ISSUE EIGHT : FALL 2017 OPEN RIVERS : RETHINKING WATER, PLACE & COMMUNITY

GRASPING WATER

http://openrivers.umn.edu An interdisciplinary online journal rethinking the Mississippi from multiple perspectives within and beyond the academy.

ISSN 2471-190X

The cover image is of Delta of the Yellow River, China (top) and Delta of the Zambezi River, Mozambique (bottom). Landsat imagery courtesy of NASA Goddard Space Flight Center and U.S. Geological Survey.

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ISSN 2471-190X	

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INTRODUCTION INTRODUCTION TO ISSUE EIGHT By Patrick Nunnally, Editor

T will keep this brief before I turn things over to our capable and distinguished guest editors Ruth Mostern and Ann Waltner, both of whom are professors of Chinese and world history.

A year ago June, when the Grasping Water Institute was wrapping up, I reflected on how interesting it was to hear thoughtful, incisive talks about rivers I had never heard of, from people whose work I did not regularly follow. "It would be great," I thought, "if some of these folks could be persuaded to write for us." The results, thanks to Professors Mostern and Waltner, are in front of you.

I just want to make three introductory points. The first is that the international dimension reflected in this issue is new for us, and welcome. It's a truism that travel broadens the individual; the same can be said about learning about rivers and water issues far afield of one's usual domain. You will continue see work from international places here, though always with some thought about its relevance to a North American audience.



Whanganui River, New Zealand by Jason Pratt, via Flickr. CC BY 2.0

Second, another new component for us this issue is the inclusion of material previously posted elsewhere, in this case through "<u>The Conversation</u>," a digital, Creative Commons licensed platform that covers all manner of subjects with "academic rigor and journalistic flair." The two pieces included in our issue, found in our Perspectives column, directly address issues we think about a great deal. They are insightful, clearly written, and contribute substantially to the discussions we are creating. We're pleased to include them, and hope you find them interesting as well.

Finally, this issue, which marks the completion of two years of publication, is our first issue to

include a peer-reviewed article. Peer review has long been a standard for publication in academic circles. A journal like ours, which includes work of academic writers as well as community-based thinkers, and which reaches audiences on and off campuses, can benefit from offering peer review for writers to whom that is important. We can now incorporate this kind of review and assessment into our work, and look forward to working with early career academic writers in coming issues.

Happy reading!

Recommended Citation

Nunnally, Patrick. 2017. "Introduction to Issue Eight." *Open Rivers: Rethinking Water, Place & Community*, no. 8. <u>http://editions.lib.umn.edu/openrivers/article/introduction-to-issue-eight/</u>.

About the Author

Patrick Nunnally coordinates the River Life Program in the Institute for Advanced Study at the University of Minnesota. He serves as editor for *Open Rivers* and was one of the lead scholars for the University's John E. Sawyer Seminar, "Making the Mississippi: Formulating New Water Narratives for the 21st Century and Beyond," funded by the Andrew W. Mellon Foundation.

INTRODUCTION GUEST EDITORS' INTRODUCTION TO ISSUE EIGHT By Ruth Mostern and Ann Waltner

We are delighted to serve as co-editors for this special issue of Open Rivers. The essays and exhibits showcased here emerge from a Summer Institute that we co-hosted in collaboration with the Institute for Advanced Study in July 2016. Titled "Grasping Water: Rivers and Human Systems in China, Africa, and North America," the Institute was sponsored by the Chiang Ching-kuo Foundation and

the Consortium of Humanities Centers and Institutes with additional support from various departments and programs at the University of Minnesota.

The Summer Institute sought to examine rivers ecologically, at the intersection of the physical world and human culture, in ways that demanded both humanistic and scientific perspectives. The



The Yellow River Breaches its Course, ca. 1160.

attempt to control rivers—to minimize flooding, to facilitate transportation, and to provide water for drinking, irrigation, and electric power-is one of the great enterprises of the human past and present. It is an enterprise with a checkered history: the control of nature has proven to be a vexed question. The question of control of rivers is deeply political: who sets the priorities for river use, who invests in river projects, where is knowledge about rivers produced, who benefits from river control? How do rivers figure into narratives about local meaning and identity, and who sets the terms for those conversations? The Institute looked at the various ways in which communities and political entities in China, North America, and Africa have dealt with the problem of controlling rivers in comparative and historical perspective.

Our international and interdisciplinary participants took part in roundtables, joined a workshop on river science for humanists, received introductory training in GIS and cartography methods, explored digital scholarship and online resources for curriculum development and support, viewed an art exhibit, and boated on the Mississippi River. We pre-circulated readings and involved environmental scientists, filmmakers, and geographic information scientists as well as humanists so that the Institute was a learning experience for everyone. The articles and columns in this issue of Open Rivers reflect the types and breadth of the work we did together in the summer of 2016, and we are pleased to be able to share it here.



Participants of the Grasping Water Institute on the Mississippi River. Image courtesy of Phyllis Mauch Messenger.

This issue of Open Rivers includes features by Sigma Colon, Rina Faletti, Anabel Galindo, Kan Li, and Ian Teh. The five features reflect on one another in a myriad of ways, and in conjunction with each other, they should launch new kinds of conversations. Architectural historian Faletti and historian Li both deal with the challenges of managing rivers in imperial cities at times of political transition, with Faletti addressing eighteenth-century New Orleans, and Li discussing nineteenth and twentieth-century Tianjin. Although the scales and circumstances differ substantially, both concern the kinds of ambitious water engineering projects that needed to be completed for cities to serve the roles that rulers imagined for them and for rivers to serve as urban emblems. Teh and Colon meditate in different ways on the aesthetics of radically

transformed rivers. As a photographer, Teh finds beauty, geometry, and luminous light on the contemporary Yellow River that traverses an ambitious and fragile China, even through haze, industry, and large-scale infrastructure. Colon, in the same vein, traces the ways that scenic guides and other works of popular geography made distant rivers visible and beautiful to armchair readers in nineteenth-century America, creating support for ideologies that arced from colonization to conservation. Galindo writes about the ways in which the water crises facing the Yaqui peoples along the Hiak Vatwe in northwestern Sonora are the product of historical inequalities, and also about the ways in which the Indigenous communities are seeking solutions to the problem of an impaired river. These are just a few of the many currents that readers may follow to connect



Grasping Water attendees having dinner on board the sternwheeler Jonathan Padelford on the Mississippi River. Image courtesy of Phyllis Mauch Messenger.

these articles. The articles surface many themes from the Summer Institute—how rivers serve as sites of pleasure and beauty, as containers for political and economic power, and as challenges to engineering prowess.

In addition to the five feature articles, this issue of Open Rivers includes several other pieces that emerged from the Grasping Water Institute. The relationships of Indigenous peoples to rivers were one theme of our Institute discussions, and so we are offering two Perspectives columns, previously published work that forefronts that perspective. Our Teaching and Practice column is the bibliography of pre-circulated readings that formed the common vocabulary and knowledge base for Institute participants. Two eminent Institute participants have written Geographies columns. Anthropologist Stevan Harrell explains that the meaning of the Anthropocene is that we are running out of resilience itself, not just particular planetary resources. World historian Patrick Manning offers a prototype for a historical atlas of rivers and watersheds, demonstrating the kinds of historical insights that river maps can offer at a range of spatial scales from the global to the local. Christopher Caskey's In Review column looks at various works of recent scholarship about world rivers, and he asks an intriguing question about them: why do we spend so little time studying and thinking about what rivers sound like and how humans have silenced them over time? Showcasing the maps that she presented in the Institute tour of the University of Minnesota Special Collections, Marguerite Ragnow has gathered images of some extraordinary early modern cartographic treasures from the James Ford Bell Library collection, which reveal how rivers have always oriented the makers and readers of maps. Our objective in presenting this collection of columns is to reproduce some of the spirit of broad and interdisciplinary inquiry that animated the Institute itself and to share some of the material that we looked at and discussed together there.

Regrettably, none of the Africanist scholars who participated in the Institute could submit work for this issue of Open Rivers, so we would like to acknowledge those participants and the important contributions that they made to the Institute. Our African participants were: Jacqueline Goldin, a cultural anthropologist and water policy expert from the University of the Western Cape; Mucha Musemwa, a historian of water in colonial and postcolonial Zimbabwe from the University of the Witwatersrand; Philip Olayoku, a research fellow at the University of Ibadan who studies the social and cultural impacts of dam resettlement in Nigeria, and Kwadwo Owusu, a geographer from the University of Ghana, who examines rivers and development at a time of climate change in both Africa and China. We very much hope that the work of some of these scholars will appear in future issues of Open Rivers.

In short, we hope that the collection of thoughts about world rivers that we have gathered in this special issue of Open Rivers suggests the insights and serendipitous connections that the Summer Institute offered to those who participated in it directly. We anticipate contributing to a growing and interdisciplinary conversation about rivers in history, culture, science, and engineering. We know that people, other species, and the rivers with which they live are always on the move together and always affect one another, and we can see that rivers reflect human power while they also power human activities. We historians generally think about human territories that are relatively shapely and compact: cities, nations, and places of shared experience. Rivers are not like this at all. They are long and skinny, they both connect and divide people, they are never still, and they traverse many ecosystems and cultures. However, despite their diversity, they all offer irrigation, drinking water, hygiene, transportation, and energy to the people who live alongside them. When we study the histories and geographies of rivers worldwide, we gain insight about these processes on rivers close to home as well. Studying rivers and thinking seriously

about them thus requires new ways of thinking about people and space, but we are certain that it is worth learning these new frameworks since rivers are vital to all forms of human life and flourishing.

About the Authors

Ruth Mostern is Associate Professor of History and Director of the World History Center at the University of Pittsburgh. She is the author of *Dividing the Realm in Order to Govern: The Spatial Organization of the Song State (960-1276 CE)* (Harvard 2011) and the co-editor of *Placing Names: Enriching and Integrating Gazetteers* (Indiana 2016). Her current book project is entitled *Following the Tracks of Yu: The Environmental and Imperial Worlds of the Yellow River*. She has co-organized several workshops and meetings on global river history including Grasping Water at the University of Minnesota.

Ann Waltner is a professor in the Department of History at the University of Minnesota. She writes on Chinese history and comparative gender history. Recent works include *The Family: A World History* (with Mary Jo Maynes) and a comprehensive website on the eighteenth-century Chinese novel *Dream of the Red Chamber*, which can be found at <u>http://z.umn.edu/redchamber</u>.

FEATURE WATERSHED COLONIALISM AND POPULAR GEOGRAPHIES OF NORTH AMERICAN RIVERS By Sigma Colon

Rivers have long been the subject and vehicle for compelling stories.[1] As physical features that tie natural and human history, rivers in narratives have hidden as much as they've revealed by naturalizing cultural practices and human values. Placing river stories together, in a genre I describe as popular geographies of rivers, forces their secrets to surface. What this



Select covers from the 'Rivers of America' book series.

remarkable genre in American cultural history reveals are ongoing processes of watershed colonialism. Beginning with nineteenth-century narratives of river exploration, then moving to twentieth-century regional histories of river folk, and ending with twenty-first-century river documentaries, this essay engages the imperial projects, settler colonialist justifications and race-based nationalisms, hydroredemptions and decolonization efforts, integral to a wide-ranging tradition—both temporally and spatially—of river geographies written for popular audiences.

Colonizing the Headwaters of the Mississippi River

Not surprisingly, the Mississippi River provides a basis for physical and literary beginnings. In 1834, Henry Rowe Schoolcraft framed his Narrative of an Expedition Through the Upper *Mississippi, to Itasca Lake* (1834) as helping to resolve the last of "three important problems" in "American Geography." All were related to rivers, the first two involved finding the source of the Missouri and mapping the Columbia, and the third was to establish the "true source of the Mississippi."[2] At the behest of Thomas Jefferson, Lewis and Clark had resolved the first two in their search for a route to the Pacific Ocean. Lewis and Clark's exploration narratives familiarized future settlers with geographies that would help inspire what historian Bernard DeVoto called "the desire of the westering nation"-essentially to colonize its way to the Pacific.[3] A series of explorers set out to mark the source of the Mississippi for military and government-sponsored campaigns. By 1889 the Minnesota Historical Society commissioned Jacob V. Brower to do a topographical and hydrological survey that would settle competing claims. In response to Brower's conclusion that

Schoolcraft had it right all along, the Minnesota State Legislature created a state park in Lake Itasca to fix the source of the Mississippi.[4]

The desire for a conclusive designation of the Mississippi's source had its roots in colonial territorial claims determined and bounded by the watersheds of rivers. Based on the geographical contiguity of rivers, Law Professor Robert J. Miller observes that the European doctrine of discovery-which has been used to dispossess Native peoples of their ancestral land and resources worldwide-held that European "discovery" of the mouth of a river created a claim over the entire watershed as well as any adjacent coast.[5] As geographer Rich Heyman points out, the French claim over the Louisiana Territory began with French explorer Robert de La Salle's proclamation in 1682 at the mouth of the Mississippi that effectively took possession of all land drained by the river.[6] After Jefferson purchased the Louisiana Territory from the French in 1803, the U.S. government had proceeded to assess its acquisition, including determining and mapping the source of the Mississippi River.[7]

Popular Geography

Both the narrative that Schoolcraft discovered the source of the Mississippi and his account of that

expedition mark the beginning of a genre meant to engage broad audiences. Exhibits in Itasca

State Park, which hosts more than half a million visitors each year, memorialize Schoolcraft's discovery of the source in 1832.[8] Schoolcraft's narrative account published in 1834 by Harper & Brothers, and reissued in 1855, was widely read by his contemporaries and continues to be easily accessible through hard copy and digital formats. [9] His voyage to the Upper Mississippi has been described as one of "the most fully documented expeditions in American history" in part because of the journals and reports from other members of the expedition who published shortly after their journey to the source of the Mississippi.[10]

In the U.S., the genre's nineteenth-century roots had a second prominent tradition exemplified by one of the most enduring popular geographies: Mark Twain's Life on the Mississippi (1883). Twain provided a cultural history of one of the dominant uses of rivers, which during his time was as transportation corridors. The Mississippi River Commission, a division of the U.S. Army Corps of Engineers, became an object of ridicule for Twain who concluded of their efforts to control the river, "they could buy ground and build a new Mississippi cheaper."[11] As he described navigating the Mississippi River as a steamboat pilot, and compared it to the work of the Commission, Twain lamented the shift from recognizing the river as infinitely powerful and alive to imagining human dominion over it. Eventually the Army Corps would become the primary governing body with jurisdiction over U.S. rivers.

Popular geographic accounts of rivers from the 1800s through the 1920s exposed the convergence of settler colonialism and the spatial transformation of North American rivers. Organizations such as the Great Lakes-St. Lawrence Tidewater Association published geographies intended to educate government agencies and settlers on the use-value of their local rivers, for example, using the St. Lawrence as a source of hydroelectric power and advocating for the development of a shipping channel



through the river.[12] Scenic guidebooks, such as The Hudson River Route, included detailed maps, illustrations and advertisements for points of interest and lodging along rivers, in an effort to entice tourists to the "noble river" and impress them with "one of the busiest scenes of commercial activity in the world."[13] Similarly, on the West coast, compiled reflections on The Grand Canyon of Arizona, including a piece by explorer John Wesley Powell, persuaded readers that "toil from month to month through its labyrinths" to see firsthand the Grand Canyon of the Colorado River, would culminate in "sublimity... never again to be equaled on the hither side of paradise."[14] Less celebratory accounts lamented significant changes to river flow-in Tales of a Vanishing River, Earl Reed suggested that the "Kankakee of old has gone," when "the denuded winding channels," were altered beyond recognition.[15] Since their inception, popular geographies contributed to, and also contested, colonialist, progressive narratives of control and conquest through North American rivers.

Rivers of America -1930s

Popular geographies were serialized in the 1930s with the beginning of the Rivers of America volumes published from 1937 to 1974. Through prose, illustrations, and maps, Rivers of America produced regional forms of geographic lore that celebrated American nationalism. As dynamic reflections of the place of rivers in American culture, Rivers of America provided an antidote to what geographer Jamie Linton has describes as the "placelessness of modern water." [16] Of the 24 volumes originally commissioned with Farrar & Rinehart, editor Constance Lindsay Skinner assigned nearly half to women and none to an academic historian.[17] The series grew to a total of 65 volumes, each one about a distinct North American river. First editions appeared from 1937 with the Kennebec River of Maine to 1974 with the American River of California. Altogether the series had more than 350 known printings; millions of copies have been sold with approximately one-third of the titles still in print. [18]

Part of a humanist approach that connected readers to river regions, Rivers of America produced a narrative form of settler colonialist ideology and race-based nationalism that was upheld or challenged by individual authors.[19] In his volume, The Upper Mississippi: A Wilderness Saga (1937), Walter Havighurst was among the most blatant proponents of Euroamerican solidarity. "It is natural for racial groups to hold together," he wrote, and asserted that the "Indian menace" brought together Swedes, Norwegians, Scots, Germans, and New Englanders on the Upper Mississippi, and furthermore that the opposition to Native peoples "smashed the racial walls, compelled speech that was English of a sort, and drew the different groups into the closeness of one people."[20] For Havighurst, race-based nationalism extended to "Yankees, Southerners, Germans, and other breeds hemming the Norse settlements."[21]

In a 1935 essay appended to early volumes, entitled "Rivers and American Folk," Skinner invited



Rivers of America book series, selected titles.

readers to consider the Rivers of America series as a narrative and political act. "When American folk have troubles which do not end swiftly," they were inclined "to examine their own sources as a nation and their own story as a people."[22] For Skinner the source and the story of what it meant to be an American were intimately linked to waterways-the physical locations where "foreigners... began their transition from Europeans to Americans as River Folk." Skinner envisioned that sustained focus on nature's agency and the human struggle to navigate. harness, settle, and cultivate river landscapes would reveal the importance of folk culture. She assessed that "the natural rhythm moving the pioneer life of America forward was the rhythm of flowing water." She also referred to a literary movement when she announced, "It is as the story of American rivers that the folk sagas will be told."[23]

Though they adhered to twentieth-century paradigm shifts in the practice of geography and



revealed cultural politics of their contemporary moment, *Rivers of America* volumes focused primarily on narrative history and geography that extended to the end of the nineteenth century. Skinner's preference for focusing on river history prior to industrialization went hand in hand with her belief that descriptions of American pioneers would illustrate "a new thing on the earth, evolving a new faith and theory of government out of practical and physical struggle with the earth and under the menace of Indians and other wars (Spanish and French)."[24] She imagined that the "social significance" of focusing on a pre-industrial past would emphasize the "democratic ideal of the dignity of the individual." Narratives that paid special attention to the foundational American strengths "laid all over the land" would convey the auspicious beginnings for "the marvelous inventions that have speeded our labor and increased our riches built upon this foundation. Inventions of free-minded men in a free society." In practice, however, individual authors grappled with the significance of the past in the context of the major environmental and social costs they experienced in the present, the foundations of which many conveyed as undemocratic, environmentally and socially unsustainable.

In the book that launched the series in 1937, *The Kennebec: Cradle of the Americans*, Robert P. Tristram Coffin lamented that "greed has fouled the Kennebec" and he attacked the production of cheap goods and the shortsighted businessmen who prioritized consumer commodities over the future of a great river. [25] He advocated for environmental protections: "Stop the pollution by the mills and the cities, replenish the river from the hatcheries and lakes, and 'Kennebec salmon' need no longer be only a name on every hotel menu, and a myth, but can return to the nation's table."[26] Coffin critiqued industrialized lumber production: "Shortsightedness and the lumber merchants' impatience have brought down the chief Maine industry of the latter part of the nineteenth century to such small pickings. The small logs are cut up and peeled, rolled into the streams, and floated to the rivers when the thaws come. And the small streams of both the Kennebec and the Androscoggin are draining

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the last life of Maine's once magnificent forests away."[27] He described the era of trees ushering in an era of massive pollution as increasing amounts of wood by-products, such as sawdust were dumped into the Kennebec. This along with the dyes and chemicals of the paper mills that rose on the riverbanks marked the beginning of massive pollution in the 1870s and 80s. Coffin recognized, however, that those processes created work for thousands of people.[28]

The perennial tension for *Rivers of America* authors was the consumption of rivers and social life by industry. "With the exception of agriculture," writes historian Patrick Wolfe, no industry "provides a sufficient basis for social life. You cannot eat lumber or gold; fishing for the world market requires canneries. Sooner or later, miners move on, while forests and eventually even fish become exhausted or need to be farmed."[29] Whereas Skinner imagined the continuity of what she thought of as the American democratic ideal, *Rivers of America* volumes engaged the aftermaths and ongoing incursions of watershed colonialism.

In The Powder: Let'er Buck, Maxwell Struthers Burt critiqued the extensive environmental degradation caused by the Northwestern cattle business and examined the systematic circumstances of settlement that exacerbated that depletion. [30] He wrote extensively on the Sioux who he described as following the buffalo who in turn "followed the grass, across the greatest grasslands this country has ever known."[31] For Burt the confrontation between Euroamerican settlers and Native peoples was "one of the great tragedies of history."[32] In all the time that the Sioux and the buffalo occupied the Powder River region, Burt argued, they had "kept inviolate the green strip of country."[33] Unlike the Sioux, he argued that the cattlemen who came after them "lived too largely and too carelessly. News of their easy profits spread too far. The Powder River country was opened up to white settlement in 1878; within five





years the grass was crowded."[34] For less than a decade cattlemen dominated, and by Burt's account, destroyed the region.

The emphasis on industry and labor within narratives of environmental change exposed tensions between glorifying and criticizing settler colonialism. In The Sacramento: River of Gold, Julian Dana detailed how Euroamerican settlers had destroyed fish stocks with hydraulic mining. In the mid-nineteenth-century, "gold and the machine against the land" led to enormous dumping in the river.[35] Without government regulation, Dana described every group who moved to the valley as polluting the rivers in the Sacramento basin exponentially through mining, ranching, and wheat cultivation.[36] According to Dana, when large-scale wheat production became more lucrative than mining, the few consolidated landowners, "Kings of Wheat," capitalized on farm mechanization that small owners could not afford, and hired hundreds of migrant laborers for harvest. Small farmers unable to compete "were gobbled up and added to the imperial holdings of the few."[37] Dana concluded that "the era of the capitalist had arrived and most of the small landholders were against this concentration of land in a few hands."[38] He described the Kings of Wheat as "the most colossal spenders of resources in our history. For fifty years the land had been sown to the same crop and it was tired."[39] Once the fertile land was exhausted, the large-scale farming methods and concentrated ownership that characterized wheat cultivation



became key features of the intensive cultivation of orchards, vineyards, and vegetable fields.[40] Dana criticized resource extraction and intensive farming that depleted the environment alongside consolidation of land and wealth. Profiling specific men who rose to power and prominence, Dana conveyed that without government regulation, individual actors acted in their sole best interest and, as a result, the environment was depleted and polluted.

Rivers of America-1940s and 1950s

In the 1940s, 32 of the *Rivers of America* volumes were published, and 13 were published in the 1950s. During the war years many books were published as special editions with a notice printed on dust jackets: "WAR EDITION." In her revised 1945 publication of *The James*, Blair Niles concluded her preface by referencing the "vision of freedom and of faith which has come to men in the foxholes, to men fighting on perilous seas, and in the air."[41] The imperative to defend Western culture became an ideological basis for river geographies including Paul Horgan's volume, which claimed a prophetic Anglo American Manifest Destiny to justify settler colonialism. In

his Pulitzer prize-winning volume, Great River: The Rio Grande in North American History (1954), Horgan mythologized Anglo American occupation of the Rio Grande as a facet of the manifest destiny that fueled American Western expansion, Native American removal, and war with Mexico.[42] He characterized General Taylor's Army on the Rio Grande as carrying a "collective prophecy" that he described as "their own seed," which they were compelled to "sow"[43]-the sexual connotation suggested the primary physical experience for the settler was in "overcoming a virgin land" and securing the cultural reproduction that would uphold settler colonialism.[44] According to Horgan, Rio Grande Americans had given birth to a new social world, "a society formed around a central passion: the freedom and equality of democratic man. A taste of this-the American theme-had already come near to the river with the Texan settlers in the south, and the trappers and traders in the north; but now once again change, coming with a final sovereignty, was about to make its way along the whole river with an energy and a complexity unknown in the earlier societies of the Indian, the Spaniard and the Mexican." [45] Horgan found no irony in the notion of spreading freedom and self-government through the conquest of Native peoples and land. He compared Western settlement to domesticating wild nature and characterized the colonizers as preordained objects and subjects of civilization, "plants turning toward the light and space of a new Eden," but also the gardeners, "Cotton Mather said 'the whole earth is the Lord's garden-why should men not tend its empty places?"[46] For Horgan, Anglo American occupation was natural and everlasting, "Wherever they put themselves on the earth, the American newcomers seemed able to take root against the wilderness."[47] North American primeval nature regenerated Europeans who had become "useless plants," wrote Horgan, "wanting vegetative mold and refreshing showers. They withered; and were mowed down by want, hunger, and war. The American is a new man, who acts upon new principles."[48] Horgan





used the past to try to interpret and construct a shared Anglo American historical and geographic culture.

Rivers of America-1960s and 1970s

In the final volumes of the 1960s and '70s, concerns over pollution and unabated dam construction made for volumes that identified watershed colonialism as national detriment rather than an imperative. Mirroring the shift towards applied geography in the 1960s, *Rivers of America* volumes moved from descriptive accounts of river regions to actively engaging federal environmental regulation, including the Wild and Scenic Rivers Act and the Clean Water Act. Senator Edmund Muskie made his first public appeal for support of clean water legislation in the *Rivers of America*. He had suggested to author Lew Dietz that he write a volume on *The Allagash* (1968), for which he wrote in the forward, "now, under a cooperative federal-state program, the Allagash will be protected in perpetuity as an unspoiled link with our past."[49] Muskie referred to a 1966 act passed by citizens of Maine as a kind of successful precursor to his own act. Whereas national legislation addressed ecological considerations within the context of expanding outdoor recreation opportunities, popular geographies consistently connected environmental degradation and pollution with environmental justice by lamenting the loss of livelihoods connected to river landscapes and by pointing to the interconnections between human and environmental health.

