



Watershed Encounters

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Abstract The term *watershed* is derived from the German *wasserscheide*, which means “parting of the waters” and refers to the geographic boundary that separates one drainage basin from another. It is from this definition that we derive the concept of “watershed moments”—events that seem to change the course of history. I suggest that the intersection of temporal and spatial relationships embedded within the watershed concept reveals the interaction between modernist conceptions of space and time, enabling the persistence of trauma and violence that characterizes modernity. In this article, I examine a series of watershed encounters in the Chesapeake Bay region and how they transform our understanding of the environmental problems that face the estuary and its landscape. I argue that the “restoration” effort currently at work in the Chesapeake Bay watershed fails to grapple with the spatial and temporal ruptures that created these problems, and therefore it simply perpetuates the trauma and violence of modernity. However, through the praxis of watershed encounters described in this article, I argue that we can penetrate the spatial and temporal logics of modernity and begin the recuperative work of finding what Deborah Bird Rose refers to as “alternatives to our embeddedness in violence.”

Keywords watersheds, computational modeling, recuperative work, space-time, modernity, Chesapeake Bay

Introduction

In its contemporary usage, the term *watershed* refers to the spatial expanse wherein water tends to converge toward a single confluence—a drainage basin. We all live within a watershed, and the concept has been used in recent years by environmental management and policy makers as a reminder that our actions have far-reaching consequences. The flush of a toilet in Maryland, the erosion of a stream bank in West Virginia, the dumping of pollutants in New York, the application of fertilizer in Pennsylvania—all of these actions flow downstream and have an effect on the quality of water in the Chesapeake Bay, where the streams, rivers, and creeks ultimately converge.

Etymologically, however, the term is derived from the German *wasserscheide*, which means “parting of the waters” and refers to the geographic *boundary* that separates one drainage basin from another. From this definition, now largely unused, we

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derive the concept of “watershed moments”—events or periods wherein history seems to flow in a new direction.¹ In this sense, a watershed is a rupture that marks a beginning and an end. Such ruptures are characteristic of modernist notions of both space and time. Modernist temporality is structured around periods and “epistemological breaks” that define the continual march of progress.² Similarly, modernist spatiality is organized around bounded domains that mark a distinction between different social and ecological relationships.³

I argue that these conceptions of temporality and spatiality are mutually reinforcing—temporal ruptures are maintained through spatial disjunctures and vice versa. Furthermore, these ruptures underlie the violent logics of colonization and ecological exploitation. I propose that, by revealing the continuity of space and time, encounters with watersheds as material components of the landscape enable us to undermine the spatiotemporal ruptures that constitute modernity and begin the recuperative work of confronting the violence that shapes our socioecological landscapes.

The Chesapeake Bay watershed is marked by multiple spatiotemporal watershed ruptures: technocratic attempts to restore the landscape, the colonization of the region by Europeans, and its integration into the United States as a nation-state and into the broader flows of global capitalism. The restoration process is focused on reducing the quantity of nutrients that flow off the landscape as a result of extractive agricultural practices, deforestation, resource depletion, and other forms of ecological violence.⁴ While there has been some success at reducing nutrient pollution loads, I argue that the restoration process is dependent on the very modernist ruptures that brought about the destruction of the Chesapeake Bay and its landscape. As a result, restoration simply adds rupture to ruptures and fails to effectively address the ongoing violence that causes ecological harm.

In the following sections, I explore a series of “watershed encounters”—material features on the landscape that mark the spatiotemporal ruptures of colonization, capitalism, and restoration on the Chesapeake Bay watershed. Furthermore, I examine the ways in which such encounters might contribute to a recuperative process of working through the trauma of modernist ruptures and toward the creation of, as Deborah Bird Rose suggests, “alternatives to our embeddedness in violence” (24).

Encountering the Watershed

Although I live in Binghamton, New York, more than two hundred miles from the Chesapeake Bay, I still live within the bay’s sprawling watershed. The Susquehanna River—

1. Online Etymology Dictionary, s.v. “watershed,” etymonline.com/index.php?term=watershed&allowed_in_frame=0 (accessed October 14, 2016).

2. Latour, *We Have Never Been Modern*.

3. Rose, *Reports from a Wild Country* (hereafter cited in the text); Cronon, “Trouble with Wilderness”; Cronon, *Nature’s Metropolis*.

4. Chesapeake Bay Program, *Chesapeake Bay Total Maximum Daily Load*; Cooper and Brush, “Twenty-Five-Hundred-Year History.”

which drains fifty-one million gallons into the Chesapeake every day—flows two blocks from my house. The water I use to drink, shower, cook, and flush the toilet is part of that flow and contributes in its small way to the ecological problems affecting the estuary. When my basement floods after a heavy rainfall, I know that the erosion from the influx of water will add to the nutrient and sediment loads that cause eutrophication in the Chesapeake Bay.

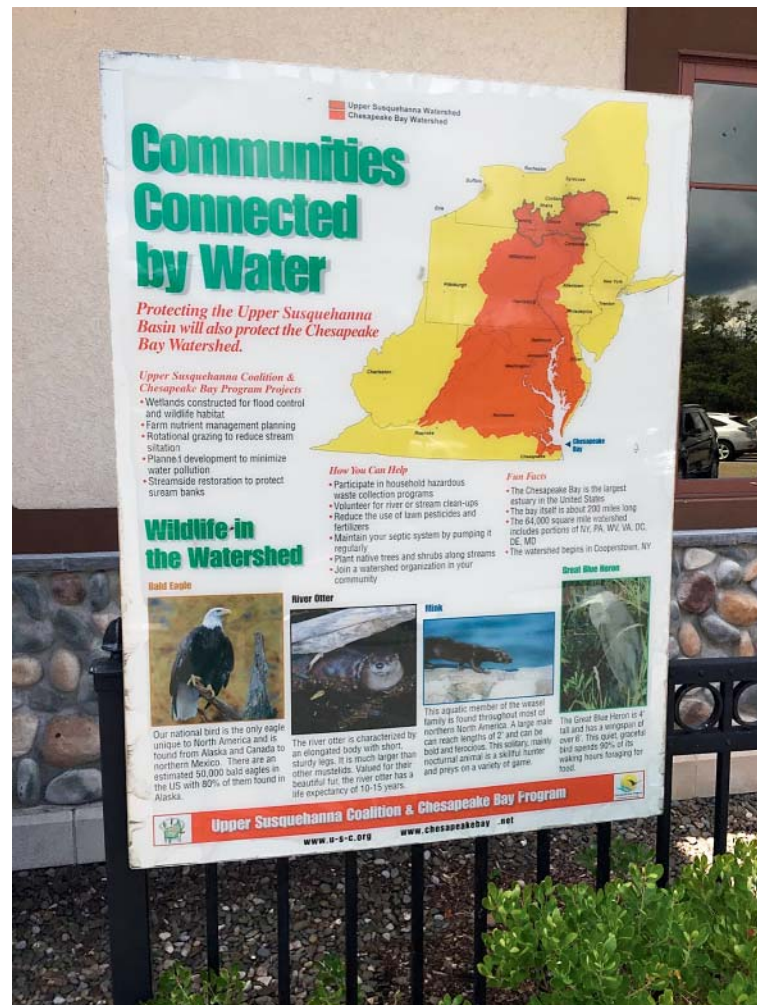
I teach in Cortland, New York, which is a short drive away from the Finger Lakes, but this city too falls just inside the boundary of the Chesapeake Bay watershed. When I drive home from Cortland, I head south on Interstate 81, following the Tioughnioga River. About twenty minutes into the nearly hour-long drive, I sometimes stop at a rest area just past Marathon, New York. The rest area sits on a hill overlooking the river valley—a picturesque pastoral mountain landscape. A farmhouse sits on the side of a hill across the valley, and the light from the setting sun makes the trees and fields glow. It is quite a stunning view and provides a nice respite after a long day of teaching.

