Introduction

Urban Water as an (Un)natural Resource

New York City is sustained by a water infrastructure that few users understand. As long as clean water flows through taps on demand, the source seems to be of little concern. After all, the city's water is often labeled "the champagne of tap water," and the source of this bubbly is simply the distant mountains. What else is there to know? To start, thousands of people have been removed from their homes and businesses to create the artificial lakes that feed the system. The city owns and controls lands all around its nineteen reservoirs and controlled lakes. The land is managed by the New York City Department of Environmental Protection (hereafter, NYCDEP or DEP). There is no agency dedicated to protecting and preserving the associated human communities and their ways of life. Their histories are denied and erased to naturalize the system and clear additional land for the city's eternal water needs.

Like most human communities, New York City began in a place that had a supply of fresh water, mainly springs and small ponds fed by reliable rainfall. But as the population increased, so did water consumption and water pollution. The city began with the Dutch settlement of New Amsterdam in 1626 (Burrows and Wallace 1998: 23). By 1790, the population had grown to 33,131 residents (see table 0.1). The city's local supply had become so putrid that even horses considered it undrinkable (Koeppel 2000: 27). The stagnant and foul water also helped spread cholera and other diseases. The 1832 cholera outbreak killed 3,500 and caused 100,000 residents, a third of the city's population, to flee (Koeppel 2000: 146; New York City 2022). The city needed a clean and safe water supply to grow, and that required the construction of reservoirs, pumping stations, and aqueducts to move water over great distances because Manhattan Island is surrounded by saltwater. Politicians, architects, and engineers worked behind the scenes to direct the water from distant sources onto Manhattan, in ways that naturalized the unnatural water system.

Whenever the supply seemed plentiful, city residents were assured they need not concern themselves with the problems of water. Any notice of the costs rural residents were asked to pay was dismissed as for the "greater good" of a prosperous

Table 0.1. Growth of New York City's Population (1790–1990).

Year	Population
1790	33,131
1840	312,710
1890	1,515,301
1940	7,454,995
1990	7,332,564

Source: NYC.gov.

city. Villages were demolished. Cemeteries were dug up. Roads were rerouted. But perhaps worst of all, thousands of rural people were left behind on scarred landscapes, without rights to the same water that had fueled their lives and without the community infrastructure around which daily life once revolved. Those people and their landscapes are the central focus of this book. What happened, and is still happening, in New York is important because it is not unique. The creation and maintenance of urban water systems usually necessitates destruction of the peoples and places that water is taken from. These sacrifices need to be acknowledged and understood now as new waves of infrastructure development are being planned and executed in response to climate change.

A similar wave of infrastructure development occurred in the early twentieth century. At that time many American cities were building municipal water systems to keep up with the growing demand spurred by industrialization. New York City's period of reservoir construction lasted from the 1830s to the 1960s (see table 0.2). As soon as one reservoir was complete, the added supply enabled population

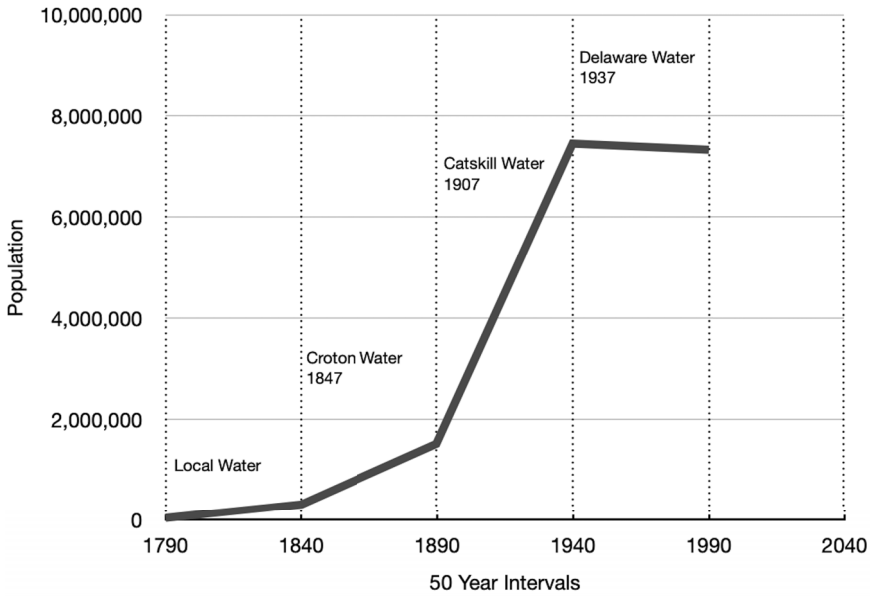

Figure 0.2. Growth of New York City's population (1790–1990) and corresponding water system expansions (New York City 2022). © April M. Beisaw.

