



HUDSON RISING

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Classroom Materials for the Exhibition

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Cover image: Robert Havell Jr., *View of Hudson River
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THE NEW-YORK HISTORICAL SOCIETY

Since its founding in 1804, the New-York Historical Society has been a mainstay of cultural life in New York City and a center of historical scholarship and education. For generations, students and teachers have been able to benefit directly from our mission to collect, preserve, and interpret materials relevant to the history of our city, state, and nation. The New-York Historical Society consistently creates opportunities to experience the nation's history through the prism of New York. Our uniquely integrated collection of documents and objects is particularly well suited for educational purposes, not only for scholars but also for schoolchildren, teachers, and the larger public.

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HUDSON RISING

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LETTER FROM THE PRESIDENT

DEAR EDUCATOR,

The New-York Historical Society is pleased to present this collection of educational materials and resources to accompany *Hudson Rising*, a multifaceted exhibition that explores human relationships to the natural world through the history of the Hudson River. Spanning two centuries of environmental thinking, industrialization, and artistic imagination, this wide-ranging exhibition brings together art, artifacts, and stories that illuminate how the Hudson contributed to American awareness of the human role in ecological change.

The materials included here highlight important episodes in the history of the Hudson River. They are arranged chronologically, geographically, and thematically in five units: The Adirondacks, 1870–1890s; The Palisades, 1890s–1950s; Storm King, 1960s–1980s; The Environmental Movement, 1960s–1980s; and A Rising Tide, Today. Each unit includes primary and secondary sources intended for use by teachers and students, along with suggested classroom activities and discussion questions. Elements of these classroom materials, including works of art, photographs, documents, primary accounts, and timelines, underscore shifting perceptions of the river and attitudes about the environment. Life stories included in the materials profile the lives of people whose work identified key issues facing the river and devised ways to address them.

The Education Division of the New-York Historical Society is committed to providing stimulating and useful materials and programming to enhance the teaching and learning of American history in the classroom. This collection of resources has been designed to complement and enhance school visits to the exhibition as well as to help teachers and students across the nation address environmental history in the social studies classroom.

To learn more about school and teacher programs designed for *Hudson Rising* and about all Education programs at the New-York Historical Society, contact us at 212-485-9293 or visit the Education Division online at www.nyhistory.org/education.

Sincerely,



Louise Mirrer, Ph.D.
President & CEO



ABOUT THE EXHIBITION

HUDSON RISING: MARCH 1, 2019–AUGUST 4, 2019

The New-York Historical Society exhibition *Hudson Rising* is a unique review of 200 years of ecological change and environmental activism along “the most interesting river in America.” It examines how people became aware of our role in the river’s ecological degradation and devised strategies to address it.

Hudson Rising spans two-plus centuries, from the early industrial age to the present. It begins with artist Thomas Cole’s *Course of Empire* (1834–1836). This five-painting cycle traces the transformation of a pristine landscape into a thriving city, followed by its dramatic decline and the fall of civilization. Cole questioned the social costs of what was then called progress. His poetic work serves as a prelude to the exhibition narrative, which is organized chronologically and geographically into five sections.

Journeys Upriver: The 1800s is inspired by the detailed rendering of the river landscape in *Panorama of the Hudson* (1847), one of the great tourist guides of Hudson River history. Supplemented with paintings, objects, historic maps, and brief profiles, this section explores the navigable stretch of the Hudson between New York City and Troy and establishes the many uses made of the river and surroundings. Over time, and with developing environmental degradation, these varied uses began to seem incompatible to some.

The Adirondacks: 1870s–1890s examines the connection between extensive logging in the

Adirondacks and the health of the Hudson River. By the 1870s, rainfall over deforested, eroded land was carrying silt to the Hudson, where it collected on the bottom. The shallower water impeded navigation on America’s foremost commercial river. Opponents of overlogging made a powerful case for forest conservation and contributed to the 1892 creation of Adirondack Park, where logging was soon outlawed on state land.

The Palisades: 1890s–1950s traces the effort to protect the Palisades and preserve their scenic beauty. In the late 1800s, quarry companies were blasting the cliffs with dynamite and selling the rock to New York City builders. Citizen advocates fought back, especially the New Jersey State Federation of Women’s Clubs and the American Scenic and Historic Preservation Society, a New York City group. They helped create Palisades Park, which opened in 1909. Residents of New York and New Jersey thronged to the recreational site, arriving by foot, ferry, train, and car. Over two million people visited in 1920 alone, most of them from Manhattan.

The Hudson Highlands: 1960s–1980s explores how Hudson River activists helped spark the modern American environmental movement. By the early 1960s, untreated sewage and industrial pollutants were poisoning the river. In the spectacular Hudson Highlands, the nuclear power plant at Indian Point was killing massive numbers of fish. When Con Edison proposed a new plant on Storm King Mountain, citizen organizations, including Scenic Hudson and the precursor of Riverkeeper, prevented its construction. Overlapping with these efforts was

the discovery of PCB contamination in the Hudson, largely from General Electric factories near Glens Falls. The battle over PCBs is introduced in this section and continued in the next.

A Rising Tide: Today presents a compelling look at two significant challenges we now face. One is the ongoing contamination of the river with PCBs and the legal battle over responsibility for removing them. The other is the threat of climate change. This part of the exhibition showcases models of the Living Breakwaters project designed by landscape architecture firm SCAPE. The breakwaters will form a necklace of protective reef-like structures around the southern tip of Staten Island, which was devastated by storm surges in Superstorm Sandy.



THE HUDSON: AN OVERVIEW

The Hudson River is a tidal estuary. Each day its waters ebb and flow with the ocean tides. Salt water flows in from the ocean and mixes with freshwater flowing down from northern tributaries, producing brackish—partly salty—water that extends from New York Harbor to Troy, New York.

Because of its link to the sea, the estuary was once among the most productive ecosystems on earth. As one measure of this abundance, oysters flourished in the first 60 miles of these brackish waters. Because oysters suck in seawater to extract nutrients, they filter the water as they eat. For millennia, oysters cleaned the water and fed the people who lived nearby. The extensive underwater oyster reefs also protected shorelines by reducing the intensity of waves.

But by the late 1700s, the rapidly growing city of New York endangered the oyster beds by building on top of their natural habitats and by dumping sewage and other pollutants into the water. The rise of industrialism brought further dramatic change to the oysters and to the ecosystem itself.

Beginning in 1807, steamboats made Hudson journeys easy, cheap, and reliable. Sailing sloops and steamboats carried people and manufactured goods upriver. They brought back ice, bricks, iron, coal, and lumber. Trade expanded, and the region prospered. The river and its shores were reshaped to accommodate steamboats. Wharves and piers extended into the river. Soft-edged shorelines were hardened and contained. River edges were diked and the bottom dredged.

The resulting deeper, straighter Hudson worked well for shipping. But the shallows that once supported plants and animals, filtered the water, and protected against flooding largely disappeared. By 1851, the railroad connected New York City to Albany. The tracks, built along the river, cut off bays and tributaries and turned the sandy shorelines into rock-lined edges. Coal replaced timber as the fuel of choice for trains, steamboats, and foundries. It powered the industrial revolution. No one knew that burning coal would stimulate what we now call climate change.

Since the late 1800s, advocates have recognized and worked to correct a variety of threats to the river, some of which remain today. The five units of this curriculum examine important chapters in this history.

THE ADIRONDACKS, 1870s–1890s

The Adirondack Mountains occupy a vast stretch of northern New York State. For many people during the nineteenth century, especially those in New York City, they were a far-removed wilderness and a prime source of lumber. But three men became particularly keen observers of the relationship between the Adirondacks and the Hudson River. Their work helped people appreciate and understand why that relationship was so vital to the region.