If I go inside the building at the rest stop, I pass a sign by the entryway. It is an informational sign with the title “Communities Connected by Water” (fig. 1). This is one of the few reminders in this region that we are in the Chesapeake watershed. Images of wildlife in the watershed line the bottom, and bullet points describe the importance of the Chesapeake Bay, the value of water quality management this far upstream, and ways we all can help reduce nutrient pollution. The largest image, however, in bright, bold red and yellow, takes up about one-quarter of the sign: a map of the watershed familiar to anyone involved with the Chesapeake Bay restoration effort. This watershed image and its peculiar history have led me to think about the ways in which both the landscape and its history are broken up and ruptured and the kinds of violence that these ruptures both mark and conceal.

The watershed map is an image much like the “Earthrise” photo from the Apollo space missions that is often credited with sparking environmental awareness and a global sensibility, with the difference that the watershed map is local rather than global.⁵ The map is used in every part of the Chesapeake Bay cleanup effort and is meant to draw awareness to—as the title of the sign suggests—the connectedness of the communities that make up the watershed. I see this map on posters, flyers, Power-Point slides, and signs and in reports and journal articles, among many other places. Sometimes it is overlaid on a map of the watershed states (Maryland, Virginia, Pennsylvania, Delaware, West Virginia, and New York as well as the District of Columbia) or a map of the terrain, and sometimes it stands alone, but if you are in tune to the Chesapeake Bay, you simply know what it is. Nevertheless, I am struck by its presence hundreds of miles from the estuary, which feels distant in this landscape that has more in common with the dairy farms and wineries of the Finger Lakes than with the crab cakes and oysters of the Chesapeake Bay.

5. Ivakhiv, “Age of the World Motion Picture.”

Figure 1. A sign at a rest stop near Marathon, NY, shows an image of the Chesapeake Watershed. Photograph by the author



I have asked around about this image; it arouses my curiosity because it is ubiquitous but also unexplained and taken for granted. My colleagues at the Chesapeake Bay Program did not know where it came from initially. A few people I asked at the US Geological Survey could not tell me for certain either but assumed that it had been projected from existing topographical information. The earliest example of the image I have found dates to 1946.⁶ But I have never seen any mention of when, how, or by whom the data were first collected or how the map was projected—nor does there seem to be any effort to update it as the landscape changes.

In other words, there has been a collective forgetting of the origins of this image and, more significant, the process of its making. As with the Earthrise image, the watershed map has become a “view from nowhere” typical of much scientific imagery.⁷ Such

6. Beaven, “Effect of Susquehanna River Stream Flow.”

7. Haraway, “Situated Knowledges.”

forgetting is standard in a modernist conception of temporality, which depends on radical breaks or ruptures to define itself as separate from that which came before. Bruno Latour, for example, argues that the periodic temporality of modernity and the process of forgetting associated with periodicity solve the problem of having to explain the provenience for scientific artifacts, allowing them to be naturalized.⁸

At the same time, the watershed map also reveals the ways in which these temporal ruptures are intimately connected with the disjunctures that characterize modernist spatiality. The concept of wilderness, for example, has been shaped by two intersecting cultural narratives—the Romantic notion of the sublime and the American image of the frontier.⁹ These cultural conceptions allow wilderness to be imagined as a “pristine” landscape untouched by human influence, despite the fact that much of what we think of as wilderness today is hotly contested and intimately maintained. Furthermore, this conception of wilderness as a discrete place means that nature is always elsewhere—that we must travel outside our everyday lives in order to experience it.¹⁰ The map defines the Chesapeake Bay watershed as a naturally bounded area, connected by the flow of water—a wilderness that must be restored.

These two modernist taxonomies—spatial and temporal—intersect with and reinforce one another in many ways to reproduce the social boundaries they define. Underlying these intersections is a fundamental disjuncture between space and time. Separating space and time allows spatial ruptures to be temporalized and temporal ruptures to be spatialized in order to maintain the modernist constitution. By relegating spatial ruptures (e.g., wilderness) to the past (e.g., as “Edenic narrative”), Nature is made to seem transcendent—outside the scope of human history—and certain peoples are made to appear “backward” or outside the domain of modernist progress (see Rose).¹¹ Similarly, by delimiting temporal features in space (e.g., museums, landmarks, monuments, etc.), the past is periodized and made to seem transcended.¹² In other words, when we travel within certain landscapes (e.g., wilderness areas), the past seems to envelop us, and the march of history seems to fade away. Similarly, when we travel to certain places (e.g., historical sites, museums, ruins), we seem to have traveled back in history, and in so doing, the stories we tell about our collective past are made concrete.

However, such ruptures have more than epistemological consequences. The social connotations of periodized temporality have been described by Johannes Fabian as a “denial of coevalness.”¹³ Thus indigenous peoples and other marginalized groups are projected into the past as “contemporary ancestors.”¹⁴ This justifies their exclusion

8. Latour, *We Have Never Been Modern*, 68.

9. Cronon, “Trouble with Wilderness”; Cronon, *Nature's Metropolis*.

10. Cronon, “Trouble with Wilderness.”

11. See Rose, *Reports from a Wild Country*; see also Cronon, “Trouble with Wilderness”; and Cronon, *Nature's Metropolis*.

