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Introduction by Melanie Kiechle, Virginia Tech, Kara Murphy Schlichting, Queens College CUNY, and Keith Woodhouse, Northwestern University

In *Pipe Dreams: Water and Empire in Central Asia’s Aral Sea Basin*, Maya K. Peterson takes readers on a journey through the irrigation dreams, schemes, and consequences in Tsarist- and Soviet-controlled Central Asia. In following water and aridity across these political periods, Peterson documents the long history of imperial decisions that contributed to a contemporary disaster, the ongoing disappearance of the Aral Sea. *Pipe Dreams* contributes to long-standing conversations about irrigation and aridity, modernization and civilization, and scientific rationality. In addition to these familiar narratives, Peterson carefully approaches a range of archival sources to draw out the perspectives, contributions, and subversions of indigenous Central Asians. It was the region’s indigenous peoples, so often dismissed by their governments as “culturally backward” nomads and peasants, who understood the land and water better than any state planner or engineer could—and who endure the consequences of state intrusions into hydrology and agriculture.

It seems crucial to acknowledge at the outset that this roundtable is unlike any we’ve edited and published. After Maya Peterson agreed to have her book featured, and after Heather Hoag and Pey-Yi Chu drafted their comments about *Pipe Dreams*, the unthinkable happened: Maya and her daughter Priya Luna died in childbirth. Those tragic deaths reverberated through many communities, including the loose knit field of environmental history. For our part, we put a hold on the roundtable for the sake of all involved. But many months later we decided that it was important to continue discussing Maya’s work and its ongoing relevance to anyone interested in water, imperialism, Indigeneity, and environmental devastation. Heather Hoag and Pey-Yi Chu gamely agreed to continue working on the roundtable, and in particular to add a personal perspective alongside their scholarly comments. We asked Ellen Arnold for additional thoughts about Maya as a colleague and a friend. In crafting those thoughts Ellen wanted to draw from as many voices as possible, so she talked about Maya with attendees at this year’s American Society for Environmental History conference.

Below are all of these comments: Heather’s and Pey-Yi’s reflections about Maya as a friend and extended comments on *Pipe Dreams*, and Ellen’s consideration of Maya as a friend and a colleague in light of her conversations at ASEH. Although it feels odd to publish a mostly scholarly discussion in the shadow of an enormous loss, our aim in doing so is to promote a conversation about what Maya the scholar has given us: a vital book on a subject about which all environmental historians should care. We hope that conversation extends far beyond the pages of this roundtable, and that it helps elucidate Maya’s considerable intellectual legacy.
H-Environment Roundtables are always conversations. While Maya Peterson is unable to take part, we hope you will carry the conversation forward. We pause here to thank all of the contributors for generously sharing their time and ideas, even more so than usual, and to dedicate this roundtable to Maya. Finally, we would like to remind readers that as an open-access forum, *H-Environment Roundtables* are available to scholars and non-scholars alike, around the world, free of charge. Please circulate.
Comments by Ellen Arnold, The Ohio State University

I am delighted that Maya Peterson’s book is receiving the attention of a H-Environment roundtable and of these wonderful scholars providing their commentaries. *Pipe Dreams* is vibrant, confident, smart, careful, and a contribution to water history that expands our field’s geographic vision. Maya cared deeply about the people and places she studied. You can hear her engagement and interest clearly in this interview conducted while she was a fellow of the Rachel Carson Center, where she discusses the project that would become *Pipe Dreams*.¹ She talked about the project and the Aral Sea for BYUradio as well.²

With *Pipe Dreams*, and with her active participation in conferences, workshops, and academic networks, Maya contributed greatly to the field of water history and to the lives of all of us who had the joy of calling her a friend and colleague. She touched so many of us, and interactions with her always left us feeling supported, loved, and valued. I knew Maya both through the water history community and through the Rachel Carson Center; we spent some time as “accountability buddies” in a stage when we both needed some extra motivation. I trusted her with both scholarly and personal aspects of my life and valued her insights and support.