River Restoration

A key distinction between narrative geographies and histories of rivers is the insistence that it is necessary and possible to restore our rivers. Historians Christof Mauch and Thomas Zeller point out that in the decade after Bill McKibben's The End of Nature appeared in the late 1980s, a prevailing set of interpretations emerged based on the ecological determinants of rivers wherein scholars emphasized the decline, despoliation, and death of American rivers. Writers and scholars documented the life course of rivers as ending in decline, extermination, rape, silence, and death. Gregory McNamee mapped this trajectory onto the Gila River in his book, Gila: The Life and Death of an American River. Similarly, Blaine Harden wrote of the Columbia as A River Lost. Rivers became unrecognizable natural entities to scholars such as Philip Fradkin who describes the Colorado River as A River No More and Blake Gumprecht who characterizes the Los Angeles River as a non-river.



[50] Popular geographies of rivers constructed alternate narratives of rivers as fluid bodies capable of renewal and brought those qualities to bear in public debates and in widespread river restoration efforts.

National legislation adopted to clean and conserve rivers inspired a vast array of river restoration geographies across the country. Artists and scholars created popular geographies that helped make the history, geography, and ecology of urban rivers visible to a broad public. Lewis Mac-Adams, a man described as "the first person in 50 years to promote the idea that the L.A. River could be something more than a drainage ditch," characterized his first artistic piece concerning the L.A. River as "the first act of a 40 year artwork to bring the L.A. River back to life through a combination of art, politics, and magic."[51] Mac-Adams created a popular geography for the Los Angeles River—a river not included in the original *Rivers of America* series—in a book of poetry, The River: Books One & Two. He participated in a successful protest to stop the U.S. Army Corps of Engineers from building a sewer system that would have discharged the town's liquid wastes into the ocean.[52] As cofounder of Friends of the Los Angeles River (FoLAR), established in 1985, MacAdams' position as a representative of the river contrasts with that of Gumprecht, who describes his interest in the river as "more in its past than in its future."[53] Scholar Jenny Price spearheaded popular geographies including co-founding the Los Angeles Urban Rangers collective in 2005-an online platform replete with guided hikes and interpretive tools designed to help the public explore everyday habitats and help citizens identify public easements on the Malibu coastline that are seemingly blocked by private property.[54] The L.A. River found its most ardent supporters among urban dwellers, artists, and activists who in 2010 successfully lobbied that the river be entitled to protection under the Clean Water Act.





Hydroredemption on Film

The willingness to engage the histories and aftermaths of troubled hydraulic pasts together with the ability to imagine better futures became an excellent basis for film. By the early decades of the twenty-first century, river documentaries became the dominant form for popular geographies of rivers. Cinematic representations addressed the consequences of watershed colonialist strategies that had disconnected rivers from their floodplains, polluted and devastated their waters, and allocated water resources based on long-standing settler colonial inequalities. Films offered viewers reparative narratives by advancing possibilities for hydroredemption and raising public awareness.

River restoration efforts in the form of dam removal convey a desire to redeem hydrosocial processes that once destroyed natural environments. Reconnecting historic habitats for species-especially salmon, which are central to the culture and heritage of local tribes-become evidence of hydroremption in a plethora of films related to dam removal efforts on the Klamath River, including *Battle for the Klamath* (2005), Upstream Battle (2008), River of Renewal (2009), and A River Between Us (2014).[55] The most prominent dam removal film, DamNation (2014), emphasizes the successful removal of the Condit Dam on the White Salmon River in Washington and the largest dam removal in U.S. history on the Elwha River in Washington. The title of the film evokes religious connotations of divine punishment rendered in an afterlife for actions committed on earth-we see a reversal of the negative consequences of dams once they are removed. In more secular terms historian Donald Worster describes the dam removal movement in the U.S. as one of the "boldest challenges to the water empire."[56] The dramatic unveiling of rivers in the film DamNation occurs in tandem with an examination of the epistemology of water control and centralized governance within

federal agencies that first dammed, diverted, and destroyed US Rivers.[57] *Return of the River* (2014) focuses exclusively on the Elwha River, which was the first river restoration of its kind and provides a success story that conservationists continue to use as a model for the promise of hydroredemption and the ability of river systems to dramatically recover.[58]

A second form of hydroredemption, expressed in the documentary Lost Rivers (2012), involves uncovering and restoring urban rivers. Linton marks the transition to "modern water" during the end of the nineteenth-century as a time when hydraulic megaprojects attempted to accommodate growing water demands, address sewage problems related to rising populations, and create hydraulic infrastructure that removed water from central locations in order to control its provision. [59] Lost Rivers pivots on this symbolic moment when rivers went from being seen above ground, to being hidden and used from below. Rivers once polluted, diverted, and buried in the industrial city are unearthed and represented as sites of communal hydroredemption for white-collar workers in Seoul, Korea who find respite from their busy lives on the Cheonggyecheon River, school children who take part in the ecology of the Saw Mill River in New York, and transnational urbanites in London, Montreal, and Brescia, Italy who connect with local water sources. By linking underground waters to a common Edenic historical past before the ill effects of industrialization drove them underground, Lost Rivers is able to emphasize communities working together to recapture the connections fostered when people congregated around water-despite scenes of recognition that access to rivers if often unequal and segregated.

Testimonials on Film

River documentaries raise awareness by depicting rivers as visible markers of the legacy of watershed colonialism and imperialism locally and globally. Films developed to confront water struggles in the western U.S. include Wind River (2000), which portrays ongoing struggles between the Arapahoe and Shoshone Tribes against farmers and ranchers using the Wind River in Wyoming. [60] Watershed: Exploring a New Water Ethic for the New West (2012), produced by the Redford Center and Kontent films, focuses on the Colorado River as one of the most dammed and diverted rivers in the world that "struggles to support thirty million people."[61] In contrast to the high-quality cinematography of Kontent films, Remains of a River (2013) produced by Northwest River Supplies (NRS), offers candid videography and a more intimate portrayal of the troubled status of the Colorado River.[62]

Taking a global approach, the film *Watermark* (2013) begins with a silent and immense landslide of silt pouring out of the Xiaolangdi Dam on the Yellow River in the Henan Province of China. [63] The sound grows louder as the vertical lines explode with tremendous force into the river, creating enormous waves of silt and water, with plumes of air-born dust and water. Suddenly the camera stops on a still image of parched Colorado River Delta in Mexico, the cracked earth a visual testament of the upstream mega-dams that fueled U.S. development of the arid West.[64] The great dams of the American Southwest were put in place to divert water to U.S. agriculture and industry, leaving a visually captivating "saline dead zone" that appears in photographer Edward Burtynsky's images as an intricate tree-like structure with branching, salty streams. The camera follows the Lower Colorado where we see water that once flowed into the sea disappear long before reaching Mexico's Gulf of California. Burtynsky visually connects American and Chinese water control in a cinematic portrayal of Worster's contention that





China has gone on to emulate twentieth-century U.S. hydrological technologies.[65]

Conclusion

From the headwaters of the Mississippi River where Schoolcraft designated the source as part of an imperialist project to conquer and assimilate new territory, to Burtynsky's images of the Colorado River without a mouth, popular geographies testify to the movements and paralyzing consequences of watershed colonialism. Across this reach of time and geography, the deluge of exploration narratives; *Rivers of America* volumes; visual, poetic, and digital maps of degraded rivers; and documentary films indicate the appeal and power of telling river stories. Increasingly, popular geographies have become a forum for marginalized communities to engage histories of watershed colonialism and to raise awareness of decolonization efforts. Beyond what is included here, readers might imagine the breadth of geographies devoted to understanding and spatializing rivers within human history. The abundance and variety of river geographies indicate the potential of Rob Nixon's conviction that "stories matter... in a world drowning in data, stories can play a vital role...in the making of environmental publics and in the shaping of environmental policy."[66]

Footnotes

[1] Many thanks to the organizers and participants of the *Grasping Water: Rivers and Human Systems in China, Africa, and North America* Summer Institute at the University of Minnesota for broadening my conception of river geographies, and to Michael Denning who was instrumental in helping me develop the dissertation on which this piece is based.

[2] Henry R. Schoolcraft, Narrative of an Expedition Through the Upper Mississippi to Itasca Lake, The Actual Source of This River; Embrasing an Exploratory Trip Through the St. Croix and Burntwood (or Broule) Rivers in 1832 (New York: Harper & Brothers, 1834), 7–8.

[3] Bernard DeVoto, ed., *The Journals of Lewis and Clark*, maps by Erwin Raisz (Boston: Houghton Mifflin Company, 1953), lii.

[4] Henry Sibley, President of the Minnesota Historical Society correspondence to J.V. Brower, included in Jacob V. Brower, *The Mississippi and its Source: An Historical and Illustrated Geographical Record. A Narrative and Critical History of the Discovery of the River and its Headwaters, Accompanied by the Results of Detailed Hydrographic and Topographic Surveys* (Minneapolis, MN: Harrison & Smith State Printers, 1898. Reprinted in Minnesota Historical Collections. Vol III), 1.

[5] Robert J. Miller, *Native America, Discovered and Conquered: Thomas Jefferson, Lewis and Clark, and Manifest Destiny* (Lincoln: University of Nebraska Press, 2008). Robert J. Miller, "The Doctrine of Discovery: The International Law of Colonialism." Sandra Day O'Connor College of Law, Arizona State University, Chief Justice, Grand Ronde Tribe Court of Appeals. Preemption clause: 25 U.S.C. Section 177 (2006).

[6] Rich Heyman, "Locating the Mississippi: Landscape, Nature, and National Territoriality at the Mississippi Headwaters." *American Quarterly* 62:2 (June 2010), 311.

[7] Jacob Vradenberg Brower, *The Mississippi and its Source: An Historical and Illustrated Geographical Record. A Narrative and Critical History of the Discovery of the River and its Headwaters, Accompanied by the Results of Detailed Hydrographic and Topographic Surveys* (Minneapolis, MN: Harrison & Smith State Printers, 1893. Reprinted in Minnesota Historical Collections. Vol III), vii.

[8] Heyman, "Locating the Mississippi," 310–312.

[9] Mason, ed., *Schoolcraft's Expedition*, preface, xi; Over twenty editions were published between 1834 and 1998 (WorldCat identities); In 1953 Michigan State University Press began working to make Schoolcraft's major works available to the public including a 1958 edited volume (Mason, ed., Schoolcraft's Expedition, forward, viii).

[10] Lucile M. Kane, "Review of Schoolcraft's Expedition to Lake Itasca: The Discovery of the Source of the Mississippi," The Mississippi Valley Historical Review 46:1 (June 1959): 136–37.

[11] Mark Twain, Life on the Mississippi (Boston: J.R. Osgood, 1883), 267.

[12] Alexander T. Vogelsang, *St. Lawrence Power: Key to the Fuel Crisis on the Eastern Seaboard* (Great Lakes-St. Lawrence Tidewater Association, 1919).

[13] Charles Newhall Taintor, *The Hudson River Route* (New York: Taintor Brothers, 1900).

[14] *The Grand Canyon of Arizona: Being a Book of Words From Many Pens, About the Grande Canyon of the Colorado River in Arizona* (Chicago: Passenger Department of the Santa Fe, 1909), 32.

[15] Earl H. Reed, *Tales of a Vanishing River* (New York: John Lane Company; London: John Lane, The Bodley Head, 1920), 26, 28.

[16] Jamie Linton, *What is Water? The History of a Modern Abstraction* (Vancouver: University of British Columbia Press, 2010), 18.

[17] Constance Lindsay Skinner, "Rivers and American Folk," (1935), 3; Nicolaas Mink, "A Narrative for Nature's Nation: Constance Lindsay Skinner and the Making of *Rivers of America." Environmental History* 11:4 (Oct 2006), 761.

[18] Carol Fitzgerald, *The Rivers of America: A Descriptive Bibliography, Volumes I and II*, edited by Jean Fitzgerald (New Castle, Delaware: Oak Knoll Press, 2001), xxi.

[19] In his work expanding the terrain of cultural and ideological history, Michael Denning observes, "Rather than seeing ideology as a system of ideas, a worldview, a collection of fragmentary opinion— which can be characterized as true or false—one can see ideology as essentially narrative in character, a set of stories one tells oneself to situate oneself in the world, to name the characters and map the terrain of the social world" (*Mechanic Accents: Dime Novels and Working-Class Culture in America*. London: Verso, 1998, 78).

[20] Walter Havighurst, *The Upper Mississippi: A Wilderness Saga*, illustrated by David and Lolita Granahan (New York: Farrar & Rinehart, 1937), 53, 54.

[21] Havighurst, Upper Mississippi, 103.

[22] Skinner, "Rivers," 1.

[23] Skinner, "Rivers," 2.

[24] Constance Lindsay Skinner Papers, "Notes on Town Hall dinner speech," Box 17, Manuscripts and Archives Division of the New York Public Library.

[25] Robert P. Tristram Coffin, *The Kennebec: Cradle of the Americans*, illustrated by Maitland de Gogorza (New York: Holt, Rinehart & Winston, 1937), 271.

[26] Coffin, Kennebec, 273.

[27] Coffin, Kennebec, 165.

[28] Coffin, Kennebec, 156.

[29] Wolfe, Traces of History, 179.

[30] Maxwell Struthers Burt, *The Powder: Let'er Buck*, illustrated by Ross Santee (New York: Farrar & Rinehart, 1938).

[31] Burt, Powder, 3.

[32] Burt, *Powder*, 198.

[33] Burt, *Powder*, 5–6.

[34] Burt, *Powder*, 6.

[35] Julian Dana, *The Sacramento: River of Gold*, illustrated by J.O'Hara Cosgrave (New York: Farrar & Rinehart, 1939), 105.

[36] Dana, Sacramento, 155.

[37] Dana, Sacramento, 179, 191.

[38] Dana, Sacramento, 162.

[39] Dana, Sacramento, 179.

[40] Dana, Sacramento, 191.

[41] Fitzgerald, Descriptive Bibliography, xxi.

[42] Paul Horgan, *Great River: The Rio Grande in North American History* (Hanover: Wesleyan University Press, 1984 [1954]).

[43] Horgan, Great River, 619.

[44] Horgan, Great River, 626.

[45] Horgan, Great River, 619.

[46] Horgan, *Great River*, 620.

[47] Horgan, Great River, 402.

[48] Horgan, Great River, 621.

[49] Fitzgerald, Descriptive Bibliography, 10; Dietz, Allagash, xiii.

[50] Christof Mauch and Thomas Zeller, *Rivers in History: Perspectives on Waterways in Europe and North America* (Pittsburgh: University of Pittsburgh Press, 2008), 6. Gregory McNamee, *Gila: The Life and Death of an American River* (Albuquerque: University of New Mexico Press, 1994); Blaine Harden, *A River Lost: The Death of the Columbia* (NY: Norton, 1996); Philip L. Fradkin, *A River No More: The Colorado River and the West* (Berkeley: University of California Press, 1996); Blake Gumprecht, *The Los Angeles River: Its Life, Death, and Possible Rebirth* (Baltimore: Johns Hopkins University Press, 1999); Bill McKibben, *The End of Nature* (Random House, 1989). Not all river histories emphasized the de-spoliation of rivers, in *The Organic Machine*, Richard White posited that the Columbia was not gone, defiled, or dead, but retained a life and energy of its own that extends beyond human control. (Richard White, *The Organic Machine* (New York: Hill and Wang, 1995).

[51] Gumprecht, *The Los Angeles River*, 250, 253.

[52] Gumprecht, The Los Angeles River, 250.

[53] Lewis MacAdams, *The River: Books One and Two* (San Francisco: Blue Press, 1998), *Book One*, poem 16; Gumprecht, *The Los Angeles River*, 5; Friends of the LA River: <u>https://folar.org/</u>.

[54] Los Angeles Urban Rangers: <u>http://www.laurbanrangers.org/</u>.

[55] *Battle for the Klamath*, Dir. Steven Johnson, Veriscope Productions, 2005; *Upstream Battle*, Dir. Ben Kempas, Preview Production, 2008; *River of Renewal*, Dir. Carlos Bolado, Lobitos Creek Ranch, 2008; *A River Between Us*, Dir. J. Martin, It Matters, 2014.

[56] Donald Worster, "Flow of Empire: Comparing Water Control in China and the U.S.," *Rachel Carson Center Perspectives* (Munich, Germany: Rachel Carson Center for Environment and Society, 2011), 20.

[57] DamNation, Dir. Travis Rummel and Ben Knight, Patagonia, 2014.

[58] *Return of the River*, Dir. Jessica Plumb and John Gussman, 2014.

[59] Lost Rivers, Dir. Caroline Bacle, CatBird Films, 2012; Linton, What is Water, 13-19.

[60] Wind River, Dir. Drury Gunn Carr, High Plains Films, 2000.

[61] *Watershed: Exploring a New Water Ethic for the New West,* Dir. Robert Redford and Mark Decena, Redford Center and Kontent Films, 2012.

[62] *Remains of a River*, Dir. Will Stauffer-Norris, NRS Films, 2013.

[63] *Watermark*, Directed by Edward Burtynsky and Jennifer Baichwal, Sixth Wave Productions, 2013.

[64] *Watermark* includes personal testimonies of trauma as well. In his investigation on the formation of the environmental documentary genre Charles Musser describes a key feature of environmental documentaries is the trauma of ecological events and devastation people experience, "their lives have been upended, and they feel compelled to speak—to bear witness to their trauma often as a way to begin to take action and also begin the process of recovery." *Watermark* incorporates testimonies of trauma throughout. (Charles Musser, "Trauma, Truth and the Environmental Documentary," in Anil Narine, ed., *Eco-Trauma Cinema* (New York: Routledge, 2015), 47).

[65] Worster, "Flow of Empire."

[66] Rob Nixon, "The Great Acceleration and the Great Divergence: Vulnerability in the Anthropocene," Presidential Forum, *Profession* (March 19, 2014).

Recommended Citation

Colon, Sigma. 2017. "Watershed Colonialism and Popular Geographies of North American Rivers." *Open Rivers: Rethinking Water, Place & Community*, no. 8. <u>http://editions.lib.umn.edu/openrivers/article/watershed-colonialism/</u>.

About the Author

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FEATURE (PEER REVIEW) INDUSTRIAL ORNAMENT, MODERN SYMBOL: NEW ORLEANS' FIRST WATERWORKS ON THE MISSISSIPPI RIVER By Rina Faletti

Editors' note: This feature article has been peer reviewed.

The second city in U.S. history to debut a modern industrial urban waterworks system was New Orleans[1] (figure 1). Designed and



I. Tanesse's 1815 survey map of New Orleans. Note lower left inset image depicting Benjamin Latrobe's New Orleans waterworks, featured as one of the city's dozen most noteworthy buildings. Credit: 'Plan of the City and Suburbs of New Orleans' by I. Tanesse, William Rollinson, Charles Del Vecchio and P. Maspero (1815), Library of Congress, <u>https://www.loc.gov/resource/g4014n.ct000684/</u>.



Figure 1: New Orleans Water Works design, 1812. Designer: Benjamin Latrobe. Construction Supervisor: Henry Latrobe. Credit: Detail from 'Plan of the City and Suburbs of New Orleans' by I. Tanesse, William Rollinson, Charles Del Vecchio and P. Maspero (1815), Library of Congress, Geography and Map Division.

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built between 1811 and 1820, the New Orleans Waterworks displayed the most advanced innovations of its day, both in hydraulic engineering technology and in aesthetic architectural design. Its cutting-edge steam-powered pumps lifted water from the Mississippi River, fed it into a neoclassical-style waterworks pumping station, and then conveyed the water supply through a downtown distribution network of bored-log pipes. In addition to pioneering industrial machinery capable of pumping river water continuously under pressure and against gravity, the New Orleans system featured a vanguard architectural design. The neoclassical temple to water technology displayed a bold aesthetic form designed by the nation's leading engineer-architect and Architect of the U.S. Capitol, Benjamin Latrobe. Latrobe's temple form worked symbolically to brand the port city of New Orleans as a modern, industrious, and prestigious gateway to



The WATER WORKS, in Centre Square PHILADELPHIA.

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Figure 2: Philadelphia Centre Square Water Works, 1799-1801. Designer: Benjamin Latrobe. Credit: 'The Water Works in Centre Square' by William Birch (1800), from 'Birch's Views of Philadelphia in 1800', the Independence Hall Association, <u>http://www.ushistory.org/birch/plates/plate28.htm</u>.

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the new American West, and it advanced a vision of technological and aesthetic innovation for the United States.

It may be hard for readers today to realize that when the new steam-powered waterworks appeared, "the very notion of 'technology' as an agent of change scarcely existed."[2] Midtwentieth-century historian of the American West, Leo Marx, revealed that, from the Revolutionary War until deeply into the nineteenth century, industrial technology was deemed relatively trivial in comparison with agriculture: "Although many features of what we now call industrialism already were visible, neither the word nor the concept...was available."[3] Today, by contrast, our views of history and society are deeply defined by an integration of technology, not only as an agent of change, but as an omnipresent feature of daily life. Technology plays a major role in our senses of time, place, change, and well-being now, but two hundred years ago, just after the 1810 Census, the state of industrial technology was very different: the



BANK OF PENNYYLVANIA, South Second Smeet FILLADELPOIN.

Figure 3: Bank of Pennsylvania, Philadelphia, 1798. Design: Benjamin Latrobe. Credit: "Bank of Pennsylvania," engraving by William Birch, Wikipedia, <u>https://en.wikipedia.org/wiki/Bank_of_Pennsylvania</u>.

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United States numbered 17 states, with Kentucky and Tennessee the farthest to the west, and only five American cities had populations over 20,000. A concept of "urban places" was developing, and cities were just beginning to grapple with the need to increase water supplies through industrial technology.

One aspect of that problem, added to the task of inventive hydraulic engineering design, was to determine the physical form an industrial hydraulic works structure should take. Latrobe's design solution for New Orleans built upon neoclassical traditions, but broke ground with an unconventional drum-and-dome temple form featuring a portico of Greek columns. An octagonal drum rose from an office base featuring a pedimented colonnade; arched windows punctuated the office block; a clerestory of a dozen small windows ringed the drum; and an oculus centered on the dome was the mouth of a hidden smokestack.[4] Latrobe had introduced this Greek-inspired design a few years earlier, initiating in Philadelphia the nation's very first modern neoclassical waterworks[5] (figure 2, see also figure 7). The engineer-architect applied these formal innovations to all his structures, from public works like waterworks and lighthouses, museums and banks, churches and residential mansions, city halls and the U.S. Capitol (figure 3, see also figures 11–12). At this time, waterworks stood as an aesthetic and cultural equal with all major urban buildings.

The exemplary neoclassical building for the waterworks was more than simply an infrastructure warehouse limned with a decorative facade. It was a carefully studied design, inside and out. The arrangement of machinery within the open octagonal drum served as the core of a fully fitted engine house[6] (figure 4). Steam engine, boilers, and flywheel worked together within the compact cylindrical space to pull water up from the river, move it along a dock to the waterworks, and lift it up into its storage tanks, where gravity flow then conveyed water through 5,000 feet of wooden distribution pipes.[7] These "invaluable machines" carefully packed into the open cylinder of the waterworks temple drum showcased Latrobe's penchant for modern invention as he matched the groundbreaking machinery's utility with inventive architectural form.[8] With the formal design problems solved, "waterworks were not only the latest in steam technology, they were aesthetically pleasing as well."[9] Waterworks design began to play a leading role in creating an architectural signature for American cities.

The New Orleans Waterworks gave the Mississippi River a prominent monument, one very different from the city's architectural norm at the time. In New Orleans, French Creole was the local vernacular style. When Latrobe first visited the city, he admired its French identity, and lamented that "American" culture was rapidly overtaking the Old World French architectural styles in the city, "a replacement of good taste by bad." Latrobe observed that most recent buildings "exhibit[ed] the flat, dull, dingy character of Market Street in Philadelphia...instead of the motley and picturesque effect of the stuccoed French buildings of the city."[10] The unique Waterworks temple Latrobe then designed, sited prominently on the Mississippi River off Decatur Street (today the site of Latrobe Waterworks Park), stood out from among both the traditional French Creole architecture and the uninteresting warehouses near the growing market in the original town grid, now called the French Quarter or Vieux Carré (figure 5). In a city map of 1815, a drawing of the Waterworks highlighted it among a handful of the city's most prominent buildings[11] (figure 6). New Orleans was already an established city, and indeed a former French territory - the French Creole is a hybrid style that developed from its French, Spanish, and Caribbean stylistic historical influences-but the engineer-architect's introduction of a new look in European neoclassical architecture added a modern structural form to the more lyrical vernacular skyline.[12]



Figure 4: Benjamin Latrobe's Centre Square Water Works in Philadelphia, 1799-1801. Credit: Adam Levine, 'PhillyH20: The History of Philadelphia's Watersheds and Sewers', http://www.phillyh20.org/backpages/figures/Fig07_20040570221042_withnos.jpg.



Figure 5: New Orleans grid map (1811) showing the location (but not the final design) for the waterworks engine house. Note the planned waterfront fountain, never built. Credit: Image courtesy of Louisiana Division/City Archives, New Orleans Public Library.



Figure 6: 1822 plan drawing for the new vegetable market, showing the final waterworks location and design plan at the corner of Ursulines and Rue de la Levee (now Dacatur). Credit: Image courtesy of Louisiana Division/City Archives, New Orleans Public Library.
The Precedent for New Orleans: Philadelphia's Center Square Water Works

The New Orleans Waterworks was the second modern waterworks for both Latrobe and for the nation. The first had been at Philadelphia, the Center Square Water Works of 1801 (figure 7, see also figure 2). Pinpointed upon the central public square of William Penn's 1682 city grid plan, the round temple with its colonnaded porticoes was the city's centerpiece (figure 8). The architect's signature style—the domed neoclassical structure

with a portico of Greek columns—came to be revered as the American Greek Revival style, and it established the engineer-architect's immediate fame and eventual moniker, "The Father of American Architecture." His first successful buildings, with their domes, rotundas, and colonnaded porches, had caught President Thomas Jefferson's eye, and, in anticipation of the Louisiana Purchase Treaty of 1803, Jefferson



Figure 7: Period Image of Centre Square Works, ca.1810. Image courtesy of Adam Levine, Philadelphia. Water Department Historical Collection, <u>http://www.phillyh20.org</u>

brought Latrobe to Washington, D.C. as the Surveyor of Public Buildings and Architect of the Capitol. As the national architect, Latrobe supervised design and construction of all federal buildings and public works, with a special focus on the design for the future U.S. Capitol dome as an architectural symbol that associated Greek and Roman legacies with American civic ideals. From his position in Washington, he set his sights on New Orleans for the nation's second waterworks.

