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Using the Environmental History of the Commonwealth to Enhance Pennsylvania and U. S. History Courses

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USING THE ENVIRONMENTAL HISTORY
OF THE COMMONWEALTH TO ENHANCE
PENNSYLVANIA AND U.S. HISTORY
COURSES

Charles Hardy III

*W*hy teach Pennsylvania environmental history? How can teachers use it to improve students' understanding of the history of the state, the region, and the nation? I have found through my teaching at West Chester University that environmental history grounds American history in the physical realities upon which human history unfolds: the natural resource bases, both renewable and nonrenewable, that all societies use to construct their economies, cultures, and political systems.¹ Recognizing this grounding, students can better understand the complex world in which they live, and thus better respond to the challenges they will face as citizens and consumers.

Nature's Gifts

When I teach the history of Pennsylvania, I start with its physical structures—its geology, climate, and hydrology—then move to its flora and fauna.² These are the same elements that fascinated

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early European explorers and colonists. Indeed, in 1683 William Penn began his letter to the Free Society of Traders by describing his colony's "soil, air, water, seasons, and produce, both natural and artificial." In his 1685 letter on the "Good Order Established in Pennsylvania and New Jersey," Thomas Budd wrote about the plants and livestock—both native and European—that grew well in Pennsylvania, and the natural markets for its abundance of "flour, bisket, and pork" in the Caribbean. Noting how if "we sprinkle but a little English hay seed on the land without plowing, and then feed sheep on it, in a little time it will increase that it will cover the land with English grass, like unto our pastures in England," Budd also provides a wonderful window into the history of the Columbian Exchange. So, too, does America's first great botanist and plant exporter, John Bartram, who in the 1700s sent more American species to Old World gardeners than any other person.³

Blessed with a temperate climate and rich soils, the colony of Pennsylvania grew rich on its farms. Students can engage in historical detective work by analyzing images of the Pennsylvania colonial coat of arms (which replaced helmet, shield, and dragon with plow, sheaf, and ship), the colonial grain mills that still dot the Commonwealth's landscape, its rich farmsteads, and the iconic Pennsylvania bank barn to understand what made Pennsylvania the breadbasket and meat provisioner of North America.



FIGURE 1: Pennsylvania Coat of Arms. After declaring independence the state of Pennsylvania placed a plow and a merchant ship on paper money (1777) and then in its coat of arms (1778) to symbolize the two principal sources of the Commonwealth's wealth: agriculture and commerce.



FIGURE 2: Edward Hicks, “An Indian summer view of the Farm and Stock OF JAMES C CORNELL of Northampton Bucks county Pennsylvania,” 1846. In this painting, Hicks beautifully captured the richness of Pennsylvania’s farm economy in the early 1800s. Behind the prize-winning livestock—their place in the foreground indicating their importance—one can see the large stone farmhouse, massive barn, full corncribs, and an orchard and wood lots in the background. Courtesy National Gallery of Art, Washington.



FIGURE 3: Farmer and wife in front of their barn, somewhere in Pennsylvania, circa 1890. The Commonwealth’s most distinctive architectural form, the Pennsylvania barn served many functions. Large barns, like the one pictured here, speak to the great productivity of farms across the state. Courtesy of The Library Company of Philadelphia.

Paintings, photographs, and other visual sources also enable students to learn about how Americans viewed and made sense of the natural world. Nowhere, for example, is the Quaker philosophy of the peaceful coexistence of man and nature more eloquently expressed than in the celebrated but poorly understood “Peaceable Kingdom” paintings of Edward Hicks. Teachers who might be familiar with the landscape painters of the Hudson River School (see Stephen Cutcliffe’s essay in this issue) can also explore Americans’ changing attitudes toward the natural world by investigating Pennsylvania landscape painters from the Susquehanna River Valley School of the mid-1800s, the New Hope and Pittsburgh schools of the early 1900s, and the Brandywine School painters of the mid- and late twentieth century. Rich primary sources such as these offer valuable lessons in visual literacy.⁴

