for managing water, from young men who performed irrigation maintenance to

women and children charged with procuring water for domestic uses. People also recognized that water could be dangerously scarce. These resources, therefore, required many forms of management, from the spiritual to the technical, which could often be in competition. The chapter illuminates the highly dynamic nature of water management and the extent to which that knowledge was decentralized. Though linguistically diverse and politically disparate, people on the mountain shared a common vision of the waterscape, which defined water as their divine right.

Chapter 2 turns to how those from beyond Kilimanjaro viewed its waterscape. From the 1850s, mountain communities came into increasing contact with Swahili traders and European explorers arriving from the coast. These traders and explorers developed very different perceptions of mountain waterscapes from those held by locals. Europeans perceived Kilimanjaro as an Eden in the heart of Africa. This chapter shows how these notions arose from the experience of encountering the lush mountain after arduous journeys across the steppe and also from the contrast of this encounter with prevailing archetypes of the continent as a whole. While the mountain's tremendous size made it distinctive, it was the waterscape—the white cap and the abundance of rivers and streams—that most captured European imaginations. Kilimanjaro, a place of magical snows, endless water abundance, and favorable climate, emerged as the most known and symbolic geographic feature in sub-Saharan Africa. The mountain's waterscape features placed it centrally into European missionary, scientific, and colonial objectives for the continent. Yet the impression these actors developed, based on visual observations and little data, was a far cry from that of locals. Through centuries of observation and experimentation, they knew all too well that water could be scarce and that these resources required careful management.

Presumptions of Kilimanjaro as a place of water abundance are what informed European thinking into the early decades of colonial rule, as we see in chapter 3. The onset of colonial rule led to the arrival of German colonial administrators, Catholic and Lutheran missionaries, and settlers from Germany, Greece, and elsewhere. In the way these new arrivals imagined the waterscape, they were more like the explorers who preceded them than like their African counterparts, and so they were surprised by the dynamic nature of the resource and the need

for careful management. They largely embraced local management knowledge, and they depended on wamangi for access to water and specialists to construct canals to their farms and missions. This relationship, which defies accepted notions of relations between Europeans and Africans in the colonial period, stemmed from factors including the small number of settlers, their lack of hydrological expertise, the economy of earthen canals, and the limited time they had before the disruption of the First World War. Reliance on local expertise gave communities a tool with which to manage their relationships with colonial actors. Despite evidence to the contrary, including a devastating drought in 1907–8, Europeans persisted in their assumption that the waterscape was abundant.

Water-abundant visions of Kilimanjaro persisted until the early years of British rule. Chapter 4 looks at how this belief dried up in the 1920s and 1930s. Along with settlers and missionaries, colonial officials of the newly renamed Tanganyika Territory began to conclude that the waters of the mountain were not in fact abundant but instead scarce and in need of careful management. This rethinking stemmed from an increasing demand for water on the mountain as well as new demand from beyond it, such as hydroelectric power and sisal cultivation in the Pangani Valley. Supply-side reconsiderations arose as well, including fear of increasing aridity, erosion, and wasteful use. These concerns targeted mountain communities, whose once “ingenious” water practices came to be considered prodigal and harmful. The administration and the wamangi responded with a series of initiatives to gain control of the region’s waters. These included commissioning colonial scientists to produce studies of mountain hydrology and the problems facing the water supply, and they also included creating laws, policies, and structures to regulate water use and restrict the mifongo. Local communities vehemently resisted these new initiatives. Their perception of the waterscape had always involved volatility and the need for careful management, so these new concerns had little resonance. They also rejected the notion that users beyond the mountain had rightful claim to its waters.

This chapter marks a distinct shift in thinking about the waterscape of Kilimanjaro and also marks the start of struggles that persist to the present day. Seeing the mountain as water scarce, colonial actors felt compelled to transform management practices they considered

harmful. To this end, they embraced new knowledge of water produced by scientists and politicians and rejected that held by local experts. Local knowledge came to be viewed as unscientific, superstitious, and dangerous. In the process, colonial actors conflated hydrological and technical knowledge, essentially saying that local expertise was no longer useful because the technology of the canals was outdated. Technocratic management significantly narrowed the field of people who could be experts and thus encouraged the government to develop more centralized planning of the resource. This shift threatened the local control of water and the roles of many specialists.

Even as mountain communities resisted the notion of scarcity and the idea that their long-held management practices were suddenly harmful, they began to adapt new water knowledge. Chapter 5 examines how new forms of water knowledge were incorporated in the areas of health, spirituality, and cultivation. It focuses on the discourse of harm, the tool with which outsiders lobbied for change in local practices. Between 1930 and 1960, numerous actors—missionaries, schoolteachers, colonial officers, coffee co-op employees, midwives, and others—worked in mountain communities to disseminate new knowledge and practices. They cited waterborne disease, non-Christian spirituality, and irrigation of eleusine (linked to erosion and excess beer consumption) as harms that could be rectified by managing water in modern ways. Over time, changes in everyday water use began to materialize, but these must be understood in the context of the dynamic nature of knowledge production. Mountain communities selectively adapted new ideas in response to conditions on the ground, such as outbreaks of waterborne disease and localized scarcity. In turn, this empowered people to act as specialists in new ways. It consequently contributed to the decline of older forms of water knowledge and the status of those who possessed them.