Maya was the first person I knew with an expanded passport—and who then filled it up. Her love of travel, her quest to be a thorough researcher who knew her archives and the places she studied, and importantly her love of friends and family took her all over the world. Maya thrived in all sorts of places, and in all kinds of settings, making all sorts of people (those she knew well and those she had just met) feel welcome, comfortable, and at home. I am sorry that we always met while we were both traveling. Though this gave me a tremendous appreciation for her energies and enthusiasms, it would have been wonderful to interact with her in Santa Cruz, to see her home reflected through her love of place and people.

Maya made permanent impressions on so many communities, many of whom have come together to celebrate her life and career. She was a valued teacher and colleague at UC Santa Cruz.³ She brought passion and energy to the field of Central Asian studies.⁴ A celebration of Maya’s life and work was hosted in 2021 by the Davis Center

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¹ “Prof. Dr. Maya Peterson on “Irrigation in Central Asia,” Rachel Carson Center, YouTube video, 3:56, https://www.youtube.com/watch?v=ezh0IP9PEgg.
² “Oceans Falling and Rising,” Constant Wonder, BYUradio, Nov. 5, 2020, https://www.byuradio.org/7f0f20e4-00c0-42ec-b4d9-f6ce1b96f7a4.
I’m writing this almost exactly three years after Maya’s death, and it is still unimaginable to all of us that she is not with us. I realize that my voice and thoughts are a drop in the sea of commemorations, but I’m glad to have the chance to express my deep admiration for Maya. I’m also glad that this online forum gives us the chance to highlight and assemble in one place records of the ways that she mattered to a wide range of people.

If you find inspiration in these pages, and in Maya’s work, we hope that you will read more about water and about Central Asia or other peoples and places you don’t yet know. You can also support Maya’s legacy at UC Santa Cruz by supporting the Maya K. Peterson Memorial Endowment, which will use the funds both to bring in speakers to share new perspectives and ideas and places with students and to support student research and language learning.

Though we cannot comprehend the loss that her home community and family still feel, the water history community also deeply feels Maya’s absence. Those of us who knew her miss her and grieve her loss. But I am also happy that this roundtable will introduce her work and voice and passion to new readers. I recently had reason to revisit Pipe Dreams myself, and was once again struck by the clarity and singularity of Maya’s voice, and by the way she was able to convey place, people, and the complexities of historical motivations.

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Chu remembers Peterson: *I grew up professionally with Maya and gained so much inspiration from her creative and incisive mind, intellectual generosity, and joyful, adventurous spirit. For over a decade, she was a peer mentor and role model to me and so many other early career historians. She could, with equal facility, articulate constructive critiques of my work, nerd out over the history of science and environmental history, and recommend the best lobster rolls in Boston. I took it for granted that I would be in conversation with Maya over my entire career. In 2021, I was excited to take on the task of commenting on Pipe Dreams for H-Environment’s Roundtable Reviews.* I had been immersing myself in Maya’s words and ideas when word of her sudden passing struck me. I miss her and think of her often. I am grateful to the editors for reviving the roundtable and hope that reading our collective reflections will inspire research into the questions she opened. May our community of scholars continue to honor Maya through rigorous discussion of and engagement with her ideas.

In *Pipe Dreams*, Maya Peterson takes readers on a journey across a century of Russian and Soviet rule in Central Asia by following the water. Beginning and ending at the Aral Sea, her narrative moves along its historical tributaries, the Syr Darya and Amu Darya, with an excursion to the Chu River farther east. Along the way, we witness the panorama of exploration, annexation, settlement, and development imposed upon the region from the 1840s through the 1930s. With an eye to their present legacies, Peterson analyzes processes of colonization as well as ideologies of colonialism—the “pipe dreams” of the book’s title. It’s a clever and apt pun. The book focuses on literal conduits of water—the building of irrigation systems—but also the inflated ambitions of colonial officials and engineers to turn deserts into fertile fields. While shedding light on the political, social, economic, and legal aspects of Russian and Soviet colonization, Peterson’s rich study inspires questions about the frameworks and categories of environmental history.