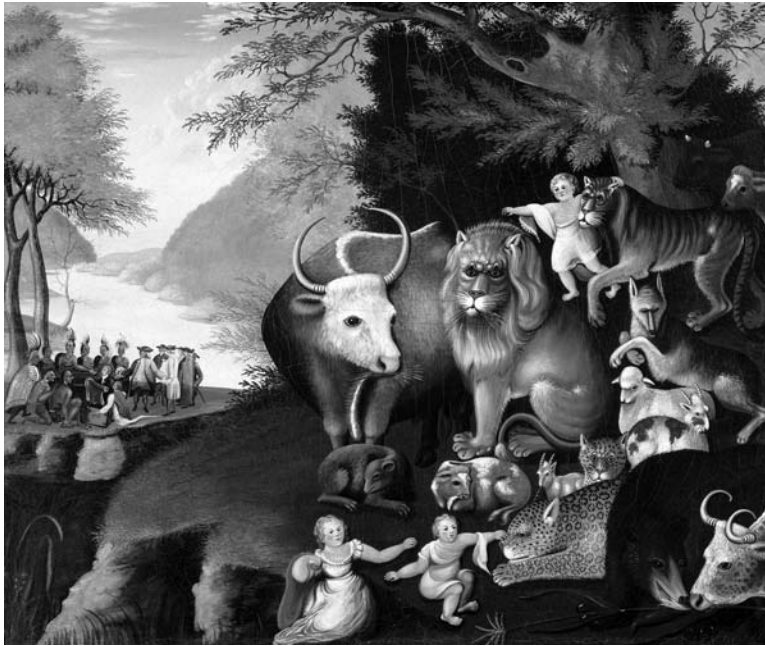


FIGURE 4: Edward Hicks, *Peaceable Kingdom*, circa 1834. In the early 1800s Edward Hicks rendered William Penn’s Quaker vision of a Holy Experiment in his *Peaceable Kingdom* paintings. In this version, Hicks paired his allegory of different species living together in harmony with the story of William Penn’s fabled meeting of friendship with Lenape Indians in 1683. Courtesy National Gallery of Art, Washington.



FIGURE 5: George Inness, *The Lackawanna Valley*, circa 1855. Commissioned by the president of the Delaware, Lackawanna, and Western Railroad, Inness's *The Lackawanna Valley* is one of the most famous and highly discussed nineteenth-century American paintings of the impact of industrialization upon the natural world and the complex relationship between the two. Courtesy of the National Gallery of Art, Washington, DC.

Pennsylvania's agricultural bounty was matched by the abundance of its other natural resources. The vast forests and extensive deposits of iron ore, anthracite and bituminous coal, and oil transformed Pennsylvania into an industrial powerhouse. Nowhere in the United States can the history of energy regimes—the sources of energy that fuel our lives and economies—be better told than in Pennsylvania. The Commonwealth was home to more than 95 percent of the anthracite coal in the Western Hemisphere and vast deposits of bituminous coal, the birthplace of the world oil industry (Titusville 1859), the first successful three-wire electric lighting system in the United States (Sunbury in 1883), the world's first large-scale nuclear powerplant (Shippingport, 1957), and the nation's worst nuclear accident (Three Mile Island, 1979). And it was its location at the confluences of three rivers and its proximity to the Pittsburgh seam, a vast deposit of bituminous coal that produced the nation's best coking coal, which enabled Pittsburgh to become the steel capital of the world.⁵

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FIGURE 6: Wire mills spewing smoke along the Monongahela River, Donora, Pa., 1910. The industrial pollution in and around Pittsburgh culminated in the Donora Smog of October 29, 1948, when a temperature inversion in this small town thirty-seven miles south of Pittsburgh killed twenty-one people and caused 40 percent of the town to become sick. Investigations by the state of Pennsylvania, U.S. Bureau of Public Health, and United Steelworkers led to the passage of the first state and federal laws against air pollution. Courtesy of the Library of Congress.



FIGURE 7: Beehive coke ovens in front of steel mill, Aliquippa, Pa., 1941. The roasting of bituminous coal in Pennsylvania's beehive coke ovens, more than 46,000 of which were operation in the 1910s, poured huge clouds of toxic smoke into the air twenty-four hours a day, 365 days a year. The chemical cocktail of tar, benzene, lead, sulfur dioxide, and more than a thousand chemical compounds poisoned the surrounding landscape and caused untold illnesses among coke workers and residents of Pennsylvania coal country. Courtesy of the Library of Congress.

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The British steam locomotive was first introduced into the United States to carry coal in northeastern Pennsylvania, and it was coal that soon fueled the fire-breathing—and forest-fire-starting—iron horses that collapsed time and space, and integrated previously isolated areas into the surging industrial economy. An ever-spreading network of railroads then laced its way through



FIGURE 8: *Scene on Bear Creek, Woods on Fire*, by Gustav Grunewald, 1848. In the 1800s railroads were a major cause of forest fires. Sparks and cinders flying from the stacks of passing locomotives burned tens of thousands of acres to the ground. In 1848 Bethlehem artist Gustav Grunewald painted this scene of a train on the Lehigh and Susquehanna Railroad passing through a forest fire near Bear Creek, a remote location southeast of Wilkes Barre. Courtesy of the Payne Gallery of Moravian College, Bethlehem, Pa.



FIGURE 9: Banning No. 1 Mine of the Pittsburgh Coal Company, Perryopolis, Pa., 1933. In the early 1900s American railroads used millions of tons of Pennsylvania coal each year. To get a sense of the scale of coal use by Pennsylvania railroads see the photograph of the Bridgeport Coal Station, circa 1920, on ExplorePAhistory.com. Collection of the Pittsburgh and Lake Erie Railroad, Archives Service Center, University of Pittsburgh.

isolated mountain valleys to haul out the timber and coal, and crisscrossed the Commonwealth transporting the raw materials and finished goods of the industrial world.

When Charles II granted William Penn his vast New World colony in 1681, trees may have covered more than 90 percent of Pennsylvania.⁶ To provide the fuel for its homes and iron foundries, to build its railroads' tracks and bridges, and to buttress the underground tunnels of mines, loggers cut and milled the Commonwealth's timber. The state led the nation in timber harvests in the 1860s, was second in the 1870s and 1880s, and was still a major producer into the early 1900s, when its hemlocks supported the nation's largest concentration of tanneries. Pennsylvania's forests made Williamsport the timber capital of the nation, and home, it is often boasted, per capita to the most millionaires in the nation.⁷



FIGURE 10: The Susquehanna Log Boom, Williamsport, Pa., 1895. Completed in 1851, the Williamsport Log Boom enabled Williamsport to become the “Lumber Capital of the World” in the late 1800s. At its peak, the boom’s six miles of walls could hold close to a million logs in a 450-acre enclosure. Courtesy of the Lycoming County Historical Society and Thomas T. Taber Museum.