In 1803, New Orleans was slated to become the most prominent port in the United States. For many decades, most Americans were unable to imagine the full extent of the Western Territories' land mass, but infrastructure modernization as a foundation for future growth was emerging among planners as a new urban reality. Before the 1803 Louisiana Purchase, the 1800 U.S. Census listed 33 "Urban Places," whose populations ranged from the largest (New York City at 60,000, and Philadelphia at 41,000), to the smallest, which included Washington, D.C., with populations of less than 10,000. It might seem inconceivable today that even Manhattan, the most populated U.S. city since the Census began in 1790, did not have a modern water supply until 1842. More than four decades earlier, the waterworks Latrobe had built for Philadelphia (with its 1801 population of 41,000) and New Orleans (with 17,000 inhabitants in 1810) were indeed keystones of American urban modernization, and they were seen as such in their time.

It is difficult to imagine the extent of the city and its water supply in retrospect, but it might



Figure 8: William Penn's Plan of Philadelphia, 1682. Benjamin Latrobe's 1801 Centre Square Water Works occupied the Centre Square, at the centerpiece of the city grid, currently the location of Philadelphia City Hall. Credit: Library of Congress, <u>https://www.loc.gov/exhibits/religion/images/vc006400.jpg</u>.

be helpful to compare current-day population equivalencies in Louisiana, taken from the 2010 Census, with numbers from the 1810 Census, the first after the Louisiana Purchase. The 1810 Census saw New Orleans immediately enter the top rank of American cities as the seventh largest of 46 "Urban Places," with 17,000 inhabitants, on a scale of today's Opelousas or Natchitoches. [13] To round out the comparison, New York City was about the population of Lake Charles; Philadelphia numbered between that of Houma City and Alexandria City; and Washington, D.C. ranged in population between the cities of Ponchatula and Plaquemine. In 1803, these numbers would have been even smaller. 5,000 feet of bored-log pipelines distributed water to the central city grid but the water system did not reach every neighborhood in New Orleans.[14] The history of communities who did not receive access to the modern water supply is one of urban social inequality that has yet to be fully explored.

Urban Spectacles: Steam Power and Hydraulic Technology

How might we grasp the engineering novelty of waterworks at the turn of the nineteenth century and the effects it had on people at the time? Current-day readers must make a conscious effort to "forget" our blind twenty-first-century reliance on hydraulic technology. For us, it just works. In the first decade of the nineteenth century, by contrast, New Orleans' and Philadelphia's hydraulic works were unique, modern innovations. First and foremost, they were steam-powered. To push large quantities of water against gravity over a distance of a mile or more was an advanced achievement that required breakthrough developments in industrial steam and mechanical technology. Well into the nineteenth century, water for the nation's busiest cities came primarily from common public hand pumps placed at intervals through the city center, or from barrels carted through the streets. Indoor plumbing was rare, even for the wealthy. Water for mills (the primary form of machine production) was lifted from local rivers by traditional waterwheels, a bucket at a time, and then conveyed short distances in gravity-fed ditches.

Before Latrobe designed aesthetic works at Philadelphia and New Orleans, large-scale hydraulic mill works were the norm for machine production, and the structures were purely utilitarian in both function and form. Water-powered mills were simple wood or stone buildings in no way distinguished by architectural design, although they were the smaller-scale hydraulic technology marvels of their day. By contrast, Latrobe's waterworks forms functioned as visually provocative signs for the advanced technology inside them, the water it moved, and the modernization their city sites represented.

The Mississippi River was the water source for the developed portions of the city center, but the river was also central to new advancements in transportation. This meant developing river infrastructure on a brand-new scale, to ensure sufficient water supplies and to sustain increased navigation. The resulting development vision for the Mississippi port city required rethinking water as both supply and transport. To meet the requirements of the federal governance and improvement plan for the Louisiana Purchase, President Jefferson ordered a national lighthouse for the delta river mouth beyond New Orleans, at Frank's Island.[15] Latrobe, "one of only a few Americans who realized the potential of river

transportation for America," proposed several lighthouse designs between 1805 and 1817, eventually refining a unified neoclassical structure[16] (figures 9a & b). In 1810, he hired his 18-year-old son, Henry Latrobe, to supervise his work in New Orleans-over the years, the Latrobes had several commissions in New Orleans, to include a house of commons, churches, and a bank. Henry had trained in his father's architectural offices and had supervised engineering and construction of the National Road in the east, and the younger Latrobe's mastery of French was critical in New Orleans, where French was the official language. He supervised the lighthouse work, and in 1811 presented his father's plan for the New Orleans Waterworks, working on

both projects until his sudden death from yellow fever in 1817. Two years later, in 1819, Benjamin went to New Orleans, but within a year he, too, had died, also of yellow fever, unaware that the mosquito was "the carrier of the disease he was attempting to arrest by supplying clear water to New Orleans."[17] He completed the waterworks distribution system just before his death.

Before Latrobe's 1796 emigration to Virginia, he had worked in England with noted architect and engineer John Smeaton. With Smeaton, Latrobe practiced both hydraulic engineering and neoclassical architecture. His exposure to historical and modern neoclassical styles throughout the Grand Tour cities of Europe tutored him in both



Figure 9: Frank's Island Lighthouse, New Orleans coast. Design: Benjamin Latrobe, 1816. Credit: "Plan Elevation ½ Section of a Lighthouse to be Erected at the Mouth of the Mississippi River," 1816, Records of the Bureau of Lighthouses and its Predecessors 1785-1951, Records of the United States Coast Guard, Record Group 26, U.S. National Archives. Image courtesy of Jay Riedl, Frank's Island Lighthouse, <u>http://franksislandlight.blogspot.com/</u>.



Figure 9b: Detail from Frank's Island Lighthouse, New Orleans coast. Design: Benjamin Latrobe, 1816. Credit: "Plan Elevation ½ Section of a Lighthouse to be Erected at the Mouth of the Mississippi River," 1816, Records of the Bureau of Lighthouses and its Predecessors 1785-1951, Records of the United States Coast Guard, Record Group 26, U.S. National Archives. Image courtesy of Jay Riedl, Frank's Island Lighthouse, <u>http://franksislandlight.blogspot.com/</u>.

ancient and modern European architecture and engineering. When he emigrated to the United States in 1796, he brought hydraulic engineering practices and architectural design ideas with him, and these ideas fed his statements in waterworks designs that proclaimed his vision for a new architectural identity for modern American cities. His Philadelphia and New Orleans waterworks buildings displayed innovations on neoclassical architectural designs that recalled historical and cultural precedents, but with a new-world flair. These stylistic innovations quickly became ingrained as modern symbols for expanding American ideals and values. With a river-fed waterworks system in the city and a lighthouse at the mouth of the Mississippi, New Orleans was poised to fulfill its new destiny as the key port city for an expanding American West.

New Orleans as the New Center of the American West

In 1803, when the Louisiana Purchase was complete, Americans knew nearly nothing of the territories west of the Mississippi River. Perceptions of geography, topography, climate, land extent, and distance were completely misunderstood, regardless of the official government exploration surveys that began in 1804. The Louisiana Territories Treaty had doubled the geographical expanse of the United States. This confounded cultural concepts of "West" by making the Mississippi River and New Orleans a center line within this vast new territory, in sharp contrast to its previous situation, when the Mississippi River and its delta city had marked a far-west outland border, the last falling-off place beyond the country's terminal limit.

Also unbeknownst to Americans were the realities of water west of the Mississippi. Water posed an extreme exception within traditional Euro-American conceptions of the western landscape.

The material fact of an unknown, expansive, and arid West was hard to imagine, much less accept and adapt to, in light of long-held landscape ideas. New problems for grappling with types of topography, weather, and water never before imagined rendered traditional conceptions of a western landscape contradictory and meaningless.[18]

It is easy to forget that these perceptions of land, water, and fertility developed east of the Mississippi, where, in 1803, the "continent" comprised 17 states and the Northwest Territory of the Ohio River watershed. The total area ranged from the Atlantic seaboard to the Mississippi River and from the southern shores of the largely unexplored Great Lakes to the Georgia territory in the south. Long-held cultural conceptions of a fertile cultivated landscape could not possibly apply to the "virgin land" of the territory west of the Mississippi River, but no one knew that yet.

Machine and Garden

To define the historical importance of urban water delivery in 1800 is complicated by another history: that of water's relation to ideas of nature, landscapes, and gardens. When these are interpreted as cultural ideas that determine the way people view nature's place in human

culture, landscape is "a cultural image, a pictorial way of representing, structuring or symbolizing surroundings."[19] This is historically central to cultural identity in Euro-American culture. Further, since internal cultural images figure their way into cultural products like architecture and parks, we can interpret cultural aspects of architecture built into a landscape. Artistic and literary works of the age, for example, were replete with representations of the glories of a lost golden age, represented by ancient ruins in pastoral and agrarian scenes, versions of Edenic gardens, and awe-inspiring grand Romantic landscapes. This was the pastoral landscape ideal in pictures and in print; built environments, too, like gardens and parks, were also cultural products whose form and iconography signified landscape ideas of the age. Given that hydraulic works were set in gardenscapes and parks, as I have described, landscape ideas are helpful for interpreting industrial waterworks designs.

European ideas of westward imperial movement across unknown oceans and lands that could only be imagined originated with European Renaissance explorations, and ideas of "West" have historically grounded ideas of land, landscape, and garden for western cultural history. Behind patent territorial aims, European exploration sought a paradise on earth that transcended the sublime terror of the unknown. By the eighteenth century, the American interior beyond the Atlantic coast was imagined by Europeans, and by the new Euro-Americans, as an enchanting region of inexpressible beauty and fertility. As settlement focused on individual private lands supported by agriculture, the dream became embedded as a "garden of the world." [20] The idea persisted, and traveled continuously westward, that an individualistic yeoman working an agrarian West thrived on a fertile landscape blessed with endless water from ample local rivers fed by reliable rainfall during the growing season.

As industrial machinery began to force itself onto the pastoral landscape ideal of the Romantic age, a complex contradiction in American values emerged. Leo Marx was one of the first historians to note that only artists initially were able to address this contradiction, in representations that depicted "machine technology [as] a proper part of the landscape."[21] Representations of the West first circulated in print after the Lewis and Clark expeditions of 1804, ordered by President Jefferson as a way to explore the nation's new territory with the aim of finding a Missouri River outlet at the Pacific Ocean, presumable connected with the Columbia River. American landscape painters and photographers joined expeditions, producing landscape representations that embellished published reports and popular descriptions.[22] Prominent artists such as George Catlin, and later Albert Bierstadt, Thomas Moran, and Sanford Gifford, built on early eighteenthand nineteenth-century European landscape painting traditions, eventually founding grandscale American Romantic painting traditions grounded in the vastness and sublimity of the American Western landscape. These cultural images, as well as travel brochures enticing westward emigration, suspended the idea of "West" behind a veil, serving to obscure the real nature of land and water in the Far West region.[23] These exaggerated artistic views reinforced imagined narrative impressions rather than describing real experiences of overland migration. The scientific reports went largely ignored.[24] This may seem strange in retrospect, but it reveals a cultural conflict of the age:

From the time of Franklin down to the end of the frontier period almost a century and a half later, the West had been a constant reminder of the importance of agriculture in American society. It had nourished an agrarian philosophy and an agrarian myth that purported to set forth the character and destinies of the nation. The philosophy and the myth affirmed an admirable set of values, but they ceased very early to be

useful in interpreting American society as a whole because they offered no intellectual apparatus for taking account of the industrial revolution.[25]

As a kind of bridge between myth and reality, new-style industrial waterworks stood prominently on open squares centrally located within a town grid or on a waterfront, conveying the idea that nature was best shaped by human ingenuity (see figure 10). Waterworks temples placed in park-like garden settings offered a kind of engineering artistry that carried cultural currency. This style of waterworks architecture eased the tension that machine technology's screech levied against the perceived calm of agrarian traditions and pastoral ideals. In allying the unfamiliar with the familiar, Benjamin Latrobe's comforting neoclassical aesthetic brought into balance the foreign "throbbing, industrial function" the architectural form enclosed.[26]

It may seem to some that the waterworks temple form was incongruent with the utilitarian industrial function of the building, and that neoclassical style for waterworks was a meaningless skin that costumed the works. This interpretation makes the building a caricature that served promotional purposes alone, meant to glorify patrons and disguise capitalist aims. Such an interpretation certainly raises valid issues: architecture has worked throughout human history



Figure 10: I. Tanesse's 1815 survey map of New Orleans. Note lower left inset image depicting Benjamin Latrobe's New Orleans waterworks, featured as one of the city's dozen most noteworthy buildings. Credit: 'Plan of the City and Suburbs of New Orleans' by I. Tanesse, William Rollinson, Charles Del Vecchio and P. Maspero (1815), Library of Congress, <u>https://www.loc.gov/resource/g4014n.ct000684/</u>.

in part to promote building patrons and their investments. Any business or institution that has commissioned a high-status building design and constructed it upon a visually, culturally, or politically prominent site has certainly advanced programs of architectural symbolism to legitimize the business it houses. Indeed, in addition to the waterworks I examine in this article, comparable examples arose in architectural designs for capitol and government buildings, banks and lighthouses, churches, museums and universities, for precisely this reason (see figures 11 & 12).

Yet, I encourage deeper analysis. The situation goes beyond simple promotion. All conscious and

sophisticated building design draws attention to underlying cultural values in addition to indexing business or ideological interests. At best, any close study of aesthetic form examines cultural ideas that underlie design choices, specifically in order to avert a summary dismissal of architectural design as boosterism alone.

In fact, the architecture of early nineteenth-century waterworks drew full attention to the industrial contents, making no effort to hide them. Contrary to what we might believe today, the visual form of these buildings heightened the experience of the physical workings within. The building design and its workings called



Figure 11: Benjamin Latrobe's probable Louisiana State Bank exterior design, from an 1822 engraving. Credit: Collins C. Diboll Vieux Carre Digital Survey, Historic New Orleans Collection, <u>https://www.hnoc.org/vcs/property_info.php?lot=11271</u>.

public attention. It drew spectators toward it. The machinery inside was loud. It clanked and boomed. It smelled. Period prints illustrate visitors gathered around the Center Square temple in its parklike setting as plumes of black smoke streamed from the oculus of the dome (see figure 2). The aesthetic of a neoclassical temple in a garden setting provided a recognizable visual context for framing the "beauty" of the new technology, while still allowing the transparency of the industrial processes within to speak for themselves.

The waterworks building embodied a cultural function as much as it advanced a utilitarian one. In form, temple contained machine. It housed, displayed, and celebrated—eventually venerated—not only a water supply larger than ever before imagined, along with the machinery that moved it, but also the engineering and aesthetic lineages from antiquity forward. This resulted



Figure 12: Louisiana State Bank (1820), Benjamin Latrobe. HABS front elevation and cross section drawings. Credit: Library of Congress, <u>http://www.loc.gov/pictures/item/la0010.sheet.00004a/resource/</u>.

in a mix of forms. The water temple, a sacred cultural type often associated with religious connotations of water, was a symbolic container for the industrial works that moved water. Yet, this form also signaled a deep ambivalence between two apparently conflicting cultural values. On the one hand, society valued a reliance on nature and agriculture, represented by long-held western European pastoral ideals such as Old Testament images of the Garden of Eden. On the other hand, changed circumstances created a prospective reliance on industrial machinery as a fabricator of a new urbanism, a symbol of a modernity that worked to better nature through human ingenuity.

The image of a steam-powered waterworks held inside a temple within a pastoral garden presented society with a technological form that conflated the garden with the machine. This provided a context for machines to take an updated but still familiar form; yet, an underlying ambivalence, the tension between agriculture and industry, still managed "to mask the real problems of an industrial society," problems the nation had not yet defined.[27] Ultimately, nineteenth-century agrarian pastoralism was "powerless to confront issues arising from the advance of technology."[28]

This conflict was subtle, but not new. It had plagued Thomas Jefferson, who had expressed deep ambivalence toward the relationship between the workings of industrial technology and the ideals of landscape and agrarian values. Jefferson was fraught with indecision regarding the role manufacturing should play as American society moved toward economic independence from Europe. He struggled to align what appeared to be irreconcilable values. Placing "the manufacturer by the side of the agriculturalist," Jefferson saw an either-or dilemma: "He...who is now against domestic manufacture, must be for reducing us either to dependence on that foreign nation, or to be clothed in skins, and to live like wild beasts in dens and caverns."[29] Leo Marx

suggested that the inconsistencies and conflicts that arise within deep cultural ambiguities die hard: "They stem from a profound ambivalence—a complex response to the conflicting demands of the self and society... decisive contradictions in our culture and in ourselves."[30] The symbol of America as a garden became a less and less accurate description of a society transformed by commerce and industry, but the image of an agricultural paradise in the West remained a prominent image throughout the nineteenth century.

In this way, waterworks buildings inter-identified modern with ancient, present with past, machine with garden. The two contradictory ideas melded. Industrial waterworks structures in their landscape contexts became an impetus for larger and larger public parks, with water technology as a cultural center point. In New Orleans, as in Philadelphia, the new waterworks watered a public garden. An 1811 Latrobe drawing shows a fountain proposed for Jackson Square, facing the Mississippi River (see figure 5). One of the nation's first waterworks-fed fountain designs after that of Philadelphia, the architectural form embodied a cultural symbolism that signified a combination of water, technology, and landscape as a center for urban life. Earlier, Philadelphia's Center Square of 1801 (see figure 8) had been the first park featuring a waterworks, but by 1812, the city had outgrown the Center Square works, and an expansive Greek Revival building complex rose in stages on the Schuvlkill River, about a mile downstream from the first works. The new Fairmount Waterworks expanded between 1812 and 1822-the same time period in which the New Orleans Waterworks were in planning and building stages-and the wooded hillside grew into Fairmount Park, the first large city park sited on an urban waterworks site. There, the works themselves were a spectacle as much as the surrounding garden. Fairmount Park predated by many decades the formal development of New York's Central Park or San Francisco's Golden Gate Park, but these too, as well as many

other nineteenth-century urban leisure gardens, were waterworks sites before they were fullblown, large-scale central city parks. Hydraulic architecture became signature, symbol, and spectacle of modernity in American cities.[31] The commission of an industrial waterworks in the form of a neoclassical domed temple became a city's statement showcasing its leadership in innovative urban growth. Prominent engineers and architects after Latrobe eventually designed waterworks buildings in similar neoclassical forms for every major city in the nation, into the twentieth century.

CONCLUSION

Benjamin Latrobe's waterworks aesthetic stood as a cultural equal to every major building type that contributed to the modernization of early nineteenth-century American cities. When urban modernization was in its beginnings, water systems were in their infancy, but so were government, banking, business and social organizational developments. Period modernization involved defining new cultural criteria for urban prosperity and progress, and cornerstone architectural symbols established the image of the early nineteenth-century American city.

Latrobe's neoclassical models inspired an original American architecture that would serve posterity.[32] As cutting-edge hydraulic engineer and contemporary architect, Latrobe's artistic aim for public works development was to marshal a balanced dialogue between form and function, enabling a waterworks building's form to heighten the modern relationship between its technological functions and its broader cultural and historical contexts.[33] When Latrobe recorded his impressions of three prominent buildings on the New Orleans skyline,

for example, he drew a clear distinction between two views. First, he described the visual effect of each individual building. Second, he wrote about the visual impression a group of buildings projected when seen together from a distance-an early identification of what we today call a city skyline. He wrote: "In detail [they] are as bad as they can be," even as their symmetry, proportions, strong relief, and solid mass produced "an admirable effect when seen from the river or the Levee."[34] Latrobe's ability to see, value, and produce architectural nuance-more specifically in individual building design and more broadly toward a complete urban vision-filed his leading edge as an inventive creator, during a time when the nation needed a symbolic urban image. His fusion of aesthetic architecture and industrial technology made the New Orleans waterworks temple on the Mississippi River a symbol for the important roles water played in the formation of an American city identity in the early nineteenth century.

Editor's note: This feature article has been peer reviewed.

Footnotes

[1] See also Rina Faletti, "Undercurrents of Urban Modernism: Water, Architecture and Landscape in California and the American West" (PhD diss., University of Texas at Austin, 2015), 74–85, <u>https://repositories.lib.utexas.edu/handle/2152/30482</u>.

[2] See Leo Marx, *The Machine in the Garden: Technology and the Pastoral Ideal in America* (New York: Oxford University Press, 1964), 150–69, esp. 154–55, and 376 n. 4–8.

[3] See Marx, *Machine in the Garden*, 150–69, esp. 154–55, and 376 n. 4–8.

[4] See the following for images: Stapleton, *Engineering Drawing*,174–78, esp. 178, fig. 41; Leland M. Roth, *American Architecture: A History* (Boulder, CO: University of Colorado Press, 2001), 125–26 (a print image of the Center Square Water Works appears in Roth, 125); Harold Donaldson Eberlein, "The Fairmount Waterworks, Philadelphia," *The Architectural Record* 62 (July 1927), 57, 64; Jane Mork Gibson and Robert Wolterstorff, "The Fairmount Waterworks," *Philadelphia Museum of Art Bulletin* 84, no. 360/361 (Summer 1988), 1–46; Donald C. Jackson, "The Fairmount Water Works, 1812–1911,' at the Philadelphia Museum of Art," *Technology and Culture* 30, no. 3 (July 1989), 635–39; and Talbot Hamlin, *Benjamin Henry Latrobe* (New York: Oxford University Press, 1955).

[5] See Gary A. Donaldson, "Bringing Water to the Crescent City: Benjamin Latrobe and the New Orleans Waterworks System," in *Water-Supply and Public Health Engineering, vol. 5 in Studies in the History of Civil Engineering*, ed. Denis Fischbacher-Smith (Aldershoot, Great Britain: Ashgate, 1999), 195-210. See also Darwin H. Stapleton, ed., *The Engineering Drawings of Benjamin Henry Latrobe* (New Haven: Yale University Press for the Maryland Historical Society, 1980), 198–204 and figs. 55–57.

[6] See Stapleton, Engineering Drawings, 199–205, esp. 199, fig. 55.

[7] Donaldson, "Bringing Water," 209. During May 2017 in Philadelphia, bored log conduit was discovered beneath city streets during a water main replacement project. See <u>http://www.phillywa-tersheds.org/resident-helps-spot%E2%80%94and-preserve%E2%80%94some-philly%E2%80%99s-oldest-water-infrastructure#more</u>.

[8]Marx, *Machine in the Garden*, 150–69, esp. 154–55, and 376 n. 4–8. Marcus Whiffen and Frederick Koeper, *American Architecture*, vol.1: 1607–1860, (Cambridge, MA: MIT Press, 1981), 130. See also Roth, *American Architecture*, 125–26.

[9] Eleanor A. Maass, "A Public Watchdog: Thomas Pym Cope and the Philadelphia Waterworks," *Proceedings of the American Philosophical Society* 125, no. 2 (Apr. 30, 1981): 134–54, esp. 136.

[10] Donaldson, "Bringing Water," 198, 205.

[11] I. Tanesse, William Rollinson, Charles Del Vecchio, and P. Maspero, "Plan of the City and Suburbs of New Orleans, from an actual Survey made in 1815" (New York: Charles Del Vecchio; New Orleans: P. Maspero, 1815). Accessed March 25, 2017, <u>https://www.loc.gov/item/90684205/</u>.

[12] Michael W. Fazio, "Benjamin Latrobe's Design for a Lighthouse at the Mouth of the Mississippi River," *The Journal of the Society of Architectural Historians* 48, no. 3 (September 1989):238–39.

[13] Campbell Gibson, "Population of the 100 Largest Cities and Other Urban Places in the United States: 1790 to 1990," Population Division Working Paper No. 27, U.S. Bureau of the Census, Washington, D.C., June 1998. Accessed Sept. 3, 2017, <u>https://www.census.gov/population/www/documentation/twps0027/twps0027.html</u>.

[14] Henry Latrobe's 1811 drawing of the New Orleans city grid shows a water distribution service area of 13 x 7 blocks. Stapleton, *Engineering Drawings*, Fig. 55.

[15] Fazio, "Benjamin Latrobe's Design," 232–47; Lee W. Formwalt, "Benjamin Henry Latrobe and the Revival of the Gallatin Plan of 1808," *Pennsylvania History* 48, no. 2 (April 1981): 99–128.

[16] Donaldson, "Bringing Water," 208.

[17] Donaldson, "Bringing Water," 206.

[18] Roland Van Zandt, *The Metaphysical Foundations of American History* (Gravenhage: Mouton & Co., 1959) 17–19, quoted in F.S.C. Northrop, *The Logic of the Sciences and the Humanities* (New York: Macmillan Co., 1947), 16.

[19] Denis E. Cosgrove, *Social Formation and Symbolic Landscape* (Madison, WI: University of Wisconsin Press, 1998), 1, 98–101, 135–41.

[20] Henry Nash Smith, *Virgin Land: The American West as Symbol and Myth* (1950; repr., Cambridge, MA: Harvard University Press, 2009), 11; Cosgrove, *Social Formation*, 1, 98–101, 135–41. Cosgrove's work related to hydraulic engineering and waterworks projects, from a global point of view. See also Denis E. Cosgrove and Geoffrey E. Petts, eds., *Water, Engineering, and Landscape: Water Control and Landscape Transformation in the Modern Period* (New York: Belhaven Press, 1990), esp. 1–11, 188–208; and Denis E. Cosgrove, et al., "Landscape and Identity at Ladybower Reservoir and Rutland Water," *Transactions of the Institute of British Geographers*, New Series 21, no. 3 (1996): 534–51.

[21] Marx, Machine in the Garden, 226.

[22] Wallace Stegner, *Beyond the Hundredth Meridian: John Wesley Powell and the Second Opening of the West* (1953, repr., New York: Penguin Books, 1992), 174–91, and section of images with captions inserted between 92–93.

[23] G. Malcolm Lewis, "Rhetoric of the Western Interior: Modes of Environmental Description in American Promotional Literature of the 19th century," in *The Iconography of Landscape*, eds. Denis E. Cosgrove and Stephen Daniels (Cambridge: Cambridge University Press, 2008), 179–93.

[24] Catrin Gersdorf, "History, Technology, Ecology: Conceptualizing the Cultural Function of Landscape," *Icon*, v. 10 (2004): 34–52.

[25] Smith, Virgin Land, 259.

[26] Gerard T. Koeppel, *Water for Gotham: A History* (Princeton, NJ: Princeton University Press, 2000), 105.

[27] Marx, *Machine in the Garden*, 6–8. On Eden, Marx quotes José Ortega y Gasset, *The Revolt of the Masses: Authorized Translation from the Spanish* (New York: W.W. Norton & Co., 1932), 1030; Smith, *Virgin Land*, 128.