The book’s overarching argument is that the disappearance of the Aral Sea, that infamous symbol of environmental destruction in the Soviet Union, had causes originating in the tsarist era. Observers have long blamed Soviet economic policies and development practices for shrinking, since the 1960s, what was once the world’s fourth-largest lake. Specifically, the push to expand cotton production by building canals for large-scale irrigation drained water from the Syr Darya and Amu Darya. Without replenishment from its two main feeders, the Aral Sea increasingly became desert.

Peterson demonstrates, however, that the sources of such schemes were not communist planners but rather Imperial Russian administrators and engineers. These included Alexander Krivoshein, the Minister of Agriculture who, in the decade before the Bolshevik Revolution, promoted a government project to irrigate the region known as the Hungry Steppe. As Peterson explains, Krivoshein believed that
“cotton plus irrigation plus colonization would equal a ‘new Turkestan’” (157), referring to the Central Asian province of the Russian Empire established in 1867. Peterson also highlights Vladimir Vasil’ev, an engineer tasked with helping to realize Krivoshein’s vision by irrigating the Chu River valley in the Semireche region of Turkestan.

Beneath this overarching argument runs a secondary one: that Russian and Soviet colonization—by irrigation—relied on—and appropriated—indigenous knowledges, practices, and labor. Peterson shows that the conditions for such dependency varied. For Grand Duke Nikolai Konstantinovich, a member of the Romanov royal family, the Islamic cultures of Central Asia were the source of romantic fascination. Captivated by stories of bygone kingdoms whose power and prosperity grew from controlling water, Nikolai personally initiated several irrigation projects in Turkestan in the 1880s and 1890s. While serving the Russian Empire, he sought to incorporate indigenous canal-building techniques, consulting with local elders, engaging local workers, and creating what Peterson argues was a “hybrid world” (77).

Peterson portrays Nikolai as earnest, if self-aggrandizing, in his efforts to harmonize Russian rule and indigenous customs; by contrast, tsarist and Soviet bureaucrats were driven by pragmatism and cynicism. The Imperial and early Bolshevik governments aspired to apply advanced Euro-American science and technology to irrigating Central Asia. But unfamiliarity with local environments and shortages of experts and equipment compelled them to rely on manual labor—in keeping with historic methods—and existing canal networks. The Stalin-era state went further: it forcibly mobilized thousands of people to build new canals in Tajikistan and Uzbekistan. Simultaneously, it co-opted the indigenous tradition of hashar by which households performed cleaning, maintenance, and construction work on canals they benefited from as a form of tax. By invoking hashar and claiming it to be voluntary, Soviet propaganda spun “state-sponsored mobilization of a captive population” (318), in Peterson’s apt phrasing, as authentic and progressive. For Peterson, such distortions attested to “continuing state weakness in the borderlands” (336) that belied both Imperial and Soviet rhetoric and goals. Lacking knowledge and capacity, would-be modernizing regimes fell back on indigenous resources. Lacking genuine legitimacy, they resorted to manufacturing it.

The book’s interwoven strands—illustrating continuity between the Imperial and Soviet periods and the use and manipulation of indigenous practices in managing water—make key contributions to environmental history. For one, they provide a 360° view of water in Central Asia, showing how it factored into law, labor, social customs, and conflict, migration, and settlement, agriculture, and engineering. Such topics have been the focus of water history since it emerged as a field in the wake of a “river turn” in environmental history in the late 1980s. Compared to North America and Europe, however, water histories focusing on Central Asia, the Russian Empire,
and the Soviet Union have surfaced more slowly. *Pipe Dreams* is pioneering in this regard.⁷