Pioneering conservationist George Perkins Marsh linked overlogging in the Adirondacks to the health of the river. In his bestseller, *Man and Nature* (1864),

he argued that deforestation prevented forest ground cover from retaining moisture, thus leaving soil dry, contributing to floods, and loading the river with silt and debris.

Hudson River School ([Introductory Activity](#)) artist Asher Brown Durand journeyed frequently to the Adirondacks. He believed trees provided evidence of the divine on earth. In paintings like *Adirondack Mountains, New York* ([Resource 1](#)), he portrayed nature’s mysteries as something to be treasured.

In his role as superintendent of the Adirondack Survey, [Verplanck Colvin](#) mapped the Adirondacks’ high peaks and lakes. He identified the most elevated source of the Hudson as a lake atop Mount Marcy, later named Lake Tear of the Clouds ([Resource 2](#)). Colvin and other influential voices, including photographer Seneca Ray Stoddard, called on New York State to protect the Adirondack forests and the Hudson River watershed by creating an enormous public park. The Adirondack Forest Preserve was created in 1885 and later expanded and designated as a park. Logging in Adirondack Park continued for a time, but it was prohibited on state-owned land in the park in 1894, when the legislature amended the New York State Constitution to keep Adirondack Park “forever wild” ([Resource 3](#)).

THE PALISADES, 1890s–1950s

As the Adirondacks came under state protection, the Palisades across from New York City came under assault. These column-like cliffs form part of a



THE HUDSON: AN OVERVIEW *(continued)*

40-mile ridge that stretches from Hoboken, New Jersey, to Haverstraw, New York, along the river's western shore. The sheerest cliffs extend about 20 miles north from Fort Lee, New Jersey.

The hard rock of the Palisades lent itself perfectly to the construction of docks, roads, and concrete foundations that New York City needed as it grew. At first, entrepreneurs collected rock that had fallen to the cliff base. In the 1890s, spurred by growing demand and improved dynamiting technology, quarry companies began blasting the Palisades to obtain the rock ([Resource 4](#)). The roar of dynamite shattered the nerves of residents on both sides of the river. Exploding rock flew through the windows of local homes. The famous forested cliffs of the Hudson began to disappear, especially from the area north of Fort Lee.

Cecilia Gaines and Elizabeth Vermilye led a broad coalition of women's groups in a campaign to save the Palisades. Their network expanded from their own small Englewood, New Jersey, women's club to the New Jersey State Federation of Women's Clubs, and then to the national, 800,000-strong General Federation of Women's Clubs. The year was 1896, and women could not yet vote. So members organized a grassroots lobbying campaign to convince New Jersey officials to stop the destruction of the Palisades.

The American Scenic and Historic Preservation Society, a New York City group, joined the battle. They lobbied and were heard by New York's conservationist governor, Theodore Roosevelt. In 1899, Governor Roosevelt and New Jersey governor

Foster Voorhees each appointed five people to a study group to come up with a solution. Gaines and Vermilye were chosen by Governor Voorhees, the only women in the group.

In 1900, as a result, the Palisades Interstate Park Commission was formed, an innovative interstate body that would end quarrying and create Palisades Interstate Park. New York and New Jersey each appointed five commissioners. Gaines and Vermilye were told their presence would make the men uneasy and were not appointed.

The Commission was authorized to acquire the cliffs and turn the Palisades into a park. With state and private funds, it acquired 175 different parcels of land. In 1909, Palisades Interstate Park opened, a 14-mile stretch of riverfront from Fort Lee northward. Nearby residents flocked to the park ([Resource 5](#)), especially those from New York's crowded Lower East Side.

The park grew substantially with new acquisitions and donations of land. Today it includes a string of parks along the Hudson in New Jersey and New York, all operated by the Palisades Interstate Park Commission.

STORM KING, 1960s–1980s

In 1962, Con Edison announced plans to build a new hydroelectric plant ([Resource 6](#)) on Storm King Mountain in the Hudson Highlands, one of the most beautiful and celebrated sections of the river. It said

the plant would provide the electricity demanded by customers, especially in New York City. Supporters praised Con Edison for promising to improve the industrialized riverfront in nearby Cornwall. The Federal Power Commission (FPC) granted the license to build.

But citizen activists drew the line. In 1963, several Hudson Valley residents formed the Scenic Hudson Preservation Conference and sued to stop Con Edison. In 1965, the court required the FPC to restart the licensing proceedings and assess the proposed plant's impact on the environment. As Scenic Hudson began its battle, fishermen were reporting massive, daily fish kills at the Indian Point nuclear power plant, another Con Edison facility further down the Hudson. Many of the dead fish were striped bass, or "stripers," which swim in coastal waters but return to the Hudson to spawn. One of the concerned fishermen was **Robert Boyle**, a *Sports Illustrated* writer who lived in the Hudson Highlands.

In 1965, Boyle published "A Stink of Dead Stripers" in the magazine, detailing what was happening at Indian Point. He traced the fish kills to the plant's operations and cited a scientific study showing that stripers lay their eggs in the Highlands, not well to the north as Con Edison claimed. In 1966, Boyle and others formed the Hudson River Fishermen's Association to monitor and protect the river. Later, the group became known by its current name, Riverkeeper.

Concerns about the dead fish at Indian Point centered on the plant's cooling system. Round the



THE HUDSON: AN OVERVIEW *(continued)*

clock, it pulled in cool river water and discharged heated water. Boyle was convinced that eggs and young fish were sucked in with the cool water. Warm water posed different dangers, and in his 1969 book, *The Hudson River*, Boyle identified several, including lower oxygen levels in the water and increased risk of disease. The proposed plant at Storm King was not a nuclear facility, but it would use the same cooling technology.

Together, the Fishermen's Association and Scenic Hudson spearheaded a 17-year effort against the Storm King proposal. In 1980, after years of court appearances, public meetings, scientific studies, and many reversals, the parties compromised and signed an agreement known as the Peace Treaty for the Hudson ([Resource 7](#)). Con Edison surrendered its license to build Storm King, granted by the Federal Power Commission in 1970. It donated the land to the Palisades Interstate Park Commission and established a \$12 million endowment for ecological research on the Hudson.

In return, the agreement said that Con Edison did not have to build new cooling towers at Indian Point, which had been required by the Environmental Protection Agency to replace the existing system. Instead, Con Edison agreed to modify the facility to reduce fish kills, and to take the plant off-line during striped bass spawning season.

As a result of this struggle, citizens around the country were now allowed to sue in court on behalf of environmental concerns. Federal agencies were now required to investigate all relevant facts before

granting approvals for any federal action that significantly affected the environment. The scenic, historic, and recreational character of places could now be protected by law. And using settlement funds from Con Edison, the Hudson River Foundation began the first-ever sustained research on the complex ecology of the Hudson.

THE ENVIRONMENTAL MOVEMENT, 1960s–1980s

Frances Dunwell, author and Hudson River Estuary Coordinator at the New York State Department of Conservation, described the Hudson River of the 1960s: “I remember the river as polluted with sewage, butcher waste, industrial chemicals, and heavy metals. People swam in the river, but at their own risk. People fished the Hudson, but the fish tasted like oil. On any given day, the creeks might change color from industrial dyes.”

In the mid-1960s, New York City dumped great volumes of oil, raw sewage, and trash into the river ([Resource 8](#)). In towns up and down the river, factories poured in more of the same, as well as paper sludge, toxic chemicals, and dangerous heavy metals like mercury. Much of this debris floated on the river's surface, where it was seen and smelled by boaters, fishermen, and anyone daring to swim.

