



TAKE THREE

What Comes after the Conquest of Nature?

Ashley Carse 

Department of Human and Organizational Development, Vanderbilt University, Nashville, TN, USA
Email: ashley.carse@vanderbilt.edu

In 2023, the Panama Canal Authority restricted ship traffic due to an extended drought. Over the course of the year, administrators cut the number of daily canal transits by nearly half (from around thirty-eight to twenty-two).¹ They also enacted draft restrictions, reducing the maximum underwater depth of ships in transit. Some vessels reduced or offloaded cargo to pass through a shallower canal; most waited in queues for days or weeks to transit; others traveled longer alternative routes to avoid the chokepoint altogether.

By mid-year, the Panamanian drought had been recast as a global concern that could affect markets and everyday life in faraway places. The minutiae of canal wait times and draft restrictions, typically the domain of maritime and logistics industry publications, began to garner broad concern and analysis. The *New York Times* reported, “Drought Saps the Panama Canal, Disrupting Global Trade.”² *ABC News* fretted, “Panama Canal’s Low Water Levels Could Become a Headache for Consumers.”³ *CNN Business* made it personal, proclaiming, “A Severe Drought Is Affecting the Panama Canal. That’s Not a Good Sign for Supply Chains—or Holiday Shopping.”⁴

What caused the water shortage? Most journalistic accounts framed Panama’s drought as a unique event that *happened to* the canal and the maritime industry—an environmental problem driven by the year’s El Niño event and, probably, by climate change. While 2023 precipitation levels were among the lowest in the preceding fifty years, this narrative elided a pattern of water shortage anxiety and response dating back to the design and construction of the canal.

The cultural theorist Paul Virilio argued that every technological innovation carries its own negativity, which is invented simultaneously. “When you invent the ship,” he wrote, “you also invent the shipwreck; when you invent the plane, you also invent the plane crash; and when you invent electricity, you invent electrocution.”⁵ Did the construction of the Panama Canal invent the drought? Not exactly. But the engineering and environmental management choices of the 1904–1914 construction era and expansion of global maritime traffic in the following century have articulated with dry periods in Panama to produce a recurring problem.

¹Panama Canal Authority, *Advisory to Shipping No. A-48-2023* (Panamá, 2023), <https://pancanal.com/wp-content/uploads/2023/01/ADV48-2023-Reduction-in-Transits-Due-to-the-Ongoing-Deficit-in-Precipitation-in-the-Canal-Watershed.pdf>.

²“Drought Saps the Panama Canal, Disrupting Global Trade,” *New York Times*, Nov. 1, 2023, <https://www.nytimes.com/2023/11/01/business/economy/panama-canal-drought-shipping.html> (accessed Jan. 15, 2023).

³“Panama Canal’s Low Water Levels Could Become a Headache for Consumers,” *ABC News*, Aug. 30, 2023, <https://abcnews.go.com/International/panama-canals-low-water-levels-become-headache-consumers/story?id=102674557> (accessed Jan. 15, 2023).

⁴“A Severe Drought Is Affecting the Panama Canal. That’s Not a Good Sign for Supply Chains—or Your Holiday Shopping,” *CNN Business*, Sept. 6, 2023, <https://www.cnn.com/2023/08/26/economy/panama-canal-supply-chain/index.html> (accessed Jan. 15, 2023).

⁵Paul Virilio, *Politics of the Very Worst* (New York, 1999), 89.

Imagining the Conquest of Nature

Until recently, most English-language histories of Panama Canal construction have described an epochal engineering project begun in 1904 and completed in 1914—a testament to U.S. political will, scientific and technological innovation, and migrant labor.⁶ Accordingly, the final chapter of David McCullough's *The Path Between the Seas* (1977), arguably still the definitive construction history, is entitled "Triumph." By any measure, the opening of the canal was a stunning accomplishment. Immense volumes of earth were excavated and moved. The Chagres River, formerly Caribbean-bound, was dammed and rerouted through the Culebra Cut to the Pacific. In an epic public health campaign against malaria and yellow fever, rural and urban areas were filled, drained, sprayed, and paved. All this work was done by tens of thousands of laborers—who were fed, lodged, and governed—and legions of machines, which had to be acquired, maintained, and repaired. For good and ill, canal construction reorganized life and landscape across a vast region as it ushered in a new era of interoceanic connection.