Pennsylvania was in the vanguard of the Industrial Revolution that transformed the nation and the world in the nineteenth century.⁸ The Commonwealth's concentration of natural resources gave rise to the largest business enterprise in the nation—the Pennsylvania Railroad—and six of the twenty richest men in American history: John D. Rockefeller, Stephen Girard, Jay Gould, Andrew Carnegie, Andrew Mellon, and Richard Mellon.⁹ Understanding Pennsylvania's environmental history will enable students to better understand the Industrial Revolution and how these men acquired and used their vast fortunes.

The Transfer of Wealth and Power

Economic systems operate by the laws created by humans as well as nature. The rules by which economies function are part of a negotiated, constantly disputed social contract encoded in the laws and belief systems of people and nations. Pennsylvanians played a significant role in the development of the system of industrial capitalism that emerged in the United States during the Industrial Revolution, a system that reshaped not just the nation's economy, but also its politics, government, and laws. Through environmental history, teachers can help their students better understand the Commonwealth's and the nation's political history.

The Industrial Revolution took the energy concentrated in the Commonwealth's fossil fuels and forests, transformed it into unprecedented wealth, and transferred it into the hands of an industrial elite that used it to control the state and local governments. For example, the resource extractions of the late 1800s gave rise to hastily built coal-patch, mill, and lumber towns in the isolated valleys and hillsides where the tall trees clung to mountain slopes and the underground riches were buried. To establish law and order in these boomtowns the Pennsylvania legislature in the 1860s allowed private corporations to create their own police forces, which they used and abused into the 1930s through the state's infamous Coal and Iron Police. For decades Pennsylvania had more company towns than any other state, many of which existed as company fiefdoms that withheld from tens of thousands of residents, many of them immigrants and their children, rights and protections guaranteed by the Constitution. The trial of the Molly Maguires, the 1877 railroad strike, the massacres at Lattimer and Morehead, and the battle at Homestead in 1892 all make more sense when teachers place them in the context of environmental history.¹⁰

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FIGURE 11: Company-owned housing near Eureka Mine 37, Windber, Pa., circa 1920. This winter photograph of housing owned by the Berwind-White Coal Company captures the isolation of the coal-patch towns erected by mine companies during the coal boom of the nineteenth and early twentieth centuries. Courtesy of the Special Collections and University Archives at Indiana University of Pennsylvania.



FIGURE 12: “Next!”, *Puck Magazine*, 1904. This political cartoon well demonstrates American fears about the Standard Oil Company’s vast and growing power over government. With arms already wrapped around the steel, copper, and shipping industries, the U.S. Capitol, and a state capital building, the Trust stretches out yet another tentacle over the White House. Back in 1881, Henry Lloyd Demarest quipped in the *Atlantic Monthly* that “The Standard has done everything with the Pennsylvania legislature, except refine it.” Courtesy of the Library of Congress.

Cycles of Use, Degradation, and Recovery

Pennsylvania also experienced the environmental impacts of the extraction and use of nature's abundance. In the nineteenth century, entrepreneurs, abetted by state and municipal governments and courts, engaged in a voracious, unregulated harvesting and extraction of resources that polluted the air, fouled the water, and impoverished ecosystems.¹¹ Pennsylvania thus offers some of the most compelling historical case studies of water and air pollution in American history. This history stretches back to the colonial period. Confronted by contaminated water within decades of its settlement, Philadelphia in 1767 became the first major city in British North America to pass pollution-control legislation and to subsidize the provision of potable water for its residents. In the early 1800s its Fairmount Waterworks was an international icon of American public works and civil engineering. But by the early 1900s, the lower Delaware River was one of the nation's most polluted waterways. After spending more than a billion dollars on water treatment and sewerage, the city continues the struggle, now in its fourth century, to protect its waterways and aquifers from overuse and contamination.¹²

For more than a century, no city in American history experienced worse air pollution than Pittsburgh. Today, despite deindustrialization, it still has some of the worst air quality in the nation due to the continued burning of soft coal for electrical generation.¹³ It was the smog inversion that blanketed the nearby milltown of Donora in 1948, sickening seven thousand and killing twenty, which shocked Americans and impelled Congress to pass the first national legislation to limit air pollution: the Clean Air Act of 1955.¹⁴ Using environmental history, teachers can make students aware of the severity of the pollution that once plagued the nation's air and water; its impact on people, plants, and animals; and the hard-fought campaigns for the passage and enforcement of laws that protected public health and the state's fisheries.