These conditions sparked local activism on the river's behalf. In 1969, folksinger, activist, and Hudson Valley resident [Pete Seeger](#) launched the sloop *Clearwater* to draw people to the river and publicize its plight. In 1975, a coalition of groups prevented the

building of an expressway on Manhattan's Hudson waterfront. In 1983, the Fishermen's Association, soon renamed Riverkeeper, began a full-time river patrol. Hudson River issues, organizations, and strategies played a major role in the development of a national environmental movement. (For a timeline of landmark US events, see [Resource 9](#)).

As activists succeeded on many fronts, a new crisis came to light: polychlorinated biphenyls, or PCBs. [Robert Boyle](#), the *Sports Illustrated* journalist who earlier wrote about dead striped bass near Indian Point, wrote a 1970 article disclosing high levels of PCBs in the Hudson's fish. Many factories, in the US and around the world, used heat-tolerant PCBs as insulating materials. Most of the PCBs in the Hudson River were traced to General Electric (GE) plants at Hudson Falls and Fort Edward, near Glens Falls, New York ([Resource 10](#)).

GE began releasing PCBs to the river in 1940. They remained lodged in riverbed sediment behind the Fort Edward dam until 1973, when the dam was demolished. Then PCB-contaminated sediment moved down the Hudson. Around this same time, scientists discovered a link between PCBs and human diseases, and US authorities found severe contamination in waterways around the nation.

In 1977, the Environmental Protection Agency (EPA) banned the discharge of PCBs into American waters. In 1980, Congress passed the Superfund Act, which empowers the government to designate hazardous sites and requires polluters to pay cleanup costs. In 1984, the EPA designated a 200-mile stretch of the



THE HUDSON: AN OVERVIEW *(continued)*

river, from Hudson Falls to Manhattan's Battery, as a Superfund site—the largest in the nation.

Between 2009 and 2015, GE dredged and removed PCB-laden sediment from 40 hot spots between Hudson Falls and Troy, New York. GE believes it has fulfilled its obligation, but environmental groups and responsible government agencies disagree. In December 2018, Governor Andrew Cuomo and the New York State Department of Environmental Conservation released a new study that showed continuing, harmful PCB contamination.

A RISING TIDE, TODAY

The Battery, at the tip of lower Manhattan, marks the official end of the Hudson. But the river's waters continue to flow through New York Harbor to Raritan Bay, at the base of Staten Island. Every day, tides carry a portion of this water up the Hudson estuary as far as Troy, then return it again to the harbor. River and harbor are a single continuum, two elements of a powerful regional ecosystem.

Throughout this environment, two centuries of engineering and development have created harder shorelines and left waterfront areas vulnerable. Rising seas have exposed low-lying areas to routine flooding. Scientists calculate that the sea level around New York's coastline and estuaries has risen at least a foot since 1900. They predict an additional rise of 18 to 50 inches by 2100.

Extreme weather, especially storm surges that

carry walls of water onto land, pose a less frequent but more destructive threat. Superstorm Sandy devastated the New York-New Jersey coastal region in 2012. In these two states alone, 87 people died. On the Hudson River, ten-foot storm surges were recorded as much as 150 miles north of the Battery.

In the wake of this historic storm and with sea levels rising, restoring shorelines to reduce flooding acquired new urgency ([Resource 11](#)). In 2013, the US Department of Housing and Urban Development, in partnership with nonprofits and foundations, hosted the Rebuild by Design competition to search for new approaches to shoreline management. SCAPE Landscape Architecture, founded by [Kate Orff](#), won funding for its Living Breakwaters project ([Resource 12](#)).

Breakwaters are structures designed to lessen the impact of storm waves and reduce or reverse coastal erosion. These *living* breakwaters will do more: their reef-like design will attract marine organisms and foster a more robust and diverse aquatic habitat. The structures will be seeded with oysters provided by the Billion Oyster Project, an innovative program involving students and staff at the New York Harbor School on Governors Island ([Resource 13](#)).

Beginning in 2019, the New York Governor's Office of Storm Recovery will install a series of nine living breakwaters in Raritan Bay. They will stretch approximately one mile along the South Shore of Staten Island, near the town of Tottenville, where Sandy caused unprecedented damage and loss of life.

CONCLUSION

These five episodes span two centuries of activism on behalf of the Hudson River. Committed individuals and organizations saw how the river and its environment were or might be harmed and created innovative strategies to help solve the problems. In the process, they provided an incubator for ideas and actions that were later adopted by environmentalists nationwide.

THE HUDSON RIVER SCHOOL

The first and second generations of nineteenth-century American landscape painters were dubbed the Hudson River School in recognition of the river's central role in their work. The river and the valley not only provided the subjects for many of their paintings, they also facilitated the artists' access to sketching grounds in the Catskill and Adirondack Mountains.

These artists instilled in their paintings a variety of ideas about what mattered most in the landscapes they portrayed. Some emphasized nature in its purer forms in order to show the presence of the divine. Others equated signs of human progress with the magnificence of the natural setting. The common thread was a romantic view of the world, "romantic" in the sense of idealized or heroic. Hudson River School paintings held great appeal in a rapidly urbanizing and industrializing America. People who responded strongly began to see value in the Hudson beyond its economic potential. Some would begin to take action to protect their cherished landscapes.

The eight paintings in this introduction are a small part of the extensive Hudson River School collection at the New-York Historical Society. (A ninth painting, Asher Durand's *Adirondack Mountains, New York*, is [Resource 1](#) of this curriculum.) They were selected for their diverse views of the landscape and people and because they show locations that will appear again in the curriculum units. The works are arranged geographically, beginning with New York Harbor and proceeding northward. The chronology spans more than four decades, from 1820 to 1863. Each painting is supplemented with brief details adapted from *The Hudson River School: Nature and*

the American Vision by Linda S. Ferber and the New-York Historical Society.

SUGGESTED ACTIVITIES

- Before introducing these paintings or other parts of this curriculum, ask students what they know about the Hudson River. Prompt the discussion with questions about where the river begins and ends, whether it is clean, how it is used, why it is important, etc. Generate a class list of the responses and important questions students raise. Return to the list as you work on this curriculum, correcting or adjusting students' initial ideas as they learn more.
- Using existing maps as sources, create a large-scale map of the Hudson River for the classroom. Show the whole river, from its source at Lake Tear of the Clouds in the Adirondacks to New York Harbor. Print these eight paintings and [Resource 1](#) and attach them to the map in the correct locations, labeling places as needed. As you explore this curriculum, return to the map to add new images from the units. When you have enough material on the map, select a location and describe the visible changes between the Hudson River School painting and later images.
- In small groups, study the Hudson River School paintings for telling details about the Hudson between the 1820s and 1860s. What was its function in the region? How did it

affect the work people did? The places they lived? What they could buy in stores? How they traveled?

DISCUSSION QUESTIONS

- Why would painters want to show the landscape in a romantic way? What non-romantic details do you think they left out?
- Why would the paintings appeal so much to nineteenth-century Americans? What else was happening in the country that might explain this appeal?
- How do you think these paintings made people think and feel about the river? Why would they encourage people to act on the Hudson's behalf?

THE HUDSON RIVER SCHOOL *(continued)*

A SKETCH OF CASTLE GARDEN, NEW YORK



Jasper Francis Cropsey (1823–1900), *A Sketch of Castle Garden, New York*, 1851. New-York Historical Society, Thomas Jefferson Bryan Fund

On several occasions, Jasper Francis Cropsey portrayed Castle Clinton, perhaps the most famous of New York City's early fortifications, built on submerged rocks at the base of Manhattan. By the time Cropsey, best known as a landscape painter but trained originally as an architect, painted A Sketch of Castle Garden, the fort had been turned into an entertainment center and concert hall called Castle Garden. Cropsey portrayed the structure from a vantage point on the water, depicting the covered walkway that provided access to the theater.