When the Panama Canal opened, it was touted as modern man's ultimate conquest of nature.⁷ That narrative depended on a selective reading of what came before. It typically begins with colonial fantasies of discovering a hidden interoceanic strait across the isthmus linking Europe and Asia by water. Then, it chronicles a succession of projects by states and capitalists to make that fantasy real: colonial road projects, a nineteenth-century railroad, and a failed French effort to build a sea-level canal.⁸ As these events unfold, the reader, anticipating the triumph of 1914, can imagine that the canal has always been there, a ghostly presence in the jungle, just waiting for the right people—outsiders with power, vision, capital, and technology (with *agency*)—to dominate tropical nature and activate Panama's geographic potential.

Accounts of the U.S. construction project are rife with struggles against torrential rains, floods, mudslides, heat and humidity, out-of-control vegetation, and disease-carrying insects.⁹ And then, with the "triumph" of 1914, nature was tamed and receded to the background. Or so it seemed. In the scholarly and public imagination, the open canal became a site to think about *human* agencies—particularly those of powerful people (politicians, engineers, capitalists) and nation-states. In recent years, revisionist scholars have challenged key elements of the canal's heroic storyline by centering accounts of human dispossession and resistance, often foregrounding the experiences of Panamanians, black Caribbean laborers, and others. However,

⁶Over the past several decades, a body of critical and revisionist history—established in Spanish and now flourishing in English—has reframed canal construction and administration as an imperial project built on the backs of black migrant laborers and at the expense of Panamanians. In English, see Michael L. Conniff, *Black Labor on a White Canal: Panama, 1904–1981* (Pittsburgh, 1985); Joan Flores-Villalobos, *The Silver Women: How Black Women's Labor Made the Panama Canal* (Philadelphia, 2023); Julie Greene, *The Canal Builders: Making America's Empire at the Panama Canal* (New York, 2009); and Marixa Lasso, *Erased: The Untold Story of the Panama Canal* (Cambridge, MA, 2019). In Spanish, see Alfredo Castellero Calvo, "Transistmo y Dependencia: El Caso Del Istmo de Panamá," *Lotería* 211 (1973): 25–56; Guillermo Castro Herrera, *El Agua Entre Los Mares* (Panamá, 2007); Omar Jaen Suarez, *Análisis Regional y Canal de Panamá: Ensayos Geográficos* (Panamá, 1981); and Jorge E. Mastellari Navarro, *Zona Del Canal: Analogía de Una Colonia* (Panamá, 2003).

⁷For critical perspectives on the conquest of nature narrative and its implications, see Paul S. Sutter, "Nature's Agents or Agents of Empire? Entomological Workers and Environmental Change during the Construction of the Panama Canal," *Isis* 98, no. 4 (2007): 724–54; Ashley Carse et al., "Panama Canal Forum: From the Conquest of Nature to the Construction of New Ecologies," *Environmental History* 21, no. 2 (2016): 206–87.

⁸For example, see Gerstel Mack, *The Land Divided: A History of the Panama Canal and Other Isthmian Canal Projects* (New York, 1944); David McCullough, *The Path Between the Seas: The Creation of the Panama Canal 1870–1914* (New York, 1977); and Matthew Parker, *Panama Fever: The Battle to Build the Canal* (London, 2007).

⁹See geographer Stephen Frenkel's analysis of negative discourses of tropical nature during Panama Canal construction, which he analyzes in relation to a long-running tendency for outsiders to present Panamanian nature as paradisaical (positive) and dangerous (negative): Stephen Frenkel, "Jungle Stories: North American Representations in Tropical Panama," *Geographical Review* 86, no. 3 (1996): 317–33; Stephen Frenkel, "Geographical Representations of the 'Other': The Landscape of the Panama Canal Zone," *Journal of Historical Geography* 28, no. 1 (2002): 85–99.

the conquest of nature narrative—built on imperial and racialized assumptions of technoscientific mastery like those that erased marginalized people—has proven remarkably durable in ways that can lead us to misunderstand both the past and the present.