12. Latour, *We Have Never Been Modern*, 69; see also Dawdy, “Clockpunk Anthropology.”

13. Fabian, *Time and the Other*, 31.

14. *Ibid.*, xxiii.

from the progressive temporality of modernity and contributes to the ongoing violence of colonization.¹⁵ Similarly, Rose describes the ways that modernist spatial conceptions mark a disjuncture between those who are part of modernity's progressive march of history and those who are outside it (see Rose).

These modernist temporal and spatial logics are carried forward in the discourse of "ecological restoration." While the theory and practice of restoration has come a long way in recent decades in terms of recognizing the intersection of social and ecological processes and in working with stakeholders to define the value and goals of the restoration process,¹⁶ it nevertheless continues the violence of rupture inherent in the modernist mentality. Although practitioners acknowledge that the idea of restoring an ecological system to its predisturbance state is not feasible, there is still a sense of returning the system to a "natural" condition.¹⁷ In this sense the spatial logic of nature replaces the temporal logic of history. As a result, the restoration process fails to grapple with the violence that has shaped and continues to shape both ecological and social relations.

In place of a "restoration" effort that continues the modernist ruptures, what is needed is a process for coming to terms with the violence that shapes our social and ecological landscape and for mending the ruptures that characterize it. Following Rose, I refer to this as "recuperative work," which "trawl[s] the past and present, searching out the hidden histories and the local possibilities that illuminate alternatives to our embeddedness in violence" (Rose, 24).

The idea of a watershed, with its entanglement of spatial and temporal metaphor, can serve as a conceptual guide for such recuperative work. By taking this entanglement literally rather than figuratively, we can conceptualize watersheds as spatiotemporal ruptures. *In other words, they are material artefacts, features, or sites that are indicative of a temporal regime—a watershed moment or period—as well as of a particular configuration of relationships that shapes the landscape.* Through their displacement in space and time, the ruptures that these watersheds represent are made to appear distant and naturalized despite their ongoing influence on the present relational landscape.

In the following sections, I describe a series of such watersheds that have shaped and continue to shape the landscape of the Chesapeake Bay watershed. These ruptures are both spatial (areas displaced as historic markers, sites, and ruins) and temporal (indicative of specific watershed moments in the historical narrative of the Chesapeake Bay). Only by encountering these watersheds and recognizing the intersections of space and time that they represent can we begin the work of coming to terms with the violence that has shaped the Chesapeake Bay landscape and of finding "alternatives to our embeddedness in violence."

15. Chakrabarty, *Provincializing Europe*.

16. Martin, "Ecological Restoration."

17. Corlett, "Restoration, Reintroduction, and Rewilding."

The Colonized Watershed

About eighty miles northeast from my home in Binghamton, New York, lies Lake Otsego and the town of Cooperstown. Lake Otsego (fig. 2) is the headwater for the Susquehanna River, which winds approximately four hundred miles through the Appalachian mountains, across the piedmont plateau, and through cities and towns in New York and Pennsylvania, skirting the edge of the Philadelphia suburbs; it then cascades over the spillway for the Conowingo Dam and, ultimately, cuts through the middle of the Chesapeake Bay. Lake Otsego is also known colloquially as Glimmerglass—the central landmark for many of the Leatherstockings stories of James Fenimore Cooper, whose father gave his name to Cooperstown.

It was a cold and blustery day when I first visited Cooperstown, on New Year's Eve of 2015. Driving there is like taking a journey into the past, winding along back roads through hills and farms. There is a quaint feeling to the town; when you arrive, it seems as if you have suddenly found yourself in the eighteenth or nineteenth century. Navigating around the lake, the large farm estates interspersed with woodland areas evoke the feel of Cooper's Leatherstockings tales, which offer fictionalized accounts of the early settlement of the area and encounters with its indigenous populations.¹⁸ In his stories, Cooper describes a primordial wilderness landscape where the "last of the Mohicans" roamed and lived harmoniously with their environment until settlers began to arrive. Although the Iroquois and Susquehannocks of the region had already been in contact with Europeans, largely through the fur trade, the settlement of the land for farming was a significant watershed moment in the ecological narrative of the Chesapeake Bay.¹⁹

It was not only in Cooperstown, however, where European settlement had transformed the landscape, and the town is not the only place where this watershed moment is commemorated. Traveling to the southern end of the Chesapeake Bay to what is known as the Historic Triangle—Jamestown, Williamsburg, and Yorktown, Virginia—is also like taking a journey into the past. In fact, the Colonial Parkway that allows visitors to travel to all three sites is explicitly designed to evoke the experience of navigating the past. Much earlier than Cooper's Leatherstockings, John Smith's account of his voyage from Jamestown, Virginia, to explore the Chesapeake Bay draws on wilderness imagery of a landscape untouched by humanity: "Heaven & earth never agreed better to frame a place for man's habitation; were it fully manured and inhabited by industrious people. Here are mountaines, hil[l]s, plaines, valleyes, rivers, and brookes, all running most pleasantly into a faire Bay, compassed but for the mouth, with fruitfull and delightsome land."²⁰

18. MacDougall, "Cooper's Otsego County."

19. Wennersten, *Chesapeake*; Mancall, *Valley of Opportunity*.

20. Smith, *Generall Historie of Virginia*, 44–45.



Figure 2. View of Lake Otsego from Cooperstown, NY. Photograph by the author

Smith goes on to describe large tracts of untamed wilderness and encounters with indigenous peoples who lived off the land, including his infamous relationship with Pocahontas and Chief Powhatan. Smith's quote today often prefaces the story of the decline of the Chesapeake Bay,²¹ and from there the narrative follows a typical modernist periodic motif: with the rupture of colonization, there was a dramatic decline in the ecology of the landscape resulting, ultimately, in the eutrophication of the Chesapeake Bay.²² While it may be true that the decline of water quality in the bay can be traced back to the watershed moment of colonization,²³ the periodicity of the narrative cements the idea of a primordial wilderness outside of the realm of history—a pure and untouched landscape that must now be “restored.” By wrenching both the wilderness landscape and the region's indigenous peoples out of history, the narrative, reinforced by the spatial rupture of the colonial historic sites, justifies, obscures, and validates the ongoing and intersecting processes of ecocide and genocide that coincide with colonization (see Rose). The decline of the landscape and water quality in the Chesapeake Bay

21. “Captain John Smith,” Discover the Chesapeake, History, Chesapeake Bay Program, www.chesapeakebay.net/discover/history/captain_john_smith (accessed December 20, 2017).