Adapted from Linda S. Ferber and the New-York Historical Society,
The Hudson River School: Nature and the American Vision, 2009.

AFTERNOON HASTINGS LANDING

George Harvey was an émigré English miniaturist and painter who arrived in 1833. He embarked on an ambitious series of watercolors after settling in 1834 in Westchester County at what is now Hastings-on-Hudson. One of these watercolors is Afternoon Hastings Landing. Palisades Rocks in Shadow, New York, 1836–37, a carefully detailed record of his own property and river view.

Adapted from Linda S. Ferber and the New-York Historical Society,
The Hudson River School: Nature and the American Vision, 2009.



George Harvey (1799–1880), *Afternoon Hastings Landing. Palisades Rocks in Shadow, New York*, 1836–37. New-York Historical Society, Gift of Charles E. Dunlap

THE HUDSON RIVER SCHOOL *(continued)*

VIEW OF THE HUDSON RIVER FROM TARRYTOWN HEIGHTS



Robert Havell (1793–1878), *View of the Hudson River from Tarrytown Heights*, ca. 1842. New-York Historical Society, Gift of Harry Peck Havell

Busy river traffic, steam and sail, navigates the broad expanse of the Tappan Zee under a dramatic sky in Robert Havell's panoramic View of the Hudson River from Tarrytown Heights. He captures the vista looking north, with Hook Mountain at the left and Kingsland and Croton Points jutting from the Westchester County side of the river.

Adapted from Linda S. Ferber and the New-York Historical Society,
The Hudson River School: Nature and the American Vision, 2009.

STEAMBOAT IRON WITCH

The side-wheel steamboats that carried much of the Hudson River's commercial and passenger traffic were heralded as marvels of modern technology. These 'floating palaces' offered the speedy travel, regular schedules, and luxurious accommodations that have always facilitated tourism. The sign painter John V. Cornell portrayed the Steamboat Iron Witch about 1846, showing her original grandeur as a huge paddle-wheel steamer passing High Tor Mountain on the western Rockland County shore between Haverstraw Bay and the Tappan Zee stretch of the Hudson.

Adapted from Linda S. Ferber and the New-York Historical Society,
The Hudson River School: Nature and the American Vision, 2009.



John V. Cornell (b. 1813), *Steamboat Iron Witch*, 1846. New-York Historical Society, Gift of Samuel Verplanck Hoffman

THE HUDSON RIVER SCHOOL *(continued)*

VIEW OF THE HIGHLANDS FROM WEST POINT



John Ferguson Weir (1841–1926), *View of the Highlands from West Point*, 1862. New-York Historical Society, Robert L. Stuart Collection

Weir was steeped in this locality, having been brought up at West Point where his father, Robert Walter Weir, taught drawing for many decades. Weir, in what was his first major commission (and one of his relatively few landscape paintings), adopted the traditional view of the Highlands from Mount Independence, looking north and east across the river toward the village of Cold Spring. The viewer stands just above West Point near Fort Putnam.

Adapted from Linda S. Ferber and the New-York Historical Society,
The Hudson River School: Nature and the American Vision, 2009.

BEACON HILLS ON THE HUDSON RIVER

Asher B. Durand purchased a country house about 1849 overlooking the Hudson near Newburgh. The pleasant vista recorded in Beacon Hills on the Hudson River, Opposite Newburgh—Painted on the Spot may be the view from his property looking across the river to Fishkill. Durand’s property would be compromised by the building of a railroad. This ultimately drove the artist from his country retreat and, in the words of his eldest son and biographer, John, “obliged him to resume his annual search for the picturesque in the undisturbed wilderness.”

Adapted from Linda S. Ferber and the New-York Historical Society,
The Hudson River School: Nature and the American Vision, 2009.



Asher Brown Durand (1796–1886), *Beacon Hills on the Hudson River, Opposite Newburgh—Painted on the Spot*, ca. 1852. New-York Historical Society, Gift of Lucy Maria Durand Woodman

THE HUDSON RIVER SCHOOL *(continued)*

VIEW NEAR FISHKILL, NEW YORK



William Guy Wall (1792–after 1964), *View near Fishkill, New York*, 1820. New-York Historical Society, Louis Durr Fund

The Hudson River Portfolio was a set of landscape prints depicting twenty significant sites along the river's course, published in New York between 1820 and 1825. For the bucolic *View near Fishkill, New York*, the accompanying text offers the blend of poetic eloquence and descriptive prose typical of touring literature: "This view represents the Landing at Fishkill, one of those beautiful elbows in the winding course of the Hudson River. This landing is situated a little to the north of West Point." The hamlet shown in the print is now called Beacon.

Adapted from Linda S. Ferber and the New-York Historical Society, *The Hudson River School: Nature and the American Vision*, 2009.

A WINDOW, HOUSE ON THE HUDSON RIVER

Worthington Whittredge exploited an opportunity to capture the view from inside a riverside estate in *A Window, House on the Hudson River*. This creative variation on the Hudson River vista is said to depict the interior of a house called *Riverside* on the west side of the Hudson, north of Troy. An African-American nurse and her charge sit at a window seat with a splendid view behind them. In this Civil War year, both woman and child might be imagined dreaming of the tranquility the river symbolized.

Adapted from Linda S. Ferber and the New-York Historical Society, *The Hudson River School: Nature and the American Vision*, 2009.



Worthington Whittredge (1820–1910), *A Window, House on the Hudson River*, 1863. New-York Historical Society, Robert L. Stuart Collection

THE ADIRONDACKS, 1870s–1890s

The vast, forest-covered region of the Adirondacks harbors the source of the Hudson. Its lakes and streams feed the river. In the nineteenth century, its trees supplied lumber for fuel, construction, and papermaking. Once considered a watery wasteland, by the 1870s, many came to see the Adirondacks as a valuable wilderness. They remarked on its beauty, wildlife, and recreational opportunities. People with health problems believed that mountain air could help make them well.

As the Adirondacks became a popular destination, the extent of its deforestation made headlines. Editorials and scientific articles warned that overlogging and a growing number of fires were threatening the forest, the river, and the region's potential for public health and recreation. Of all the reasons behind the call for a public park in the Adirondacks, one argument proved most convincing: destroying the trees of the Adirondacks threatened the nation's foremost commercial river.

KEY IDEAS

- The health of the Hudson River is directly tied to the forests of the Adirondacks.
- Artwork, photos, and scientific surveys helped Americans see the distant Adirondacks as a real place worth saving.
- Surveyor Verplanck Colvin advocated for a public park in the Adirondacks in order to end overlogging and protect the source of the Hudson River.

ESSENTIAL QUESTIONS

How do changes in the natural environment affect the economy?

How do visual images shape people's views of the natural world?

How does environmental change happen? What strategies ended logging on state lands in the Adirondacks?

VERPLANCK COLVIN, 1847–1920

Mapping the Adirondacks



Verplanck Colvin knew he would grow up to practice law like his father, a lawyer and politician in Albany. But his boyhood passions were collecting rocks and making maps of places he explored near his family's country home across the Hudson River. When he was 17, he looked at **surveys** of the Adirondacks and mapped a route through the mountains. Then he and a friend headed north, where they found that the map was useless, showing streams where in fact there were mountain peaks. Colvin learned that early **surveyors** had used less-than-accurate equipment and methods. Later, as the official Adirondack surveyor, Colvin used more reliable tools to produce precise and detailed maps.