Historically, the burdens of pollution have fallen most heavily upon the poor, and consequently also upon people of color. Most teachers who include any history of American citizens' grassroots struggle to protect themselves and their children against toxic chemicals do so through the story of the families who lived and died in the Love Canal neighborhood of Niagara Falls, New York in the 1970s and 1980s. Another way to explore the history of both the American NIMBY (not-in-my-backyard) movement and environmental racism is to look at the grassroots campaign waged by poor multiracial residents in Chester, the Commonwealth's poorest city, to stop the transportation

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FIGURE 13: “Midday darkness,” Pittsburgh, Pa., circa 1940. In the mid-1800s Pittsburgh’s famous smoke-filled skies were a symbol of its thriving businesses and economic promise. By the early 1900s, however, smoke pollution from its steel mills and other industrial plants was so bad that the city suffocated for days beneath darkened skies. Courtesy of the Archives Service Center, University of Pittsburgh, Smoke Control Lantern Slide Collection.



FIGURE 14: Wastes dumped into the Bridgeport Canal, Bridgeport, Pa., October 25, 1928. In the late 1800s and early 1900s Philadelphia had some of the nation’s most polluted rivers and worst public water supplies. This 1928 photo shows wastes in the Bridgeport Canal below the outlet of March Packing Company. The Canal fed into the Schuylkill River, from which Philadelphia received much of its drinking water. Courtesy of the Philadelphia Water Department Historical Collection.

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of thousands of tons of trash and infectious waste from as far away as Virginia into their community for incineration. Students can be drawn into this history by viewing the acclaimed 1997 documentary film *Laid to Waste*, and by listening to Philadelphia folksinger Joshua Marcus's compelling song "Invisible City," available on his *This Land: An Environmental Justice Folk Recording* website and CD.¹⁵

Pennsylvania's environmental history also provides students the opportunity to think about the complex cocktails of synthetic chemical compounds that continue to impact the state's ecosystems—and our bodies—in ways not yet adequately measured or understood. Today, Pennsylvania residents are exposed to emissions from thirty-eight coal-fired powerplants within the state and reside downwind from dozens of regional coal plants in Ohio and West Virginia. In 2010 eighteen counties received a grade of F for short-term levels of pollution, five out of six Pennsylvanians lived in metropolitan areas that still received a failing grade for air quality, and Pittsburgh still had air quality ranked among the worst of any major city in the nation. As of February 2010 Pennsylvania contained ninety-five active Superfund sites—trailing only New Jersey (112) and California (96).¹⁶ Today, it is tremendously difficult to understand these environmental issues because the very visible and odiferous pollutants of previous generations have been replaced by new, less obvious substances.¹⁷



FIGURE 15: Slag piles beneath company town near Montour No. 4 mine of the Pittsburgh Coal Company, Washington County, Pa., 1942. Pennsylvania's iron furnaces produced a huge volume of molten slag—impurities that separated from iron during the smelting process—which was drained out of the furnace, cooled into solid pieces, and then dumped, sometimes piling into huge mounds. Courtesy of the Library of Congress.

Environmental history also grounds human history in the context of ecosystems. Before European colonization, Pennsylvania, with its temperate climate and extensive waterways, supported a lavish abundance of wildlife.¹⁸ Teachers can use environmental history to share with their students the fate of that fauna, and how the excessive “harvesting” of mammal, fish, and fowl transformed the natural world around them. Astonished by the bounty that “God, in his Providence, hath freely afforded,” William Penn in his 1683 *Frame of Government* granted the inhabitants of his province the “liberty to fowl and hunt upon the lands they hold, and all other lands therein not enclosed; and to fish in all waters in the said lands, and in all rivers and rivulets in, and belonging to, this province and territories thereof.”¹⁹ In the centuries that followed, people hunted, trapped, and fished the once abundant deer, beaver, elk, panther, bear, wolves, birds of prey, shad, sturgeon, shore birds, and other wildlife until they were gone from the Commonwealth or in numbers so diminished that social and political movements emerged for their protection and restoration.

Few developments offer a more compelling way to engage students in thinking about environmental history than the extinction of a species, for once gone no organism can be restored through technological fixes or market adjustments. As David Soll explains in another essay in this issue, the extermination of the American passenger pigeon, once the most numerous bird species in the Western Hemisphere as well as the Commonwealth, offers a dramatic way for students to see how market hunting and habitat destruction in Pennsylvania contributed mightily to an extinction that transformed the ecosystem of the eastern United States. More broadly, it can provide a springboard for getting them to think about the ongoing wave of extinctions now taking place globally, and what changes this calls for in our own attitudes and behaviors.²⁰

Today, much of Pennsylvania is again covered with trees and supports thriving hunting, fishing, and outdoor recreation industries. Through environmental history students can learn about the conservation and preservation movements that blessed us with the forests, parks, and bodies of water that we now enjoy, and the hard-fought battles waged to conserve natural resources for future use, protect ecosystems, and acknowledge the right to life of other species. When teachers discuss the modern conservation movement in American history survey classes—if they mention it at all—they typically do so with a wave of the hand at President Theodore Roosevelt and first national forester Gifford Pinchot, whose family had made its fortune as

timber barons in northeastern Pennsylvania. The conservation movement, however, began much earlier, at the local and state level. Confronted by humanity's "tree-destroying instinct," University of Pennsylvania botany professor Joseph Rothrock in 1877 started the campaign that led to the creation of publicly owned forest reserves to protect the future prosperity of the Commonwealth. By the time Rothrock stepped down as Commissioner of Forestry in 1904—a year before Pinchot accepted President Roosevelt's invitation to lead the new U.S. Forest Service—Pennsylvania had acquired more than 443,000 acres of forest. By 2000 that figure had grown to more than four million acres.²¹