[28] Smith, Virgin Land, 259.

[29] Thomas Jefferson to Benjamin Austin, Jan. 9, 1816, in *The Writings of Thomas Jefferson*, XIV, ed. Andrew A. Lipscomb (Washington, D.C.: Thomas Jefferson Memorial Association of the United

States, 1903), 387–93, quoted in Marx, Machine in the Garden, 139, 375 n. 47.

[30] Marx, *Machine in the Garden*, 136–37, 141; Richard Hofstadter, *The American Political Tradition and the Men Who Made It* (New York: A.A. Knopf, 1948), 24–25; Merrill D. Peterson, *The Jefferson Image in the American Mind* (New York: Oxford University Press, 1960), 443–46.

[31] Donaldson, "Bringing Water," 198; Stapleton, Engineering Drawings, fig. 55.

[32] Fazio, "Benjamin Latrobe's Design," 238–39.

[33] Fazio, "Benjamin Latrobe's Design," 239.

[34] Donaldson, "Bringing Water," 390. See also Richard W. Longstreth, "Academic Eclecticism in American Architecture," *Winterthur Portfolio* 17, no. 1 (Spring 1982): 55–82.

Recommended Citation

Faletti, Rina. 2017. "Industrial Ornament, Modern Symbol: New Orleans' First Waterworks on the Mississippi River." *Open Rivers: Rethinking Water, Place & Community*, no. 8. <u>http://editions.lib.umn.edu/openrivers/article/industrial-ornament-modern-symbol/</u>.

About the Author

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FEATURE **RIO YAQUI-THE HIAK VATWE: THE TRANSFORMATION OF A CULTURAL LANDSCAPE** By Anabel Galindo and James Hopkins

In 2017, an ecological, cultural, and public health crisis is unfolding in northwestern Sonora, Mexico in which Yaqui people face daily

challenges to access clean drinking water where noxious elements litter an endangered cultural landscape. The problems that overwhelm the



This 1920s aerial view of the Hiak Vatwe flowing through a traditional Yaqui village shows the magnitude of the river before dams and irrigation infrastructure were built in the 1940s. Image courtesy of Fideicomiso Archivos Plutarco Elías Calles y Fernando Torreblanca, Mexico City.

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Yaqui communities today are a direct result of the historical relationships and the conceptual views about the Yaqui River. For Yaqui people, the Yaqui River, or what is known traditionally as the *Hiak Vatwe*,[1] is a landscape that reflects a deeply rooted cultural and spiritual connection that explains the origins of life, social values, and the intricacies that shape Yaqui identity.

During the early seventeenth century, as foreigners arrived and settled in northwestern Sonora, an ideological polarity emerged. The Spanish witnessed a seemingly endless water source with abundant surface water and fertile soils that had long made the *Hiak Vatwe* a true gem in the desert. The *Hiak Vatwe* landscape was central for the colonial agenda to transform a semi-arid desert ecology into a coastal agricultural haven that would give way to inland campaigns for precious minerals. With a diverse ecology and riverbanks of loamy, mineral-rich soils, the *Hiak Vatwe* was comparable to the Nile River; without hesitation, the eighteenth-century Jesuit priest, Father Nentvig, baptized it as the Nile of Sonora. The plentiful natural riches in the region made it possible for the Spanish missionaries to settle,



Figure 1: Photograph of about a dozen head of cattle fording the wide placid river, Rio Yaqui, in Mexico, ca.1900. The surrounding landscape is very flat, with no vegetation on the near shore and low vegetation on the far shore. Image from the California Historical Society Collection at the University of Southern California, via Wikimedia Commons.

evangelize, and gradually create a commercial economy. Spain's colonial practices introduced a process of commodification of the *Hiak Vature* landscape, introducing agricultural techniques, seed varieties, domesticated animals, and the excavation of ditches and channels to best control the river course.[2] In other words, the Spanish sought to rationalize the use of the landscape by controlling land and water resources thought to be misused by its Indigenous inhabitants, whose technology often exhibited more natural methods of consumption.[3] By the end of the eighteenth century, economic and political pressures incited an independence movement that aspired to sever the ties to the Spanish crown and eliminate the colonial privileges, especially those enjoyed by the church, such as communal land holdings.

The path to becoming a nation was not an easy one; decades of internal strife and two foreign interventions left Mexico crippled with a debilitated economy and half its territorial size. [4] Despite all the chaotic turn of events, the liberal politicians at state levels adopted laws that enabled the division of communal lands favoring large landowners. But it was the *Lerdo* Law under the Constitution of 1857, that systematically ruptured the communal land system.



Figure 2: These historical aerial views of the Hiak Vatwe flowing through Torim and Bacum, two traditional Yaqui villages, show the magnitude of the river before the dam systems and extensive irrigation infrastructure were built in the 1940s. The images date from the 1920-30s; Yaquis were attacked by aerial strikes during the period 1926-29. Images courtesy of Fideicomiso Archivos Plutarco Elías Calles y Fernando Torreblanca (FAPECFT), Mexico City.

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The privatization of communal lands threatened the ability for Indigenous communities to access pastoral lands and woodlands (Tutino 1989, 262). The Diaz regime (1876-1911) hastened the transformative agrarian process with scientific explorations that identified potential lands and rivers for technological development. Moreover, it legalized the rational use of space. Lands not in production were considered mismanaged. Vacant laws and policies legally appropriated lands and Indigenous peoples were alienated from their cultural landscape, deprived of their rights, sustenance and yet simultaneously peons in their lands, if not forced to migrate to urban centers. [5] The ideological polarity established during the colonial era deepened in the nineteenth and twentieth centuries with convictions of dominance over natural resources and seeing the landscape as capital mode of production. Steven Bourassa argued that a Eurocentric view of space and landscape is mostly shaped by notions of power (Bourassa 1991, 5). In this model, the power that resides in the hands of individuals with an identity that is not defined by a connection to the landscape undervalues peoples' interconnectedness and relations to that space. As a nation, Mexico's historic land tenure and natural resource policies generated a political and economic disparity between Indigenous peoples



Figure 3: These historical aerial views of the Hiak Vatwe flowing through Torim and Bacum, two traditional Yaqui villages, show the magnitude of the river before the dam systems and extensive irrigation infrastructure were built in the 1940s. The images date from the 1920-30s; Yaquis were attacked by aerial strikes during the period 1926-29. Images courtesy of Fideicomiso Archivos Plutarco Elías Calles y Fernando Torreblanca (FAPECFT), Mexico City.

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and their access to communally held lands. The polarization enabled the state to dictate and often sacrifice the future of Indigenous cultural landscapes.

At the turn of the twentieth century, foreign traveler accounts popularized and in many ways justified the violent physical removal and the cultural alienation of Yaquis from the Hiak *Vatwe* by framing the Yaqui Wars as an inevitable course in the name of progress. The once "lush cactus forest"[6] would soon become the farming wonderland of Mexico. Reports encouraged foreigners to invest, emphasizing the potential for economic opportunity with large tracts of irrigated land available free of menacing threats from Yaqui people. The reports often minimized the violence, vilified Indigenous peoples, and justified the legal dispossession from Yaqui people. After nearly four decades in power, the social, political, and economic inequities that plagued the nation under Díaz were a catalyst for the Mexican Revolution. Order and Progress (slogan for the regime) had come at a price for the nation, but it was the pressures of land tenure that was pivotal for the revolutionary movements.[7]

As a result of the Mexican Revolution, Article 27 of the 1917 Constitution became the watershed of the modern twentieth-century agrarian reform. The delegates strived to amend the social ills of the previous century and addressed issues of tenure and distribution of land and water. It confirmed Mexico's claim to exclusive ownership of all natural resources including land, water, and the subsurface, declaring Mexico as the undisputed gatekeeper, sole legal proprietor, and titleholder authorizing the uses of public lands. It also established a legal framework, ejidos-land held in commune, this model system was in theory a milestone of communal ownership and resource management efforts; it also prevailed as the institutional construct for addressing the use of land, but not the inalienable rights to land, for the developing modern Mexican agro-economy.

By the 1930s, Article 27 had proven inefficient. It did little to nothing to recognize the inalienable claim to tenure, land use, and water management by Indigenous communities like the Yaqui whose identity is inseparable from their cultural landscape. Land distribution was disparate and inefficient, benefitting large landowners rather than the Indigenous or mestizo peasants. President Lázaro Cárdenas in 1934 re-ignited distribution and strengthened the *ejido* model by establishing the National Credit Ejidal Bank (BNCE) to provide support for year-round operations. He also broadened a modernization plan for the countryside, where the small farmer would become the backbone of the Mexican economy and leader in the progression of the nation. The BNCE channeled technical support, facilitated credit lines, and organized local producers with consumers. It controlled every aspect of the agricultural process, creating a bureaucratic dependency that dictated what, when, and how to farm (Hewitt de Alcantara 1978, 250). The ejido model displaced cultural relations and accelerated a system that in theory intended to individuate rights for use and profit, but ejido farmers became indebted to its bureaucratic authority. Superficially, the ejido governance served as Indigenous communal tenure, a close cultural match, but in reality, the system ignored customary practices and denied support when these practices concerned sustainable use of traditional resources that differed from the bank directives. Bourassa's concept of individuated power stalked Article 27 for a century as subsequent reforms focused on incentivizing individual ejido members to make greater economic gains and rewarding those gains with increased ownership in the organization, while at the same time weakening the same communal system it represented. Power dynamics, resource management, and land tenure became entangled in the bureaucratic maze.

The *Hiak Vatw*e was no exception. After decades of violence, turmoil, and war against Yaqui people by the Mexican government, the permanent transformation of the *Hiak Vatwe* was inevitable.

Although Yaqui people gained some latitude with President Lázaro Cárdenas's recognition of territorial boundaries and water rights of the soon-to-be-dammed river in 1938, they lost traditional claims to ancestral lands that extended beyond the 485,000 hectares of the "new" government-defined boundary.[8] Furthermore, this arrangement led to the permanent commodification of the Hiak Vatwe landscape as the territory integrated into the agricultural scientific exploration shaped by the Green Revolution of the 1940s to 1960s. This technological progression shaped the countryside; modern marvels not only defied, but dominated nature with permanent structures that diverted natural streams and captured the waters of prominent rivers. The Hiak Vatwe was captured in a colossal construction of its time: the Angostura Dam built in 1941 (1 of 3 dam systems damming the river). Mexico, like many other developing nations, pursued a solution to concerns of food scarcity by adopting new technology and infrastructure intended to advance output production. Political leaders, like Cárdenas, envisioned an agro-cultural society with modern tools rather than rudimentary and traditional modes of farming. The introduction of large machinery, higher yielding strains of grain seeds, and increased pesticide use facilitated the exponential growth of an export economy that replaced traditional ecologies of farming, culture, and connectivity. The concept of time also revolutionized the process; what may have taken a Yaqui farmer weeks of preparation, seed manipulation, and other customary practices to ensure a plentiful harvest was replaced by an accelerated farming process that ignored these traditions. No longer was the mythical and sacred *vovok* (a toad) used in a procession across the fields to call upon the rain for a bountiful harvest (Valencia 1985, 41). This mythical figure symbolically connects Yaqui farmers with the landscape, the natural elements, and in many ways exemplified the cultural connections. A customary practice like this was inefficient in a commercial agricultural process.

Additionally, while Yaquis were able to secure a land base, the redistribution favored the neighboring non-Yaqui ejido, known as the Yaqui Valley. It overshadowed the irrigable surface area of the Yaqui communities, not only in size, but also in available resources (Hewitt de Alcántara 1978). The valley became the cradle of the Green Revolution movement, and the non-Yaqui farmers soon benefitted from hydraulic infrastructure with access to both surface and groundwater sources. As recipients of new technology, hybrid seeds, and pesticides that ensured rapid and hearty harvests, their immersion in the commercial economy enabled the Yaqui Valley farmers, not Indigenous Yaqui farmers, to become the export agricultural model.

The results of the Green Revolution and the policies that once envisioned a pastoral agricultural society transformed the rural landscape into a drought-stricken mono-crop farming dependent on excessive groundwater pumping to meet the demands of an export economy (Hewitt de Alcántara 1978). The destruction has been further augmented by the excessive use of pesticides and agro-chemicals whose residuals dump into the water table and subsurface and thus expose the Yaqui population to contaminants. By the 1970s, the limitations, inefficiencies, and unsustainability of the Green Revolution were evident (Sonnenfeld 1992, McCully 2001). Mexico's attempt to generate a modern agricultural society resulted in environmental degradation affecting the flora and fauna from the Hiak Vatwe landscape up to the coastal waters; excessive groundwater pumping; alterations to traditional foods by producing and consuming export crops; substitution of Yaqui customary traditions and practices; deepened social and economic disparity as Indigenous farmers had unequal access to credit, loans, and technology; and alarming rates of health-related issues. In addition, the *Hiak Vatwe*—irreparably drained and diverted-is perhaps the most acute recorded instance of ocean inland intrusion on the North American continent. The Pacific Ocean

has claimed 30 kilometers of riverbed and destroyed more than 800 square kilometers of the Yaqui delta's coastal aquifer. The decline of the *Hiak Vatwe* and its delta parallels a deteriorating human rights situation resulting from population growth in Sonora's Pacific coastal region, as well as the internationally contested role and uses of the Yaqui River Basin as the largest shared basin between Arizona in the United States and Sonora in Mexico.

In 2017, the *Hiak Vatwe* is still a zone of contention and violence over the landscape, villages still lack potable water services, the marginal Yaqui farm lands are mostly farmed by non-Yaquis,[9] and Yaqui villages like Potam are exposed to high levels of arsenic in the land and water sources.[10] The pressures have intensified with the development of an aqueduct, dubbed "Independence," which diverts volumes of water from the *Hiak Vatwe* stored at the Novillo Dam, to quench the needs of the dry stricken state capital of Hermosillo. Mobilizations against the construction of the aqueduct and the political turmoil over the usage of the water for commercial rather domestic use are now overshadowed by the most recent violence, the construction of the gas pipeline that will traverse the *Hiak Vatwe* landscape. These recent transformative constructions threaten the well-being of Yaqui communities and the *Hiak Vatwe* today, but also in the near future, with perhaps irreversible damage.

In conclusion, the historical transformation of the *Hiak Vatwe* landscape is grounded in the power dynamics of Mexico's sovereign patrimony exercised over its territorial boundaries. The complexity of land and water policies enabled the Mexican government to control every aspect of water management, land tenure, and redistribution and development of natural sources in the country. Bureaucratic institutions established to determine the allocation of resources resulted in a process that was not only limiting, but disastrous for Indigenous communities. These institutions were ill equipped to address the overarching concerns of tenure, access, and the inalienable



Figure 4: Agricultural fields near Potam, Rio Yaqui (2015). Image by Anabel Galindo.



Figure 5: Dry river bed near Vicam, Rio Yaqui (2015). Image by Anabel Galindo.



Figure 6: Dry river bed near Torim, Rio Yaqui (2005). Image by Anabel Galindo.



Figures 8 and 9: Scenes near Vicam, Rio Yaqui. In early September 2010, the floodgates to the Novillo Dam (Sonora) were opened due to an overflow, which allowed the Hiak Vatwe to flow into the dry river course. The resulting landscape sparked the imagination and conversations about what the flow of the Hiak Vatwe must have looked like prior to the construction of the three dams. Photos by Anabel Galindo.

Indigenous rights over their traditional cultural landscape. Continuous demands for solutions have pressed Mexico to reevaluate its role and the rights of Indigenous peoples. In 2001, Article 2 of the Constitution conveyed broad and aspirational recognition with respect to Indigenous rights. However, it omitted reference to the issue of pre-existing claims to resource tenure. These amendments, therefore, have yet to address the fundamental concerns that affect Indigenous peoples and it is uncertain how the new laws will deal with globalizing changes and technology that capitalize on environmental destruction and the alienation of Indigenous peoples to their cultural landscape, as in the *Hiak Vatwe* case. Nevertheless, a century after a transformative agricultural agenda, Yaqui Indigenous communities fervently continue to pressure the government for change, to uphold the rights they already have, and to seek solutions that will enable Yaqui people to make autonomous decisions that aim, at the core, to protect and preserve the *Hiak Vatwe* landscape.

Footnotes

[1] The *Hiak Vatue* flows 850 km starting from the Sierra Madre Occidental in the state of Sonora and ends at the Gulf of California. It is considered one of the most important river systems in Northwest Mexico.

Landscape is used here to describe the natural resources of a given place or territoriality (in this case Rio Yaqui Territory that encompasses roughly 485,000 hectares of ancestral land). The term "landscape" is also used to understand a relationship between its Indigenous inhabitants and the physical space tied by the historical cultural connections. To use historian Richard White's words, "We cannot understand human history without natural history and vice versa" (White, 1995: iv). To understand how humans shaped the changes in a given land base, I refer to Steven Bourassa (1991) and Denis Cosgrove (1984) for their theoretical framework to understand the landscape.

[2] For further reading, see Alfred Crosby's *Columbian Exchange: Biological and Cultural Consequences of 1492* (1972); Elinor Melville, *A Plague of Sheep: Environmental Consequences of the Conquest of Mexico* (1994); Emily Brownell and Toyin Falola, *Landscapes, Environments, and Technology in Colonial and Postcolonial Africa* (2012); Rebecca Earle, *The Body of the Conquistador: Food, Race and the Colonial Experience in Spanish America* 1492-1700 (2012).

[3] Jesuit priests noted the magnitude of the *Hiak Vatwe*'s fertile soil: Yaquis had abundant harvests of squash, beans, and corn, relying mostly on river floods.

[4] The independence movement began in 1810, but Mexico did not achieve independence until 1821. See Josefina Zoraida Vasquez and Lorenzo Meyer, *The United States and Mexico* (1995), for further discussion on the war of 1846–48, and Pedro Santoni, Mexico at Arms: *Puro Federalists and the Politics of War*, 1845–1848 (1996).

[5] Yaquis were often working for landowners that controlled areas once belonging to ancestral lands. This is not only a Yaqui experience; many native peoples were forced legally off their lands, but yet employed by the families who usurped ownership. In many rural villages, Indigenous communities were forced to migrate to the capital city for an opportunity that the countryside could no longer afford them. See Lourdes Arizpe.

[6] American leisure magazines, like *Sunset, Overland, Munsley*, and *Pacific Monthly*, among others, reported on the Yaqui Wars and described the horrors of war, but also the inevitable decimation of a nation. As a solution to the Yaqui Wars, and to rid the valley of the traditional knowledge bearers, state and federal officials deported the Yaquis to Yucatan, Oaxaca, and other states in Mexico.

[7] Historian Alan Knight extensively analyzed the factors that ignited the revolution, arguing that those directly affected by the land changes, villagers dispossessed of their lands, as the Zapatistas, and most importantly in the north by the *serranos* and *rancheros*, all those were threatened by the expansion of the hacienda.

[8] By the 1920s, the traditional villages of Bacum and Cocorit were lost to non-Yaqui farmers who had encroached during the wars. The traditional villages have since been relocated.

[9] Renting land parcels, although illegal, became a source of income for Yaqui farmers who, as a result of the modification of Article 27 in 1992, which allowed for the privatization of the *ejido* collectives, left Indigenous communities unable to access credit lines, as they no longer had collateral nor support from the state. Renting became a widespread practice by the early 2000s, when almost 96% of Yaqui farming land in the *Hiak Vature* was rented to non-Yaquis who had the means to invest.

[10] Meza, Maria Mercedes. "Plaguicidas Organoclorados en Niños Indígenas de Potam, Sonora, México." Presentation at the Binational Forum: Law and Environment on the Yaqui River Hermosillo, Sonora, August 18, 2017.

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Recommended Citation

Galindo, Anabel, James Hopkins. 2017. "Rio Yaqui—The Hiak Vatwe: The Transformation of a Cultural Landscape." *Open Rivers: Rethinking Water, Place & Community*, no. 8. <u>http://editions.lib.umn.</u> <u>edu/openrivers/article/rio-yaqui-the-hiak-vatwe/.</u>

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Anabel Galindo is a doctoral student whose research centers on a long duree of Yaqui history, exploring concepts of mobility, community, and identity from the mid-eighteenth century to modern twentieth century. Ms. Galindo has committed herself both at an academic and personal level to the Yaqui communities on both sides of the border. She is part of the history team at the Department of Language and Culture at the Pascua Yaqui Tribe and has helped develop resources and courses that raise awareness, in a binational effort, of the historical processes that have shaped Yaqui histories. Her dedication is vested in the community, her family, and her studies.

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FEATURE **RIVER CONSERVANCY AND THE UNDETERMINED FUTURE OF THE PORT OF TIANJIN, 1888-1937** By Kan Li

Tianjin, a city on the east coast of North China, has the world's fourth largest seaport. [1] It is one of the four centrally administered municipalities of China.[2] The urban population of Tianjin is 6,825,105, ranked the fourth largest among the cities in China. Our tale about this city and its river conservancy took place before the birth of its current seaport. Across the last several decades of China's last imperial dynasty,

the Qing (1644-1912), and China's first republic (1912-1949), on the banks of a river connecting Tianjin with the sea, the most important seaport of North China in the early twentieth century was built, thanks to the consistent efforts of river conservancy. In this story, we will see that Tianjin was not destined to become a seaport. To the contrary, Tianjin's status and prospect as a seaport were often questioned.[3] This story makes



A map of Tianjin dated 1899. The Northern Grand Canal, Southern Grand Canal, Daqing River, Ziya River, and Yongding River merged into the Haihe in Tianjin. The walled city was to the southwest of the confluence.

an inquiry into how Tianjin, facing challenges from other potential seaports and doubts from various parties, avoided misfortune on the brink of ceasing to be a seaport and remained one until the mid-twentieth century. Located 70 miles to the southeast of Beijing and 30 miles west offshore, the city of Tianjin began to form as a military fortress in the thirteenth century. The Northern Grand Canal, Southern Grand Canal, and three rivers merged into the Hai River (or Haihe, meaning "the river of the



Figure 1: A map of the Zhili Province dated 1912. Tianjin was a county of Zhili Province during the Qing. Claudius Madrolle, 'Madrolle's Guide Books: Northern China, The Valley of the Blue River, Korea' (Paris: Hachette & Company, 1912).

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sea" in Chinese) at Tianjin and flowed into the Bohai Sea at the Gulf of Zhili (see figure 1 and figure 2). Once the Ming emperor Zhu Di moved his capital from Nanjing to Beijing in 1420, to secure the supplies to this new capital, he ordered the dredging of the Grand Canal, the transport artery of the southern and northern reaches of the empire. Tianjin thus became the last stop of the long-distance tribute grain transport on the Grand Canal before the tribute grain could reach the capital. [4] Gradually turning into a bustling Grand Canal port, Tianjin attracted merchants who brought from the south sugar, paper, silk, porcelains, and herbs, trading for dates, pears, cotton, fur, and peanuts produced from Tianjin's broad hinterland. Tianjin was also

the biggest salt production center of North China. Numerous saltpans spread along the seashore, producing one eighth of the total amount of salt produced in China. The circulation of all kinds of goods, especially the monopolized salt trade,[5] nurtured many rich merchants in Tianjin. They built gorgeous residential compounds and gardens, and sponsored charitable organizations, schools, and theaters. Tianjin thus prospered as a Grand Canal port and grew into a commercial city with a thriving urban culture. Starting in the 1850s, the Grand Canal was severely silted up in its sections to the north of the Yangtze River and was frequently deprived of traffic due to local disturbances. As a result, many formerly vibrant



Figure 2: A map of Tianjin dated 1899. The Northern Grand Canal, Southern Grand Canal, Daqing River, Ziya River, and Yongding River merged into the Haihe in Tianjin. The walled city was to the southwest of the confluence.

ports of the Grand Canal began to decline. Would Tianjin be one of them?

When transportation on the Grand Canal became unreliable, Tianjin had to reposition itself in the transport system to keep its prosperity. In the 1850s, steamships were introduced to China and coastal trade and sea transport grew. While being a Grand Canal port, Tianjin was also a destination for boats sailing from Fujian Province and Guangdong Province along the coast. Could Tianjin turn to the sea? The Bohai Sea is thirty miles to the east of Tianjin and was connected with Tianjin by a shallow and sinuous river, the Haihe.[6] The Haihe had been used occasionally to move tribute grain and other goods whenever the transportation on the Grand Canal was impeded, but it was not an ideal river for developing steamer transportation. Nor was the Qing government willing to allow steamship transportation at Tianjin. Having been forced into several unequal treaties by the foreign gunboats approaching China's coast from the sea, the Qing government feared that a steamer terminal so close to Beijing would put the court in danger. However, once the Anglo-French allied forces defeated the Qing troops during the Second Opium War (1856-1860), whether to open Tianjin to foreign steamers and trade was no longer a decision that the Qing government could make on its own. After a series of battles at the Dagu Fort, on the coast near Tianjin, the foreign forces made their way through Tianjin and attacked Beijing. The emperor escaped from his palace and agreed to sign the so-called "Treaty of Peking" with Britain, France, and Russia. The treaty opened Tianjin as a treaty port, ceded lands to Britain and Russia, and allowed Western Christian groups to rent or purchase land for their establishments.

Before Tianjin, fifteen ports including Guangzhou, Fuzhou, Shanghai, and Nanjing had been opened as "treaty ports" to foreign trade and residence as a result of the Western imperialist powers' forces and unequal treaties. [7] The provisions of the Treaty of Peking further granted the Western powers the privilege of renting land permanently in the treaty ports to establish their "concessions" which they administered independently and where they enjoyed the consular jurisdiction. As soon as Tianjin became a treaty port, Britain, France, and the United States selected their parcels of land to the southeast of the Chinese walled city, along the west bank of the Haihe. Altogether these three powers occupied an area of 4,058 square meters, extending two miles along the waterfront. Later, the number of concessions in Tianjin grew to nine: Germany obtained its concession in 1895, then Japan in 1898, Russia in 1900, and Italy, Austro-Hungary, and Belgium in 1902.[8] These concessions covered 15 square kilometers and were all located along the two banks of the Haihe (see figure 3). Not until 1947 had the last three remaining concessions been returned to the Chinese government.