Colvin was the outdoorsy son of a prominent family. It's likely that he read the 1864 bestseller *Man and Nature*. The book's author was the pioneering conservationist George Perkins Marsh, who studied how excessive **logging** affected **waterways**. He wrote that treeless soil could not absorb water. Instead, rainfall and melting snow raced over exposed hard ground, carrying soil and debris into nearby streams and rivers. This process, known as silting, was making the Hudson River shallower. Colvin took the book's message to heart.

Another view of nature was provided by the artists of the popular **Hudson River School (Introductory Activity)**. Their romantic landscapes appealed to people, especially those who lived in urban, industrial areas. These painters made the rugged Hudson River landscape look spiritual, inviting, and safe. Asher B. Durand, for example, chose to show the Adirondacks as a pristine forest landscape as far as the eye could

see ([Resource 1](#)).

The reality of the Adirondacks was quite different. The region functioned as a warehouse of raw materials, particularly iron and lumber. Wood was needed for nearly everything in nineteenth-century America, so logging dominated, and the methods were rough. Dams were built so logs could be floated to **sawmills** over flooded areas that were soon called “drowned lands.” One dam was built on the Raquette River around the time Durand painted the Adirondacks. According to a local historian, it was 300 feet long and 10 feet tall, and it flooded the land for nearly 30 miles upriver. “Of course all of the fine timber lining the shores was killed, transforming a beautiful section into a dead forest indescribably desolate in appearance.”

Logging was so extensive that by the 1870s, large areas of the Adirondacks were bare of trees. Newspaper reports heightened people's fear that the forests, as well as their animals, were going extinct. This was not entirely true, but many trees were being cut. And rainfall and melting snow were carrying silt into the Hudson, making the river shallower and less easy to navigate. When the water level dropped during droughts, conditions were even worse.

After his first trip as a teenager, Colvin continued to explore the Adirondacks. He was often alone or accompanied by one of the local guides, some of whom were Native Americans. He gave little thought to comfort and often slept on open ground or under his canoe. Returning to Albany, where he practiced law, he began speaking out against uncontrolled

VERPLANCK COLVIN, 1847–1920

Mapping the Adirondacks (*continued*)

Top: Seneca Ray Stoddard, *Bog River Falls, Adirondacks*, ca. 1880. New York State Museum
 Bottom: Seneca Ray Stoddard, *The drowned lands of the lower Raquette*, ca. 1888. Library of Congress, Prints & Photographs Division

logging. He argued for a public park in the Adirondacks to protect the Hudson River. “The Adirondack Wilderness contains the springs which are the sources of our principal rivers, and the feeders of the canals,” he wrote in 1870. “Each summer the water supply for these rivers and canals

is lessened, and **commerce** has suffered.” The Hudson River—and the Erie Canal, which connected to it—were New York’s most essential waterways. So warnings from Colvin and others unnerved Albany lawmakers. In 1872, the state legislature made Colvin a member of a new commission to study the idea of a state park. He was in his early twenties and still regularly exploring. In 1873, he discovered and mapped the area where the Hudson River begins ([Resource 2](#)).

New York State created a new job for Colvin—Superintendent of the State Adirondack Survey. He and a crew began conducting annual surveys, one section of the Adirondacks at a time. In his regular reports to the legislature, he called urgently for restrictions on logging. In 1878, photographer Seneca Ray Stoddard joined Colvin’s expeditions. His photos provided unmistakable evidence of both beauty and destruction. In presentations for the public and for state legislators, Stoddard projected more than 200 slides on a 30-by-30-foot canvas screen, a powerful and unusual media show that impressed audiences. Together, Stoddard and Colvin campaigned for protection of the Adirondacks from overlogging.

In 1883 and 1884, severe drought hit the Adirondacks. Water levels fell so low in the Erie Canal that barges had trouble moving. In 1885, over the objections of logging companies, New York State declared that state-owned lands in the Adirondacks and the **Catskills** were now state forest preserves. This put them under Albany’s control.

In 1892, New York State established Adirondack

Park, combining state and private property into a massive protected area. Limited logging, supervised by state forestry experts, was allowed. Verplanck Colvin, George Perkins Marsh, and Seneca Ray Stoddard all believed that some logging was acceptable if it was managed by the state.

Despite these measures, overlogging continued and the Hudson suffered. Finally, in 1894, an amendment to the state constitution ended large-scale commercial logging on state land in the Adirondacks. (For extracts of these legal measures, see [Resource 3](#).)

Verplanck Colvin continued as superintendent of the State Adirondack Survey until 1900. He died 20 years later in a hospital for the mentally ill. But his decades-long work provided a detailed and accurate knowledge of the stunning Adirondacks. It helped Americans understand that this vast region was not a distant wilderness that could be exploited without cost. The mountains and forests and streams were directly connected to the health of the Hudson River and the financial well-being of the entire state.

VERPLANCK COLVIN, 1847–1920

Mapping the Adirondacks (*continued*)

VOCABULARY

Catskills: The mountain range in southern New York State; since the early 1900s, the source of New York City's drinking water.

commerce: Buying and selling, generally on a large scale.

Hudson River School: A mid-nineteenth-century art movement focused on the landscapes of the Hudson Valley and Catskill Mountains.

logging: The business of cutting down trees to sell the wood.

sawmills: Factories in which machines saw logs into boards.

surveyors: People who measure and map areas of land.

surveys: Maps based on land measurements.

waterways: Navigable bodies of water.

SUGGESTED ACTIVITIES

- Trace the way that concern over navigation on the Hudson River led to the creation of Adirondack Park.
- Working in small groups list the reasons that logging operations existed and continued in the Adirondacks. For example: Americans' need for wood, the rights of private businesses, etc. Then create a second list, identifying steps Verplanck Colvin took to end overlogging. For example: his annual surveying trips, his detailed maps, etc. Now draw arrows connecting Colvin's actions to particular forces that kept logging going. Did Colvin address all the items in the list of forces? If not, speculate about why. What does this activity suggest about the role of individuals in creating change?

DISCUSSION QUESTIONS

- How did concern over navigation on the Hudson River lead to the creation of Adirondack Park?
- What traits of Verplanck Colvin led him to his commitment to the Adirondacks?
- How would written reports, survey maps, and photographs affect the attitudes of people in cities far from the Hudson? What's the difference between reading about a place and seeing images of it? Why were Stoddard's photos important?
- Why would some people think it was acceptable to do extensive logging in the Adirondacks? What arguments would they give?

AN ARTIST'S VIEW OF THE ADIRONDACKS

BACKGROUND

Hudson River School artist Asher Brown Durand journeyed often to the Adirondacks. He believed that trees provided evidence of the **divine** on earth. By capturing the landscape's **majesty** in paintings like *Adirondack Mountains, New York*, Durand conveyed a respect for nature that supported the idea of protecting forests.

Despite Durand's beliefs, skills, and impact, his view of the Adirondacks was selective. He chose to show a rich, green **vista**. But great stretches of the Adirondack forests had already been cut to the ground.

For more about the Hudson River School, see [Introductory Activity: The Hudson River School](#).



Asher Brown Durand (1796–1886), *Adirondack Mountains, New York*, ca. 1870. New-York Historical Society, Gift of Miss Nora Durand Woodman

AN ARTIST'S VIEW OF THE ADIRONDACKS *(continued)*

TAHAWUS
OR
MOUNT MARCY

VOCABULARY

divine: Related to God or a god.

Hudson River School: A popular mid-nineteenth-century art movement that portrayed the Hudson Valley and Catskill Mountains as romantic landscapes. A “school” is a group of artists with a shared vision, style, or subject matter.

majesty: Impressive dignity or beauty.

vista: Scene or view.