22. Wennersten, *Chesapeake*.

23. Cooper and Brush, “Twenty-Five-Hundred-Year History.”

along with the decimation of the region's indigenous population is portrayed as the inevitable, though regrettable, result of European-style progress. Because indigenous communities are relegated to the past both temporally and spatially, these processes are not recognized to be ongoing—the landscape continues to be destroyed and the indigenous peoples of the area continue to struggle for tribal recognition and decolonization.²⁴

The presence of these sites and their temporalization reproduces the violence of colonization on the present landscape. But colonization is not the only rupture that must be confronted in recuperative work on the Chesapeake Bay. The region has also been subject to extensive exploitation as a result of capitalist interests in the resources that can be found in the area. This era of exploitation and economic growth has left scars that mark the ruptures of global capitalism.

The Capitalist Watershed

If you walk down the hill a couple of blocks from my house in Binghamton, you will find yourself next to the Susquehanna River, where you will see a narrow park that runs along the river's bank. On the way to the Washington Street walking bridge about a half a mile downstream, you will encounter several monuments and memorials. Crossing the bridge, you will come to Confluence Park, where the Chenango River merges with the Susquehanna River before continuing on toward the Chesapeake Bay. To the side of the bridge, you might notice a historical marker somewhat hidden among the trees (fig. 3). When I first read this marker I was taken aback, and my entire understanding of the Chesapeake Bay watershed was transformed: under "Chenango Canal" it read, "The southern end of the 97-mile canal (1837–78) was at the river confluence. It moved PA coal, local lumber, and goods to the Erie Canal."

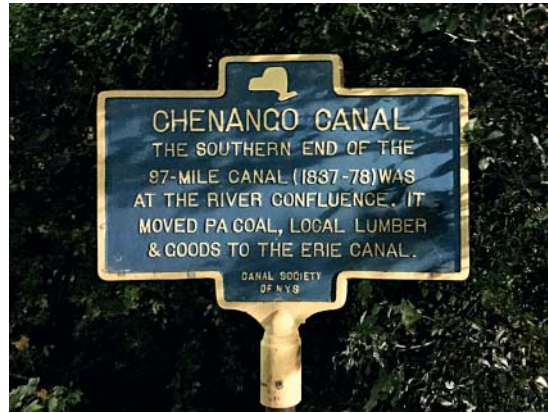
This encounter sparked in me a sudden interest in the history of the canal system in the United States and its environmental impacts. I had never known about the Chenango Canal, and assembling the disparate geographic histories led me to a startling fact: between 1834 and 1878 the Chenango Canal connected the Susquehanna River to the Erie Canal in Utica. The Erie Canal to this day connects the Hudson River to Lake Erie.²⁵ As a result, before the Chenango Canal was closed off in the late nineteenth century, *three watersheds* were connected by the canals—the Chesapeake Bay, the Hudson River, and the Great Lakes Basin. This means that the watershed I have become so familiar with throughout my research has not always been the watershed I imagined. While the canals were in operation, they permeated the boundaries of the watersheds and allowed water and other materials to flow between them.

The Chenango Canal was not the only canal that cut across the watershed to connect the nation's waterways. Another ran through the Great Dismal Swamp, connecting

24. Libit, "Piscataway Conoy."

25. Bernstein, *Wedding of the Waters*.

Figure 3. Chenango Canal historical marker at Confluence Park in Binghamton, NY. Photograph by the author



the Chesapeake region to the North Carolina coast. When I lived in the DC area, I spent many of my days off walking along the Chesapeake and Ohio (C&O) Canal—an immense project that would have connected the Potomac River to the Ohio River in Western Pennsylvania. It was never completed, but if it had been it would have connected more than half of the North American waterways into a sprawling aqueous superhighway.²⁶

Harnessing the power of water has been an important component of both nation building and capitalist expansion since the early years of the industrial revolution.²⁷ Canals opened the flow of water between watersheds and also provided a regularized flow along the rivers not as susceptible to the vagaries of precipitation. This made transportation between regions easier and so enabled trade and migration. In fact, the US canal system was specifically envisioned as a way to bring together the nascent nation still divided along colony/state boundaries—a *watershed nation*.²⁸ In the early nineteenth century, the Whig Party emerged, promoting a strong federal government in opposition to the Jacksonian approach focused on the self-sufficiency of the states. The Whigs raised the idea that a strong federal government could unify the nation by helping to develop infrastructure throughout the United States. The canals were one of the projects endorsed by the Whig Party that, it was hoped, would generate a stronger national identity.²⁹ In that regard, it is telling that the construction of the canals coincided with the United States' first push westward and the intensification of attacks on the region's indigenous populations.³⁰

The canals integrated the recently united colonies into a national watershed but also further incorporated the nation into a broader watershed of which it was already becoming a part—the emerging watershed of global capitalism. The colonization of the Americas had opened channels across the ocean for the flow of goods, resources, and

26. Ibid.

27. Malm, *Fossil Capital*; Barca, *Enclosing Water*.

28. Ibid.

29. Ibid.

30. Mancall, *Valley of Opportunity*.

people. The flow of the bodies and labor of enslaved Africans and their descendants, the flow of the rivers, and the flow of nutrients in the soil combined to link the Chesapeake to the global capitalist watershed through the outward flow of products such as tobacco and furs.³¹ These connections already existed when the canals were built, but the constructed waterways helped to consolidate the national watershed and extend the flows farther into the North American landscape.