Despite the adaptation of new water knowledge, the trend toward scientific, centralized management began to impact mountain communities. Chapter 6 examines this in the context of the Chagga and Tanzanian nationalisms that emerged in the 1950s and 1960s. These movements used water development to encourage people to embrace new political identities. In 1952, mountain communities elected the first paramount chief for Kilimanjaro, Thomas Marealle. He promoted a shared sense of ethnicity across the chiefdoms, inventing traditions,

ceremonies, and a shared notion of history. Water development lay at the center of his initiatives. He promised to help those facing acute land and water scarcity by investing in new technologies such as pipelines. In doing so, he promoted a state-centered model for water development that embraced high modernism and defied the mountain's long-held tradition of local management. In the early 1960s, Tanganyika emerged from colonial rule as an independent nation, and by 1967 the new Tanzanian state had entered the era of socialist nation-building known as Ujamaa. In this period, the government in Dar es Salaam defined water as a national resource, to be provided to people for free. It invested in large-scale projects such as pipelines and the Nyumba ya Mungu Dam. These projects challenged two tenets of local water knowledge: that the waters of the mountain belonged to its people exclusively and that water should be managed locally. The projects that accompanied Ujamaa, ostensibly about providing more and better water, served as nation-building tools that consolidated government authority over the resource. People in the foothills accepted water pipes and taps when those helped ease scarcity, and people in the upper areas incorporated them into their existing mix of water resources. They therefore tried to embrace the new technologies while rejecting the underlying political objectives.

Mountain communities nonetheless became increasingly dependent on the new systems. In the highlands, an aging population found itself without the labor to maintain the mifongo or traverse long distances for water. In the foothills and lowlands, people had no alternative but to rely on government-built systems. By the 1970s, communities depended on water systems over which they had little control and in which they took little ownership. Local knowledge that was related to water quality and provision became less important in the upper areas and resented by those in the lower areas who viewed it as contrary to their interests. Specialists disappeared as elders passed away and children did not assume their roles. These changes reshaped how people made sense of the waterscape. Rather than one in which most people assumed an active role in management, it became one where people used resources passively.

By the late 1970s, Tanzania had fallen into steep economic decline. Facing economic collapse, the country abandoned Ujamaa and accepted a program of structural adjustment designed by the International

Monetary Fund (IMF). Chapter 7 looks at how neoliberal economic reforms transformed water management. The Tanzanian government, with the aid of international development agencies, embraced Integrated Water Resources Management (IWRM). This called for two major changes: the devolution of control from the central government to basin-level authorities and local user associations, and the introduction of cost recovery to fund projects and maintenance. Communities on Kilimanjaro have responded in highly nuanced and varied ways. Most vehemently reject the notion that they should pay for water, seeing this as an affront to their cultural norms and their pocketbooks. They also generally realize that despite the devolution rhetoric, they are denied any real power over water. Whereas people in the highlands have been most resistant to new water user associations—seeing them as shadows of the real thing—people in lower areas are more accepting, partly out of necessity and also because they have less interest in maintaining traditional forms of management.

The rise of neoliberal water management indicates the extent to which people's impressions of the waterscape have changed, as well as how they have remained the same. The physical water features of the mountain, natural and man-made, are very different from how they were in 1850. Many more people draw on these resources and use them in many more ways. While some forms of local management persevere, especially in the domestic and spiritual spheres, technical and hydrological management has diminished because of a dependency on government-managed pipelines and the decline of the *mifongo*. There is a substantial difference in thinking between people living in the highlands, who still practice a multiple-source water economy, and those in the foothills and lowlands, who depend solely on pipes. The former tend to look more favorably on older forms of water management, while the latter reject them as counterproductive and antiquated.

The final chapter returns to the most symbolic feature of the waterscape, the snows atop Kibo. For nearly one hundred years, the mountain's glaciers have been shrinking, and scientists predict that they will disappear completely within the next twenty years. Some claim that it is the direct result of human-induced climate change, while others see it as the product of regional factors such as increasing aridity and mountainside deforestation. The debate has spilled over into the political realm, where the snows of Kilimanjaro are used to promote

or rebuke policy changes related to greenhouse gas emissions. The political and scholarly discourses of glacial recession ignore the perspective of mountain people and the knowledge they have produced about the glaciers and their place in the waterscape. This chapter shows how local communities are producing knowledge to explain the changes to the glaciers, the likelihood of the glaciers' demise, and how they can manage the implications. This enables them to acknowledge the scale of the problem while retaining a sense of agency. Their desire to interpret glacial recession in terms of both local and global factors reflects the broader historical trend shown throughout this book. Interestingly, scientists have pivoted in this direction over the past few years. Recent studies have shown that deforestation is largely causing the decline in water supplies on the mountain, and the studies cite local resource-management practices as essential to reversing the trend.



Though this is a historical study, it analyzes one of today's biggest resource dilemmas. Millions around the world, particularly in Africa, face chronic water scarcity. Population growth and climate change will only exacerbate this crisis. This study indicates the importance of examining how communities develop knowledge of water resources and how this knowledge in turn motivates action. The concept of waterscapes enables us to see how water resources are socially constructed and how conflicting views of resources result in struggles between users. Most of all, it shows that the social dimensions of water management—particularly a sense of ownership and responsibility—are essential to the success or failure of any project. The key to water development is building local capacity in a meaningful, engaged manner. My hope is that this work will inspire those involved in water development to think of the social and cultural dimensions of water as more than just adjunct and rather as key elements to developing sustainable water solutions.