SUGGESTED ACTIVITIES

- Compare Asher Durand’s painting ([Resource 1](#)), Verplanck Colvin’s map of the source of the Hudson ([Resource 2](#)), and the Seneca Ray Stoddard photos in Colvin’s life story. For each, write descriptive captions. Then assign key words or hashtags to each image. How are these images different? What audiences would they appeal to?
- Imagine living in 1870, knowing nothing about the Adirondacks, and then seeing Durand’s painting for the first time. Write a letter to the artist telling him what you think and feel about the Adirondacks. Ask him any questions you like.
- List everything you know about the river. Make a list of questions you wish you could answer.
- If you live close enough, visit the Hudson River. Take pictures or draw what you see, or describe what you see in detail.

DISCUSSION QUESTIONS

- How does the painting show what Durand believed and felt about the Adirondacks? Why would he choose to paint this unspoiled view?
- How do you think this painting influenced how New Yorkers, or city people in general, felt about the Adirondacks? About logging? About the Hudson River and Valley?
- What is your idea of the Adirondacks? Have you ever been there? Does Durand’s painting capture the way you know or imagine the area?

WHERE DOES THE HUDSON GET ITS WATER?

BACKGROUND

During one surveying trip, Verplanck Colvin identified and mapped the Adirondack ponds and streams where the Hudson River begins. The highest source was a “**lakelet**” atop Mt. Marcy. It was just two acres in size and barely three feet deep. Colvin described it as “**minute, unpretending.**” He originally called it Summit Water, but it soon became known as Lake Tear of the Clouds. From there, the Hudson travels a little more than 100 miles through the Adirondacks, growing larger as it absorbs other streams.

In Colvin’s 1873 map, red lines chart altitude in the high peaks, and Lake Tear of the Clouds appears in clear blue. This map, and others drawn by Colvin, helped people see how the Hudson River and the Adirondack Mountains were physically connected. In the 1870s, scientists began using the term “watershed” to describe this connection. It means an area where rainwater and melting snow drain toward a single river or other body of water. Today, the Hudson River watershed is known to lie mostly in New York State, but portions stretch into New Jersey, Massachusetts, Vermont, and Connecticut.

VOCABULARY

lakelet: A small lake or a pond.

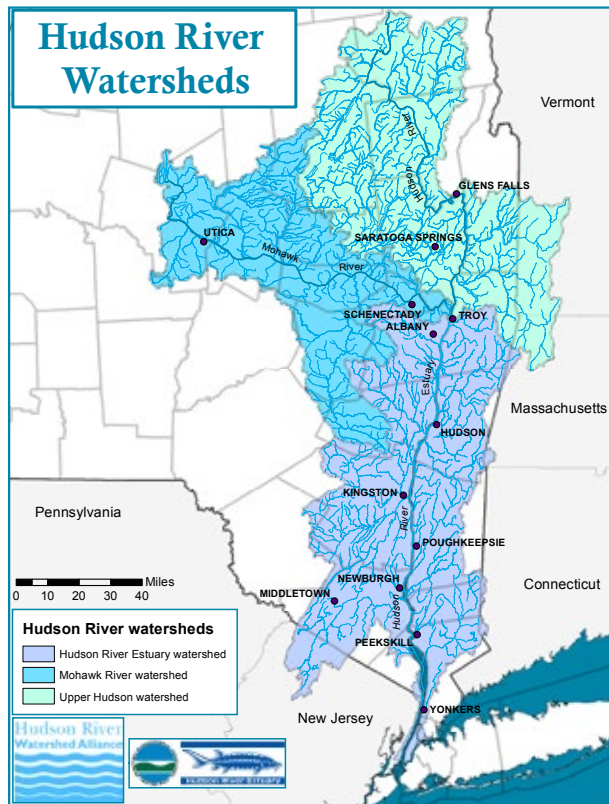
minute: Tiny. Pronounced my-NOOT.

unpretending: Genuine, not showy or false.

Verplanck Colvin, *Secondary reconnaissance sketch of Mount Marcy and the most elevated lakelets or pond sources of the Hudson River*, 1873. Courtesy of Adirondack Experience



WHERE DOES THE HUDSON GET ITS WATER? *(continued)*



Hudson River Watersheds, Hudson River Watershed Alliance

SUGGESTED ACTIVITIES

- Create a poster for New York City students in the 1870s, announcing the discovery of Lake Tear of the Clouds. Be clear about why the discovery was important for New Yorkers.
- Explore the Adirondacks using Google Earth. For example, follow the track of the Hudson River from Lake Tear of the Clouds to Troy. How does the river change as it flows south?

SUGGESTED RESEARCH PROJECT

- Use this site to find out about water quality in different parts of the Hudson River watershed today: <https://www.riverkeeper.org/water-quality/citizen-data>. Compare two areas, one upstate and one downstate. What differences do you see? Why would Riverkeeper want to monitor the river today? (For more about Riverkeeper, see [Unit 3](#).)

DISCUSSION QUESTIONS

- How would the discovery of the Hudson's source affect how people in New York City thought about the river?
- How would understanding the Hudson River watershed influence what people thought about logging in the Adirondacks?
- How would the name given to the lake affect how people thought of it? How would the name, and the lake's small size, contribute to changing attitudes about the river?

PROTECT THE FORESTS TO PROTECT THE HUDSON

BACKGROUND

In 1885, after a drought and dangerously low water levels, New York State created a forest preserve and a commission charged with “the preservation of the forests.” The law regulated logging on state-owned land in the Adirondacks, excluding Altona and Dannemora, where a prison was located. The preserve also included Greene, Ulster, and Sullivan Counties in the **Catskills**. In 1892, legislators added private land to the forest preserve and created the 2.8 million-acre Adirondack Park. With these two steps, New York State attempted to rein in lumber companies and create a space for recreation as well as **commerce**. Logging was permitted but controlled.

Many prominent people argued that, for the sake of the Hudson, logging should be stopped altogether. In 1894, during ongoing drought, the legislature amended the New York State Constitution to keep the Adirondacks as “wild forest lands.” The amendment became known as Forever Wild. Opponents, especially **lumber interests**, fought it. But in the decades since, Forever Wild has never been weakened.

And Adirondack Park has grown. Today, at six million acres, it is the largest publicly protected area in the **contiguous United States**—larger than Yellowstone, Everglades, Glacier, and Grand Canyon National Parks combined. Nearly half the park’s land is owned by New York State, and logging is prohibited there. But the park also includes towns, businesses, resorts, and homes. On privately owned land, controlled logging is permitted under state supervision. So is cutting trees in order to build dams, roads, etc. Because logging has been so dramatically reduced, the soil of the Adirondacks can now absorb more rain and snow than before and can filter the water gradually toward the Hudson River.

Supporters of the Forever Wild amendment mainly wanted to safeguard the Hudson River. But over time, the idea that wilderness itself was a public good began to take hold. In 1964, President Lyndon

1885: Creating The Forest Preserve

All the lands now owned or which may hereafter be acquired by the state of New York, within the counties of Clinton, excepting the towns of Altona and Dannemora, Essex, Franklin, Fulton, Hamilton, Herkimer, Lewis, Saratoga, St. Lawrence, Warren, Washington, Greene, Ulster, and Sullivan, shall constitute and be known as the forest preserve.

The lands now or hereafter constituting the forest preserve shall be forever kept as wild forest lands. They shall not be sold, nor shall they be leased or taken by any person or corporation, public or private

It shall be the duty of the [forest] commission to maintain and protect the forests ... and to promote ... the further growth of forests

The forest commission shall ... prepare ... concise advice ... for the starting of new plantations upon lands that have been denuded, exhausted by cultivation, eroded by torrents, or injured by fire....