It was also during the canal-building period that Karl Marx observed what he described as an “irreparable rift” in the “metabolic” relationship between humans and nature.³² Drawing on the soil chemistry research of Justus von Liebig (1803–73), Marx argued that the flow of agricultural products from farms to cities in order to feed growing industrial labor populations had an unsustainable effect on water and soil quality. As a result of this soil depletion, farmers turned to external sources of soil nutrients in the form of guano obtained from islands off the coast of South America, in a process Marx described as “guano imperialism.”³³

This same process was at work in the Chesapeake region, where soil depletion resulting from tobacco and plantation agriculture forced farmers to apply guano in order to maintain productivity.³⁴ However, guano was only part of the story. The fur trade decimated the beaver population, and the beaver dams, which had held back the flow of water and created vast wetland ecosystems that helped to remove pollution before it flowed into the rivers and streams, fell into disrepair. Deforestation for lumber and to clear land for agriculture increased erosion and exacerbated soil depletion. And finally, the overharvest of oysters to supply markets throughout the nation and in Europe in the late nineteenth century depleted the one resource that the estuary had for maintaining its water quality, since oysters are highly effective at removing nutrients and sediment from water.³⁵

Combined, these various rifts resulted in the eutrophication of the Chesapeake Bay ecosystem. *Eutrophication* literally means “well nourished.” However, nutrients such as nitrogen and phosphorous feed algae, which grow in massive blooms and prevent light from penetrating the surface of the water. This causes sea grasses to die, which reduces dissolved oxygen in the water and creates dead zones. Fish, crabs, and other macro-organisms that pass through these dead zones suffocate because of the lack of oxygen. Ultimately, the ecosystem is transformed from one that favors macro-organisms into one that is dominated by micro-organisms, including potentially toxic blue-green algae.³⁶

31. *Ibid.*; Wennersten, *Chesapeake*.

32. Quoted in Foster, *Marx's Ecology*, 141.

33. *Ibid.*

34. National Museum of American History, “The Norie Atlas,” Smithsonian Institution, americanhistory.si.edu/norie-atlas; Wennersten, *Chesapeake*.

35. Wennersten, *Chesapeake*; Keiner, *Oyster Question*.

36. Cooper and Brush, “Twenty-Five-Hundred-Year History.”

Eutrophication is a symptom of “metabolic rift,” and the process has only accelerated in the nineteenth and twentieth centuries. The canals were largely abandoned in the late nineteenth century as railroads, highways, and airplanes took over the task of connecting the nation’s flow of resources both internally and abroad.³⁷ Similarly, synthetic fertilizers replaced guano, but the proliferation of industrial agriculture in the twentieth century—to feed a globalized market—led to a dramatic increase in nutrients on the landscape.³⁸ Finally, exponential growth in the population and infrastructure resulted in more impervious surfaces like roads and buildings that allow water to flow more directly, increasing erosion and nutrient runoff and preventing natural systems such as wetlands from cleaning the water before it enters rivers and streams.³⁹

Now the canals lie in ruins or have been appropriated as recreational spaces, as in the case of the C&O Canal. They are displaced spatially as relics of a prior temporal period but are indicative of the spatial rupture of global capitalism that produces the metabolic rift as well as the temporal disjuncture that projects capitalist accumulation into the past. As a result, the national and the global flows of capitalism have become naturalized—part of the seemingly inevitable and the ongoing progress that integrates the Chesapeake landscape into the global and national watersheds. The temporal and spatial ruptures that have created the metabolic rift are left unchallenged and unquestioned. Instead, they are compounded through the creation of an additional rupture in the effort to restore the landscape to its natural condition.

The Watershed Restoration

When you drive across the Chesapeake Bay Bridge from Annapolis and south along the shore of Kent Island, you will see signs for the Matapeake Clubhouse. If you take the road to the clubhouse, you will pass through a large, oddly shaped field. If you do not know the history of the site, you might not think twice about it, but this field used to be the location of a massive hydraulic model of the Chesapeake Bay (fig.4). If you walk around the field and through the brush that covers it, you can see the model’s remains: chunks of concrete, strips of metal and wire, a handful of water meters, an overgrown road that ran around the circumference of the model’s warehouse, a pile of broken pipes, and the water tower off to one side. On my most recent visit to the site, a construction crew was erecting the frame for a new building meant to house retail stores or other businesses.

The model—or what remains of it—is the ghost of a different era of Chesapeake Bay management and indicative of the watershed moment of the restoration effort itself. It was commissioned by Congress in 1965, and construction began under the US Army Corps of Engineers (USACE), though it took more than a decade to complete and

37. Bernstein, *Wedding of the Waters*.

38. Wennersten, *Chesapeake*; Ernst, *Chesapeake Bay Blues*.

39. Ernst, *Chesapeake Bay Blues*.



Figure 4. Former site of the Chesapeake Bay Model. An original water meter is in the foreground, and the original water tower can be seen in the distance. Photograph by the author

cost upward of \$25 million.⁴⁰ The result was a fourteen-acre structure housing the eight-acre scale model of the estuary and its tidal tributaries, complete with running water and figures of prominent sites such as the US Congressional Building (fig. 5).⁴¹ However, by the time it was constructed, the model was already obsolete. It was brought up to full flow only a handful of times for testing (and then once more to successfully locate the missing body of a passenger on an airline that had crashed in the Potomac River near Washington, DC).⁴² After that, its doors were closed and the funding was cut back; the model was left to decay for the next twenty years. Ultimately, the entire structure was demolished in 2015, after the roof caved in during a large snowstorm. The site was cleared and regraded; all that remains of this impressive piece of engineering is the field described above.

40. CLUI, "Chesapeake Bay Hydraulic Model."

41. *Ibid.*

42. *Ibid.*



Figure 5. The sprawling Chesapeake Bay Hydraulic Model, housed in a warehouse that covered fourteen acres, became obsolete as soon as construction was finished. Photo courtesy of the US Army Corps of Engineers

While the model was being constructed, the Chesapeake Bay was going through a watershed era that would radically transform the practice of environmental management in the United States, rendering the model obsolete. In fact, the 1970s could be said to be *the* watershed era for the Chesapeake region, since what emerged from it was the first watershed-scale environmental management program ever implemented in the United States. Two major developments made this emergence possible: first, enactment of the Clean Water Act (CWA) in 1972 shortly after establishment of the Environmental Protection Agency (EPA) in 1970, which granted federal authority over the management of interstate water quality;⁴³ and, second, the development of computational modeling that allows a management organization to monitor and track water quality in complex hydrodynamic systems.⁴⁴ Together, these factors made watershed-scale management possible in a new way, and they made the hydraulic model obsolete.