Table 0.2. Completion dates and current capacities of New York City reservoirs. The New Croton Reservoir replaced the original Croton Reservoir.

Service Year	Reservoir	Watershed	Volume (billion gallons)
1842	Croton Receiving & Distributing Reservoirs	Croton	N/A
1873	Boyds Corner	Croton	1.7
1878	Middle Branch	Croton	4.1
1891	East Branch	Croton	5.2
1892	Bog Brook	Croton	4.4
1893	Titicus	Croton	7.2
1895	West Branch	Croton	8.0
1897	Amawalk	Croton	6.7
1905	Muscoot	Croton	4.9
1905	New Croton	Croton	19.0
1908	Cross River	Croton	10.3
1911	Croton Falls	Croton	14.2
1911	Diverting	Croton	0.9
1915	Ashokan	Catskill	122.9
1915	Kensico	All	30.6
1926	Schoharie	Catskill	17.6
1950	Rondout	Delaware	49.6
1954	Neversink	Delaware	34.9
1955	Pepacton	Delaware	140.2
1964	Cannonsville	Delaware	95.7

Source: NYC.gov.

growth and a new reservoir was needed. Once one city solved its water problems, others needed to do so too or risk losing their social and economic power. In 1927, Boston, Massachusetts, dismantled four towns to create the Quabbin Reservoir, displacing 2,500 people (Nesson 1983). In 1936, construction of the Kinzua Dam for the Pittsburgh, Pennsylvania, water supply displaced more than 550 Seneca and submerged a large part of their reservation (Bilharz 1998; Forbes, Heron, and the Seneca Nation 1994; Spewack 2016). In 1938, the last residents of Saint Thomas, Nevada, were evacuated before the homes of 500 people were lost to the filling of Lake Mead (National Park Service n.d.). No comprehensive scholarly or governmental list of communities lost to water infrastructure projects exists. Historian Bob H. Reinhardt's growing Atlas of Drowned Towns includes eighty

inundated by water projects, just in the American West (Reinhardt 2020). Wikipedia (2020) lists sixty-eight communities throughout the United States that were destroyed to create lakes and reservoirs. While that list is certainly incomplete, the longest list of destroyed communities is attributed to New York State.

One of New York City's own engineering reports contains the following totals (table 0.3) for just seven of their nineteen reservoirs and controlled lakes: seventeen villages destroyed; 4,464 people homeless; and 8,093 bodies removed from cemeteries. Not tabulated are the losses that were suffered to create the earlier dams and reservoirs and the long-term impacts to those who were not forced to move. Without their neighbors, schools, churches, cemeteries, or free access to what was once their own water source, many watershed residents struggled to remain, and few who did were able to prosper. This book focuses on the long-term effects of two New York City reservoirs, Boyd's Corner (1867–1873) and Ashokan (1907–1915), on the towns where they were constructed. The destruction, I argue, did not end when the reservoirs were functional. It continues today.

One difficulty in telling water histories is that the system is always changing in response to natural and cultural pressures. After 150 years of the city taking lands and water far from its own political boundaries, the New York State government passed legislation preventing the construction of additional reservoirs (Soll 2013: 122). Then the city had to refocus on protecting the existing reservoirs by ensuring that a sufficient supply of clean water flowed into them. The need to comply with the 1974 Safe Water Drinking Act (42 U.S.C. §§ 300f–300j–26) and associated regulations such as the 1989 Safe Water Treatment Rule (40 C.F.R. § 141.71) posed additional challenges. The United States Environmental Protection Agency (EPA) requirements for clean drinking water include filtration of urban water.

Table 0.3. Demolition and removal caused by seven of New York City's nineteen reservoirs and controlled lakes.