Peterson also energizes the ongoing effort to contextualize the well-known story of Soviet environmental degradation by examining it in terms of not communism but rather colonialism. Since the 1970s, environmental histories of the Soviet Union have been informed by what Diana Davis, writing about a different setting, has called a “declensionist narrative.” To explain environmental decline, scholars have pointed to the idiosyncrasies of communist authoritarianism. These included a command economy fixated on industrial production at any cost and restrictions on civil liberties that stifled citizens’ efforts to protect nature.⁸ More recent scholarship has complicated this picture by highlighting the Soviet regime’s conservation initiatives, tracing shifts in its pollution record, and pointing out parallels with capitalist, liberal democratic modernization.⁹

Peterson, by positioning her narrative center of gravity in the tsarist era (four chapters examine the Imperial period, two examine the Soviet period), adds colonial considerations to the debate. She shows that the Russian Empire’s initiatives to irrigate Turkestan at the turn of the twentieth century were motivated by the desire for wealth, security, and prestige. Despite the Bolsheviks’ assertions of being antithetical to the tsarist regime, they were guided by similar calculations cloaked in revolutionary rhetoric. Irrigation and cotton production offered a pathway to productivity and self-sufficiency, only instead of profit for the empire, they served the goal of achieving “socialism in one country” (284). Canal-building and settlement in border regions would secure Soviet rule by showcasing its benefits to those inside and outside the USSR. This hope motivated the Vakhsh Irrigation Construction Project in Tajikistan, the Stalinist iteration of the Chu Valley Irrigation Project. Even colonial expectations of civilizing nomadic and semi-nomadic peoples persisted, cast in the

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language of liberation from backwardness, imperialism, and an unforgiving environment.

Peterson does not simply point out parallels between Imperial and Soviet visions but traces continuities through personnel and institutions. These included Georgii Rizenkampf, a tsarist-turned-Soviet engineer whose ideas to irrigate the Hungry Steppe were implemented under Stalin and Khrushchev despite his arrest on charges of counterrevolution; Arthur Davis of the United States Reclamation Service, who explored possibilities for an irrigation concession from the Imperial government and later acted as consultant to the Soviet government; and the Central Cotton Committee, initially established under the Imperial Ministry of Agriculture and recreated under the Supreme Soviet of the National Economy. On both sides of the revolutionary divide, administrators and engineers treated Central Asia as a provider of raw materials. Peterson thus concludes that, “from an environmental perspective, early Soviet Central Asia remained a colony of the Soviet Union” (7-8). She demonstrates how environmental history can illuminate the coloniality of Soviet rule.10

By drawing attention to the colonial features of Soviet environmental degradation, Pipe Dreams raises the possibility of applying environmental justice frameworks to Soviet history. Peterson mentions contemporary movements for environmental justice surrounding water in her conclusion, but environmental justice does not serve as an explicit focus of the book. As a scholarly field, environmental justice aims to demonstrate how exposure to harms and access to clean, sufficient food, land, water, and air differ between racial and ethnic groups. It highlights how people who have suffered discrimination on the basis of their race, ethnicity, and nationality consequently experience the negative effects of pollution and scarcity of resources. It also explores how environmental risks and deprivations, while sparing others, fall more heavily upon marginalized groups, exacerbating their disadvantage. Environmental justice has had relevance for the study of the United States, given its legacies of conquest, slavery, and nativism. Scholars have also extended it to understanding differences in responsibilities and burdens arising from global environmental phenomena, including climate change, between former colonial powers and colonized countries.11

How might an environmental justice framework illuminate the Russian and Soviet context, including the story told in Pipe Dreams? In many respects, environmental justice seems highly relevant to Peterson’s story. Russian and Soviet colonial policies

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rendered indigenous peoples of Central Asia, including Kazakhs, Kyrgyz, Qaraqalpaqs, Uzbeks, and Turkmen, vulnerable to hunger and disease. They imposed restrictions on access to land, appropriating what the government deemed to be “superfluous” (179) to pastoral nomadism or in excess of one person’s “labor use” (249). They also pressured indigenous farmers to shift from growing rice, a staple, to growing cotton, a cash crop. Such moves eroded an essential aspect of indigenous practices that Kyle Whyte has identified as redundancy, the ability to derive sustenance from multiple sites to guard against environmental fluctuations.\footnote{Kyle Whyte, “Settler Colonialism, Ecology, and Environmental Injustice,” \textit{Environment and Society} 9, no. 1 (September 2018): 125–44 (132).}