The Production of Water Scarcity

Water supply is a source of anxiety in Panama and beyond because the canal requires an enormous freshwater supply by design. Unlike the Suez Canal, a sea-level channel between the Mediterranean Sea and the Red Sea, ships cross Panama via an aquatic staircase of six locks. As a ship makes its way through the locks—three steps up, three steps down—fresh water stored in summit-level reservoirs is released through culverts, raising or lowering the vessel. All this water, which comes from the Chagres River and its tributaries, ultimately flows out to sea.

The 2023 drought began early in the year.¹⁰ Precipitation in central Panama has historically been characterized by a May–December rainy season (*invierno*) and a January–April dry season (*verano*), though this has been changing, likely due to climate change.¹¹ Two large reservoirs—Gatun Lake and Alajuela Lake—store rainy season precipitation for use throughout the dry season. But when the dry season runs long and rainfall is diminished, the stored water supply can be pushed to its limit. In 2023, precipitation was well below the historical average; it was the second driest year since 1950.¹²

In meteorological terms, this is the very definition of drought: a temporary event resulting from atypical climate conditions.¹³ And yet, it tells us little about the circumstances in which a prolonged dry period becomes a significant social, political, or economic problem. This is an outcome of both water supply and water demand—a relationship mediated by infrastructure.

Water shortage anxieties have animated the technical development and territorial expansion of the Panama Canal for more than a century. Nearly a decade before the first transit, Henry Abbot, a former Army Corps brigadier general and consulting hydrologist, wrote, “The vital question was to determine whether the Chagres [River] will supply all the needs of the Canal in seasons of low water. Any reasonable doubt here would be fatal to the project of a canal with locks.”¹⁴ By the 1920s, droughts and low water levels in Gatun Lake raised reasonable doubts and motivated the U.S. expropriation of twenty-two square miles of Panamanian territory for the creation of a second reservoir, Alajuela Lake (then Madden Lake), to increase the water supply.¹⁵

In 1927, Panama Canal Governor M. L. Walker outlined a looming problem:

During approximately eight months of the year much excess water enters the lake and has to be spilled into the sea. During the remaining four months the inflow is wholly inadequate to meet the demands for water which must be provided for the lockage of ships, the generation of electric power, and for municipal purposes.... With the continued increase in traffic, the time is approaching when this margin will not suffice to provide safe transit through the cut for heavy draft vessels toward the end of a dry season both extremely dry and unusually prolonged.... The necessity for additional storage is but a matter of time in any event, and early construction will simplify present operating problems and minimize the possibilities of serious accidents or delays to shipping.¹⁶

¹⁰*Advisory to Shipping No. A-48-2023*; “Drought Saps the Panama Canal, Disrupting Global Trade.”

¹¹See Michelle Acciaro, “Climate Change Adaptation in the Panama Canal,” in *Climate Change and Adaptation Planning for Ports*, ed. Adolf K. Y. Ng et al. (London, 2016).

¹²*Advisory to Shipping No. A-48-2023*.

¹³Giorgos Kallis, “Droughts,” *Annual Review of Environment and Resources* 33 (2008): 85–118.

¹⁴Henry L. Abbot, *Problems of the Panama Canal* (New York, 1905), 105.

¹⁵I detail the history of the expanding hydrological footprint of the Panama Canal in Ashley Carse, *Beyond the Big Ditch: Politics, Ecology, and Infrastructure at the Panama Canal* (Cambridge, MA, 2014), 93–119.

¹⁶Governor of the Panama Canal, *Annual Report of the Governor of the Panama Canal* (Washington, DC, 1927), 22.