43. Malone et al., "Nutrient Loadings to Surface Waters."

44. Keiner, "Modeling Neptune's Garden."

Prior to the 1970s, there had been a great deal of concern about the quality of water in the Chesapeake Bay and how it was affecting fish and oyster populations. However, the management of water quality was a power delegated to the states; the only federal agency that could manage water across state boundaries was the USACE, which was tasked with clearing waterways for shipping and military uses.⁴⁵ Because the estuary itself borders two states, and the watershed covers four more and the District of Columbia, cleaning the Chesapeake Bay required collaboration across state boundaries. There was an attempt to form such a collaboration in 1936 when a conference was assembled and the participants—Maryland, Virginia, Delaware, the District of Columbia, and the federal government—agreed to form an interstate commission to address the Chesapeake Bay’s environmental problems. But the commission never materialized. There was simply no incentive for the states to collaborate to clean up the bay.⁴⁶

The 1965 study of the Chesapeake Bay environmental issues commissioned by Congress and led by the USACE, which funded the construction of the hydraulic model, was a renewed attempt to confront the problem. The federal government still lacked the authority to manage water quality across state boundaries, but that changed in the late 1960s and early 1970s. The passage of the CWA in 1972 was a significant development for water quality management in the United States. For the first time, the federal government, under the EPA, was given the authority and responsibility to regulate water quality. This effectively broke through the state boundaries and made it possible to build a watershed-scale partnership among the various jurisdictions responsible for cleaning up the Chesapeake Bay.⁴⁷

However, managing an estuary and watershed as large as the Chesapeake Bay is a difficult task. The watershed covers roughly sixty-four thousand square miles and is home to more than seventeen million people, all of whom contribute to the water quality issues in the region.⁴⁸ Identifying the problems and tracking the sources of pollution in this large, complex system would have been an impossible task if not for another important development that emerged in the 1970s—the computational revolution.

Since the 1930s, the USACE had been constructing massive physical models of hydraulic systems, including the Mississippi drainage basin and the San Francisco Bay.⁴⁹ The Chesapeake Bay Hydraulic Model, the last of these to be constructed, was, as I have mentioned, poorly timed. While computers had been around for decades before the 1970s, and in fact a hydraulic simulation program had been created as early as the

45. While the US Forest Service had some authority to manage landscapes for water quality, it was limited to federally controlled lands. See Carse, *Beyond the Big Ditch*.

46. Ernst, *Chesapeake Bay Blues*.

47. *Ibid.*; Malone et al., “Nutrient Loadings to Surface Waters.”

48. “The Chesapeake Bay Watershed,” Chesapeake Bay Program, www.epa.gov/sites/production/files/widgets/find-your-watershed.html (accessed February 18, 2017).

49. Kailith, “America’s Last Top Model.”

1960s,⁵⁰ computer modeling was considered too costly and unreliable for environmental management.⁵¹ But in the 1970s computers became more accessible, and hydraulic simulation software was refined to the point of being less expensive and more reliable than the physical models. This enabled environmental managers to identify and track the sources of pollution across a large landscape in a way that was not possible with physical models.⁵²

With the legal authority to manage interstate water quality and the computational tools to track pollution throughout the landscape, the stage was set for a new regime of environmental management for the Chesapeake Bay. However, a catalyst was needed to bring all of these factors together. I have described the 1970s as a watershed era for the region, but the Chesapeake Bay had a watershed moment as well. On June 22, 1972, tropical storm Agnes—formerly a category-one hurricane—made landfall near New York City and plowed its way toward the Finger Lakes. Its slow movement and relatively high rainfall caused some of the most destructive flooding the watershed had seen in recent history. The city of Wilkes-Barre, Pennsylvania, was submerged, and, further downstream, the Conowingo Dam was within a few feet of overflowing.⁵³ The dam was so inundated that, for only the second time since its construction in 1928, the floodgates were fully opened. Explosive charges were placed to demolish sections of the dam in order to avoid catastrophic failure but ultimately were not detonated. The storm caused 128 deaths and more than \$2 billion in damage to a region that was already suffering from the decline of industry and an emerging recession. As a result of the significant impact, the storm name Agnes was retired from use.⁵⁴

Agnes had one positive outcome, however. The massive flow of water from the landscape, which brought with it an enormous amount of sediment, caused researchers and managers to turn their attention to the drainage basin.⁵⁵ Prior to the storm, the focus had always been on the estuary itself. In fact, the hydraulic model covered only the estuary and the tidal portion of the landscape—the area below the “fall line.” Researchers at the time thought that the water quality of the estuary was influenced more by tidal flows from the ocean and the impacts of dumping on the portions of the tributaries that were closest to the bay. Agnes made it apparent that the entire watershed had an effect on the estuary and that management would have to encompass the full drainage area.⁵⁶ A new study was commissioned on the effects of Agnes, which led

50. Crawford and Burges, “History of the Stanford Watershed Model.”

51. Keiner, “Modeling Neptune’s Garden.”

52. Ibid.

53. Chesapeake Research Consortium, “Effects of Tropical Storm Agnes.”

54. Horton, “Retrospective.”

55. An archaeologist friend of mine who has excavated sites throughout the watershed told me that his first encounter with Agnes came when an older archaeologist pointed to a thick stratigraphic lens of sand and silt and proclaimed, “That’s Agnes!” Michael Roller, conversation with the author, March 3, 2016.

56. Malone et al., “Nutrient Loadings to Surface Waters.”

to a subsequent study of water quality in the Chesapeake Bay. This time the EPA led the project rather than the USACE. From this study emerged two important things: a computational model of the Chesapeake Bay watershed, known today as the Chesapeake Bay Modeling System (CBMS), and a watershed-scale management organization led by the EPA in partnership with the watershed states, known as the Chesapeake Bay Program. As a result, the hydraulic model was displaced as a relic of an old institutional regime, an obsolete technology, and an outdated scientific understanding of the estuary.⁵⁷

The hydraulic model—or what remains of it—is a reminder of both the institutional and the technological changes that took place during this watershed era. Displaced spatially through its demolition, it represents the rupture of the restoration process itself. The past that the model represents has been buried, and we are now thought to be in the more enlightened era of scientific management of the Chesapeake Bay and its watershed. But a question remains: can the ruptures that caused the Chesapeake Bay's environmental problems in the first place—the spatial and temporal ruptures that continue to persist on the landscape—be mended by adding another rupture to the mix?

Restoration, Recuperation, and Watershed Encounter

By adding rupture to ruptures, the Chesapeake Bay restoration effort carries on the modernist spatial and temporal watersheds rather than effectively confronting them. These ruptures are not simply historical events or places in which violence has occurred; they are ongoing practices of denial that result in what Rose (7) refers to as the “doubling” of violence. The ongoing process of maintaining these spatial and temporal ruptures is continually reenacted in the present, resulting in an ongoing violence against both the natural world and the people who do not fit within the modernist constitution. In other words, the trauma of the past is replicated and carried forward in the present through a refusal to engage with the violence and trauma that shape the landscape. As a result, I would argue that addressing the ecological problems facing the Chesapeake Bay requires more than a simple practice of restoration, and the watershed encounters described above suggest a potential alternative praxis that might help to start the process of confronting modernist violence.