Reservoir	Construction Years	Communities Destroyed	Population Homeless	Bodies Reburied	Land Taken (sq. mi.)
Ashokan	**1907–1915**	7	2,000	2,800	23.8
Kensico	**1913–1917**	1	500	0	
Schoharie	**1919–1927**	1	350	1,300	3.7
Neversink	**1941–1953**	1	342	0	9.6
Pepacton	**1947–1954**	4	943	2371	18.8
Roundout	**1937–1954**	3	329	1,622	5.5
Cannonsville	**1955–1967**	5	941	0	31.1
Total		**17**	**4,464**	**8,093**	**92.5**

Data compiled from the New York Board of Water Supply report (1950: 35, 76) and Finnegan (1997: 608).

New York City's is the largest unfiltered urban water system in the United States. The city filed a filtration avoidance plan with the EPA that "required the City to show that it could avoid pollution in the drinking water supply *by controlling the activities of those who lived in the watershed*" (Church 2009: 398, emphasis added). In response, the city designed a Land Acquisition Program (LAP) to control activities in watershed communities by purchasing thousands of additional acres around reservoirs and along streams that feed them (NYCDEP 2010). By 2019, more than 150,000 acres of watershed land had been acquired through the LAP, further altering reservoir communities. In comparison, the landmass of Manhattan Island is just under 15,000 acres.

The logic of the LAP, as reported by the city (NYCDEP 2009: 1), is as follows:

> The Land Acquisition Program grew out of the City's response to the Federal Safe Drinking Water Act Amendments (1986) and Surface Water Treatment Rule (SWTR, 1989). As a result of increased awareness of the threat posed by micro-organisms in unfiltered surface water systems, the SWTR required such public water supplies to either filter their supply or meet specific "filtration avoidance criteria." The City, through its Department of Environmental Protection, sought to meet those criteria and avoid filtration through the development of a comprehensive Watershed Protection Plan . . . Under the SWTR, an applicant for filtration avoidance needs to "demonstrate through ownership and/or written agreements with landowners within the watershed that it can control all human activities which may have an adverse impact on the microbiological quality of the source water." Ownership of watershed lands is a key component of the City's ability to meet this condition.

With their filtration avoidance plan in place, the city's attention has shifted toward ensuring its reservoirs can withstand climate change. Alterations like raising dams to hold back the floods of stronger storms may also bring new threats to surrounding communities. New York is not the only city having to plan for the double threat of increasing populations and unpredictable climate changes. The planet has never had so many people; the global population is predicted to hit 9 billion people in the near future (United Nations 2019), and each person comes with increased water needs. At the same time, climate change is shifting the planet's water supplies. Glaciers are melting, reducing the amount of sunlight that is reflected back into the atmosphere and increasing the amount of liquid in the oceans and seas. As water levels rise, coastal cities are more easily flooded by storms. As temperatures rise, some places experience more storms and others experience more droughts. Water systems will need to pull water from farther away or deeper into the earth, lowering the water table and lessening supplies elsewhere. The expectation of readily available clean and inexpensive water will change where and how some of us live. This is less a prediction of the future than a lesson from the past, as this book attempts to show using the stories of two watershed towns.

One prediction is for a future where clean water is bought and sold like oil, by the barrel and with market prices that shift on a daily basis. If that seems far-fetched, recall the recent water crises of two Michigan cities, Flint and Detroit. When jobs disappeared from Detroit, the cost of tap water skyrocketed (Associated Press 2014; Guillen 2014). Abandoned homes and leaky pipes were stressing the distribution system and placing cost burdens on the few residents who remained. When Flint disconnected from the Detroit water system, their new source poured lead-tainted water into homes for years (Associated Press 2017). Activists responded to these cases with the slogan that water is a human right. But the World Health Organization (WHO) standards place that human right at thirteen to twenty-six gallons of water per person per day, the equivalent of a daily shower. That leaves nothing for washing clothes, watering the lawn, power washing the deck, making coffee, and cooking and cleaning tasks. Americans consume more water per day than any other nation (United Nations Department of Economic and Social Affairs 2015). Residents of New York City currently consume 118 gallons of water per day, down from a high of 213 gallons in 1979 (New York State Office of Information Technology Services 2022), thanks to water conservation efforts. This overconsumption means that US cities will be the most challenged in addressing climate-related changes to water supplies.

Just as New York City's water system was a model for many cities in the early 1900s, it may be so again in the 2000s. Will the model they create mean more destruction of communities outside the city limits?