Since foreign interests all concentrated on the banks of the Haihe, the foreigners worked to turn the waterfront in their concessions into seaports. During the first five years of the opening of Tianjin, the number of foreign ships arriving at Tianjin increased from 111 to 209, and the goods from 26,561 tons to 60,049 tons.[9] But "the port has been a disappointment to those who expected that it would reach an importance such as to crush Shanghai and its other rivals, or at all events, to divert a considerable portion of their trade."[10] The foreign community realized the difficulty of building a high-capacity seaport on the Haihe, given the river's circuitous water course and sand-rich water. They were also concerned with the sandbar at the estuary, which only allowed ships of light draft to cross.[11]

In the meantime, foreigners and Chinese reformist officials advocated building a railroad network across China. The first officially approved railroad was built in 1881 between the Kaiping coal mine (in today's Tangshan, Hebei Province) and a small town named Xugezhuang to transport the coal. This 5.7-mile long railroad was extended



Figure 3: Map of Tianjin and Foreign Concessions, all located along the Haihe, 1912. Reproduced from an original in the collections of the Geography & Map Division, Library of Congress.

to Tanggu, a coastal town near Tianjin, and then to Tianjin in 1888 (see figure 4). The foreign community in Tianjin was at first very excited by this new move of improving the connectedness of Tianjin and was more confident than ever in Tianjin's future. However, contrary to their expectation, because of the railroad, Tianjin's status as a seaport was soon put into debate and an option of moving the seaport from Tianjin to Tanggu was put forward.



Figure 4: Partial image of map showing the location of Tanggu (spelled Tangku in the map) and the railway connecting Tanggu with Tianjin (spelled Tientsin in the map).

Tianjin or Tanggu?

Tanggu, 30 miles downriver from the port at Tianjin, sometimes served as a temporary anchorage for steamers when the Haihe was too shallow for ships to go up to Tianjin. Before railways reached Tanggu in 1888, it was only a "muddy lowland" where, except the big salterns, "no other means of living could be sought."[12] This had been changed once the railroad reached this small town. From that time on, passengers and cargoes coming by ships would disembark at Tanggu and take the train to Tianjin, which was a faster option than navigating through the troublesome Haihe. Thus, in 1890, Tanggu became the official anchorage for steamers.[13]

Unfortunately for the seaport in the concession area, the conditions of the Haihe increasingly deteriorated at the same time. Only a few steamers of light draft could come to the port in Tianjin with the assistance of highly skilled pilots. In 1889, although the navigation of the Haihe was said to be the worst since Tianjin was opened to foreign trade in 1860, the trade still grew at a satisfactory rate, thanks to the railroad.[14] The development of the railroad now appeared more like a threat to the existence of the seaport in Tianjin.

Once the railroad between Tianjin and Tanggu was further extended toward Beijing in 1897, "Peking [Beijing] fruit is sent direct to Tangku [Tanggu] for shipment south and Peking is similarly supplied with southern fruit; and traffic generally developed so rapidly that it soon became necessary to double the line."[15] The track was indeed doubled. In addition, warehouses and docks were built at Tanggu. This unknown fishing and salt producing town started to grow into a busy seaport. By the end of the 1890s, Tanggu could accommodate almost all the cargo from both the sea and railway. Even when not a single steamer could reach the port of Tianjin, the trade of Tianjin (including Tianjin and Tanggu) was still rapidly growing, to the point that the value of the trade at Tianjin was second only to Shanghai. [16]

In the mid-1880s, discussions and speculations about relocating the city and port of Tianjin down the river to Tanggu began to draw the attention of newspapers. The flood in 1885 brought too much sand and mud into the Haihe and the sandbar at the river mouth. For the greater part of the summer, steamers were impeded by the silting of the Haihe in its upper reaches.[17] Shen Bao, an influential Chinese newspaper in Shanghai, reported that Tianjin was having an ongoing discussion about building a new city or relocating the city to Tanggu.[18] The following year, from April to mid-September, almost all the vessels failed to reach the foreign settlements in Tianjin and had to unload their cargoes about 14 miles below the port.[19] The North China Herald reported in May that "the removal of the Settlement further down the river or to Taku [Dagu][20] is not vet seriously contemplated, although talked of."[21]

This line of thinking continued into the next decade and resulted in action. Two leading companies in Tianjin, the China Mining Company and the China Merchants Steamer Navigation Company, bought land in Tanggu and were going to build wharves and warehouses there. The reporter from the Peking and Tientsin Times, the most influential English newspaper in Tianjin, cautioned that the steamer companies would "follow the example," and "make themselves independent of the river."[22] The same newspaper also warned the vested interests at Tianjin that the day when the railways would make Tanggu a powerful competitor to Tianjin was coming and at that time, they would have to take action to preserve Tianjin as the terminus of steamers.

[23] Worse still, in 1899, the three major steamer companies at Tianjin—Butterfield & Swire, Jardine Matheson & Co., and China Merchants Steam Navigation Company—changed their policy to discourage shippers from sending their cargo from the port in Tianjin. The *North-China Herald* criticized this new policy of the steamer companies that it would "greatly influence the prosperity of this settlement." The editor commented that this move could drive the steamer companies to discharge at Tanggu "only and always," and it became certain that the steamer companies were trying to replace the current location of the seaport with Tanggu.[24]

With their interests concentrating on the Haihe and their decades' efforts of building the concessions at stake, the foreign municipalities of the settlements strived to keep the seaport alive. To compete with railroad and Tanggu, they had to tackle the chronic problem: the bad navigating conditions of the Haihe. The municipalities sought for help from the diplomatic bodies who then pressured the Qing government to cooperate in the Haihe conservancy. A Sino-foreign jointly administered river institution, the Haihe Conservancy Commission, was established in 1897. The obligation of the Qing government in providing funds for this commission was written down in the protocol signed between China and the eight allied forces after the Boxer Uprising (1899-1901).[25]

Since 1897, the Haihe Conservancy Commission had constantly worked on various projects on Haihe. Five of the most difficult sections of the Haihe for steamers to pass were straightened over the years from 1901 to 1923. Numerous bends where the radius was too small were cut off and the river course was carefully trained and deepened. These "cutting" projects shortened the navigating distance from the sea to Tianjin by 17 miles (see figure 5). Before the cuttings were made, it took a sea-going steamer seven to eight hours to navigate from Dagu to Tianjin. As the river course was straightened and deepened,

the time was reduced to five hours 10 minutes in 1903 and four hours 10 minutes in 1904. In 1904, when three major cuttings had been completed, the fastest record of navigating from Dagu to Tianjin was 3.75 hours.[26] A straighter and deeper river course was not enough to make Tianjin a good seaport. At the mouth of the Haihe, a strip of sandbar laying underneath the water, the so-called Dagu Bar, obstructing large steamers from entering the Haihe. In 1905, the Commission brought up a plan of dredging a 6-foot-deep channel across the Dagu Bar, so that on an 8-foot tide, ships drawing 12 feet could pass into the Haihe.[27] The Commission achieved the goal of a 6-foot channel on the crest of the bar in April 1915.[28] To keep Tianjin open to steamers, the Haihe had been engineered into an artificial canal. Even more important in the Commission's job was the maintenance work. The Commission bought icebreakers to keep the port on the Haihe open all year long, as well as dredgers to clear sediment deposited on the riverbed and at the Dagu Bar. Lighthouses, docks, and sluices and other infrastructure that a seaport needed were also built and maintained. To provide data for conservancy works and to archive the performance of the river, the Commission took surveys of the river and recorded the water level, height of tide, and volume of sediment regularly. Fortunately, these expensive and difficult works paid off immediately. The number of steamers that could come through the Haihe all the way to the concessions in Tianjin significantly increased. In 1905 when three cuttings had been done, 395 steamers arrived at the wharves of the foreign settlements. The figure was 333 in 1903 and 374 in 1904. The number rose to 511 in 1908 and 623 in 1909. From 1909 to 1916, each year over 600 steamers arrived at the port of Tianjin. In 1914 and 1915, the numbers even reached 814 and 768. [29] The value of trade of Tianjin also rapidly grew from 1894's 44,277,054 Taels to 1914's 123,639,776 Taels.[30]

Although Tanggu had better natural conditions that a seaport required and had already been



Figure 5 (a,b stacked): The "cuttings" on the Haihe (areas highlighted by author). The Haihe Conservancy Commission conducted four "cuttings" on the Haihe from 1901-1913. The fifth cutting in 1918 was designed by the Commission and was carried out by the local gentry.


Figure 5 (c,d stacked): The "cuttings" on the Haihe (areas highlighted by author). The Haihe Conservancy Commission conducted four "cuttings" on the Haihe from 1901-1913. The fifth cutting in 1918 was designed by the Commission and was carried out by the local gentry.

facilitated into a small seaport by the end of the nineteenth century, the idea of moving the port to Tanggu was not actually carried out. Tanggu as an alternative port was not chosen in the 1890s, but the possibility of moving the primary port of Tianjin to Tanggu never died out. Despite the tireless efforts of the conservancy of Haihe, in the 1910s, the Haihe was again silted up and Tianjin's potential of continuous thriving was questioned again.

Floods in North China

The Haihe was the only outlet to the sea for an area of 102,000 square miles, receiving five major rivers and canals in North China. The vast hinterland of the Haihe suffered from floods frequently, affecting nearly thirty-five million

people in North China.[31] Throughout the years from 1736 to 1911 that have consecutive records, the Haihe flooded every two years on average. [32] In protecting the river that it had strived to improve from the floods, the hands of the Haihe



Figure 6: The short dotted line between the Jiangan River (Chien Kan Ho) and the Chaobai River (Chao Pei Ho) to the upper left of the map shows the location of the 1912 Lisuizhen break (Li Shu Chen Break) and the detour to the Chaobai River this break created. Reproduced with permission from the Archive of the Haihe Conservancy Commission housed at the Tianjin Municipal Archives, W0003-1-000210, page 455.

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Conservancy Commission were tied, for its jurisdiction was restricted to the Haihe. Without a comprehensive plan involving the upper reaches of the Haihe, the outcomes of the Commission's works were vulnerable; a major flood could easily nullify the effects of years of improvement and maintenance of the river, which could put Tianjin's seaport on the brink of collapse.

The consecutive floods in 1912 and 1913 raised the awareness of the urgency of river conservancy in Zhili Province. In 1914, the Governor General of Zhili, Zhu Jiabao, invited the Tianjin Haihe Conservancy Commission to attend a meeting about conservancy of the rivers in North China. This meeting, organized by the General Governor of Zhili, provided an opportunity for the Haihe Commission to extend their influence to a larger area. At the meeting, the Haihe Commission proposed to repair a long-neglected break on the Chaobai River.

The Chaobai River was in the upstream area of Tianjin. Originally, the Chaobai River merged into the Northern Grand Canal to the north of Tianjin and contributed to the supply of fresh water of the Haihe. The dike of the Chaobai River had burst a few times. In 1904, the dike of Chaobai River broke at Lisuizhen, a village to the northeast of Beijing. Instead of flowing into the Northern Grand Canal, the water from the Chaobai River entered the Jian'gan River through the break. The break in the Chaobai River was later sealed, but was again and again ruptured. The break reappeared in 1912 after a disastrous flood, creating a gap of 1.8 miles at the dike of the Chaobai River (see figure 6). The Chaobai River again shifted course. The water level of the Northern Grand Canal thus decreased. The Haihe River was in turn affected. Not only had the water level of the Haihe dropped, the level of its river bed had also increased rapidly because of the deposit from a messy river, the Yongding River. The Yongding (meaning "forever peaceful" in Chinese) River, formerly called Wuding, meaning "never peaceful," was a river that carried

enormous amounts of sand and silt and flooded and changed course frequently. It originated from Shanxi, meandering across Hebei and Beijing, then merged into the Northern Grand Canal to the north of Tianjin. Prior to the break, due to the fresh water it received from the Chaobai River, the Northern Grand Canal had a higher water level than that of the Yongding River, so the Northern Grand Canal could restrict the inflow from the Yongding River and wash away the sand and silt that the Yongding River brought. As the water level of the Northern Grand Canal dropped in 1912, the silt that the Yongding River carried was deposited on the beds of the Northern Grand Canal and the Haihe more easily. Moreover, the delta of Yongding was 42 feet above the bed of Haihe. If the free flow of Yongding continued, as the engineer of the Haihe Conservancy Commission was concerned about, "the present level of the water of the Hai Ho [Haihe] would become that of its bed."[33]

For three years, the Northern Canal Conservancy Bureau that was responsible for this break failed to carry out any effective mends. At the meeting of 1914, in order to secure the navigation at the Tianjin port, the engineer-in-chief of the Haihe Conservancy Commission at the time, an Italian, T. Pincione, proposed to close the break on the Chaobai River and revert the river to its old course.

In the meantime, the Beiyang Government (1912-1928) established the National Conservancy Bureau in Beijing and hired a Dutch engineer Van der Veen to draw up a plan of controlling the tributaries and canals in the north and mitigating floods. Van der Veen's plan was to give the Northern Grand Canal a new course and let it directly flow into the sea without merging into the Haihe. If Van der Veen's plan was carried out, not only would the shipping and commercial interests at Tianjin be damaged, Tianjin and the surrounding villages would be short of drinking water. Pincione condemned this plan because "European experiences had proved that

despite the temporary relief, a general silting would follow if dividing up the draining water entirely."[34] He warned the Chinese government that "the tortuousness of a river like the Pei Ho [Northern Grand Canal] exists for a reason and if the Chinese Government tries to give the River a different course, they will soon find that the river will wander here and there until it has formed again that slope which Nature, the Supreme Engineer, has assigned to it."[35]

The Beiyang Government at Beijing approved Van der Veen's plan, whereas the Zhili Provincial Government approved Pincione's plan. In April 1915, the work of permanently directing the Northern Grand Canal into a separate course to join the sea started.[36] This meant that Pincione's proposal that would divert more water into the Haihe through the Northern Grand Canal had been ruled out. As Van der Veen's project progressed, the navigation on the Haihe had begun to suffer from losing the clear water from the Northern Grand Canal. In March 1916, the dredging plant in the Haihe was unable to cope with the rapid silting up of the river. The water at the port was already two feet shallower than that at the mouth of the river, so the steamers entering the Haihe could not come up to Tianjin, but had to anchor at Tanggu or Baitangkou. Pincione estimated that the coming fall would witness a reduction of three to four feet in the draft of the steamers that could come up to Tianjin.[37] In May, at some sections of the Haihe, the riverbed had risen no less than eight feet as compared to what it was a year earlier.[38] If this project of giving the Northern Grand Canal a separate channel toward the sea continued, Tianjin might lose its status as a seaport.

Tianjin vs. North China

Engineering projects are embedded in their sponsors' economic, social, and political goals. [39] With multiple active powers administering different sections of the Haihe and its tributaries, any conservancy plan would inevitably harm some interests while benefitting some others. What were the interests behind these two plans proposed by the National Conservancy Bureau and the Haihe Conservancy Commission?

The plan proposed by Van der Veen from the National Conservancy Bureau was aimed to relieve the floods that frequented the North China plain. The Haihe had been the only outlet to the sea for the five major waterways in North China. To give the Northern Grand Canal a separate channel would to some extent release the pressure of the river system of North China, especially during the summer freshets, when the rainy season coincided with the melted water. The Haihe Conservancy Commission also acknowledged in a report that the Van der

Veen proposal "would provide means, albeit temporary, of carrying off the flood waters."[40] What this flood mitigation plan disregarded was the commercial interest of the port of Tianjin. The National Conservancy Bureau of the Beiyang Government justified their plan of diverting permanently the Northern Grand Canal by indicating that "there is no longer the necessity to transport rice" by the Grand Canal.[41] The absence of the effects of the plan on Tianjin, the largest port and commercial center of North China, in their evaluation of the proposal was worth noticing. The trade of Tianjin had grown since its opening as a treaty port. The value of exports at Tianjin had been second only to Shanghai since 1905. Its direct imports from foreign countries had also increased by more than 50 percent.[42] The trend continued in the 1910s and 1920s and the trade of cotton, straw hat braids, hides, and peanuts had surpassed Shanghai and become the number one nationwide.[43] The thriving economy of Tianjin and its active commercial society also nurtured

other aspects of urban development such as street planning, policing, public health, and education, and made Tianjin a role model for Chinese modern cities. A long-time foreign resident of Tianjin described the city in the late 1910s and early 1920s as "the most progressive town in China and an easy leader in education and social science."[44] It was unlikely that the National Conservancy Bureau was truly ignorant of the impact that their plan would have on Tianjin's prosperity. They either intentionally left that part out or thought that the port of Tianjin could be given up for the sake of flood prevention in North China.

The supporters of this plan demonstrated their perspective about the effects on Tianjin more frankly. The Peking Daily News, a Chineseowned-and-run English language newspaper, praised that the Beiyang Government's plan was "a very wise one." The solution adopted by the National Conservancy Bureau would improve the draining situation of the entire Zhili Province as well as the interests of Tianjin as a port, because it would relieve the Haihe from the burden of receiving too large a volume of water that was way over its capacity. Somewhat paradoxically, the same article admitted that the plan would affect the navigability of the Haihe and the prosperity of Tianjin, but it urged the authorities at Tianjin to recognize that "the interests of Chihli [Zhili] are as great, if not greater, than the interests of this northern seaport," and "the harm done by the diverting of the waters of the Pei Ho [Northern Grand Canal] into the other river is very small compared with the benefit obtained elsewhere." The reporter criticized the Haihe Commission's plan that it had only one object in view, which was the welfare of Tianjin, and disregarded the enormous harm that it would do to Zhili.[45] Although this article suggested that the government's plan had considered the benefit of Tianjin, it still saw the interests of Tianjin and the Zhili Province as conflicting.

Another way to legitimize the plan that could ruin Tianjin's future as a seaport was the pessimistic view of Tianjin that had lasted for decades since the 1890s. Van der Veen also believed that the end of Tianjin as a port was foreseeable because of the fast elevation of the river bed.[46] The Peking Daily News, while acknowledging the importance of Tianjin, considered it a port that would disappear anyway, so the current interests at the port weighed much less than the flood relief of North China. The article argued that the Haihe's incapability of conveying the water from the five important waterways was a reason why serious dike breaks along the upper courses recurred every year. The remedy would be to enlarge the Haihe's capacity, but the newspaper did not think it was practical to do so. Even if the capacity could be enlarged, the work would cost an enormous amount of money that no party could afford.[47] Moreover, the newspaper claimed that the Gulf of Zhili would in time cease to exist as "the deposit that the many rivers debouching into it carried along would eventually fill it up."[48] If the Gulf would disappear in the near future, why bother preserving the seaport of Tianjin?

Whereas the National Conservancy Bureau was most concerned with the flood prevention in North China, the Haihe Conservancy Commission put the commercial interest of the seaport of Tianjin as their priority. But, unlike the National Conservancy Bureau that overlooked the devastating effects of their plan to Tianjin, the Haihe Conservancy Commission insisted that the interests of Tianjin were not contrary to those of the hinterland and that their plan would take care of both the flood prevention in North China and the shipping and commercial interests at the port of Tianjin.[49] The Commission promised that their plan would close the break of the Chaobai River and reverse the river to its old course, as well as replacing the impaired flood relief weirs of the Northern Grand Canal. In his evaluation of Van der Veen's plan, Pincione tried to demonstrate that Tianjin's interests were in accordance with

the Zhili Province. He reiterated his point that the National Conservancy Bureau's plan would speed up the sedimentation of the Yongding delta and promote the flooding of the eastern area of Zhili. Tianjin was no exception, but just a part of Zhili that would be equally harmed by the plan of giving the Northern Grand Canal an independent outlet. If that plan was carried out, Tianjin, along with its surrounding area of Zhili would become marshes and subject to floods from the "homeless" Yongding and Northern Grand Canal.[50]

The Haihe Conservancy Commission also responded to both the newspaper and Van der Veen's hypotheses that the Haihe and the Zhili Gulf would soon be filled up. First, no data had shown that the depth of the Gulf of Zhili was decreasing. Second, it is possible that Haihe would become unnavigable soon, but as long as the Northern Grand Canal joined the Haihe, the Canal would serve as a barrier to decrease the water level difference between the Yongding and the Haihe and to reduce the speed of water from the Yongding.[51]

In April 1915, upon hearing the news that Van der Veen's project had commenced, the Haihe Conservancy Commission immediately protested to the Governor General of Zhili, but the Governor General stated that he was not informed of this plan made by the National Conservancy Bureau. After some unfruitful communication with the Chinese government, in the end of 1915, the Haihe Commission decided to try the diplomatic channel. On behalf of the Haihe Conservancy Commission, the Diplomatic Body made representations to the Office of Foreign Affairs of the Beiyang Government

to request a meeting with the Minister of the Interior. In the representations, the Dean of the Diplomatic Body, John Newell Jordan, pointed out that the National Conservancy Bureau's plan "depriving the Hai Ho [Haihe] of the waters of Pei Yun Ho [Northern Grand Canal] and the Yun Liang Ho, is most detrimental to the welfare of the port of Tientisn and was certainly not agreed to by the Hai Ho Conservancy with whom the Chinese Government promised that the Chinese Authorities concerned should cooperate."[52] It took a long time for the Chinese government to respond. In May 1916, the Minister for Foreign Affairs, Lu Zhengxiang, agreed to arrange a meeting between the Minister of the Interior and Pincione, the engineer of the Haihe Conservancy Commission. By the time that the Ministry of the Interior approved Pincione's plan and called off the other project, the summer freshet was around the corner. Due to the time limit, a temporary solution was put forward by Pincione, which was to build a weir at Lisuizhen to partially divert the flow from the Chaobai River that could flood the surrounding villages into the old course, thus into the Northern Grand Canal and the Haihe. The old course of the Northern Grand Canal that had been filled up in Van der Veen's work was partially recovered in November 1916 and the flood relief weir at Lisuizhen was completed in May 1917.[53]

These works temporarily halted the deterioration of the navigating conditions of the Haihe caused by the break of the Chaobai and the National Conservancy Bureau's project. The seaport of Tianjin thus went on with its development, but its future remained indeterminate.

The Great Northern Port

Although the dispute between Haihe Conservancy Commission and the National Conservancy Commission from 1915 to 1917 ended up with implementing a project in favor of Tianjin's interests, Tianjin's status as a seaport was still not secured. By the end of the 1920s, the navigation

condition of the Haihe was still disappointing. In the late nineteenth century when the Haihe conservancy works had just commenced, the river could allow ships of a draft under 11 feet to pass. The commission tried every possible way to increase the depth of water and the best result they had ever attained was 18 feet 3 inches in 1925. In 1928, the draft of ships that the river could carry dropped to 12 feet.[54]

The same year, the Nationalist Government assumed control of North China. A North China Conservancy Commission was immediately established to reorganize the former Beiyang Government's conservancy institutions, and unify the segmented jurisdictions of river conservancy from the hands of various parties. The engineer of the North China Conservancy Commission criticized the plans drawn up by the former institutions and the Haihe Conservancy Commission, saying that they were overly influenced by foreign powers: only caring about the navigation situation of the Haihe River and the commercial interests at Tianjin but neglecting the safety of the people in North China.[55]

Another important mission of the North China Conservancy Commission was to carry out the plan of the Great Northern Port drawn up by Sun Yat-sen, the "Father of China's Republic," in 1919. In his famous essay, "International Development of China," Sun Yat-sen put the construction of a Great Northern Port at the center of the first program of this grand plan. This program aimed



Figure 7: The location of the Great Northern Port in Sun Yat-sen's plan. Source: 'Map II in Sun Yat-sen, The International Development of China.' New York and London: G.P. Putnam's Sons, 1922.

to attract foreign capital to North and Central China and accelerate China's industrial development. The program included:

- The construction of a great Northern Port on the Gulf of Pechili [Bei Zhili].
- The building of a system of railways from the Great Northern port to the Northwestern extremity of China.
- The Colonization of Mongolia and Sinkiang [Xinjiang] (Chinese Turkestan).
- The construction of canals to connect the inland waterway systems of North and Central China with the Great Northern Port.
- The development of the Iron and Coal Fields in Shansi [Shanxi] and the construction of an Iron and Steel Works. [56]

In Sun's plan, the Great Northern Port would "serve as a base of operation of this International Development Scheme, as well as a connecting link of transportation and communication between China and the outer world." [57] Tianjin at the time was already the center of trade and transportation in North China, and yet Sun did not choose Tianjin, but rather proposed to build this Great Northern Port midway on the coastline between Tanggu and Qinhuangdao, at the estuary of the Daqing River[58] (see figure 7). He argued that the new site, because of its proximity to the deep water of the Gulf of Zhili, would provide an ice-free port. [59] Tianjin and Qinhuangdao were "too far from the deep water line and too near to fresh water which freezes in winter."[60] With its broad hinterland, proximity to Tianjin, and superior natural conditions, this Great Northern Port, Sun claimed, would be developed "as large as New York in a reasonable limit of time."[61] An engineer-official later revealed another reason why Sun bypassed Tianjin and Tanggu: to avoid the established western powers at the treaty port. [62]

In 1928, the North China Conservancy Commission began the preparation for this ambitious scheme. They made the budget, arranged the funding, purchased the required materials and facilities, and organized and sent out survey teams. The North China Conservancy Commission divided the construction into three phases and expected to complete all in 50 years. Unfortunately, soon after the Japanese troops invaded Northeast China (the Mukden Incident, September 18, 1931), the project came to a de facto halt in 1932.[63]

Never finished, the Great Northern Port was like a ghost that haunted the seaport of Tianjin. In 1937, the Japanese forces occupied North China and decided to build a new seaport. Two proposals were put forward; one of them was to build the new port at the location of the Great Northern Port. The Japanese eventually decided to adopt the other plan: excavating a new port in Tanggu.

The Tanggu New Port had been partially finished by the Japanese when they were defeated in World War II in 1945. After the Nationalist Government resumed sovereignty, some Chinese engineers still advocated building the Great Northern Port on the grounds that the better natural endowment at the Daging River estuary would save enormous money and labor in the long run.[64] The attempt to resume the construction of the Great Northern Port was soon interrupted by the civil war (1945-1949) between the Nationalist Party and the Communist Party, but a deeper navigation channel had already been excavated at the Tanggu port. After 1949, the Communist government carried on the project of building a seaport at Tanggu. It eventually accomplished the plan of making Tanggu a fullfledged seaport in 1951. The seaport in Tianjin gradually lost its functionality to Tanggu. Since 1958, the Haihe no longer received steamers from the sea, but the city of Tianjin had been expanded to absorb Tanggu – a plan that had been put forward in the late nineteenth century and later was brought up again and again but was put aside every time.