Conceptually, restoration reflects the modernist conception of Nature as wilderness—outside time and therefore always present despite human intervention. All that is required in this conception is a continuation of modernist progress toward a sustainable future in which human impacts on nature are reduced so that nature can return to its undisturbed state. In terms of practice, restoration involves implementing “best management practices” that marginally reduce the effects of human activities on the landscape. In the case of the Chesapeake Bay, this means reducing the quantity of

57. Keiner, “Modeling Neptune’s Garden.”

nutrients that flow off the landscape by doing things like implementing no-till agriculture, erecting fences to keep livestock away from streams, planting trees along rivers and streams, and rebuilding wetland areas to slow the flow of water. While these are all beneficial practices, they do little to confront the broader forces that shape the watershed.

Furthermore, restoration fails to acknowledge the interdependence of ecological and social ruptures. The destruction of the landscape is bound up with the processes of colonization, enslavement, and exploitation. We cannot confront the violence of ecological harm without also grappling with the ongoing marginalization of indigenous peoples and people of color as well as the growing socioeconomic inequalities that force us into extractive economic relationships with the landscape.

The way that the Chesapeake Bay restoration process has been undertaken is characteristically modern, as reflected in the technocratic approach that has been implemented over the last thirty-three years. The CBMS is often described as an “accounting tool”—it tracks the implementation of best management practices and quantifies their effects on the estuary. Coupled with the 2010 implementation of a total maximum daily load—a management strategy under the Clean Water Act that sets a definite limit on the amount of nutrients that can be introduced to the estuary—the process has become simply a balancing of the books with respect to nutrient inputs and outputs.⁵⁸ This might effectively reduce nutrient inputs to a net-zero, and we might see some improvement in water quality, but the ruptures remain and the violence continues.

In this form, restoration does not require us to rethink our relationship to the watershed or the estuary nor does it challenge the social conditions that give rise to ecological destruction. What is needed, in place of modernist restoration, is what Rose refers to as “recuperative work.” This process eschews the transcendent narratives of modernity, which seek salvation in either a return to the past or the forward progression toward a utopian future.⁵⁹ Instead, it requires a praxis of attention and a recognition of the ways that the past is present on the landscape and of the ongoing disciplinary practices through which we structure our human and nonhuman relationships.⁶⁰

Instead of seeking to “restore” the Natural state of the Chesapeake watershed, recuperation demands a praxis of healing in which we collectively confront the ruptures and work through the traumas and violence that they represent (see Rose). However, this recuperative work is impeded by the rupture of space-time itself. If ruptures are obscured behind the veil of historicism and their isolation in space, we cannot confront and work through them, and instead we are doomed to add ruptures to ruptures, perpetuating and expanding the violence of modernist spatiality and temporality. In order for recuperative work to take place, we need a praxis of encountering the space-

58. Chesapeake Bay Program, *Chesapeake Bay Total Maximum Daily Load*.

59. Fowles, “People without Things.”

60. Tsing, *Mushroom at the End of the World*.

time rupture that makes possible both the spatial and the temporal ruptures that define our landscape. I suggest that the watershed concept I have outlined here provides a starting point for such praxis.

The watershed examples I have described in this article demonstrate the ways that spatial displacement and temporal periodization work together to cement a narrative of inevitable progress that naturalizes the violent relational landscapes in which we are embedded. Through a praxis of encountering these watersheds on the landscape, we can begin to dissolve the space-time dichotomy and recognize the immanence of the past in the present. As a result, we will begin to see that the ruptures of colonization, nationalism, and global capitalism are not relics of a transcended past that can be easily displaced. Instead they are ongoing processes and practices that continue to shape our landscape despite, and in some sense *because of*, the efforts of ecological restoration. Restoration allows these processes to continue while offering the illusion of a clean break from the violence of the past. Watershed encounters break through the illusion to remind us that although the era of colonization has passed, the canals have been filled in, and we now have a better understanding of environmental destruction, these processes continue to shape the landscape. Indigenous populations still struggle for recognition and sovereignty; global capitalism still compels us to extract resources and generate pollution on the landscape to contribute to the global flow of commodities.

Watershed encounters, in other words, reveal the continuity of violence and the need to work through trauma rather than relegating it to a transcended past through additional rupture. Although not in itself a solution to the violence, this recognition is the beginning of the recuperative process—a necessary first step without which no healing can take place. After such encounters comes the difficult process of working through the ruptures that they reveal in order to reconfigure the relationships that constitute them. In the Chesapeake Bay region, this may entail some of the same specific practices involved in the restoration effort, but it cannot end with those. In addition, grappling with these ruptures will include working with indigenous and other marginalized peoples to decolonize the landscape, provide reparations to descendants of enslaved people, and address socioeconomic, racial, and gender inequalities that bind people to extractive economics. It is not my place to identify their role in those processes or the potential outcomes, but watershed encounters and recuperative work will foster attentiveness to the roles that those peoples determine for themselves and help us begin to recognize the contours of what must be done.⁶¹

The encounters described in this article are only a few of the watersheds that have shaped the Chesapeake Bay and its landscape, and it is possible to recognize the same ruptures represented in other landscape features. However, my goal has not been to provide an exhaustive account of the history of the Chesapeake Bay or its ruptures but rather to explore how the concept of watersheds can help us to see through the

61. Tuck and Yang, "Decolonization Is Not a Metaphor."

ideologies of modernism. Nor has my goal been to provide a precise definition of the concept of watersheds other than the entanglement of spatiality and temporality. What is important for me is not the particular dimensions of a watershed but the experience of the encounter itself. These encounters break through the temporal and spatial ideologies of modernity and enable us to recognize the ways that temporality and spatiality are intertwined and mutually reinforce one another within the modernist framework. With such recognition, we can begin the process of recuperation—confronting and working through the ruptures of modernity and finding a way out of our “embeddedness in violence.”