We might see the famine beginning in Central Asia in 1918—“well before the better-known famine in southern Russia in 1921” (227)—as a consequence of the loss of redundancy. Might we also draw a line from that devastation to the Kazakh famine of 1930-1933, which resulted when the Soviets determined to confiscate land and livestock from nomads? During the collectivization campaign of that period, the Stalinist regime directly attacked the bases of pastoral nomadism, including kinship ties, which as Whyte argues underpinned indigenous practices of interdependence. The deaths of over one million Kazakhs can be seen as a devastating instance of environmental injustice brought upon by settler colonial domination.\footnote{Whyte, 127. On the Bolshevik assault on pastoral nomadism, see Sarah Cameron, \textit{The Hungry Steppe: Famine, Violence, and the Making of Soviet Kazakhstan} (Ithaca: Cornell University Press, 2018).}

On the other hand, the particularities of Russian and Soviet colonialism may call for refinements of an environmental justice framework. Peterson points out that “relations in non-Russian regions of the Russian Empire were far too complicated to depict with one single model of colonizer and colonized” (13). Does her narrative’s emphasis on colonial hybridity, in which colonizers incorporated rather than erased indigenous practices, blur the boundary between the dominant and the marginalized? Indigenous groups had stakes in irrigation as well, and some people, such as the Kazakh Sultan Sadyk, sought to shape Russian endeavors in Central Asia. It is also unclear whether the “Tajik authorities” (268) who supported the Vakhsh Irrigation Construction Project included native cadres and what hopes they may have had for development. On the other hand, the government sometimes sought to restrict Slavic settlement and, in the case of the Bolsheviks, punished supposedly wealthy Slavic peasants with forced labor.

One might also ask to what extent either empire or settler colonialism offers an optimal path toward understanding the Soviet Union. \textit{Pipe Dreams} highlights coloniality in order to criticize the Soviet regime: by perpetuating imperial policies of inequality and exploitation, the Bolsheviks failed to fulfill their emancipatory claims. But some scholars have emphasized that the violence of Soviet rule followed from the pursuit of equality and progress rather than the betrayal of those goals. Instead of an empire, they have characterized the USSR as an “activist, interventionist state” that departed qualitatively from colonial empires in its utopian, transformative ambitions.
and social intrusiveness. More so than Imperial authorities, the Soviets simultaneously upended Kazakh livelihoods and created new opportunities for upward mobility. Analyses of settler colonial societies have highlighted the drive to displace and eliminate indigenous groups. Yet the Kazakh famine resulted from the attempt not to eliminate Kazakhs but rather to force their transformation into a prescribed modern nation divested of nomadism. Kazakhs’ social identity as nomads made them targets, and the resulting catastrophe disproportionately affected them as an ethnic group. Given fluid identities and the politics of Soviet socialism, how might environmental justice look differently in Eurasia, especially with regard to the fault lines of race, ethnicity, and nationality?

Pipe Dreams awakens many more ideas and questions than I have raised in this essay, a testament to the expansiveness of the story it tells. Although they only scratch the surface, I offer these thoughts in hopes of motivating engagement with a work that deserves to be widely read. May Pipe Dreams continue to spark discussion and debate as a tribute to its intrepid author, an accomplished historian and beloved colleague too soon gone from us.

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14 See, for example, Adeeb Khalid, “The Soviet Union as an Imperial Formation,” in Imperial Formations (Santa Fe: School for Advanced Research Press, 2007), 113–39.