Conclusion

That Tianjin could transform into a seaport after the decline of the Grand Canal and could remain a seaport until the mid-twentieth century was largely due to the specific socio-political situation and the river conservancy projects. The existing narratives on the development of Tianjin in the late nineteenth and early twentieth centuries often attribute Tianjin's successful transition from a Grand Canal port to the largest North China seaport to its natural geography, as if Tianjin could easily turn to the sea when the Grand Canal declined given its proximity to the sea. Our story shows that it was not an easy and natural choice to build a seaport in Tianjin. Tianjin had two options in the 1880s. One option was to keep Tianjin open to steamer traffic by entirely rechanneling and constantly maintaining the Haihe; the other option was to facilitate the coastal village Tanggu as the terminal for steamers and relocate business there or expand the city significantly. With multiple foreign powers settling and investing on the banks of the Haihe, the first option was chosen. If it were not for the constant engineering works and maintenance on the Haihe and its upper streams, Tianjin would not have been able to develop into a high-capacity seaport and remain one for half a century. However, our story further shows that, although Tianjin's water landscape had been completely transformed to make it accessible to steamers, the effects of these projects did not usually last and whether Tianjin should and could be kept as a seaport was often questioned.

Connected with the sea by an artificial river, Tianjin's status as a seaport was heavily dependent on the continuous conservancy efforts on the Haihe and its tributaries. The episode in 1915 demonstrates how fragile this system of maintaining the seaport of Tianjin was. Any disruptive project such as the 1915 plan to give the Northern Grand Canal a new course could possibly end Tianjin's lifespan as a seaport. And yet, this delicate system operated for more than forty years. Why? The answer is the heterogeneous political situation of Tianjin. At various times, as many as nine Western powers coexisted in Tianjin starting in 1860. The Qing Dynasty collapsed in 1912 and the leadership of the next regime, the Republic of China, changed hands several times. None of these powers had complete control of Tianjin and were able to convince or coerce the vested interests to give up the port in Tianjin and implement the enormous project of building a new port from scratch. In 1937, as soon as the Japanese troops took over Tianjin and eliminated the other powers, they immediately began expanding and facilitating the port of Tanggu. After taking a prolonged detour for nearly forty years, the trajectory of Tianjin's development came back to the path that had been discarded earlier. Only after examining the episodes in which Tianjin's role as a seaport was not taken for granted but was questioned, can we reconsider Tianjin's trajectory to modernization not as a linear and smooth process but full of twists and turns.

The episodes here in which Tianjin reversed its destiny several times represent the resilience and dynamism that the river generated in urban development. The Haihe was in a web of waters, extending far beyond Tianjin. The web of waters wove a broad region of North China together physically and socially. The Haihe empowered all the parties who had control of any section of the river and its tributaries to project influence by river works on other regions in this web. Thus, the interests of the regions and various powers in control were all interdependent. The Haihe also provided a space for the segmented administrations of Tianjin and its vicinity to negotiate and mediate their conflicting agendas. To successfully implement a river conservancy project, the parties that would be affected had to reach a

point of agreement. Behind the river conservancy projects were often intertwined agendas. Even if the foreigners had treaty-granted privileges in operating their concessions and intervening in the policy making of the Chinese government, when proposing a river conservancy project, they had to deliver not only their own commercial

Footnotes

[1] Statistics for 2015, by cargo volume.

[2] The so-called Zhixiashi in Chinese. the other three are Beijing, Shanghai, and Chongqing.

[3] Scholarship also suggests that Tianjin's transition from a Grand Canal port to a seaport was inevitable and the process had been smooth and out of question. See Lai Xinxia 来新夏, Tianjin jindaishi 天津近代史 (Tianjin: Nankai daxue chubanshe, 1987); Liu Haiyan 刘海岩, Kongjian yu shehui: jindai Tianjin chengshi de yanbian 空间与社会:近代天津城市的演变 (Tianjin: Tianjin shehuikexueyuan chubanshe, 2003); and Wang Changsong, "Jindai Haihe hedao zhili yu Tianjin gangkou kongjian zhuanyi de guocheng yanjiu" 近代海河河道治理与天津港口空间转移的过程研究 (PhD diss., Peking University, 2011).

[4] The grain transportation on the Grand Canal was especially important for the empire, for the grain from the southern provinces were a major form of land tax and contributed greatly to the coffers of the government and the court. Collected as a tribute to the court, this grain was called tribute grain.

[5]A complex and efficient salt tax extraction system had been developed since the Ming Dynasty (1368-1644). By tendering a substantial security deposit to assure their salt monopolies, only the hereditary dealers who were enrolled in the salt syndicate register would be bestowed with the right to harvest salt from their own salterns and to transport and sell it in designated districts. While most of the considerable profit of salt monopoly was absorbed by the fortune of salt merchants, the state secured its revenue by collecting the salt tax in advance plus the donations and deposits from the monopoly merchants.

[6] For maps of the Haihe, see <u>https://dcl.umn.edu/search/show_details?search_string=tian-jin&per_page=60&&page=1, https://dcl.umn.edu/search/show_details?search_string=tianjin&per_page=60&&page=4.</u>

[7] Guangzhou, Fuzhou, Xiamen, Ningbo, Shanghai were opened in 1842 after the Opium war in the Treaty of Nanjing. After the Second Opium War, Niuzhuang, Dengzhou, Taiwan, Danshui, Dagou, Chaozhou, Qiongzhou, Nanjing, Zhenjiang, Hankou, and Jiujiang became treaty ports.

[8] The United States gave up their concession in 1896 and transferred it to the jurisdiction of the Municipal Council of the British Concession in 1902.

interests in Tianjin but also the big concerns of the Chinese—the flood relief—in a larger area. The success of the seaport of Tianjin in the early twentieth century was forged by the checks and balances that were created in the conservancy issues among the various powers, Chinese and foreign, central and local.

[9] W. M. Baker, "Report on the Trade at the Port of Tien-tsin for the Year 1865," in *Reports on the Trade at the Ports in China Open by Treaty to Foreign Trade, for the Year 1865* (Shanghai: Imperial Maritime Customs' Press, 1866), 30, Google Books.

[10] O. D. Rasmussen, *Tientsin, An Illustrated Outline History* (Tianjin: Tientsin Press, 1925), 44. The author quotes from Alexander Michie's work.

[11] Ibid., 21. "Tientsin Trade Report for the Year 1868," Tianjin Municipal Archives (hereafter TMA) W0001-1-011064.

[12] "Yubang xiangzheng" 鹬蚌相争, Shen Bao申报, March 8, 1890. Zhongguo jindai baokan 中国近代 报刊, <u>http://www.dhcdb.com.tw/SP/</u>.

[13] "Dinggu chunxun" 丁沽春汛, Shen Bao, February 16, 1890.

[14] R. S. Yorke, "Tientsin Trade Report, for the Year 1889," in *Returns of Trade and Trade Reports* 1889 (Shanghai: Statistical Department of the Inspectorate General of Customs, 1890), 19, Staatsbibliothek zu Berlin.

[15] Alfred E. Hippisley, "Tientsin Trade Report, for the Year 1897," in *Returns of Trade and Trade Reports 1897* (Shanghai: Statistical Department of the Inspectorate General of Customs, 1898), 26, Staatsbibliothek zu Berlin.

[16] Ibid, 29.

[17] Gustav von Detring, "Tientsin Trade Report, for the Year 1885," in *Returns of Trade and Trade Reports 1885* (Shanghai: Statistical Department of the Inspectorate General of Customs, 1886), 19, Staatsbibliothek zu Berlin.

[18] "Jingu yan xin" 津沽雁信, Shen Bao, Sep. 14, 1885.

[19] Decennial Report on the Trade, Navigation, Industries, etc., of the Ports Open to Foreign Commerce in China, and the Condition and Development of the Treaty Port Provinces, 1892-1901, Second Issue, Vol. I (Shanghai: Statistical Department of the Inspectorate General of Customs, 1906), 554, Google Books.

[20] Further down the river from Tanggu, Dagu was on the other side of the Haihe. Before the railway reached Tanggu, as a military settlement, Dagu was where the cannons were located and was much more well-known than Tanggu. Sometimes these two place names were used interchangeably.

[21] "Outports: Peking," *The North – China Herald*, May 14, 1886, ProQuest Historical Newspapers: Chinese Newspapers Collection.

[22] Peking and Tientsin Times, July 24, 1897.

[23] "Tientsin a Seaport," Peking and Tientsin Times, April 2, 1897.

[24] "Tientsin: The Steamer Companies and Merchants," *The North – China Herald*, April 24, 1899, ProQuest Historical Newspapers: Chinese Newspapers Collection.

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[25] A secret organization named Yihequan (The Righteous and Harmonious Fists) originated in Shandong and led an uprising against foreigners and foreign influence in North China. It was known as the Boxer Uprising. The Qing government hesitated to suppress the uprising until the eight allied powers (Britain, France, Germany, United States, Japan, Russia, Italy, and Austria-Hungary) attacked Beijing in 1900.

[26] W0001-1-007692, TMA, 16.

[27] Hai-Ho Conservancy Board, 1898-1919: A Resume of Conservancy Operations on the Hai Ho and Taku Bar Compiled by Order of the Board (Tianjin: Tientsin Press, 1920), 76.

[28] Hai-Ho Conservancy Board, 1898-1919, 107.

[29] Data from Hai-Ho Conservancy Board, 1898-1919, 22-36.

[30] Rasmussen, 301. 1 Taels equaled approximately £ 0.17 at the time.

[31] An estimate based on the data from Liang Fangzhong 梁方仲, *Zhongguo lidai hukou tiandi tianfu tongji* 中国历代户口田地田赋统计 (Shanghai: Shanghai renmin chubanshe, 1980).

[32] Shuili shuidian kexue yanjiuyuan水利水电科学研究院, Qingdai Haihe honglao dang'an shiliao清 代海河洪涝档案史料 (Beijing: Zhonghuashuju, 1981), 8.

[33] W0003-1-000200, TMA, 88.

[34] W0003-1-000200, TMA, 49.

[35] W0003-1-000200, TMA, 105.

[36] W0003-1-000200, TMA, 86.

[37] W0003-1-000200, TMA, 124.

[38] W0003-1-000200, TMA, 302.

[39] For other examples of ways in which the state or Imperialist powers embedded their agendas in river engineering projects, see David Blackbourn, *The Conquest of Nature: Water, Landscape, and the Making of Modern Germany* (New York: Norton, 2006); David Pietz, *Engineering the State: The Huai River and Reconstruction in Nationalist China*, 1927-1937 (New York and London: Routledge, 2002); *The Yellow River: The Problem of Water in Modern China* (Cambridge, MA: Harvard University Press, 2014); and Ma Junya 马俊亚, Bei xisheng de jubu: *Huaibei shehui shengtai bianqian yanjiu* (1680-1949) 被牺牲的局部:淮北社会生态变迁研究 (Beijing: Beijing Daxue chubanshe, 2011).

[40] W0003-1-000200, TMA, 108, dated March 11, 1916.

[41] W0003-1-000200, TMA, 108, dated March 11, 1916.

[42] Shinkoku chutongun shireibu 清国駐屯軍司令部, *Tenshinshi*天津志 [1909], trans. Hou Zhentong 侯振彤 (Tianjinshi difang shizhi bianxiu weiyuanhui zongbianji shi 天津市地方史志编修委员会总编辑 室, 1986). The Chinese title in translation is *Ershi shiji chu de Tianjin gaikuang* 二十世纪初的天津概 况.

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Recommended Citation

Li, Kan. 2017. "River Conservancy and the Undetermined Future of the Port of Tianjin, 1888-1937." *Open Rivers: Rethinking Water, Place & Community*, no. 8. <u>http://editions.lib.umn.edu/openrivers/</u><u>article/river-conservancy-and-the-undetermined-future-of-the-port-of-tianjin/</u>.

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Kan Li is a Ph.D. candidate in history at the University of Minnesota, Twin Cities. She is writing her dissertation about the creation of a modern transportation system in Tianjin in the late nineteenth and early twentieth centuries. She is interested in reinstalling historical contingency and agencies of individuals and the environment into the narrative of China's modernization.

FEATURE **THE VANISHING** By Ian Teh

In 1999, I read in a newspaper about the contentious Three Gorges Dam project. China's leaders had a grand vision of transforming the Yangtze River into the biggest artificial lake in the world in an attempt to control recurring floods and to generate an estimated 10 percent increase in hydropower energy. To achieve this, they would have to resettle 1.5 million people and submerge 13 cities, 400 towns, 1,352 villages, 1,283 archaeological sites and 30,000 hectares of agricultural land. The scale was incomprehensible to my mind and reason enough for me to visit the Yangtze with the intention to document some of the enormous changes in progress on the landscape and its people.

For four years I made trips to the affected area on the Yangtze River, compiling material for



The Yangtze River. The construction of the Three Gorges Dam, the largest in the world will displace 1.5 million people and submerge cities, towns and villages, the collective total exceeding over a 1000 along a 700km stretch on China's longest river. Chongqing, China. 2000.

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my series The Vanishing: Altered Landscapes and Displaced Lives. Taking the boat the 700 km from Chongqing to Yichang, I would stop at various ports along the way. On the one hand there was this grand dream of progress, promoted by the government on billboards along the riverbanks; on the other there was the evident cost of such a grandiose project. Towns once full of life became eerily quiet; occasionally there would be the sound of explosions as buildings were demolished. Migrant labourers armed with sledgehammers, wearing only sandals on their feet, worked till dusk dismantling properties and collecting scrap to sell. Fearful faces would occasionally peer out from half-destroyed homes watching this incredible transformation. These were the unlucky families who had not received compensation—either because of corrupt local bureaucracy or because they had simply fallen through the net. One woman broke down crying when I asked her about her plans. She had moved to Badong after divorcing her husband and supported her two sons by selling tofu that she made in the town market. On the wall of her rented accommodation was a Chinese character in broad red brushstrokes-it said "dismantle." Ineligible for compensation because her residential status was for her previous home in another town, and without enough savings to move, she was destitute.

The images depict the affected communities, each undergoing transformation whilst cityscapes become construction sites before settling into their new form as walls and hollowed spaces for a giant new reservoir. Whilst this is just one significant aspect of a much larger and complex story, the story ultimately leads us to ask if these sacrifices were all worth it? Official estimates put the cost of production at \$23 billion USD, however international experts believe it cost more than double that. Taking more than a decade to complete, it now produces more than eight times the capacity of the U.S.'s Hoover Dam and about three percent of China's energy needs. The raised water levels also increased the amount of cargo transported across the river to 50 million tons, triple the maximum annual amount prior to the dam's construction.

Since the dam started working at full capacity in 2012, a further 100,000 people will have to be moved over the next three to five years because of landslides and bank collapses. It is estimated that the number of landslides and other natural disasters have increased by 70 percent since the reservoir filled up in 2010, perhaps a sign of the inherent instability for any large scale project tasked with storing such enormous amounts of water. Over 265 billion gallons of raw sewage are dumped into the Yangtze annually, which now collects in the reservoir; however the government insists new sewage treatment plants have this under control. Beyond this, although there has been no concrete evidence, there has been talk about the scale of the project being linked to the Sichuan earthquake, and exacerbating the 2011 drought which in turn negated most of the dam's plus points: ships were stranded and central and eastern China faced a power shortage. Perhaps a telling sign of the seriousness of the problems that continue to plague the project is the reluctant but necessarily vague admission issued by China's State Council: "Although the Three Gorges project provides huge comprehensive benefits, urgent problems must be resolved regarding the smooth relocation of residents, ecological protection and geological disaster prevention." Looking back, I see a dream of a nation, but also the cost, not only for then, but for all of it that still continues to the present day.



A worker returning home after a day's work at the Three Gorges Dam construction site. In the distance, a three-storey boat is dwarfed by the gigantic 1.3 mile wide construction which has nearly blocked off the river. Although the final completion date for the dam is not until 2009, it has been operational since 1st June 2003. Sandouping, China. 2002.



An old passenger boat on the waters of the Yangtze River by the Three Gorges. Hubei, China. 2000.



The last vestiges of normal life in a town that has virtually been destroyed. The mass exodus of its population has turned the old section of the city into a ghost town. Wanzhou bridge once the defining landmark of the city is now weeks away from being dynamited. Wanzhou, China. 2002.



The destroyed old city of Wanzhou, only a few remaining local inhabitants are left behind. Mostly migrant workers remain to dismantle the city by hand and occasionally by using explosives. Wanzhou, China. 2002.



Recent settlers from the new city return home after a visit to the banks of the river. In the foreground the old city of Fuling has been razed and the land reclaimed to protect it from the eventual rising waters. The front row of darker buildings are all that is left of the old city. Higher up in the distance, a strip of lighter buildings mark the beginning of the new city. Fuling, China. 2003.



Migrant worker and travellers. Boat services to Yichang are disrupted due to the completion of the dam and the last section of the journey replaced by bus services. Yichang, China. 2003.



Migrant worker heading to the local docks after the recent demolition of the town. Zigui, China. 2000.



Two brothers playing in their home. Their family are one of the last remaining inhabitants in this partially demolished town. Badong, China. 2002.



Families relocating by boat. Yangtze River, China. 2001.



Labourers unloading sacks of salt from a nearby barge. Many of the labourers in cities and towns along the river come from surrounding villages in the hills, they flock to the larger towns for jobs and better wages. Yun Yang, China. 2000.



Migrant workers carrying a heavy concrete block using a modified traditional shoulder pole. They sing in unison to coordinate their movements. The destruction and and relocation of the population living on the banks of the Yangtze is one of the largest of such projects in history. Zigui, China. 2000.



Labourers carrying belongings with a traditional shoulder pole at the bus station for inhabitants relocating to the new town. Yunyang, China. 2000.



One of the last remaining inhabitants, a barber works in a demolished high-rise building where only the ground floor remains intact. Wushan, China. 2002.



Workers in a small privately owned noodle making factory along the Yangtze River. Many locals owning private businesses remain as long as possible in order to save up for the relocation. There are often complaints of state compensation not being enough for the resettlement. There are also many cases reported of compensation not being paid to locals due to corruption by local authorities. Chongqing, China.



Locals looking at Badong, a town that will eventually be two thirds submerged when the Three Gorges Dam is completed. Badong, China. 2002.



Migrant worker at a construction site in the new town. The town is built higher up the mountains and will replace the old town that will eventually be submerged upon the completion of the Three Gorges Dam. Yunyang, China. 2000.



Migrant workers dismantling a recently vacated building. The workers supplement their poor income by selling scrap metal and bricks salvaged from demolition sites. Badong, China. 2002.



Migrant workers from surrounding villages dismantling a recently vacated building. The dam has had many far-reaching impacts. One of them is the destruction of thousands of cities, towns and villages along the river. The purpose of dismantling buildings is to clear a path for the eventual submergence and to prevent disenchanted ex-inhabitants from returning to their old dwellings. Badong, China. 2002.



Daily life on the Yangtze River. China. 2001.



Last inhabitants. As the last inhabitants move out, business activity of these old towns ground to an inevitable halt. Badong, China. 2002.


Locals sitting in a local eatery. They have not ordered food, but are instead using the space to rest, whilst outside buildings are being demolished. As the last inhabitants of the town move out, the business activity of these old towns ground to an inevitable halt. Badong, China.



A street vendor selling food to passengers on a boat. Yichang, China. 2001.



A displaced family traveling by boat to relocate to one of the coastal cities in the East. The displaced are encouraged to move to the new cities or under-populated regions, which are generally impoverished areas such as Xinjiang, Tibet and Gansu. However, many have also taken their chances by joining China's 150 million floating population and travelling to the richer coastal cities in the East in search of work. China's complex residential laws mean that many of those who choose to relocate to places that do not fit with the Government's relocation programme will lose out on social benefits. Yangtze River, China. 2001.



Night life on Chaotianmen docks. Business men go for dinner on floating Chinese restaurants on the river. Chongqing, China. 2003.



Living quarters of construction workers at the Three Gorges Dam construction site. Sandouping, China. 2003.



Migrant workers. Yichang, China. July 2001.



The last remaining family moves home. In the background is a levelled construction site, this used to be the site of the old city. Wushan, China. 2003.



A view of the The Three Gorges a few days before the waters rise due to the inundation of the dam. Yangtze River, China. 2003.



The new city of Mao Ping, hailed as a model city by the government, it is an example of the new redevelopments that are supposed to replace the old cities and towns along the Yangtze River. However, many new cities suffer from high unemployment, often as high as 50%, and many residents complain about the high cost of renting and buying property. Mao Ping, China. 2000.

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New construction higher up on the hills of the Yangtze River. Chongqing, China. 2000.



New settlers visit the riverbanks by the newly built docks in Fuling. Land has been reclaimed and the docks built to accommodate the rising waters of the river in the coming months. Fuling, China. 2003.



A view of the Three Gorges Dam under construction, a view seen from the Yangtze River. Sandouping, China. 2000.

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Recommended Citation

Teh, Ian. 2017. "The Vanishing." *Open Rivers: Rethinking Water, Place & Community*, no. 8. <u>http://editions.lib.umn.edu/openrivers/article/the-vanishing/</u>.

About the Author

Ian Teh has published three monographs—Undercurrents (2008), Traces (2011), and Confluence (2014)— and his work has appeared in distinguished magazines such as National Geographic, The New Yorker, and Bloomberg Businessweek. His work is part of the permanent collection at the Los Angeles County Museum of Art, The Museum of Fine Arts, Houston, and the Hood Museum. Teh has received the International Photoreporter Grant 2016, the Abigail Cohen Fellowship in Documentary Photography 2014, and the Emergency Fund 2011 from the Magnum Foundation. In 2015, during the Paris climate talks, large poster images of his work were displayed on the streets of Paris as part of a collaborative initiative by #Dysturb and Magnum Foundation. He is a co-exhibitor for Coal + Ice, an environmental group show of internationally acclaimed photographers. Teh is a member of the prestigious British agency, Panos Pictures.

PERSPECTIVES WHY IS WATER SACRED TO NATIVE AMERICANS? By Rosalyn R. LaPier

The Lakota phrase "*Mní wičhóni*," or "Water is life," has become a new national protest anthem.

It was chanted by 5,000 marchers at the <u>Native</u> <u>Nations March</u> in Washington, D.C. on March 10, and during hundreds of protests across the United States in the last year. "Mní wičhóni"



Activists at the Native Nations Rise protest rally against the Dakota Access and Keystone XL pipelines in Washington, D.C. via Indianz Com, Flickr. CC BY-NC-SA 2.0

became the anthem of the almost year-long struggle to stop the building of the <u>Dakota Access</u> <u>Pipeline</u> under the Missouri River in North Dakota.

This chant mirrors the <u>civil rights anthems</u> of the past, which emerged out of the African-American church. *"Mní wičhóni"* in the Lakota language

also has spiritual meaning, which is rooted in a connection to nature. As a <u>Native American</u> <u>scholar</u> of environment and religion, I understand what makes the relationship between Native people and the natural world unique.

For Native Americans, water does not only sustain life – it is sacred.

Water and the American West

The Great Plains of North America, home to the Lakota, the Blackfeet and other tribes, is a dry, arid place. The U.S. government spends billions of dollars to control and retain water in this "<u>Great American desert</u>," as it was described in the early 19th century.

Geologist <u>John Wesley Powell</u>, an early director of the U.S. Geological Survey, pointed out in an important <u>1878 government study</u> that the defining characteristic of the Great Plains and the West was its lack of water. He attempted to promote land ownership that was based on watersheds, instead of dividing land into the rectangular lots still in use today. Powell also recommended that America adopt a new type of land development – one that worked with nature, so everyone had access to water.

The U.S. government, however, ignored Powell's ideas. Writing on this issue later, author Wallace Stegner, who was passionate about the West, commented,

"[W]hat do you do about aridity....You may deny it for a while. Then you must either adapt to it or try to engineer it out of existence."

The Lakota, the Blackfeet and the other tribes understood how to live with nature. They knew it was best to live within the restrictions of the limited water supply of the Great Plains.

Water as sacred place

For thousands of years, Native American tribes across the <u>Great Plains</u> developed their own methods of living with the natural world and its limited water supply. They learned both through observation and experiment, arguably a process quite similar to what we might call science today. They also learned from their religious ideas, passed on from generation to generation in the form of stories. I learned from my grandparents, both members of the Blackfeet tribe in Montana, about the sacredness of water. They shared that the Blackfeet believed in three separate realms of existence – the Earth, sky and water. The Blackfeet believed that humans, or "*Niitsitapi*," and Earth beings, or "*Ksahkomitapi*," lived in one realm; sky beings, or "*Spomitapi*," lived in another realm; and underwater beings, or "*Soyiitapi*," lived in yet another realm. The Blackfeet viewed all three

worlds as sacred because within them lived the divine.

The water world, in particular, was held in special regard. The Blackfeet believed that in addition to the divine beings, about which they learned from <u>their stories</u>, there were divine animals, such as the beaver. The divine beaver, who could talk to humans, taught the Blackfeet their most important religious ceremony. The Blackfeet needed this ceremony to reaffirm their relationships with the three separate realms of reality.

The *Soyiitapi*, divine water beings, also instructed the Blackfeet to protect their home, the water world. The Blackfeet could not kill or eat anything living in water; they also could not disturb or pollute water.

The Blackfeet viewed water as a distinct place – a sacred place. It was the home of divine beings and divine animals who taught the Blackfeet religious rituals and moral restrictions on human behavior. It can, in fact, be compared to Mount Sinai of the <u>Old Testament</u>, which was viewed as "holy ground" and where God gave Moses the Ten Commandments.



The Blackfeet Nation is an Indian reservation located east of Glacier National Park in Montana. Several waterways drain the area with the largest being the St. Mary River, Two Medicine River, Milk River, Birch Creek and Cut Bank Creek. There are 175 miles (282 km) of streams and eight major lakes on the reservation. Photographer Ken Lund, via Flickr. CC BY-SA 2.0

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Water as life

Native American tribes on the Great Plains knew something else about the relationship between themselves, the beaver and water. They learned through observation that beavers helped create an ecological oasis within a dry and arid landscape.

As Canadian anthropologist R. Grace Morgan hypothesized in her dissertation "<u>Beaver Ecology/</u> <u>Beaver Mythology</u>," the Blackfeet sanctified the beaver because they understood the natural science and ecology of beaver behavior. Morgan believed that the Blackfeet did not harm the beaver because <u>beavers built dams</u> on creeks and rivers. Such dams could produce enough of a diversion to create a pond of fresh clean water that allowed an oasis of plant life to grow and wildlife to flourish.

Beaver ponds provided the Blackfeet with water for daily life. The ponds also attracted animals, which meant the Blackfeet did not have to travel long distances to hunt. The Blackfeet did not need to travel for plants used for medicine or food, as well.