Walker's scenario was quickly realized. In an article entitled, "Two-Year Drought Hits Panama Canal," the *New York Times* reported that the 1929–1930 period, the driest on record since 1890, exacerbated existing concerns about water supply and demonstrated a need for more storage due to growing traffic.¹⁷ As the decades passed, drought and shipping restrictions became a recurring, if periodic, phenomenon. In 1957, the Panama Canal administration placed draft restrictions on large oil tankers and ore carriers, forcing some to reduce their loads.¹⁸ A similar pattern played out during 1961, 1965, 1977, 1982, 1998, and 2015–2016.¹⁹

One might reasonably analyze each of these droughts as a discrete meteorological event. But this would analytically sever the canal from the linked infrastructures of empire, global commerce, and regional water provision that make Panamanian droughts salient beyond the isthmus in the first place. Canal traffic has increased dramatically over the past century. Around 6,000 vessels transited in the 1922 fiscal year. By 2022, annual transits had exceeded 14,000.²⁰ Due to the lock design, water use increased proportionally. Moreover, canal reservoirs were sources of municipal water and hydropower for the adjacent cities of Panama City and Colón, a sprawling urban area that is now home to an estimated two million people.²¹ Seen through the interplay of the infrastructures that format and facilitate water use, the history of drought is not absolute, but relational. As a material and discursive phenomenon, its characteristics are an outcome of the interplay between rainfall and socioeconomic demand by particular groups for particular activities. In this sense, drought does not simply *happen to* the Panama Canal. Rather, the design and operation of the canal as global infrastructure has helped create the conditions of possibility for water shortage.

The Control of the Control of Nature

What can modern American historians learn from the recurring constriction of the Panama Canal due to drought? The canal was built during an era of technological hubris—a period when the Army Corps of Engineers, an agency whose ideology and personnel directly shaped canal design, was identified with the conquest and control of nature.²² That confidence would turn out to be misplaced. In Panama, as I argue in my book *Beyond the Big Ditch*, keeping the canal open means managing myriad unintended environmental consequences and second-order effects generated through its operations.²³ This is one instance of a broader twenty-first century phenomenon that the environmental writer Elizabeth Kolbert labels "the *control of the control of nature*."²⁴ First, you build the infrastructure. Then, you dedicate yourself to managing the unfolding ways that the infrastructure alters the environment that it depends upon. You can try to mitigate drought by expanding water supply, but the obvious ways to do this—

¹⁷"Two-Year Drought Hits Panama Canal. Dry Cycle of 1929 and 1930 Shows Need of Additional Storage for Future Traffic," *New York Times*, Jan. 25, 1931, Section E, 8; "The Panama Canal, Problems That It Presents, Droughts and Floods, the Time It Saves," *The Mercury*, Mar. 24, 1932.

¹⁸"Long Panama Canal Dry Season Finds Aides Glad for Wet Guess," *New York Times*, July 27, 1957, 36; and "Draft Curbs Set on Panama Canal: Low Water Level Leads to Limitations on Big Tankers and Ore Carriers," *New York Times*, June 28, 1957, 34.

¹⁹This history and line of argument were introduced in Ashley Carse, "An Infrastructural Event: Making Sense of Panama's Drought," *Water Alternatives* 10, no. 3 (2017): 888–909. I reuse some of that material with permission under the journal's Creative Commons Attribution-NonCommercial License.

²⁰Governor of the Panama Canal, *Annual Report of the Governor of the Panama Canal* (Washington, DC, 1927), 2; Panama Canal Authority, *Annual Report* (Panamá, 2022), 6.

²¹On the history of interconnections between the Panama Canal and urban infrastructures in Panama City and Colon, see Carse, "An Infrastructural Event: Making Sense of Panama's Drought."

²²See also John McPhee, *The Control of Nature* (New York, 1989); and Todd Shallat, *Structures in the Stream: Water, Science, and the Rise of the U.S. Army Corps of Engineers* (Austin, TX, 1994).

²³Carse, *Beyond the Big Ditch*.

²⁴Elizabeth Kolbert, *Under a White Sky: The Nature of the Future* (New York, 2021), 8.

flooding new reservoirs and protecting watershed forests—entail displacing rural people and then managing the sociopolitical fallout. Ultimately, modern infrastructures like the Panama Canal have not freed us from nature, as we once imagined they might. In many instances, they have tethered us more tightly and contentiously to landscapes and waterscapes of our own making. Historians can help us to understand what we have built and how we might live with it.