Archaeology's Unique Perspective

For about a decade now, I have been studying how the New York City water system was created and how it is currently maintained. I do this not from the usual perspective of politics, economics, or engineering but from the deep-time perspective of archaeology: "The word 'archaeology' is embedded in commonplace language as a journey to the field, the site of a dig where discoveries are made" (Joyce and Preucel 2002: 28). But this is not what archaeology is to me. I do not go off to distant lands in search of the oldest or most obscure. Those discoveries make irresistible headlines, but they have little impact on the present. Instead, my archaeology starts with the issues of today and seeks the archaeological explanation of "how we got here." I look to disrupt the notion that "progress" led us to this place and time, and therefore, the present is better than, or more important than, what came before. In knowing the past, we can critique the present and imagine alternative futures. True progress requires learning from past successes and failures.

Archaeology is a powerful way of revealing how the present is entangled with multiple pasts (González-Ruibal 2006), some well known and some easily forgotten. By documenting the things (artifacts) left behind on landscapes (at sites),

we can show how other ways of engaging with the world once existed. Doing so reinforces that there is no one true account of the past as everyone experienced it. Instead, there are pluralities of experience and interpretation. As an archaeologist of North America, I seek a better understanding of the peoples and places I encounter in my daily life through what has been left behind in cities, towns, and "wild" places across the continent. I particularly want to know the stories behind seemingly empty spaces. Why are certain historic or cultural places preserved and celebrated while others are torn down, built upon, or otherwise forgotten? Often the answer is simply that someone kept the memory of that place alive.

The stories that are told about any place depend on both who is speaking and who is listening. Archaeologists listen to the stories of the places where they work and then see which stories are supported by the things left behind. Whether archaeologists dig through the earth of an exotic locale, sift through the contents of a recent suburban landfill (Rathje and Murphy 2001), or examine objects stored in museum collections, their goal is to tell new stories of the past. The past helps define identities, or who we are, and establish trajectories, or where we are going. But the past is neither objective nor neutral. "Like us, past peoples observed and interpreted traces of more distant pasts to serve the needs and interests of their present lives" (Van Dyke and Alcock 2003: 1). Those events we select to remember are usually solidified through the writing of documents or the construction of monuments. Those things we seek to forget are torn down, covered over, and perhaps only recoverable through archaeological analysis.

Because archaeology can detect and recall what was intentionally forgotten or unrecorded, it can become political. Those in positions of political power often rely on the selective memory of their subordinates (Crossland 2003) because what we believe to be true about the past is what legitimates the current social order. If we believe that New York City's water system is natural, or that urban water systems are justified in whatever destruction they cause as they serve the greater good, then rural communities will continue to be sacrificed without question. Several books detail the politics and engineering of the water system, the most recent of which is David Soll's *Empire of Water* (2013). But these histories do not reveal how individual property owners and families were impacted by the decisions of politicians, aside from financial compensation paid to those forced to leave. More detailed information on how individuals struggled with the change can be found in David Stradling's *Making Mountains: New York City and the Catskills* (2009); Gerard T. Koeppel's *Water for Gotham: A History* (2000); Diane Galusha's *Liquid Assets: A History of New York City's Water System* (1999); and Bob Steuding's *The Last of the Handmade Dams: The Story of the Ashokan Reservoir* (1989). All of these sources focus on those who were forced off their lands and the compensation, just or not, that they received for it. Under-examined are the stories of those who lost their communities and infrastructure, but not necessarily their own land, when the reservoirs were built near their properties. Towns whose economic centers were

demolished received no financial compensation and no help rebuilding what was lost. Also, these sources focus on the reservoirs built in the Catskills, yet that is just one place where the city harvests water. The massive Ashokan Reservoir was built in the Catskill towns of Olive and Hurley and was in full operation by 1915. But there are older reservoirs in the Croton region, on the east side of the Hudson River and much closer to dense urban populations. Kent is one of those Croton towns and home to the Boyd's Corner Reservoir, constructed approximately forty years before the Ashokan. Boyd's was put into service in 1872.