Sulfur Lagoon, Aguablanca, Machalilla National Park, Ecuador. Extablished in 1979, Machalilla National Park was named an internationally important wetland under the Ramsar Convention in 1990.

Beaver ponds were a win-win for all concerned in "the Great American desert" that <u>modern</u> <u>ecologists and conservationists</u> are beginning to study only now. For the Blackfeet, Lakota and other tribes of the Great Plains, water was "life." They understood what it meant to live in a dry arid place, which they expressed through their religion and within their ecological knowledge.

Rights of Mother Earth

Indigenous people from around the world share these beliefs about the sacredness of water.

The government of New Zealand recently recognized the ancestral connection of the Maori people to their water. On March 15, the government passed the "Te Awa Tupua <u>Whanganui</u> <u>River Claims Settlement Bill</u>," which provides "personhood" status to the Whanganui River, one of the largest rivers on the North Island of New Zealand. This river has come to be recognized as having "all the rights, powers, duties, and liabilities of a legal person" – something the Maori believed all along.

Many other countries have come to view the natural world and water from a similar perspective. In Bolivia, for example, the government passed laws in 2010 and 2012 for the "<u>Law of the Rights</u> <u>of Mother Earth</u>," which were motivated by the belief that nature has legal rights. The Ecuadorian constitution in 2008 recognized the rights of "Nature, or Pacha Mama," with "respect for its existence," which included water.

The United States does not have such laws. This is why the Standing Rock Lakota have been demanding for almost a year a right to clean water – free from the threat of potential environmental harm and to protect its sacredness.

This article was originally published on <u>The</u> <u>Conversation</u>. Read the <u>original article</u>.

Recommended Citation

LaPier, Rosalyn R. 2017. "Why is water sacred to Native Americans?" *Open Rivers: Rethinking Water, Place & Community*, no. 8. <u>http://editions.lib.umn.edu/openrivers/article/why-is-water-sacred-to-native-americans/</u>.

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PERSPECTIVES WHEN A RIVER IS A PERSON: FROM ECUADOR TO NEW ZEALAND, NATURE GETS ITS DAY IN COURT By Mihnea Tanasescu

In the early 2000s, the idea of giving legal rights to nature was on the fringes of environmental <u>legal theory</u> and public consciousness.

Today, New Zealand's <u>Whanganui River</u> is a person under domestic law, and India's <u>Ganges</u>

<u>River</u> was recently granted human rights. In Ecuador, the Constitution enshrines nature's "right to integral respect".

What on earth does this all mean?



The Whanganui River, seen here, is now a person under New Zealand law. Photographer Alex Indigo, via Flickr, CC BY-ND.



The 1972 book that started it all. Boulder Rights of Nature

Fighting for nature

The theory of giving rights to nature was proposed in the 1970s by the American legal scholar <u>Christopher D. Stone</u> as a strategic environmental defense strategy.

In environmental litigation, many cases are unsuccessful because the people who bring the suit lack the legal standing to do so. It is hard for a plaintiff such as the US environmental protection organisation the Sierra Club to demonstrate why it – and not, for example, a property owner – has the power to sue over environmental damage.

In other words, it's difficult for nature's de facto representatives to defend its interests in court. As a workaround, Stone suggested giving rights to the environment itself, because, as a rights holder, the environment would have the standing to bring a suit on its own behalf. Rights of nature, then, are not rights to anything in particular but simply a way to enable nature to have a legal hearing.

It took decades for lawyers to turn <u>theory into</u> <u>reality</u>. But in 2006, Tamaqua Borough in Pennsylvania <u>became the first US community</u> to recognise the rights of nature within municipal territory. Since then dozens of communities have adopted similar local ordinances.



The Ganges, which flows through the sacred city of Varanasi, was granted human rights in March 2017. Photographer babasteve, via Flickr. CC BY-ND

Entitled to "integral respect"

Nature is gaining rights internationally, too.

In Ecuador, <u>article 71</u> of the <u>2008 Constitution</u> states that nature "has the right to integral respect for its existence and for the maintenance and regeneration of its life cycles, structure, functions and evolutionary processes".

In practice, that means that all persons, communities, peoples and nations can demand that Ecuadorian authorities enforce the rights of nature. One of those rights, according to article 72, is the right to be restored.

Ecuador's approach to nature's rights, which was soon emulated <u>in Bolivia</u>, were notable in two ways. First, it grants nature positive rights – that is, rights *to* something specific (restoration, regeneration, respect).

It also resolves the issue of legal standing in the most comprehensive way possible: by granting it to everyone. In Ecuador, anyone – regardless of their relationship to a particular slice of land – can go to court to protect it.

The first successful case was brought in 2011 by the <u>Vilcabamba River</u>. Its representatives in court were an American couple with riverfront property, who <u>sued the provincial government of</u> <u>Loja</u>, arguing that a planned road project would deposit large quantities of rock and excavation material into the river.

Overall, however, Ecuador and Bolivia have seen mixed results. In both countries, extractive industries <u>continue to expand</u> into indigenous territory, pursuing oil (in Ecuador) and mining (in Bolivia).

In Ecuador, <u>civil society groups</u> have struggled to exercise nature's rights effectively, in part because the domestic economy depends on the very environmentally-damaging activities they would like to target.

Personhood for the Whanganui

Things are going better in New Zealand, which passed its <u>first rights for nature law</u> in March 2017.

There, the Whanganui River, which flows across the North Island, has been granted <u>rights of</u> <u>personhood</u>. That means the river – but not nature writ large – can act as a person in a court of law; it has legal standing.

New Zealand's law also designates the river's representatives: a committee composed of representatives of the indigenous community that fought for these rights, as well as representatives of the Crown (New Zealand is <u>part of the British</u> <u>Commonwealth</u>).

This formulation, which more closely resembles the American theoretical origins of the rights of nature, diverges markedly from Ecuador and Bolivia's model by naming specific guardians and not granting positive rights.

If the Whanganui had the right to flow in a certain way, for example, then any change to its course would be a violation of its rights. Absent

this kind of right, the river is simply empowered to stand for itself in court; its legal guardians determine the positive content of its rights. It is thus theoretically conceivable that the river might one day argue for its course be changed because that change is necessary for its long-term survival (say, as an adaptation to climate change).

Prioritising indigenous defenders

Because indigenous communities play <u>an</u> <u>important role</u> in fighting for nature's rights in all three countries, it is often assumed that they are and will continue to be the obvious guardians of nature. After all, from <u>China</u> to <u>El Salvador</u>, indigenous peoples are on the front lines of environmental defence.



Members of <u>Idle No More</u> protest movement in Ottawa, Canada on January 11, 2013. Photographer Moxy. CC BY-SA 3.0

But there are problems with this assumption. The indigenous of the world are not a <u>homogenous</u> group that inherently cares for nature.

Additionally, unless the law designates a specific community the legal representative of nature, as in New Zealand, there is no guarantee that the intended community will be the one that ends up speaking for nature.

In Ecuador and Bolivia, the relevant legal texts use morally loaded language and rich references to indigenous communities that make clear the intended guardians of the nations' natural treasures.

But standing is in fact granted broadly, and neither of the two legal cases settled in favour of nature to date in Ecuador was brought by an indigenous group.

One suit was won by Americans (in the name of the Vilcabamba River) and <u>the other</u>, lodged on behalf of nature in San Lorenzo and Eloy Alfaro districts in 2011, was brought by the state, which sued to stop illegal small-scale mining operations in the area. The spirit of the law might have been violated in these cases, but the letter surely was not.

Ambiguous language could also permit abuse. In theory, given a sufficiently wide definition of standing and of nature, oil companies themselves could use the rights of nature to protect Ecuador's hydrocarbon reserves.

New Zealand's narrower approach may prove more effective in the long run. By granting natural entities personhood one by one and assigning them specific guardians, over time New Zealand could drastically change an ossified legal system that still sees oceans, mountains and forests primarily as property, guaranteeing nature its day in court.

This article was originally published on <u>The</u> <u>Conversation</u>. Read the <u>original article</u>.

Recommended Citation

Tanasescu, Mihnea. 2017. "When a river is a person: from Ecuador to New Zealand, nature gets its day in court" *Open Rivers: Rethinking Water, Place & Community*, no. 8. <u>http://editions.lib.umn.edu/openrivers/article/when-a-river-is-a-person-from-ecuador-to-new-zealand-nature-gets-its-day-in-court/</u>.

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GEOGRAPHIES "C-ING" THE RIVER: FROM COMPANION-SHIP TO CONTROL TO...CATASTROPHE OR COMPROMISE? By Stevan Harrell



Fishing at Celilo Falls, early twentieth century. Image courtesy of The Oregon Encyclopedia.

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What humanity needs to do in the coming decades is back off. In our quest for comfort, consumption, stability, and security in our lives, we have done too much with the earth. Thomas Malthus warned us about this over two hundred years ago, when he described soil as "a fund, which from the nature of all soils, instead of increasing, must be gradually diminishing" (Malthus 1798, Book 1 Chapter 1 Paragraph 17). As it is with soil, so it is with all other natural resources, including water. The Global Footprint Network, which measures how much of the planet's resources we can use without depleting our stock, "celebrates" Earth Overshoot Day each year, the date on which we have used up our yearly share of the world's resources. This year, 2017, Overshoot Day fell on August 2, meaning that we are using our resources at almost double the sustainable rate.

Still, despite the dire warnings that one or another resource—water or soil or oil, timber or rare earth minerals or salmon—will run out, no irreplaceable resource has run out yet. Instead, what we're running out of is the resilience of our ecosystems, their ability to absorb disturbance.

Already in the twenty-first century, we have Hurricanes Katrina, Harvey, Irma, and Maria; almost annual floods in Bangladesh; some of history's worst fire seasons in Portugal and British Columbia; and bigger and bigger chunks of Antarctica's and Greenland's ice falling into the sea. The biggest problem is not that we don't realize what's happening-we do. It's not even that we are ruled by hypocrites who realize it but won't do anything about it-even though we are. Rather, the problem is that we, as a society, refuse to recognize our own hubris; we refuse to admit that there are things on this Earth that we can't control; we refuse to accept limits on the degree to which we can modify the Earth without severe adverse consequences.

Nowhere is our problem with ourselves and our Earth more evident than in our approach to rivers. We channel them, dam them, pollute them, pump them dry, all in the name of comfort, convenience, and control. As a result, they not only support fewer biological resources than they previously did; they also burst their (often artificial) banks, flood surrounding areas, dry up, or even catch fire.

The Case of the Columbia River

It wasn't always so. For hundreds of generations, the Columbia, the Great River—*N'chi Wána* in the Ichishkíin or Sahaptin language—was a companion, a source of livelihood, for the first peoples of the interior of what is now Washington State (Hunn and Selam 1991). Both the archaeological research (Butler and O'Conner 2004) and the oral traditions of the Yakama, Nez Percé, Umatilla, Cayuse, Walla Walla, and other tribes document human salmon fishing at Celilo Falls near the present Dalles Dam for at least 9,000 years.

Nez Percé fisherman and scholar Allen V. Pinkham, Sr. recounts his childhood memories of fishing for salmon at Celilo Falls in the 1940s and early 1950s. "The air at the falls above Chinook Rock would be filled with three or four salmon jumping at the same time. The Salmon people were gathering to offer themselves to their relatives, the human beings. The men at Chinook Rock would be catching a salmon at nearly every dip of their nets. The men at the hanging scaffolds just below the falls would be catching two or three fish at a time when the fish ran heavy" (Pinkham 2007, 588).

The five species of salmonids native to the Pacific Northwest did not stop at Celilo Falls; they continued up the Columbia and its tributaries past its junction with the Snake, and up the Snake



Map of the Columbia River Basin via USACE.

into Idaho. Not just salmon, but trout, lampreys (commonly called "eels"), and sturgeon were important food resources that the river provided. The small fish called eulachon came into the river at the end of the lean season in the winter; in hard years they were "salvation fish" for hungry people; because they were so oily, they could not only provide much-needed calories, but their oil was a favored condiment, and they could even be used as lamps—hence the name "candlefish."

When White settlers moved in, they, too, wanted the fish, but even so, the treaties that Governor Isaac Stevens of Washington Territory forced upon the native peoples, already decimated by smallpox and other diseases, nevertheless guaranteed the Indians the "right to take fish." In the ensuing 120 years, the governing authorities and the courts often shamelessly denied the native peoples these rights, but as Allen Pinkham's account shows, even in the 1940s there were still fish, and sometimes in abundance.

The very strength of the river, however, was its downfall as a companion. The Columbia Basin in central Washington had fertile soil, but lacked water because the Cascade mountain range to the west blocked most of the rainstorms coming from the Pacific Ocean. In order to "make the desert bloom," irrigation was necessary; in order to power the emerging industries of the Pacific Northwest, cheap electricity was imperative. The solution to both these needs was dams.



The Hanford B Reactor, near Richland, Washington, under construction, 1943. Image courtesy the US Department of Energy, Hanford Collection (HASI.1996.001.1350).

The Rock Island Dam was completed in 1933, the Bonneville Dam in 1937, and the gigantic Grand Coulee Dam was the world's largest when it was completed in 1941. All in all, 13 dams rose across the main stream of the Columbia, and over 50 more on its major tributaries. The desert greened with wheat fields, and hydroelectric generation gave the Pacific Northwest the cheapest power in the United States.

So cheap, so abundant, in fact, were both the water of the river and the electricity produced by the dams that the Manhattan Project chose the Hanford Reach, well above Celilo, as the place to build a whole complex of reactors to make plutonium and win the Second World War, and to continue producing the fissile material until the end of the Cold War in the 1980s. Now, however, 30 years after the last reactor shut down, no one lives there, and the Office of Environmental Management in the Department of Energy has spent tens of billions in an effort that is still projected to last another few decades and cost over 100 billion more. The cleanup does employ about 11,000 people, and if you're a U.S. citizen, you can take a guided tour.

In 1957 the construction of the Dalles Dam ended Celilo Falls; it blew it up and drowned it under the placid, nearly salmon-free waters of Lake Celilo. Yes, there were fish ladders in some of the dams, and yes, many hatcheries produced fish that would partially replace naturally spawning populations, but they didn't work very well, and soon there were many fewer fish left to take, the fewer the farther up the river system you went. Almost all species on the Columbia have been listed as endangered or threatened under the Endangered Species Act.

Of course, the river has other uses. I once visited one of the world's largest carrot farms, close enough to the river that a system of huge pumps could irrigate its 2,000 acres of carrots and its 72 irrigation circles; its \$600,000 carrot harvesting machine was one of 20-some in the world. And the dams have locks that allow the wheat-bearing barges to pass by Portland and ship the valuable grain to the Pacific and beyond. We have successfully controlled the river.

Complex issues and solutions

Except... The issues and solutions are complex and people are fighting over the river. To have enough water for the few remaining fish to pass, farmers must accept limits on irrigation withdrawals. Navigation also requires high water. The dams on the Snake impede fish passage to the point that environmentalists for years have advocated removing them, stirring up fierce opposition among other groups. The cheap hydroelectricity makes wind and solar generation less economical, and the government has to subsidize the development of renewables. And there are innumerable lawsuits over medical and environmental costs of Hanford. Is this a catastrophe? Maybe not entirely, but we need to back off. In some ways we have. The Hanford cleanup has allowed wildlife to flourish in the less-contaminated areas of the former nuclear site, still off limits to humans. The Yakama Nation has a successful sturgeon-breeding program. It has purchased formerly White-owned wheat farms along a tributary of the Yakima River (itself a major tributary of the Columbia) and turned them back to wetlands where long-disappeared crops have started growing again. In addition, it has partnered with federal, state, and local governments and environmental organizations to adapt our use of the Yakima River to anticipated climate change. Many efforts are underway to

restore or at least prevent the further decline of the salmon runs. Maybe the four dams on the lower Snake will eventually be removed. But the best we can do, as we retreat from our delusion that we can control the river, is avoid catastrophe and achieve compromise. We will never go back to the days when thundering Celilo Falls yielded up more fish than anyone needed, and gave the First Peoples an opportunity to gather, harvest, and celebrate together during the salmon season. Perhaps Shoshone-Bannock poet Ed Edmo described best what is irretrievably lost, in "Celilo Fishermen" (used with permission of the author).

Celilo Fishermen

you made your nets & tested the knots seeing that they held. little did you know what was to hold you after the sound of water falling over what used to be.

Resources

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Recommended Citation

Harrell, Stevan. 2017. "C-ing' the River: from Companionship to Control to…Catastrophe or Compromise?" *Open Rivers: Rethinking Water, Place & Community*, no. 8. <u>http://editions.lib.umn.edu/openrivers/article/c-ing-the-river/</u>.

About the Author

Stevan Harrell recently retired after 43 years teaching anthropology and environmental studies at the University of Washington. Most of his recent work deals with the relations between people and environments in China, Taiwan, and the Pacific Northwest. He lives in Bellingham, Washington.

GEOGRAPHIES HYDROLOGY AND WORLD HISTORY: RIVERS AND WATERSHEDS FOR STUDENTS By Patrick Manning

How can one convey, to students of history, humanity's intimate connections to streams, rivers, lakes, and seas? The vision of humans as landlocked inhabitants has been reaffirmed in exaggerated terms by historical texts and maps. When students in my World History courses tried

to conceptualize the planet, they opened their texts to find political maps of the twenty-first century—emphasizing bounded terrestrial units, recent polities rather than historical spaces, and an implicit focus on divisions rather than connections among people.



How can one convey, to students of history, humanity's intimate connections to streams, rivers, lakes, and seas? Castle ruins of Aggstein, Wachau, Lower Austria. Photographer Uoaei1 (CC BY-SA 3.0 AT).

In response, I have been seeking to design a set of maps of the world to represent hydrology in the history of the past 10,000 years. The idea is that students would learn the main rivers and watersheds of the world, and through them become familiar with the places humans have inhabited and travelled for much of history. The maps displayed here reflect my first effort, with assistance from skilled cartographers.

I chose to link the display of hydrography to the issue of scale in history—alerting students to the various scales of human society, from local to global. I selected four scales that I hope students will become familiar with, using maps that fit on 8 ¹/2-by-11-inch pages. They are a worldwide map of major watersheds, at a scale of 1:150 million; continental maps at 1:40 million; and sub-continental maps (basically 3 per continent) at 1:12 million. A full set of maps would include 1 world map, 5 continental maps, and 16 sub-continental maps—adding perhaps 10 maps with samples of localized hydrological phenomena at a scale of 1:2 million.

A worldwide map of major river basins provides a good start. Map 1 shows that 40 of the world's largest river basins can be visually displayed at once—in tropical, temperate, and Arctic regions.



Map of the major watersheds and rivers of the world. Courtesy of the University of Pittsburgh Library System map collection.

The map shows well-watered inland areas, where much of the world's population has lived. These are all the places one can go by small watercraft, especially canoes—a main method of travel and shipping until very recently—including the linkages across great inland areas, such as the lands of Siberia, where immense river valleys connect wide territories. The watersheds are narrow at the coast, wide in inland areas, and allow movement along each principal river and major tributaries. The map displays migration routes, strategic points at links of watersheds, and the mouths of great rivers—and the great arid region from the Gobi to the Atlantic.

While maps of major watersheds reveal a great deal, they do not tell the whole story of hydrology. They show where people have occupied inland areas, but they do not portray the large part of human population that lives near the seaside in small watersheds, as in the Mediterranean, the Caribbean, and Japan. In addition, Map 1 does not include the endorheic or landlocked basins that exist on every continent-they are sparsely populated except for the Caspian Sea and Dead Sea basins. Especially for mapping coastal regions, greater magnification and different mapping techniques would be required. The map is not set up to show dynamic shifts in the course of rivers, though shifts in rivers cause little change to boundaries of watersheds.

If, however, we zoom in from the world map to the continental level, we see that Map 2, on Africa, shows 11 river basins, in place of the 7 watersheds shown on the world map—it also shows greater detail in principal river and major tributaries. Maps of the same scale would show equivalent detail for North and South America, Europe, and Asia.

Zooming in further to the sub-continental level, Map 3 displays southern and eastern Asia (one third of the area of the African continent and one fourth of Asia). Map 3 shows 10 river basins, in contrast to the 8 shown on the world map. All but three of the rivers flow out of the Himalaya Mountains. There would be 4 such maps for Asia, 2 for Europe, and 3 each for Africa, North America, and South America—plus one for Australia and New Guinea.

To provide a more localized view of hydrology, Map 4 (at a scale of 1:1 million) displays the historically significant Grand Portage route from the St. Lawrence watershed to Lake Winnipeg and the Canadian Prairie. This route, created by the Ojibwe Algonkians of Lake Superior, was adopted by Amerindian and French fur trappers and later by the British. When the border between the U.S. and British Canada was specified in 1803, the post of Grand Portage ended up on the U.S. side, so Britain moved its post to Fort William (now Thunder Bay).

The route itself went overland from the Grand Portage post to the Pigeon River (bypassing the river's lower falls), then upriver to South Lake and over the continental divide at Height of Land Portage (400 m high) to North Lake. This crossing of the divide was an occasion for ceremony and initiation rites for the fur-trading voyageurs. The canoes followed lakes and rivers to Rainy Lake and eventually to Lake Winnipeg. The inset map shows the centrality of Grand Portage at the intersection of three great watersheds.

Students could use these maps as a framework for learning the major watersheds. Then they can go to Google and zoom in and out to learn details of tributaries and their watersheds or the location of towns in relation to rivers, portages, and divides. (One problem I note, however, is that Google Maps does not readily display the scale of magnification or distance for maps, which makes comparing maps more difficult.) One can make up various interactive exercises with comparisons or layers of maps. Comparing watershed maps with population-density maps will confirm the importance of waterways in attracting population, but will also show exceptions. Students will see that the canals, dams, and other engineering



Map of the major watersheds and rivers in Africa. Courtesy of the University of Pittsburgh Library System map collection.

feats of the past few centuries have changed the flow of much water, but have done little to change the boundaries of watersheds.

In this work, and with the assistance of skilled mapmakers Boris Michev and Daniel Andrus, I have found that comparable, consistent, and useful maps of watersheds can be constructed. The maps I downloaded had many deficiencies: they showed either watershed boundaries or rivers, but rarely both; they gave too many rivers or not enough; they labeled poorly. Working with my colleagues, we were able to make a set of decisions about the features that are best represented for historical watershed maps. Thus, the name of the principal river (or lake) becomes the name of the watershed, but tributaries may remain unlabeled. Showing relief along the watershed boundaries is helpful, yet too much relief makes maps harder to read.

In conclusion, I am reaffirmed in my desire to see development of maps that display the role of hydrology in structuring society over the course of history, to support the teaching of world history. The maps shown here work best for the Holocene Era—the past 10,000 years of stable climate—a time of consistent interrelation of humans and waterways. But I have also learned of complexities and alternatives in mapping



Map of the major watersheds and rivers in southern and eastern Asia. Courtesy of the University of Pittsburgh Library System map collection.

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hydrology, and that we need to enhance further our tools for cartography to address issues of scale and dynamics. One could focus on recent times and human modifications: canals, dams, and lakes; one could map the shifts in sea levels, glaciation, and watercourses during the Last Glacial Maximum; one could map the hydrology of populous littoral regions. This exercise has also reminded me of an old dream that arose in the early days of IT and has yet to be implemented, to my knowledge: an interactive map for the centuries of sail, showing the oceans with the shifting directions of winds and currents during the year, and with the timing and direction of ships' trajectories—a map designed to make the best of winds and currents. That is the map that will begin to show dynamic interaction and scale in a cartographic representation that truly enhances understanding of how hydrology works.



Map of the St. Lawrence and Lake Winnipeg basins. Courtesy of the University of Pittsburgh Library System map collection.

OPEN RIVERS : ISSUE EIGHT : FALL 2017 / GEOGRAPHIES
Recommended Citation

Manning, Patrick. 2017. "Hydrology and World History: Rivers and Watersheds for Students." *Open Rivers: Rethinking Water, Place & Community*, no. 8. <u>http://editions.lib.umn.edu/openrivers/article/hydrology-and-world-history/</u>.

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IN REVIEW LISTENING TO A RIVER: HOW SOUND EMERGES IN RIVER HISTORIES By Chris Caskey

Peter Coates asks us, in "The Strange Stillness of the Past: Toward an Environmental History of Sound and Noise," why environmental historians don't delve more into sound and noise as they seek information about the past. This review focuses on Coates' inquiry on water



American landscape painter Thomas Cole captured in his famous painting, View from Mount Holyoke, Northampton, Massachusetts, after a Thunderstorm—The Oxbow, what social anthropologist Paul Connerton described in his book, 'The Spirit of Mourning', as "a tranquil sublimity," a sublimity Cole connected to a "silent energy of nature." Landscapes, especially those dominated by rivers, have distinct aural characteristics that scholars have both highlighted and perhaps overlooked. Image via Metropolitan Museum of Art, New York.

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histories, examining some examples in which scholars and writers have utilized sound to analyze and document past waterscapes, but identifying this as an underexplored area of scholarship. This review also demonstrates how we can use ideas from Coates' essay as a kind of blueprint to build a framework for studying sound in river histories. Western historical studies, Coates argues, have "long been resolutely visual in their focus."[1] With monographs typically including photographs, maps, paintings, and descriptions relying heavily on visual specifics, history (especially environmental history) has for a long time come "soundproofed," he argues. Yet some niches do exist where sound seems to hold credibility as a focus of inquiry-specifically social and urban histories. If these histories can examine how our ears help us make sense of the landscapes around us, Coates suggests, then environmental histories can do the same.

Water, especially that which flows in rivers, is ubiquitous in environmental history. Water and rivers often tie historical scholarship to other humanistic fields, whether it be the research of anthropologists studying water ritual or art historians discussing aesthetics of a romantic river valley. Water also is regularly tied to aural experiences, such as the sound of rain on a rooftop, waves on the beach, or the whooshing of water over rapids in a river canyon. Agreeing with Coates' call for an increased focus on sound in environmental history, I argue this critique is especially relevant and necessary for river histories. A review of water and river histories suggests a dearth of discussions focusing on what those rivers sounded like and minimal analyses on how sound has been used by people over time to represent those rivers.

Coates argues both for "knowing nature through sound" and "picking up nature's voices" in his case for analyzing sound in environmental history.[2] Replace the word "nature" with "river," and a typology begins to emerge to help tackle the problem of reading for sound in river scholarship.