Pennsylvania also provides a rich canvass for assessing the ability of renewable natural resources and ecosystems to recover from human impact. A hundred years ago the Commonwealth was plagued by barren and devastated landscapes, impoverished ecosystems devoid of previously abundant species of flora and fauna, and some of the most polluted water and air in



FIGURE 16: Photograph of cut over lands, taken by Hugh Baker of the Penn State Department of Forestry, Hicks Run, Pa., 1911. This photograph of lands recently harvested of virgin hemlock and hardwoods well documents the deforestation of much of Pennsylvania in the late 1800s and early 1900s. Courtesy of the author.

the nation. As a result of economic transformations, the wildlife and habitat conservation and restoration efforts of generations of Pennsylvanians, and significant changes in American law and culture, hunters and fishermen can again enjoy the Commonwealth's natural bounty. The once-polluted and -deforested landscape of "Petrolia," the oil rush territory in northwest Pennsylvania, for example, is now a mecca for sportsmen. Fishing contests take place on Pittsburgh's once near-lifeless three rivers, and some of the "Pennsylvania Desert" documented by Rothrock is now covered by dense, but biologically impoverished, forests. Today, the state licenses more than a million hunters, the third-highest total in the nation, and the Pennsylvania Game Commission manages more than 1.3 million acres.²²

Pennsylvania's second- and third-growth forests and now "clean" waterways, however, are not restorations of what previously existed. They are far different than their historical predecessors, ever changing, and constantly vulnerable to new threats, some of them from the accelerating Columbian Exchange unleashed by economic globalization. We live in a hybrid ecosystem that constantly adjusts to new arrivals. Here, local and state history provides teachers the opportunity to explore with their students the environmental impact of economic globalization. Some invasive and introduced species, such as the European honeybee, have been beneficial for human food production, but others have a long history of wreaking havoc in the Commonwealth. Interesting case studies for students include the ongoing predations of the gypsy moth, introduced to the United States for silk production in the 1860s; the Asian fungus that caused the near extinction of the American chestnut in the early 1900s; the emerald ash borer, an Asian newcomer in the 1990s that may have the destructive potential of the chestnut blight and Dutch elm disease; and the brown marmorated stink bug, which since its first appearance in the United States in Allentown, Pennsylvania, in the late 1990s has devastated orchards and annoyed homeowners across the Commonwealth and the nation.²³

Not all of these agents of ecological change are newcomers from abroad. Reintroduced after their near disappearance in the late 1800s, white-tail deer for decades have been annoying suburban gardeners and more significantly transforming woodland ecosystems by overbrowsing understory plants and by eating the nuts and shoots of certain species of trees but not others. When the deer returned, so too did the ticks. In 2011 Pennsylvania had the second-highest number of Lyme disease cases in the nation.

The reappearance of deer and other wildlife has been accompanied by a clash of values that also provides wonderful teaching opportunities. As part

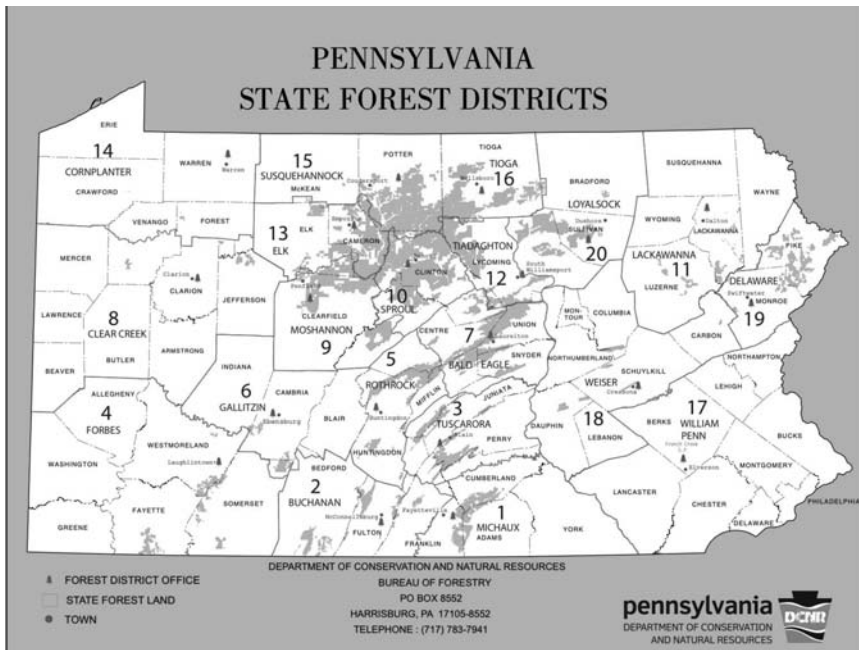


FIGURE 17: Pennsylvania State Forest Districts, circa 2010. Map of state owned parks, forests, and game lands. Courtesy of the Pennsylvania Department of Conservation and Natural Resources.

of an effort to restore and protect its historic landscape, Valley Forge National Historical Park in 2010 initiated a highly controversial plan to reduce a deer population of unprecedented size from an estimated 241 deer per square mile (1,277 deer) to the initial density goal of 31–35 deer per square mile (165–185 deer). The impassioned disagreements about the fate of Valley Forge’s deer reflect deep philosophical divisions in our attitudes toward other species’ right to life, attitudes that students can better understand when placed in a historical perspective.²⁴