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References

- Barca, Stefania. *Enclosing Water: Nature and Political Economy in a Mediterranean Valley, 1796–1916*. Cambridge: White Horse, 2010.
- Beaven, G. Francis. “Effect of Susquehanna River Stream Flow on Chesapeake Bay Salinities and History of Past Oyster Mortalities on Upper Bay Bars.” Solomons Island, MD: Chesapeake Biological Laboratory, 1946.
- Bernstein, Peter L. *Wedding of the Waters: The Erie Canal and the Making of a Great Nation*. New York: Norton, 2010.
- Carse, Ashley. *Beyond the Big Ditch: Politics, Ecology, and Infrastructure at the Panama Canal*. Cambridge, MA: MIT Press, 2014.
- Center for Land Use Interpretation (CLUI). “The Chesapeake Bay Hydraulic Model: A Miniaturization of the Largest Estuary in the United States.” Culver City, CA: CLUI, 1998.
- Chakrabarty, Dipesh. *Provincializing Europe: Postcolonial Thought and Historical Difference*. Princeton, NJ: Princeton University Press, 2009.
- Chesapeake Bay Program. *Chesapeake Bay Total Maximum Daily Load for Nitrogen, Phosphorus, and Sediment*. Annapolis, MD: Chesapeake Bay Program, 2010.
- Chesapeake Research Consortium. “The Effects of Tropical Storm Agnes on the Chesapeake Bay Estuarine System.” Baltimore: Johns Hopkins University Press, 1976.
- Cooper, S. R., and G. S. Brush. “A Twenty-Five-Hundred-Year History of Anoxia and Eutrophication in Chesapeake Bay.” *Estuaries and Coasts* 16, no. 3 (1993): 617–26.
- Corlett, Richard T. “Restoration, Reintroduction, and Rewilding in a Changing World.” *Trends in Ecology and Evolution* 31, no. 6 (2016): 453–62.
- Crawford, Norman H., and Stephen J. Burges. “History of the Stanford Watershed Model.” *Water Resources Impact* 6, no. 2 (2004): 3–5.
- Cronon, William. *Nature’s Metropolis: Chicago and the Great West*. New York: Norton, 2009.

- . “The Trouble with Wilderness; or, Getting Back to the Wrong Nature.” In *Uncommon Ground: Rethinking the Human Place in Nature*. New York: Norton, 1996.
- Dawdy, Shannon Lee. “Clockpunk Anthropology and the Ruins of Modernity.” *Current Anthropology* 51, no. 6 (2010): 761–93.
- Ernst, Howard R. *Chesapeake Bay Blues: Science, Politics, and the Struggle to Save the Bay*. Lanham, MD: Rowman and Littlefield, 2003.
- Fabian, Johannes. *Time and the Other: How Anthropology Makes Its Object*. New York: Columbia University Press, 2014.
- Foster, John Bellamy. *Marx’s Ecology: Materialism and Nature*. New York: New York University Press, 2000.
- Fowles, Severin. “People without Things.” In *An Anthropology of Absence: Materializations of Transcendence and Loss*, edited by Mikkel Bille, Frida Hastrup, and Tim Flohr Soerensen, 23–44. Berlin: Springer, 2010.
- Haraway, D. “Situated Knowledges: The Science Question in Feminism and the Privilege of Partial Perspective.” *Feminist Studies* 14, no. 3 (1988): 575–99.
- Horton, Tom. “Retrospective: The Damage Caused by Hurricane Agnes.” *Washingtonian*, June 19, 2012. www.washingtonian.com/2012/06/19/deluge/.
- Ivakhiv, Adrian. “The Age of the World Motion Picture: Cosmic Visions in the Post-Earthrise Era.” In *The Changing World Religion Map: Sacred Places, Identities, Practices, and Politics*, edited by Stanley D. Brunn, 129–44. Dordrecht, Netherlands: Springer, 2015.
- Kailith, Ryan. “America’s Last Top Model.” *Ninety-Nine % Invisible*, July 19, 2016. 99percentinvisible.org/episode/americas-last-top-model/.
- Keiner, Christine. “Modeling Neptune’s Garden: The Chesapeake Bay Hydraulic Model, 1965–1984.” In *The Machine in Neptune’s Garden: Historical Perspectives on Technology and the Marine Environment*, edited by Helen M. Rozwadowski and David K. Van Keuren, 273–314. Sagamore Beach, MA: Science History, 2004.
- . *The Oyster Question: Scientists, Watermen, and the Maryland Chesapeake Bay since 1880*. Athens: University of Georgia Press, 2009.
- Latour, Bruno. *We Have Never Been Modern*. Cambridge, MA: Harvard University Press, 1993.
- Libit, Howard. “Piscataway Conoy Continues Tribal-Status Effort.” *Baltimore Sun*, March 4, 2004. www.baltimoresun.com/news/maryland/bal-md.indiano4maro4-story.html.
- MacDougall, Hugh Cook. “Cooper’s Otsego County: A Bicentennial Guide of Sites in Otsego County Associated with the Life and Fiction of James Fenimore Cooper, 1789–1851.” Cooperstown: New York State Historical Association, 1989. external.oneonta.edu/cooper/cooperstownbooks/otsegocounty.html.
- Malm, Andreas. *Fossil Capital: The Rise of Steam Power and the Roots of Global Warming*. London: Verso, 2016.
- Malone, Thomas C., W. R. Boynton, Tom Horton, and Court Stevenson. “Nutrient Loadings to Surface Waters: Chesapeake Bay Case Study.” In *Keeping Pace with Science and Engineering: Case Studies in Environmental Regulation*, edited by Myron F. Uman. Washington, DC: National Academies, 1993. public.eblib.com/choice/publicfullrecord.aspx?p=3377131.
- Mancall, Peter C. *Valley of Opportunity: Economic Culture along the Upper Susquehanna, 1700–1800*. Ithaca, NY: Cornell University Press, 1991.
- Martin, David M. “Ecological Restoration Should Be Redefined for the Twenty-First Century.” *Restoration Ecology* 25, no. 5 (2017): 668–73.
- Rose, Deborah Bird. *Reports from a Wild Country: Ethics for Decolonisation*. Sydney: University of New South Wales Press, 2004.
- Smith, John. *The Generall Historie of Virginia, New-England, and the Summer Isles*. Bedford, MA: Applewood Books, [2006] 1902.
- Tsing, Anna Lowenhaupt. *The Mushroom at the End of the World: On the Possibility of Life in Capitalist Ruins*. Princeton, NJ: Princeton University Press, 2015.

- . *In the Realm of the Diamond Queen: Marginality in an Out-of-the-Way Place*. Princeton, NJ: Princeton University Press, 1993.
- Tuck, Eve, and K. Wayne Yang. "Decolonization Is Not a Metaphor." *Decolonization* 1, no. 1 (2012). decolonization.org/index.php/des/article/download/18630.
- Wennersten, John R. *The Chesapeake: An Environmental Biography*. Baltimore: Maryland Historical Society, 2000.