Comments by Heather Hoag, University of San Francisco

Hoag remembers Peterson: *I consider myself very lucky to be part of the water history community where colleagues quickly become friends. It was through the International Water History Association conferences that I met Maya. We shared a love of history, travel, a good beer, and the outdoor California lifestyle. She was funny, wicked smart, and passionate about her research. When asked to review her book for this roundtable, I jumped at the opportunity to learn more about what drove her to study a part of the world I knew nothing about. As I read Pipe Dreams, I recalled stories she told about her time in Central Asia and could practically hear her laughing and recounting her adventures. Maya is deeply missed. My hope is that others will discover her work and find inspiration in it.*

As someone who studies comparative water history but is relatively unfamiliar with tsarist Russian/Soviet history, the opportunity to read and comment on Maya K. Peterson’s *Pipe Dreams: Water and Empire in Central Asia’s Aral Sea Basin* was one I couldn’t pass up. The story of how the tsarist and Soviet governments attempted to make the deserts bloom through the development of canal irrigation is one of optimism, hubris, and, in the end, environmental folly. Following in the footsteps of American environmental historians like Donald Worster, Peterson examines the ways in which human societies have sought to impose their vision on arid environments and the people who reside in them.¹⁶ *Pipe Dreams* can be read as a lesson in the challenges of planning and constructing large water projects in colonial spaces where the outside authorities do not have a firm understanding of the environmental and social contexts. Peterson adds an important case study to the growing literature on global water history. A key theme in this literature is the shared belief states and engineers had in the modernizing elements of water projects. Irrigation canals, drainage ditches, barrages, and dams all have been poignant symbols of the power of humans to shape, control, and bend nature to our needs. As the case of the Aral Sea Basin shows, these efforts were not without consequences for both people and the environment. Moreover, they continue to shape land- and waterscapes today. Understanding the context within which these projects were promoted, planned, and constructed leads to a more nuanced understanding of human-nature relations and hopefully more sustainable environmental policies.

Peterson aptly notes, “Russian and Soviet colonial schemes to transform the arid lands of Central Asia paralleled similar schemes undertaken in the late nineteenth and twentieth centuries across arid landscapes from North Africa to Australia, from China to the American West, driven by similar visions of modernity, and what it meant to be civilized” (3). It is this colonial experience that I want to focus on as what I found most striking in the book was the connections and similarities between the Central Asian cases presented and those I have studied in other colonial societies. Much of my

work has been on African rivers and the attempts of outsiders—both foreign and domestic—to harness their waters for irrigation, urban and domestic use, hydroelectric power, and political prestige. Sometimes these projects have been firmly within a colonial setting, such as the development of the Gezira Scheme by the British in Sudan. We often see the continuation of the colonial relationship and projects after political independence. This is the case with most 20th century African water projects. For example, Tanzania’s Stiegler’s Gorge dam (now being built as the Julius Nyerere Hydropower Station) was proposed during the colonial period and pushed by urban-based planners and international engineers following political independence in 1961. The Rufiji River Basin, the area most impacted by the project, has remained subjugated—now to the Tanzanian rather than the British government—with decisions, technical expertise, and benefits being almost entirely made outside of the region. As Peterson shows for Central Asia, when it comes to large-scale water projects, there was much more continuity than change between different political regimes. Like the physical projects themselves, project plans often outlast the regime that conceived them.

In both the Central Asian and African cases, a focus on water projects is an effective way for environmental historians to trace how states attempted to alter and control nature and “natives.” The theme of modernity and how the tsarist Russian/Soviet state envisioned it is central to Peterson’s story. The desire to make order of uncooperative environments—be they too dry, too wet, or “misused” by indigenous communities—is a dominant ethos in the nineteenth and twentieth centuries. Water and its control by humans and machines was seen as central to the promotion of modernity. Irrigation “fantasies” and “imagined visions” motivated individuals like the Grand Duke Nikolai Konstantinovich. When reading about the Grand Duke’s commitment to transforming Turkestan into an irrigated paradise, I thought of Winston Churchill sitting at the headwaters of the Nile River in Uganda in 1907, dreaming of turbines. “So much power running to waste...such a lever to control the natural forces of Africa ungripped, cannot by vex and stimulate the imagination,” Churchill lamented. The belief that uncontrolled water was wasted and in need of human manipulation was shared by colonial authorities around the world.