Learning about the Past to Understand the Future

The preceding survey is, of course, only suggestive of how the environmental history of Pennsylvania can help students better understand the world outside their windows. Recently, the future of the state’s vast reserves of natural gas has again drawn public attention to the impact of extraction on

the environment and public health. Heralded as “the Saudi Arabia of natural gas,” the vast Marcellus shale natural-gas fields, worth more than a trillion dollars, are already impacting Pennsylvania’s economy and its environment in ways yet to be understood. Gas extraction uses, and potentially contaminates, millions of gallons of fresh water. How should the extraordinary wealth created by the extraction and utilization of energy accumulated over millions of years be divvied up? Who—and what—should bear the costs of its extraction, and the impact upon our natural and built environments? Pennsylvania’s emerging natural gas industry provides a tremendous opportunity for teachers to introduce environmental history to their students, for it forces us again to grapple with enduring questions about power, property rights, wealth transfer, public health, the relationship of government and the free market, taxation, and our relationship with and responsibilities to the natural world.²⁵

NOTES

1. For an outstanding example of the use of an environmental “long zoom” approach to history see Steven Johnson, *The Invention of Air: A Story of Science, Faith, Revolution, and the Birth of America* (New York: Riverhead Books, 2008).
2. For a modularized, student-friendly introduction to Pennsylvania’s environmental history that includes documents and an annotated bibliography, see Charles Hardy III et al., “Pennsylvanians and the Environment,” on ExplorePAhistory.com <http://explorepahistory.com/story.php?storyId=-1-9-E>. In *The Point of Pittsburgh: Production and Struggle at the Forks of the Ohio* (Pittsburgh: The Battle of Homestead Foundation, 2008), Charles McColleston also begins with a brief chapter on the region’s geology and hydrology.
3. William Penn’s “A Letter from William Penn, Proprietary and Governor of Pennsylvania in America, to the Committee of the Free Society of Traders of that Province, residing in London” (London, 1683), and Thomas Budd’s *Good Order Established in Pennsylvania and New Jersey in America* (1685), can both be found on the ExplorePAhistory.com website. For a good introduction to the lives and work of John Bartram and his son William, see Thomas Slaughter, *The Natures of John and William Bartram* (New York: Alfred Knopf, 1996).
4. See Eleanore Price Mather and Dorothy C. Miller, *Edward Hicks: His Peaceable Kingdoms and Other Paintings* (Newark: University of Delaware Press, 1983); Carolyn Weekly, *The Kingdom of Edward Hicks* (New York: Harry N. Abrams, 1999); Rob Evans, *Visions of the Susquehanna: 250 Years of Paintings by American Masters* (Lancaster, PA: Lancaster Museum of Art, 2006); Catharine Quillman, *100 Artists of the Brandywine Valley* (Atglen, PA: Schiffer Publishing, 2011); Lucian Caste and Joel A. Tarr, *Aaron Harry Gorson: The Legacy of Art and Steel* (New York: Spanierman Gallery, 2004); and Brian Peterson, ed., *Pennsylvania Impressionism* (Philadelphia: University of Pennsylvania Press, 2002).

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5. Edmund Burke III argues that “with the availability of vast quantities of coal, the amount of heat energy accessible to humans became virtually limitless,” and that the effects of the coal revolution were multiplied exponentially by the development of the steam engine. See Burke and Kenneth Pomeranz, eds., *The Environment and World History* (Berkeley: University of California Press, 2009), 42. Also see David E. Nye, *Consuming Power: A Social History of American Energies* (Cambridge, MA: MIT Press, 1999).
6. A significantly lower percentage of what is now Pennsylvania was probably covered by trees during the thousands of years of PaleoIndian occupation of the region before the arrival of Old World diseases in the 1500s. In *Fire in America: A Cultural History of Wildland and Rural Fire* (Seattle: University of Washington Press, 1997) and other works, Stephen Pyne has documented how for millennia Native Americans used fire to shape and manage the North American landscape. A study of Indian use of fire to shape pre-Columbian Pennsylvania, however, has yet to be written. Charles Martin includes a map titled “Deforestation of North America, 1500,” which visualizes how much of Pennsylvania might have been cleared by Indians in *1493: Uncovering the New World Columbus Created* (New York: Alfred Knopf, 2011), 32.
7. For a richly illustrated history of Pennsylvania’s logging industry see Thomas T. Taber III’s multivolume *The Logging Railroad Era of Lumbering in Pennsylvania* (Williamsport, PA: Lycoming Printing Company, 1972–75).
8. For a provocative introduction to the world-shaping role that Pennsylvania has played see Michael Zuckerman, “The Making and Unmaking of the Pennsylvania Empire,” in *Pennsylvania: A History of the Commonwealth*, ed. Randall Miller and William Pencak (University Park: Pennsylvania State University Press, 2002), 371–85.
9. Adjusted for wealth measured as a percentage of the national economy, Rockefeller ranked first, Stephen Girard fourth, Carnegie sixth, Jay Gould ninth, Andrew Mellon fourteenth, Richard Mellon fifteenth, Henry Frick twenty-sixth, and Peter A. B. Widener twenty-ninth. See “The Wealthiest Americans Ever,” *New York Times*, July 15, 2007. http://www.nytimes.com/ref/business/20070715_GILDED_GRAPHIC.html# (accessed June 1, 2012).
10. No good history has yet been written on the role that Pennsylvania’s geography and natural resources played in Pennsylvania’s political history. For student-friendly, modularized introductions to Pennsylvania’s political history between the 1860s and 1930, see “Pennsylvania Politics, 1865–1930,” ExplorePaHistory.com, <http://explorepahistory.com/story.php?storyId=1-9-20>, and “Chapter Two: The Struggle to Organize, 1877 to 1914,” in “Labor’s Struggle to Organize,” <http://explorepahistory.com/story.php?storyId=1-9-22&chapter=2>.
11. For a pioneering case study of the impact of extractive industries on a Pennsylvania landscape and its communities see Brian Black, *Petrolia: The Landscape of America’s First Oil Boom* (Baltimore: Johns Hopkins University Press, 2000).
12. See Charles S. Olton, “Philadelphia’s First Environmental Crisis,” *Pennsylvania Magazine of History and Biography* 98, no. 1 (January 1974): 90–100; Charles Hardy, “The Watering of Philadelphia,” *Pennsylvania Heritage* (Spring 2004): 26–35; and Michael McCarthy, “Typhoid and the Politics of Public Health in Nineteenth-Century Philadelphia,” *Memoirs of the American Philosophical Society* 179 (1987). Adam Levine’s website, PhillyH2O, <http://www.phillyh2o.org/>, contains a wealth of documents on the history of Philadelphia’s watersheds and sewers.