River historians, when utilizing sound-based sources, tend to deal with sound-based texts like music or verse, or they recount the records of the sounds heard on the rivers themselves, whether they be from audio/video recordings or written sources. Sources associated with the first category can represent an attempt to know rivers by sound or to understand how people knew rivers by sound, and some scholars have utilized them for rich discussions on relationships between rivers, landscapes, places, and identities. Though not necessarily influenced by the literal sound of the rivers they depict, songs and lyrics still illuminate a strong connection between the ear and both the individual and collective experiences along the banks of the rivers portrayed. To a lesser degree, river scholars have also depicted the sounds of the rivers themselves. This act of picking up a river's voice or voices documents both lost landscapes and cultural understanding of those landscapes, and seems to be one that is utilized rarely both inside and outside of the academy.

Backwater Blues, by Richard M. Mizelle, Jr., is a relatively recent example of analyzing how people knew nature through sound. The book examines how race frames experiences and perceptions of environment and environmental disasters, and Mizelle explores how the 1927 floods along the Mississippi River defined the African American experience in the rural south.[3] Along with more traditional sources, he also uses the lyrics of blues musicians to argue that point-that race served as a filter for the way people experienced, understood, and reacted to the river's destructive forces. He argues that the blues, a music genre with strong roots in the Mississippi Delta region, offers historians data that the traditional archives do not because the medium recorded African American experiences that individuals typically could not articulate. African Americans in the rural south (especially those most affected by the floods of 1927) had a particularly high rate of illiteracy, and those who could read and write feared retaliation from the white-dominated power structure if they were to speak plainly



Every July the <u>Midwest Society for Acoustic Ecology</u> asks people on World Listening Day to pay more attention to their sonic surroundings. This year, officials at Zion National park suggested to visitors that, "Taking a moment to listen to the burbling of the Virgin River, the wind rushing through the leaves of cottonwood trees or hearing the raspy call of a raven," can improve the outdoor experience. Image via National Park Service.

about their experiences. Thus, Mizelle utilizes the blues as his alternative archive to put forth a more complete analysis of this disastrous flood.

While Mizelle looks to music as an alternative archive for reading experiences along a river that differ from dominant and long-held narratives and assumptions, David A. Pietz examines how the powerful used music to impose dominant narratives. Pietz's <u>*The Yellow River*</u> tracks development on that iconic river and China's Northern Plain through much of the twentieth century. The book discusses multiple regimes' attempts to control the river through waterworks to establish legitimacy, the failures of those attempts, the massive human costs of those failures, and their influence in undermining and legitimating power afterwards. Along the Yellow River, music was associated with national identity during the twentieth century with pieces like the Yellow River Cantata and the Sanmenxia Cantata functioning as patriotic tributes to the powerful state. Pietz examines the music's structure and content matter, specifically discussing the performative aspects of the Yellow River Cantata, wherein emotional and catchy music was performed by a large chorus to highlight the subordination of the individual to the collective



Scholars have associated large water projects like the Shasta Dam, on Northern California's Sacramento River, with their silencing effects on the rivers they impound. Image via Library of Congress.

and commemorate revolutionary struggles.[4] Later, the *Sanmenxia Cantata* would still deal in themes of revolution and collectivism. But Pietz points out a subtle shift in how the state projected the river and the natural world from a symbol of the revolution itself to an enemy that needed to be conquered. In *The Yellow River*, both content and structure of the musical works are analyzed, offering insights into relationships among the state, the people, and the river. With Pietz and Mizelle serving as two (though not the only) examples of efforts to discuss how people knew nature through sound, how have scholars attempted to explore or document the voice of the river itself? Paula Schönach, in a recent and exhaustive review of river literature, points out rightfully one of the most immediate and noticeable impacts of dams—the literal silencing of rivers.[5] Schönach references the equally exhaustive and powerful <u>Silenced</u>



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The California mining town of Melones near this bridge and the adjacent stretch of California's Stanislaus River are left silent under hundreds of feet of still waters, as the Stanislaus was inundated after the completion of the New Melones Dam project in 1979. Its soundscape now survives in the historical record and the memories of those who experienced it. Image via California Historical Society, ca. 1930.

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Rivers by Patrick McCully, a must for anyone studying the connections between power, nations, corporate interests, and dam building. The title clearly refers to the audible effect a dam has on a river and its surrounding landscape when the waterway is inundated behind a dam. But while McCully's book is a blow to the ubiquitous claims by dam builders of the advantages of major dam projects around the world,[6] it doesn't spend much, if any, time on the literal silencing of those rivers where the dams were built. The reader does not get a sense of the lost aural characteristics of the canyons and river valleys sacrificed in the name of progress. In fact, the literal soundscape of the river itself (whether recorded in modern media or described in historical documents) appears to be a relatively rare occurrence in river scholarship, whether as a storytelling device or as part of larger analyses.

Take the river biography, a format utilized by water historians to discuss the life of a particular river, placing the river itself as the book's or article's main character. Often, when one reads a biography, one can expect to find description of or secondhand reflection on the main character's voice. But what of the river's voice? Marc Cioc's The Rhine: An Eco-Biography, like the books discussed above, does reference some music and verse romanticizing the iconic European waterway.[7] Interestingly, the biography also discusses other sensory experiences along the river, including the changes in smells with increased industrialization.[8] But the sound of the waterway itself is not a focus. The comprehensive <u>A History of Water</u> series, edited by Terje Tvedt and others, includes in its first volume a collection of river biographies. All of them (focusing on the Tama, Rhine, Hawkesbury, and Langat) offer sound analysis of historical development along those waterways. But none delve into the voices of the rivers, whether the sounds themselves or how those soundscapes are utilized or interpreted by those who lived and worked along the rivers. [9] Even Richard White's Organic Machine, perhaps the best example of a river biography

and a must-read for any water or rivers course, only includes a small sample of the Columbia River's pre-development voice. Accounts from the Lewis and Clark expedition refer to the "raging and hissing," and the "boiling and Whorling" of the river's Long Narrow, writing as if referring more to an untamed living thing than part of the landscape.[10] Rightfully so, these river biographies deal mostly in big-picture, structural terms, wrestling with notions of power, domination, declination, capitalist production, environmental catastrophe, and disasters as they track changes in nature and culture over time. But in doing so, they don't give readers a strong sense of what it sounded like to stand next to those rivers before they were so heavily altered by people over time.

Perhaps some of the best, or at least most easily found, examples of river sounds are contributions to the literature by journalists. Often those descriptions are tied to unusual or disastrous events. John McPhee, in *The Control of Nature*, uses sound pointedly when discussing the experiences of those living against the San Gabriel Mountains in the Los Angeles area, stuck in a warzone between man and nature. "Ordinarily, in their quiet neighborhood, only the creek beside them was likely to make much sound, dropping steeply out of Shields Canyon on its way to the Los Angeles River....When boulders were running there, they sounded like a rolling freight. On a night like this, the boulders should have been running. The creek should have been a torrent. Its unnatural sound was unnaturally absent."[11] Marc Reisner's classic *Cadillac Desert* succinctly describes how the infamous Teton Dam disintegrated "almost noiselessly,"[12] and of the near-disaster at Folsom Dam he states, "You couldn't have heard a jet taking off five hundred feet away; that's the kind of noise a million pounds of water makes-a million pounds a second -as it tumbles a couple of hundred feet and crashes into a canyon riverbed."[13]

Other descriptions reflect the rivers in their more typical states. Again, in *Cadillac Desert*, Reisner

draws from John Wesley Powell's recollections of running the rapids of the mighty Colorado before any other white man, as the famous Civil War veteran, geologist, and explorer commented on the "roar of the rapids," the river's "roaring falls" and a river "roaring with mud" all within pages of one another.[14] But perhaps the most effective use of sound by journalists deals with collective perceptions of environment and place. Mark Arax and Rick Wartzman's King of California is a comprehensive story of the Boswell family farming empire in the southern San Joaquin Valley, which required massive exercises of power and control over rivers and landscapes. In it, the authors describe the now-evaporated Tulare Lake, which was one of the largest bodies of water in the West before it dried up from upstream damming and farming diversions. In a longer discussion about the language of the Indigenous Yokuts, who lived near the great lake's shores, the authors explore the onomatopoeic terms for nature, including the overwhelming experience of hearing "the sudden flight of flocks so immense they extinguished the sun." The word for this phenomena? "Tow-so, tow-so. A thousand thousands."[15]

I recently presented a research project attempting a reconstruction of a lost river canyon, and a fellow graduate student from a different discipline asked me what the river sounded like. I had a hard time answering the question. Sources for the project included typical historical stuff: photographs, written firsthand accounts, media accounts, maps, and government documents. But the reconstruction as presented couldn't reproduce what this river sounded like before its inundation under a reservoir, and once pointed out, the silence was deafening. Coates argues that sound matters when remembering landscapes and environments, and I believe the same is true for rivers. Rivers are particularly auditory places. They make their own sounds and they have played important roles in influencing aural culture. Whether as a storytelling device, as part of an analysis, or even as an inclusion for the sake of posterity, the sounds of a river, both past and present, are worth documenting as part of the historical record.

Footnotes

[1] Peter A. Coates, "The Strange Stillness of the Past: Toward an Environmental History of Sound and Noise." *Environmental History*, 10 (4): 637.

[2] Coates, 637.

[3] Richard M. Mizelle, Jr., *Backwater Blues: The Mississippi Flood of 1927 in the African American Imagination* (Minneapolis: University of Minnesota Press, 2014).

[4] David A. Pietz, *The Yellow River: The Problem of Water in Modern China* (Cambridge, MA: Harvard University Press, 2015), 111–112.

[5] Paula Schönach, "River histories: a thematic review," Water History (2017): 13.

[6] Patrick McCully, *Silenced Rivers: The Ecology and Politics of Large Dams* (London: Zed Books, 1996), 133-163.

[7] Mark Cioc, *The Rhine: An Eco-Biography*, 1815–2000 (Seattle: University of Washington Press, 2009), 8–9.

[8] Cioc, 95b.

[9] M.W. Steele, "The History of the Tama River: Social Reconstructions"; M. Cioc, "Seeing Like the Prussian State': Re-Engineering the Rivers of Rhineland and Westphalia"; B. Simmons and J. Scott, "The River has Recorded the Story, Living with the Hawkesbury River, Sydney, NSW, Australia"; C. Siwar and S. Idrus, "Poverty, Water and Environmental Degradation: The Langat River Basin, Malaysia," from *A History of Water: Volume I: Water Control and River Biographies*, edited by Terje Tvedt and Eva Jakobsson (London: I.B. Tauris, 2006), 217–295.

[10] Richard White, *The Organic Machine: The Remaking of the Columbia River* (New York: Macmillan, 2011), 11.

[11]John McPhee, The Control of Nature (New York: Macmillan, 1989), 183–184.

[12] Marc Reisner, *Cadillac Desert: The American West and its Disappearing Water* (New York: Penguin, 1993), 403.

[13] Reisner, 498.

[14] Reisner, 29.

[15] Mark Arax and Rick Wartzman, *The King of California: J.G. Boswell and the Making of a Secret American Empire* (New York: PublicAffairs, 2005), 49.

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Caskey, Christopher. 2017. "Listening to a River: How Sound Emerges in River Histories." *Open Rivers: Rethinking Water, Place & Community*, no. 8. <u>http://editions.lib.umn.edu/openrivers/article/listening-to-a-river/</u>.

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PRIMARY SOURCES REFLECTIONS OF "NEW" GEOGRAPHIES: A BRIEF GLIMPSE AT PRE-MODERN CARTOGRAPHY By Marguerite Ragnow

I watched my father build a cedar strip canoe when I was five years old. I remember pieces of wood bent and clamped onto a form in our garage; I remember Dad shellacking the wood,



Map of New France. Vincenzo Coronelli, Partie occidentale du Canada ou de la Nouvelle France... Paris, 1688. (Bell Library 1688 mCo)

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which gave it a shiny, slightly orange-tinged luster. I remember him layering fiberglass sheets on the hull, gluing them down until they formed a watertight barrier. Most of all I remember painting the hull a dull black, because I got to help. We took her on a camping trip up the Wisconsin River, just north of Stevens Point, when I was seven and I was allowed to take the front and paddle. It was thrilling! There were a lot of camping trips and a lot of canoe paddling during my childhood, on rivers and lakes in both Wisconsin and Minnesota. There is a feeling of awe you get paddling in what seems like a very tiny canoe on a large lake or broad river, with towering pines or tall bluffs on all sides. Nature's majesty can overwhelm. I can easily imagine how the early explorers of the Upper Midwest may have felt experiencing this territory for the very first time, traveling down the Mississippi or the Wisconsin in dugout canoes.

I wasn't very surprised, therefore, when I first saw this 1688 map by Vincent Coronelli that features mountains along one side of the Mississippi River. My students, however, think it's crazy. "Why," they ask, "would anyone think there were mountains along the Mississippi in Minnesota and Iowa?" Here is what one of the very first European explorers of the Mississippi, Father Louis Hennepin, wrote, describing the river below Lake Pepin:

> This River has a range of mountains on each side throughout the whole of the way; which in particular parts approach near to it, in others be at a great distance. The land betwixt the mountains, and on their sides is generally covered in grass with a few groves of trees interspersed, near which large droves of deer and elk are frequently seen feeding. In many places pyramids of rocks appeared, resembling old ruined towers; at others amazing precipices and what is very



St. Anthony Falls. Jonathan Carver, Travels through the interior parts of North America in the years 1766, 1767, and 1768. London, 1778. (Bell Library 1778 Car)

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remarkable, whilst the scene presented itself on one side, theopposite side of the same mountain was covered with the finest herbage. ... But above all, the fine River flowing near and reaching as far as the eye can extend, does by turns attract your admiration and excite your wonder (Hennepin 1698).

From Father Hennepin's perspective, traveling by canoe in a totally foreign and unfamiliar

landscape, the bluffs along the Mississippi River south of the Twin Cities looked like mountains. Perhaps he had never seen real mountains. Nevertheless, Coronelli, like several other cartographers, was influenced by Hennepin's account and many early maps of North America show mountains along the Mississippi River. However, it wasn't really the mountains that impressed him, but rather the Mighty Mississippi.

The river impressed other European explorers over the years, as well. Giacomo Costantio Beltrami (1779-1855), a former Italian diplomat turned explorer, traveled up the Mississippi River in the company of Captain Stephen H. Long (1784-1864) and Lawrence Taliaferro (1794-1871), the U.S. army's Indian agent who would eventually be stationed at Fort Snelling, at the confluence of the Minnesota and Mississippi Rivers.

"What a scene presents itself to my eyes, my dear Madame! How shall I bring it before you without the aid of either painting or poetry?" wrote Beltrami to a friend upon his first view of St. Anthony Falls, a site transformed by Minneapolis'



Map of the Course of the Mississippi River. Giacomo Costantino Beltrami, A pilgrimage in Europe and America: leading to the discovery of the sources of the Mississippi and the Blood River.... London, 1828. (Bell Library 1828 Be)



Close-up of map of the Mississippi showing its "source." Beltrami, A pilgrimage... 1828.

industrial growth and which is now the heart of the city of Minneapolis. He determined then and there that he would search for the source of the river.

Beltrami created his map based on his own surveys—and that of his expedition with Stephen Long. Beltrami argued with Long and went his own way, leading to his discovery of what he thought were the headwaters of the Mississippi in August of 1823. (It was later determined that the source of the Mississippi is Lake Itasca.) In 1718, French cartographer Nicolas de Fer created this composite map of North America, incorporating information from LaSalle, Marquette, Joliet, Hennepin, and others. Rather than focus on a single river, this maps draws the eye to the Great Lakes. Of particular importance to many scholars are the notations that locate various Native American tribes in the Midwest and elsewhere. This beautiful map was water-colored by hand. At some point, the original paper split along the folds and the map was glued to a linen backing, which has caused a rippling effect. De Fer did not, however, neglect the Mississippi and in this close-up you will see that he has also included some of Hennepin's mountains, along with a mysterious giant chicken.



Close-up of the Great Lakes. Nicolas de Fer, La nouvelle France ou la France occidentale... Paris, 1718. (Bell Library 1718 mFe)

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Close-up of the Mississippi. de Fer, La nouvelle France... 1718.

While the James Ford Bell Library has a wonderful collection of maps related to European exploration and early settlement of the Americas, for which the maps above are a very small sampling, its focus is global, although often from a European perspective. For this special issue of *Open Rivers*, I have also selected a few images that reflect rivers and other bodies of water in Africa and Asia, as well.

This late medieval portolan or nautical chart is hand-drawn and painted on vellum using mineral inks, which is why the colors remain so vibrant. Azurite was a common ingredient for the vivid blue ink, for example. Like most pre-Columbian portolan charts, this one focuses on the Mediterranean world. It was created by Genoese cartographer Albino Canepa in 1489 CE. Little is known about the purpose of portolan charts, but all have similar features: lines, called rhumb lines, radiating out from compass roses and similar compass points; a basic underlying grid pattern; and place names dotting the coastlines. While a few undecorated portolan charts have survived, most of the survivors are decorated with a common iconography that is recognizable from map to map, from cartographer to cartographer, even though there might be variations in style. The Red Sea, for example, is often this oblong shape and is colored red. The Nile is prominent, as it is here, and so is the unnamed river leading to two large inland lakes to the west in Africa, which will not be found on any modern map in this configuration.

This is, perhaps, the most popular map in the Bell Library collection and I use it a lot for teaching.



Albini de Canepa. Portolan Chart, 1489. (Bell Library 1489 mCa)

By pointing students to recognizable topographical features of the map, such as the Red Sea and the boot of Italy, students are able to quickly orient themselves to the map and start to pick out other features, notice unusual characteristics, and to ask questions. They learn a) that they can learn from early maps even when the text on the maps is written in a language they cannot read, and b) that early maps are rarely objective. The Canepa portolan depicts a strong Genoese trading presence in the Black Sea some 40 years after the Turks took control of the region and restricted Genoese trade—the Mediterranean world as it was prior to 1453 rather than as it really was in 1489, reflecting perhaps the desire on the part of the person who commissioned the map to regain some past family glory.

Another reason I like this map is that it draws Africa into the late medieval Mediterranean world. The romantic nineteenth-century image of Africa as a dark, mysterious continent often overshadows northern Africa's vibrant civilizations that thrived long before Columbus sailed his tiny ship across the Atlantic Ocean.



Africa. Joan Blaeu, Le grand atlas, vol. 10. Amsterdam, 1667. (Bell Library 1667 oBl)

The map below, from a 1667 atlas by Dutch printer Johannes Blaeu, offers a different perspective of Africa—one focused on its inhabitants, both human and animal. This printed map is also hand-colored, with rivers, lakes, and mountain ranges clearly delineated. The importance of Africa's port cities is also highlighted with small inset maps at the top of the page.

However, despite the importance of northern Africa to Mediterranean culture and commerce, and the importance of its coastal ports, the interior of Africa posed difficulties for early explorers. According to the *1788 Proceedings of the Association for Promoting the Discovery of the Interior Parts of Africa*: As both Europe, and its adjacent continent, Asia, are spread over with inland seas, lakes, or rivers of the most extended navigation, so as collectively to aid the transport of bulky articles of merchandise from one extreme to the other; and to form (like stepping stones over a brook) a more commodious communication: so likewise the northern part of the new continent [Africa] appears to have an almost continuous inland navigation which must prove of infinite advantage to the inhabitants, when fully peopled; & to contribute to their speedier civilization.... But Africa stands alone in a geographical view! Penetrated by no inland seas like the Mediterranean, Baltic or Hudson's Bay; nor overspread with extensive lakes like those of North America; nor having in common



Cairo. Olfert Dapper, Description de l'Afrique... . Amsterdam, 1686. (Bell Library 1686 fDa)

with the other continents Rivers running from the centre to the extremities: but on the contrary, its regions separated from each other by the least practicable of all boundaries, arid deserts of such formidable extent, as to threaten those who traverse them, with the most horrible of all deaths, that arising from thirst! (*Proceedings* 1810).

Here, it is the lack of water rather than its majesty that is of greatest importance (Europeans had yet to discover Victoria Falls!), and which poses the greatest obstacles. China, like Africa, is a land of great contrasts. It has arid deserts, humid jungles, and an impressive system of waterways, as well as a rich coastal region.

This map of "Nanking" province highlights the dominance of the Yangtze River to the region. Today, the city of Nanjing, in the Yangtze River delta, is one of the world's largest inland ports.

The Yangtze and other rivers also are prominent on the famous 1602 map, *Kunyu Wanguo Quantu (Map of the Ten Thousand Countries of the World)*, created at the court of the Wanli Emperor in Ming China under the direction of



Imperial China. Blaeu, Le grand atlas, vol. 11. Amsterdam, 1667.

Jesuit missionary Matteo Ricci. Ricci's Chinese collaborators were not interested in investing much energy in the depiction of China on this map, compared to the details provided about the rest of the world. The map wasn't about China, but rather China's relationship to the Americas and other parts of the globe.

The Middle Kingdom is renowned for the greatness of its civilization. It comprises all between the 15th and 42nd parallels.

Tributary countries are very numerous. In such a general map as this, only some mountains, rivers, provinces, and circuits are indicated; for a more detailed account, various gazetteers may be consulted (*Kunyu Wanguo Quantu*).

Ricci, however, understood fully the power of maps. Perhaps one of the reasons he designed this map in six panels to fit on a folding screen, each approximately 5 feet long, and when the



Nanking. Blaeu, Le grand atlas, vol. 11. Amsterdam, 1667.

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China. Matteo Ricci, Kunyu Wanguo Quantu, Beijing, 1602. (Bell Library, on display)

panels are placed side-by-side the map is 12 feet in extent—a very impressive sight, indeed. On one of these panels are printed the following words from Matteo Ricci:

> Once I thought learning was a multifold experience and I would not refuse to travel [even] ten thousand Li to be able to question wise men and visit celebrated countries. But how long is a man's life? It is certain that many years are needed to acquire a complete science, based on a vast number of observations: and that's where one becomes old without the time to make use of this science. Is this not a painful thing?

And this is why I put great store by maps and history: history for fixing [these observations], and maps for handing them on [to future generations] (Ricci, *Kunyu Wanguo Quantu* 1602; trans. d'Elia).

By viewing just a few of these early modern maps, the subjective biases and errors of the maps seem so obvious, often presenting a particular world view commensurate with a non-geographical objective, such as the conversion of China to Christianity as was the case with the Ricci map, or the commemoration of Genoa's strong commercial presence in the Black Sea in the early fifteenth century, as seen in the Canepa portolan chart. These biases seem evident particularly as we are accustomed to maps of today, which use satellite technologies for detailed and precise representations. Nevertheless, these early maps allow us to ask questions about changing perspectives and about how water and humanity's relationship to it played a significant role both in pre-modern society and in the maps that society created. These questions might also help us pause to question our own changing perspectives on place and our relationships to place as well.

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Recommended Citation

Ragnow, Marguerite. 2017. "Reflections of 'New' Geographies: A Brief Glimpse at Pre-Modern Cartography." *Open Rivers: Rethinking Water, Place & Community*, no. 8. <u>http://editions.lib.umn.edu/</u> <u>openrivers/article/reflections-of-new-geographies-a-brief-glimpse-at-pre-modern-cartography/</u>.

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Dr. Marguerite Ragnow is curator of the James Ford Bell Library and a member of the graduate faculties of the Department of History, the Center for Medieval Studies, and the Early Modern Studies Program at the University of Minnesota. Her research interests include the history of cartography, the social and economic history of female monasteries in the early Middle Ages, and the history of food and food culture. She directs the Digital Research Workshop for the Consortium for the Study of the Premodern World, an Andrew W. Mellon-funded initiative for which she also is co-investigator and regent. She is also the newly elected president of the Society for the History of Discoveries, which is dedicated to the study of global interaction and its geographic impact.

TEACHING AND PRACTICE GRASPING WATER SUMMER INSTITUTE READING LIST By Ruth Mostern, Ann Waltner, and Kan Li

The following bibliography of book chapters and articles is the reading list that circulated to participants in the 2016 Grasping Water Summer Institute. Each participant read as many of these items as possible before the Institute. This helped to ensure that our diverse group

had some common vocabulary and a few shared points of reference. We had these works to refer to together as we embarked on a collective investigation of art, culture, society, science, and policy along the rivers of three continents over a scale of centuries.



This highly detailed true-color image shows the stark eastern edge of the Zambezi floodplain. To the left of the edge, water covers everything. Deep blue channels wind among green, shallowly flooded plains. To the right of the edge, the land is dry. The city of Kasane is perched confidently along the edge of the flood plain. Image courtesy of NASA Earth Observatory, 2010.

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Creating this reading list was one of the most thrilling, instructive, and challenging tasks we faced as Institute organizers. Each applicant for participation in the Institute submitted suggestions for books, articles, websites or films, resulting in a list of 125 books and articles, 28 websites, and 15 films and videos. We spent weeks reading excerpts, discussing frameworks, and regretfully cutting extraordinary works as we developed this (still lengthy!) collection of materials. We sought to balance case studies and theoretical frameworks, to introduce all the regions, eras, and disciplines that would be represented at the Institute, to share both classics and new works, and to include some writing oriented to policy and action, some journalism, and some thoughtful interrogation of culture and history.

We are grateful to all 74 Institute applicants who shared their advice and expertise with us. We also thank Li Kan, the Institute program assistant, who organized and categorized all the recommendations, created accurate and consistently formatted bibliographic entries for each one, prepared the final list, and assembled a collection of PDF documents for all Institute participants.

We are sharing this bibliography in this issue of Open Rivers as a starting point for readers who wish to learn more about rivers and human systems in Africa, China, and North America.

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Recommended Citation

Mostern, Ruth, Ann Waltner, and Kan Li. 2017. "Grasping Water Summer Institute Reading List." *Open Rivers: Rethinking Water, Place & Community*, no. 8. <u>http://editions.lib.umn.edu/openrivers/article/grasping-water-summer-institute-reading-list/</u>.

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EDITORIAL **THE PEOPLE WHO MAKE THIS JOURNAL HAPPEN** By *Open Rivers* Editorial Staff

In 2017, Open Rivers: Rethinking Water, Place & Community has been pleased to be able to publish material from insightful writers, work with thoughtful reviewers, and receive guidance from our esteemed board members. The success and growth of Open Rivers has been

made possible through the collaboration of all these people from across diverse disciplines, professions, and geographies. Thank you all for your contributions and for being part of the *Open Rivers* community.



John Day River, Oregon. Photographer Bob Wick, BLM. (CC BY 2.0)

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