1892: Adirondack Park

All lands now owned or hereafter acquired by the State within the county of Hamilton; the towns of Newcomb, Minerva, Schroon, North Hudson, Keene, North Elba, Saint Armand and Wilmington, in the county of Essex; the towns of Harristown, Santa Clara, Altamont, Waverly and Brighton, in the county of Franklin; the town of Wilmar, in the county of Herkimer; the towns of Hopkinton, Colton, Clifton and Fine, in the county of Saint Lawrence, and the towns of Johnsbury, Stony Creek, and Thurman, and the islands in Lake George, in the county of Warren; except such lands as may be sold as provided in this article, shall constitute the Adirondack park. Such park shall be forever reserved, maintained and cared for as ground open for the free use of all the people for their health and pleasure and as forest lands, necessary to the preservation of the headwaters of the chief rivers of the state, and a future timber supply; and shall remain part of the forest preserve.

Top: Laws of New York, 1885, Chapter 283. *First Annual Report of the Forest Commission of the State of New York for the Year 1885* (Albany: Argus Company, 1886).

Bottom: Laws of the State of New York, 1892, Article XIII, Section 290. *First Annual Report of the Commissioners of Fisheries, Game and Forests of the State of New York* (New York and Albany: Wynkoop Hallenbeck Crawford Co., 1896).

PROTECT THE FORESTS TO PROTECT THE HUDSON *(continued)*

B. Johnson signed the Wilderness Act. The law sought to reserve for Americans remnants of wilderness, where “man himself is a visitor who does not remain.

New York State Constitutional Amendment, Article VII (Now XIV), 1894.

1894: Forever Wild Amendment

The lands of the state, now owned or hereafter acquired, constituting the forest preserve as now fixed by law, shall be forever kept as wild forest lands. They shall not be leased, sold or exchanged, or be taken by any corporation, public or private, nor shall the timber thereon be sold, removed or destroyed.

VOCABULARY

Catskills: The mountain range in southern New York State; since the early 1900s, the source of New York City’s drinking water.

commerce: Buying and selling, generally on a large scale.

contiguous United States: The states that border each other; all the states except Alaska and Hawaii.

lumber interests: Companies or individuals who stand to gain from commercial logging.

SUGGESTED ACTIVITIES

- Hold a debate between supporters and opponents of Adirondack logging. Take and defend a position on whether limited logging should be permitted or forbidden, and why.

- Break into small groups, each group reading one of the three laws. Identify key passages and rewrite the law in your own words. Share the findings and summarize how and where these laws brought logging to an end.
- In small groups, discuss how various people would have felt about ending logging on state land. For example: an Adirondack lumberjack; the forest commissioners; Verplanck Colvin; the high-school principal in an Adirondack town; a shop owner in an Erie Canal town; high-school students in the Adirondacks; a Hudson River steamboat captain; a sawmill worker; the owner of a logging company; a manufacturer in New York City. Hold a class discussion about the personal, economic, and social impacts of ending logging in the Adirondacks.
- Compare the life stories of [Verplanck Colvin](#), [Cecilia Gaines](#) (Unit 2), and [Robert Boyle](#) (Unit 3). What commercial activity did each

see as a threat to the river? How were their methods for fighting this activity different? How were they similar? What changes do you see in activists’ strategies over time?

DISCUSSION QUESTIONS

- What did the word “wild” mean in these laws? What does it mean to you?
- Why was drought a factor in state legal actions in the Adirondacks?
- Were all three laws necessary to protect the Hudson? What did each one contribute? How did the laws change between 1885 and 1894?
- Why did New York State end logging entirely on state land? What were leaders trying to accomplish? Whose needs were they attending to?

THE PALISADES, 1890s–1950s

The ancient cliffs of the Palisades line the west side of the Hudson River in New Jersey and New York. Their natural beauty has been celebrated for centuries. But in the 1800s, builders of docks and roads prized the rock of the Palisades. By the 1890s, the builders were blasting the forested cliffs to bits.

Such massive destruction spurred a struggle for the future of the Palisades. In the end, the opponents of the blasting won. They acquired the land and put the cliffs under the protection of an innovative interstate commission.

In 1909, Palisades Interstate Park came into being. The park preserved the magnificent views of the cliffs. It also gave millions of ordinary Americans a place to experience nature firsthand. The result was heightened awareness of the natural environment and growing support for conservation.

KEY IDEAS

- Citizens working together played a key role in the battle to save the Palisades, combining private land purchases and public support.
- The preservation of scenic beauty and historical significance became persuasive reasons to protect the Palisades and other natural landscapes.
- In creating Palisades Interstate Park, two states worked in tandem to provide and maintain a park that benefits both.

ESSENTIAL QUESTIONS

If they have little political power, how can people work for causes they care about?

Why are parks important for people who live in cities?

How does environmental change happen? What strategies protected the Palisades?

CECILIA GAINES, 1867–1943

Saving the Palisades

In late September 1897, Cecilia Gaines organized a tour of the Hudson River for 50 New Jersey women. The **yacht Marietta** was lent to them for the occasion. The women were officers of the New Jersey State Federation of Women's Clubs, gathered for their annual meeting. Gaines, the group's president, wanted them to see what was happening to the **Palisades**, the column-like rock formations on the river's western shore.

The cliffs' hard rock was perfect for building docks, roads, and concrete foundations in New York City. At first, entrepreneurs collected the rock that had fallen to the cliff base. But the 1890s brought growing demand and improved **dynamiting** technology. **Quarry** companies—especially the largest, owned by the Carpenter Brothers—began blasting the cliffs to quickly produce small rocks. The Carpenters had bought stretches of the Palisades, so they were working on their own property.

The 40-mile-long Palisades begin in Hoboken, New Jersey. The tallest, sheerest cliffs run north from Fort Lee to the New York state line. Most of the Palisades quarries were in undeveloped areas north of Fort Lee. Here, according to one journalist of the day, “the lofty Palisades make an almost impenetrable barrier to the civilizing influences which have prevailed lower down the river.” Some people believed the Palisades stood in the way of progress.

But people on both sides of the river complained about the mutilated cliffs and the explosions that shook them in their beds. Cecilia Gaines and her friend Elizabeth Vermilye were members of the

Women's Club in Englewood, New Jersey, just north of Fort Lee. They began alerting women to the damage being done. In 1896, Gaines became president of the New Jersey State Federation. She told her members to agitate. “Write to the press and bombard the legislature with letters.” The following year, she arranged for the yacht trip.

Women's clubs had begun forming in 1890. They joined other Progressive Era efforts to address the problems of industrialism and growing cities. Most clubs adopted a specific mission. For the 800,000 members of the General Federation of Women's Clubs, to which Gaines's group belonged, the mission was civic reform and conservation. Protecting the Palisades was right in line with their goals.

Cecilia Gaines, an **astute** organizer, invited several men to join the yacht trip. Some were journalists. Others were members of New York City's two-year-old American Scenic and Historic Preservation Society. These influential New Yorkers were determined to protect the beauty of the Palisades, as well as their historic Revolutionary War sites. Together, the **irate** passengers viewed the damaged cliffs and planned for action. One reporter called it a council of war.

Newspapers wrote favorably about the trip, but dynamiting continued. In the spring of 1898, the Carpenters began to bring down the rocky point called Indian Head (**Resource 4**). No one doubted that New York City needed stone for **infrastructure**, but not, Gaines believed, at the cost of magnificent scenery and important history. For her, saving the

CECILIA GAINES, 1867–1943

Saving the Palisades (*continued*)

Carpenter Brothers quarry in Fort Lee. Palisades Interstate Park Commission Archives

Palisades was a moral and patriotic responsibility.