Peterson adeptly shows that regardless of such grandiose plans the Central Asian environment was not simply a stage upon which human ideas about progress played out, but also an actor in shaping human action. These were complex environmental and social systems, which outsiders often had difficulty understanding. This led to project plans based on incomplete data, a very common theme in colonial water projects. Outsiders made assumptions about where former waterways and canals flowed and falsely claimed that land not currently used by nomadic communities was

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“excess” (163). The losers in this process often were indigenous communities, whose environmental knowledge was both recognized as valuable as well as ignored as “primitive.”19 Enter the Grand Duke again. Peterson sympathetically shows how he recognized the success of local practices of water management and the thrill in the community’s manual approach to canal upkeep; blinded as he was by his imagined future for the region though, he saw both as inadequate and in need of Russian guidance to fully recognize the region’s agricultural potential (108).

Undeterred by environmental constraints, geographical distance, local support, and limited finances, engineers forged on, confident in their ability to transform nature to their vision. I was repeatedly struck by the similarities in the language used to describe the Central Asian landscapes and its people. To outsiders, the Hungry Steppe was a “wasteland” in need of transformation or restoration by Russian ingenuity and example (106). Its people were often presented as “primitive” and in need of “civilizing.” Such presentations abound in the colonial documents on African environments and peoples as well. For example, during the construction of the Akosombo Dam in Ghana, news reports described the region as “once inhabited by demons, crocodiles, snakes and wild lizards” and “notoriously known as a wasteland.” One resident said the government had “condemned our territories as unhealthy, mosquito-infested, swampy and underdeveloped and therefore economically and socially useless.” 20 The presentation of indigenous peoples as “culturally backward” and their environments as “wastelands” justified in the minds of outsiders (and some locals) the imposition of their vision to colonial lands and people (7-8). Both were in need of a “civilizing” hand—whether through example or force. How did the change of regimes influence this characterization? With the independence of Central Asian states, was there a recognition of the value of local environmental knowledge and practice or a continuation of the theme of “primitiveness?”

Large water projects were viewed as valuable ways to develop unruly lands and peoples and spur economic development. From the state perspective, irrigation projects were both aspirational and pragmatic. However, as Peterson and others have shown, even during the planning and construction phases many projects were not economically viable. The high costs in terms of capital, labor, and unintended consequences were noted at the time. These concerns were overshadowed by the commitment to “progress” and the symbolic role such projects assumed. They were viewed as evidence of the power of the state and of key political figures, after which many were named. From the Grand Duke to Stalin, irrigation canals served to bolster the image of the generous benefactor, and were framed as gifts to the colonial subjects (who were the ones who built them with their labor and taxes). As Joseph

19 For an example of this characterization of African irrigation technology, see Matthew V. Bender, Water Brings No Harm: Management Knowledge and the Struggle for the Waters of Kilimanjaro (Athens, Ohio: Ohio University Press 2019).
Chamberlain put it in 1897 in regards to the British Empire, “the sense of possession has given place to a different sentiment—the sense of obligation. We feel now that our rule over these territories can only be justified if we can show that it adds to the happiness and prosperity of the people.”

The narrative of benevolence underscored both colonial and post-colonial water development around the world.

What was the tsarist Russian/Soviet vision for the Central Asian plains? Peterson argues that government planners were “single-minded” in their focus on developing the region as a center of cotton production. The goal was to end the reliance on American cotton and support the development of a national textile industry, while also providing opportunities for settlers. To achieve this, engineers fixated on the construction of irrigation canals and the planting of American and later Egyptian cotton varieties. As Peterson notes, American historian Sven Beckert’s *The Empire of Cotton: A Global History* examines the role of cotton in the context of the spread of capitalism. This cult of cotton was very present in other colonial states, such as India, Egypt, Sudan, Mali, and Mozambique, to name a few. For many colonial states, the definition of the “proper use” of water was the production of cotton to support the metropolitan textile industry. The focus on large-scale cotton production was to the detriment of small-hold farmers and pastoralists. It also led to the decline of food crop production and necessitated the shift of food crops to other areas. It would be interesting to further explore comparative cases of cotton development and their impact on land, people, and institutions. How does Central Asia’s experience with irrigated cotton compare to that of other regions?