Those books and a wealth of existing documents provide histories of the New York City water system from the legal, political, and engineering perspectives. But ruins and artifacts can provide a new perspective. Archaeology allows us to witness the effects of watershed creation and maintenance on the communities impacted by distant decision makers. Archaeology shows us the longue durée or the historical trends that extend well beyond any one place or time. Archaeological sites around the world have taught us about the urban infrastructure of ancient Greece and Rome, the Angkor civilization of the Khmer empire (Klassen and Evans 2020), the African kingdom of Aksum (Sulas, Madella, and French 2009), the Native American city of Cahokia (Baires 2015), and individual cities of the Maya (Halperin, Le Moine, and Pérez Zambrano 2019), to name but a few. From all of these peoples, places, and time periods, we can see that engineering water systems often solves one crisis while creating others (Fagan 2011; Mithen and Mithen 2012; Solomon 2010). For example, archaeologists Sarah Klassen and Damian Evans (2020: 7) found that the eleventh-century Angkor water system "increased competition for land and increased demand for surplus," which led to the state-sanctioned "gradual accumulation of land by elites" as they extracted more resources from rural areas. That undermined local autonomy as land rights were transferred to elites. This is exactly what is happening in twenty-first-century New York. The ripple effects of moving water include a predictable shift of power through displacement of non-elites.

Archaeology can document displacement through the things left behind by those with less political power, especially adults who might not own the property they inhabit or use. Such people are often erased by official documents that either minimize the impact of community removals using terms like "slum clearance" or disguise them altogether using terms like "wilderness" or "undeveloped land." For example, many official histories of New York City's Central Park celebrate it as an environmental conservation success story that also beautified the city. Few describe the forced removal of the communities living there that was necessary in order to build a seemingly natural park (compare Rosenzweig and Blackmar 1992 to Heckscher 2008). Archaeologists Diana diZerega Wall, Nan A. Rothschild, and Cynthia Copeland (2008) have helped bring back some stories of the displaced through excavations of Seneca Village. Settled in the 1820s, this was once the only community of African American property owners in the city ("Seneca Village Project" n.d.). The archaeology of Seneca Village helped inspire the wonderful play *The*

People before the Park by Keith Josef Adkins (see Jaworowski 2015 for a review), which tells the story of a Black man and his son who live in their own home and run a small oyster business from it. When they are told they must leave, the father refuses to give up all he has built. They struggle to remain on their land but ultimately lose it all. Places like Seneca Village are everywhere in the archaeological record but are rarely spoken about in the documentary record.

My own archaeological research turned to the social memory of urban water after listening to a National Public Radio program about the city's aversion to building a water filtration plant. I recalled the small brown signs that are posted along many major roadways through New York's Catskill State Park (figure 0.3), my favorite place to hike while in graduate school at Binghamton University. The signs list the names of communities lost but provide no interpretive information. I knew these places had stories to tell, although I did not realize how enormous an undertaking finding those stories would be. The city's watershed covers nearly 1.3 million square miles; roughly the size of the state of Delaware ("NYC's Reservoir System" n.d.). For that reason, I focus on just two towns: Kent in Putnam County, approximately forty-five miles (72.4 km) north of the city, and Olive in Ulster County, approximately eighty-five miles (136.8 km) north of the city. These towns each have their own water history, and my place of employment, Vassar College, sits

Figure 0.3. "Former Site of" sign at the Ashokan Reservoir. Without accompanying interpretive material, visitors gaze into the waters looking for the ruins of lost communities. There are more ruins of the New York City water system on the lands around the reservoir than within the water line. © April M. Beisaw.

almost midway between them. This proximity meant that I could include students in my work, and more than one hundred Vassar College students have participated in it. Bringing college students to watershed communities in New York encourages them to consider water histories in the places they call home.

Using archaeological techniques of surface survey and map creation, my students and I documented items visible on the ground surface and correlated them to archival records and community knowledge. Doing so records a variety of pasts that have been obscured by the naturalization of the watershed. Our primary focus was the city-owned lands around the Boyd's and Ashokan reservoirs that are open to public recreation and hiking; many of these lands were recently acquired through the Land Acquisition Program. These city-owned recreation units are considered "vacant" lots that were willingly sold to the city to limit development around reservoirs. Most of these recreational units have no tables or benches; no ballfields or restrooms; and often no trails, parking lots, or even informational signs identifying the property as recreation land. There are only generic signs delineating the boundaries of city lands and often a corresponding set of "No Trespassing" signs put up by adjacent private property owners. The unimproved nature of these lots has helped preserve their archaeological data, the ruins of their past use (figure 0.4). Overall, the archaeology of these lands contradicts claims that these are placed without histories. Development and maintenance of the city water system

Figure 0.4. Example of a ruin on what is now New York City-owned land, approximately eighty-five miles (136.8 km) north of Manhattan. This was once a farmhouse perched on the slopes high above the Ashokan Reservoir. Construction of the reservoir destroyed most of the flat and fertile valley floor. © Alec Ferretti, reproduced with permission.

led to their abandonment. In the ruins left behind are stories of imperialism, resistance, continuity, and transition.