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13. The rich literature on the environmental history of Pittsburgh includes James Longhurst, *Citizen Environmentalists* (Medford, MA: Tufts University Press, 2010); Roy Lubove, *Twentieth Century Pittsburgh*, vol. 1, *Government, Business, and Environmental Change* (Pittsburgh: University of Pittsburgh Press, 1996); David Stradling, *Smokestacks and Progressives: Environmentalists, Engineers, and Air Quality in America, 1881–1951* (Baltimore: Johns Hopkins University Press, 2002); Joel A. Tarr, ed., *Devastation and Renewal: An Environmental History of Pittsburgh and Its Region* (Pittsburgh: University of Pittsburgh Press, 2005); and Joel A. Tarr, ed., *The Search for the Ultimate Sink: Urban Pollution in Historical Perspective* (Akron, OH: University of Akron Press, 1996).
14. On Donora, see Devra Davis, *When Smoke Ran Like Water: Tales of Environmental Deception and the Battle against Pollution* (New York: Basic Books, 2003); Lynne Page Snyder, “The Death-Dealing Smog over Donora, Pennsylvania: Industrial Air Pollution, Public Health Policy, and the Politics of Expertise, 1948–1949,” *Environmental History Review* 18, no. 1 (Spring 1994): 117–39; Benjamin Ross, *The Polluters: The Making of Our Chemically Altered Environment* (New York: Oxford University Press, 2010); Action PA: A Pennsylvania-Based Research, Networking, and Organizing Center, “The Donora Fluoride Fog: A Secret History of America’s Worst Air Pollution Disaster,” <http://www.actionpa.org/fluoride/donora-fog.html>; and California University of Pennsylvania, “The Donora Digital Collection: Donora, PA from its Origins to the Case for Clean Air,” <http://www.cup.edu/education/aam/artexhibit.jsp?pageId=158083001042122>.
15. See Luke Foster and Sheila Cole, “The Political Economy of Environmental Racism: Chester Residents Concerned for Quality of Life,” in *From the Ground Up: Environmental Racism and the Rise of Environmental Justice Movement* (New York: New York University Press, 2001); and Robert Bahar and George McCollough, Producers, *Laid to Waste*, 1997. As part of a larger project for his MA thesis in environmental studies at the University of Pennsylvania, Joshua Marcus wrote fourteen songs for what he calls an environmental justice folk recording project. These songs and supplemental instructional materials are available at <http://thislandourland.org/home.html> and on the *This Land* CD package.
16. “Pittsburgh Air Worst in Nation,” Pennsylvania Chapter, Sierra Club, http://pennsylvania.sierraclub.org/PA_Chapter_2008/Conservation/Air%20Quality/Pittsburgh-air-worst-in-nation.html. By 2011, twenty-eight Pennsylvania Superfund sites had been deleted from the National Priorities List after having been cleaned, and two new sites proposed for inclusion on the list were under review. See Final National Priorities List (NPL) Sites—by State, <http://www.epa.gov/superfund/sites/query/queryhtm/nplfn.htm#PA>.
17. The historical literature on the impact of pesticides, lead, and other pollutants is extensive. One of the best places to start exploring this subject with students is with a biography of Springdale, Pennsylvania’s Rachel Carson. Publication of *Silent Spring* in 1963, her exposé of the impact of DDT on birds, helped launch the modern environmental movement. See Paul Brooks, *The House of Life: Rachel Carson at Work* (Boston: Houghton Mifflin, 2000), and Linda Lear, *Rachel Carson: Witness for Nature* (New York: Henry Holt and Co., 1997). On the impact of pollutants on microorganisms at the bottom of the food chain in the Delaware River Basin, see Bruce Stutz, *Natural Lives, Modern Times: People and Places of the Delaware* (Philadelphia: University of Pennsylvania Press, 1998).