The final point I want to discuss is the role of the engineer. As individuals or as a collective, engineers played a key part in pursuing the vision of harnessing the world’s waters for human benefit. The ‘we can engineer our way out of this problem’ approach reigned. Peterson illustrates the impact of engineers on Central Asian landscapes and their sometimes tense relationship to the government. More importantly perhaps, she shows the international network that connected engineers around the world and further entrenched modernist visions of water development. International expositions, training institutions, state- and company-sponsored tours, and international contracts led to the ascendancy of an irrigation paradigm that connected hydraulic engineers from diverse nations. The involvement of Arthur Powell Davis, director of the U.S. Reclamation Service (now Bureau of Reclamation) in Soviet water development is one example. Engineers around the world travelled to

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the U.S. to visit water projects, returning home with goals of replicating the American experience. International engineering firms and construction companies too shaped (post)colonial spaces, constructing the canals and dams that now control water in the Global South. Engineering schools served as vehicles in disseminating the dominant approaches of the day. The water as modernity paradigm was so entrenched that critics who raised questions about the negative environmental, social, and economic impacts of large projects were ignored. Did this pattern hold after 1945? How were engineers viewed by later administrations? Now that some engineers are proposing river diversion schemes to replenish the Aral Sea, is there a danger of repeating the mistakes of the past? And how do affected communities view such projects now and the engineers who promote them?

In conclusion, Peterson's *Pipe Dreams* is far more than an important case study of irrigation development in Central Asia. She contributes to the growing historical scholarship on global water history and underscores the important role placed on water as a vehicle for modernizing colonial spaces and peoples. Part of this story is one of the shared mistakes made by governments and engineers across the world. Problems with data, limited understanding of the environmental and social conditions of a region, and unintended negative consequences of large projects further demonstrates the complexities of water development. More cases like those examined in *Pipe Dreams* can help us to better manage our global water resources and avoid some of the mistakes of our predecessors. With climate change altering the availability of water resources and necessitating new environmental management strategies, learning from the past is more important than ever.
About the Contributors

Ellen Arnold is the co-editor of the journal Water History. Trained as a medievalist, she is a scholar of water, rivers, and saints. She was a fellow at the Rachel Carson Center and worked at the University of Stavanger Greenhouse Center for Environmental Humanities. She also taught at Ohio Wesleyan University and is now senior-lecturer at the Ohio State University.

Pey-Yi Chu is a historian of the Russian Empire and Soviet Union and an associate professor of History at Pomona College in Claremont, California. Her interests center on the history of science and environmental history. She is the author of The Life of Permafrost: A History of Frozen Earth in Russian and Soviet Science (University of Toronto Press, 2020)

Heather Hoag is a Professor of History at the University of San Francisco. She specializes in the fields of African history and environmental history with a special emphasis in water development and food history. She received her Ph.D. in History from Boston University where she was involved in BU’s African Studies Center. From 2008-2017, she served as an editor-in-chief of the International Water History Association’s journal, Water History. Her book, Developing the Rivers of East and West Africa: An Environmental History (Bloomsbury Academic 2013), examines from a comparative perspective the role of rivers in former British colonies. Her current project explores the history of marine fisheries in West Africa.

Maya K. Peterson, a leading scholar in the fields of environmental, Russian, and Central Asian history, died tragically in childbirth in June 2021, along with her daughter Priya Luna. At the time of her death, she was an Associate Professor of History at the University of California, Santa Cruz. Pipe Dreams: Water and Empire in Central Asia (Cambridge University Press, 2019) was her first book and a finalist for the Central Eurasian Studies Society’s prize for best work in history and the humanities. Maya’s colleagues have written a loving In Memoriam statement, available via UCSC.

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