Book Outline

What follows is an archaeological exploration of 150 years of New York City's watershed creation and maintenance. I will take you to some of the forgotten places that were destroyed to create the artificial lakes that have fed the city's growth. Together we will bear witness to what has happened, and continues to happen, in order to predict what is yet to come. We will meet some descendants of those who lost so much and re-create the connections that help us remember what has been forgotten. As climate change and population growth work together to stress the earth's water supplies, we need to ask who, not where, we will take water from to sustain our cities. Alternatively, cities can adopt technological solutions like water filtration, desalination, and recycling, which might not produce the "champagne of tap water" but would distribute the costs of clean water to consumers rather than placing the burden squarely on the watershed communities.

The main lesson of this book is that taking water also means taking control of the land through which that water flows. A parasitic relationship develops between those who want water and those who have it. The dominant power naturalizes their actions through labels like "environmental protection" when what is being protected is the human population of a distant city. Realizing and remembering the sacrifices of rural communities allows us to consider the future impacts of newly proposed infrastructure projects. Instead of speculating on where water-poor cities like Las Vegas, or states like California, can get much-needed water from, we should be wondering who they will be taking water from to ensure their own survival. A secondary lesson of this book is that the past is rife with cautionary tales that can help us imagine futures that are more just. Where the written record is inherently biased toward those in power, archaeology provides a means of recalling those onto which that power was enacted. As this book demonstrates, the water that flows to New York City comes not from natural lakes but from an engineered watershed that is now a landscape strewn with ruins. Such ruins are evidence of traumatic events, not of progress (Stoler 2008), as this book will demonstrate.

Chapter 1 presents the method and theory for an archaeology of the contemporary past. Archaeologists use theories about how human cultures interact with objects and landscapes to interpret the sites and artifacts they find during fieldwork. For this project, lessons learned from the archaeology of landscape clearance and community removal elsewhere provide additional interpretive power. When archaeologists record sites and artifacts in what governments claim to be wilderness, we give a presence to what was erased or deemed absent. Because such work can be used to critique local politics, the role of archaeologists as activists is also reviewed.

Chapter 2 provides archaeological and historical context for the creation of New York City's water system and how it is linked to political and cultural power. The erasure of communities began on-island with the African and African American communities that lived around the Collect Pond, near Wall Street, and in Seneca Village, now a part of Central Park. Clearance occurred when communities of living or dead were deemed less important than the greater good that would be served by their removal. This continued off-island with the creation of the Croton Dam and then the build-out of reservoirs in what were agricultural communities before agriculture was deemed a pollution risk for city water.

Chapters 3 and 4 present the history and contemporary archaeology of Kent and Olive. Chapter 3 covers Kent and the Boyd's Corner Reservoir. This small reservoir was constructed in the 1870s. New York City now owns and controls 16 percent of the town lands as part of their DEP recreation area program. Chapter 4 presents similar information for the Ashokan Reservoir and the town of Olive. This massive reservoir was constructed between 1907 and 1913. New York City now owns and controls 15 percent of the Olive lands as part of their DEP recreation area program. Where the two towns differ is that Kent has become a bedroom community for New York City residents who have few ties to the town's history. Olive is still home to descendants of the original Euro-American settlers and the survivors of the reservoir land takings in their community. The trauma here is palpable but so is the sense that the city is all-powerful.

Chapter 5 summarizes main themes about the pasts of urban water systems in order to help us imagine better alternatives for the future. Throughout this book, the line between past and present is often blurred. The ruins of Kent and Olive are not so different from those created by the water systems of cities around the world, past and present. Because water is about wealth and power, moving water brings ruination to non-elites, especially those forced to exist on the outskirts of a city. The destruction does not end when the reservoirs and aqueducts are built. It continues as long as water is being extracted. As archaeologist Alfredo González-Ruibal (2006) has said, the past is part of the present, it is not over and certainly not done.