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18. For a wonderful account of the once-abundant wildlife near Philadelphia, see John Fanning Watson, "Beasts of Prey and Game," in *Annals of Philadelphia and Pennsylvania in the Old Time* (Philadelphia: Elijah Thomas, 1857), 433–36.
19. Full text of William Penn's *The Frame of the Government of the Province of Pennsylvania and, Territories thereunto annexed, in America* and other Pennsylvania colonial charters can be found on the Avalon Project website, http://avalon.law.yale.edu/subject_menus/statech.asp.
20. For decades, Harvard biologist E. O. Wilson has been sounding the alarm about the vast and accelerating global wave of extinctions. The classic introduction to this issue remains his *The Diversity of Life* (New York: W. W. Norton, 1992). On the passenger pigeon, see John C. French, *The Passenger Pigeon in Pennsylvania* (Altoona, PA: Altoona Tribune Co., 1919). On the history of now-extinct wildlife in the Commonwealth, see Henry Shoemaker, *Extinct Pennsylvania Animals, Part 1: The Panther and the Wolf* (Altoona, PA: Altoona Publishing Co., 1917), *Extinct Pennsylvania Animals, Part 2: Black Moose, Elk, Bison, Beaver, Pine Marten, Fisher, Glutton, Canada Lynx* (Altoona, PA: Altoona Publishing Co., 1919), and *Pennsylvania Deer and Their Horns* (Reading, PA: Faust Pub. Co., 1915). On the history of the state's once abundant shad fishery see Richard Gerstell, *American Shad in the Susquehanna River Basin: A Three-Hundred-Year History* (University Park: Pennsylvania State University Press, 1998), and Charles Hardy III, "Fish or Foul: A History of the Delaware River Basin Through the Perspective of the American Shad, 1682 to the Present," *Pennsylvania History* 66, no. 4 (Autumn 1999): 506–34.
21. See Lester A. De Coster, *The Legacy of Penn's Woods: A History of the Pennsylvania Bureau of Forestry* (Harrisburg: Pennsylvania Historical and Museum Commission, Pennsylvania Department of Conservation and Natural Resources, 1995); and Rebecca Diane Swanger, "'Something Akin to a Second Birth': Joseph Trimble Rothrock and the Formation of the Forestry Movement in Pennsylvania, 1839–1922," *Pennsylvania Magazine of History and Biography* 134, no. 4 (October 2010): 339–63. For an exploration of the complex issues related to wilderness preservation in Pennsylvania's Allegheny National Forest, see Samuel A. MacDonald, *The Agony of an American Wilderness: Loggers, Environmentalists, and the Struggle for Control of a Forgotten Forest* (Lanham, MD: Rowman and Littlefield, 2005).
22. See Joe Kosack, *The Pennsylvania Game Commission, 1895–1995: 100 Years of Wildlife Conservation* (Harrisburg: Pennsylvania Game Commission, 1995); Maurice Broun, *Hawks Aloft: The Story of Hawk Mountain* (Mechanicsburg, PA: Stackpole Books, 2000); and Jim Wright, Kevin Watson, and Deborah Edge, *Hawk Mountain: The World's First Raptor Sanctuary* (Philadelphia, PA: Camino Books, 2009).
23. Information on native and invasive species in Pennsylvania can be found on the following websites: Pennsylvania Biological Survey, <http://www.altoona.psu.edu/pabs/history.html>; Pennsylvania Department of Conservation and Natural Resources, "Invasive Species in Pennsylvania," <http://www.dcnr.state.pa.us/conservationscience/invasivespecies/index.htm>; and U.S. Department of Agriculture National Invasive Species Information Center, State Resources, Pennsylvania, <http://www.invasivespeciesinfo.gov/unitedstates/pa.shtml>.
24. See National Park Service, "White-Tailed Deer Management," October 3, 2011, <http://www.nps.gov/vafo/parkmgmt/white-tailed-deer.htm>. The modern animal rights and animal liberation movements can also be explored through Pennsylvania history. In *Eco Warriors: Understanding the Radical Environmental Movement* (Chicago: Noble Press, 1990), Rik Scarce documents the Animal

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- Liberation Front's 1984 break-in of the Experimental Head Injury Laboratory at the University of Pennsylvania, which exposed brutal experiments on unanesthetized baboons.
25. Studies of the history and environmental impact of the Marcellus shale extraction are just beginning to appear. For a good introduction, see Seamus McGraw, *The End of Country* (New York: Random House, 2011). See also Jonathan Storm's controversial documentary *Gasland*, which premiered on HBO in June 2010. The environmental activism and the civil disobedience that characterized the antilogging movement in the Pacific Northwest in the late twentieth century may appear in rural Pennsylvania as well. On December 27, 2011, Daniel Roupp, a supervisor in a small rural township in Lycoming County, dropped a half dozen trees over a local road after Range Resources, a large drilling firm, had refused for months to make promised repairs—or to cease using the route even after the township had erected roadblocks. Range then promised to work with the township to complete the EPA-mandated repairs. See Amy Worden, "Small Town Takes on Big Gas Firm Over Road Repairs," *Philadelphia Inquirer*, December 30, 2011.