Hoping to spur government action, Gaines and the New Jersey State Federation appealed to New Jersey's governor, Foster Voorhees, and state legislators. In New York, the American Scenic and Historic Preservation Society lobbied the conservationist governor, Theodore Roosevelt. In

1899, the two governors formed a joint study group and appointed five citizens from each state. Just before Gaines's marriage to physician John Holland, she and Elizabeth Vermilye were named to the New Jersey group. They were the only female members.

The study group recommended creating a park managed by a new commission representing New

York and New Jersey. The legislatures of both states agreed, and private funders helped buy land for the park. On Christmas Eve, 1900, the Carpenter Brothers agreed to sell their land and close their quarry. Dynamiting of the Palisades stopped for good.

The Palisades **Interstate** Park Commission was the first institution formed by two states solely to conserve scenic features. But Cecilia Gaines and Elizabeth Vermilye were not members of this historic group. The women were told that the male members would not speak freely in their presence. Excluded but still committed, Gaines joined the new League for the Preservation of the Palisades, founded by Vermilye. Although her term as president of the New Jersey State Federation of Women's Clubs had ended in 1898, she continued to speak for the Palisades, locally and nationally. According to the *New York Times*, audiences were inspired by Gaines's efforts: "The California women wish to save the big trees of California, the Colorado women the 'picture' rocks of that State, and if an interest is created in the Palisades it will help them all."

Palisades Park opened in 1909 and became a favorite getaway for New York City residents ([Resource 5](#)). In 1930, Cecilia Gaines Holland reflected on its origins. "I do not claim that women saved the Palisades. That would have been impossible. We were then not even citizens; we had no vote, no power, either political or financial. What we did have was enthusiasm for the shores of the most picturesque river in the world." Later she added another essential factor: "The biggest thing about us," she said, "was our Ambition."

CECILIA GAINES, 1867–1943

Saving the Palisades (*continued*)

VOCABULARY

astute: Clever, perceptive.

dynamiting: Related to the use of dynamite, an explosive patented in 1867 by Alfred Nobel, originator of the Nobel Prize.

infrastructure: The fixed installations a city or society requires, including roads, bridges, subways, etc.

interstate: Involving two or more states.

irate: Angry.

Palisades: In Europe, “palisades” meant defensive walls made of stakes bound closely together. Early settlers in New York thought the Hudson’s cliffs looked like them.

quarry: To harvest stone from naturally occurring rock deposits.

yacht: A pleasure boat, usually large and expensive.

SUGGESTED ACTIVITIES

- Prepare questions for an interview with Cecilia Gaines about the Palisades, then use the questions as the basis for a newspaper article about the yacht trip.
- In a map activity, locate Englewood and Fort Lee in New Jersey, and the New York/New Jersey state line.
- Using Google Images or a similar site, search for “New York City 1900.” Identify photos that help explain why the city needed paving material. Use the photos to summarize the arguments city residents might have used to support quarrying the Palisades.

DISCUSSION QUESTIONS

- What strategies did Gaines and others use against quarrying the Palisades? Why did they work?
- How might the outcome of the Palisades struggle affect how New York and New Jersey residents saw their responsibilities toward the Hudson River?
- The Palisades were saved from destruction by socially and politically prominent people. Why would their prominence matter?
- Why were women able to contribute so much to the effort? What does this, and their later exclusion from the Palisades Interstate Park Commission, indicate about how women were perceived?
- Compare the fight to save the Palisades with other Progressive Era success stories. Who was involved in each? How were American attitudes changing?
- When Gaines reflected on the Palisades battle in 1930, what had changed for women? Why was “our ambition” significant when the battle was being fought?
- Do people have a right to peace, quiet, and beautiful scenery?

BLASTING THE PALISADES

BACKGROUND

One of the distinctive rock formations on the Palisades was known as Indian Head. The formation was as tall as a 20-story building. It projected above the Hudson River just north of Fort Lee, where George Washington had camped with the Continental Army during the American Revolution.

The Carpenter Brothers, the biggest quarrying company on the Palisades, owned the site and planned to demolish the rock formation to produce crushed stone for paving roads. They invited crowds to watch the spectacle of the demolition from the cliff tops. Within a year, the entire formation had been destroyed. The loss of the familiar landmark, coupled with the violation of an American Revolution historical site, inflamed those who wanted to preserve the Palisades.

Today the George Washington Bridge enters New Jersey just south of the site of the destroyed rock formation.

Demolition Begins

*The **brawny** arm of the **boss blaster** flew high as he drew the “**plunger**” out to its full length. Then he forced it back with a quick, vicious thrust. The ground for hundreds of yards back from the brink of the cliff shook and trembled. There was an enormous all-pervading crash and roar. The solid face of the cliff bellied out at the middle and then the whole great surface collapsed and crumbled with a rush. Echoes of the explosion and fall reverberated along the cliffs and shores for six minutes. Where the Indian Head had been there was a huge, raw-looking **concavity** in the side of the Palisades, with a great pile of broken rock heaped at the bottom.*

New York Times, March 5, 1898.

Demolition Ends

*Memorial Day was signaled by the final destruction of one of the most historical points on the Palisades of the Hudson, known as Indian Head. A blast in which at least 10,000 pounds of **dynamite** were used was fired off at the **quarries** of the Carpenter Bros., located at Coytesville, near Fort Lee. The blast brought down about 200,000 tons of earth. It was the most successful effort ever made and brought out of the Palisades a vast amount of earth. . . . Huge masses of rock were thrown to the river, some of them falling into the river. Blocks that lay in the roadway were three times the height of a man.*

*Indian Head, the point finally demolished yesterday, is about 500 yards from Washington Point, at which Gen. Washington arrived after the defeat of his forces in New York. The **declivity** which he climbed still stands. Indian Head a few days ago projected 150 feet into the North River beyond the point at which the demolition commenced.*

Los Angeles Herald, June 1, 1899.

BLASTING THE PALISADES *(continued)*

VOCABULARY

boss blaster: The person in charge of a quarrying site.

brawny: Strong, muscular.

concavity: A pit or depression.

declivity: A downhill slope.

dynamite: An explosive patented in 1867 by Alfred Nobel, originator of the Nobel Prize.

plunger: The device that creates the electrical current that sets off the explosion.

quarries: Areas from which stone is cut for use elsewhere.

SUGGESTED ACTIVITIES

- Analyze the newspaper excerpts from the *New York Times* and the *Los Angeles Herald*. How are they different? (The *Times* described how it sounded, felt, and looked, and communicated emotion with a phrase like “huge, raw-looking concavity.” The *Herald*, on the other side of the country, used less personal language.) How might distance from the Palisades affect how the blasting was viewed?
- Working in small groups, write two letters to the editor of a New York or New Jersey newspaper. In one, present the strongest case for stopping the dynamiting of the cliffs. In the other, present the strongest case for continuing the blasting. Then analyze the arguments of both sides. How are they different?

DISCUSSION QUESTIONS

- Why would the blasting of the Palisades be especially upsetting to those nearby?
- Why would the Carpenter Brothers invite onlookers to the explosion? Why would people come?
- What do you think the quarrymen thought about the Palisades? How do you think they felt about those who opposed their operations?
- How do you interpret the photo of the dynamited Palisades in the Cecilia Gaines life story? How do you react to it today?
- The Carpenter Brothers owned the cliffs they quarried. Did they have the right to blow them up? Why or why not?
- How might the Palisades story have affected attitudes about who can intervene when an environment is at risk?

PALISADES PARK

BACKGROUND

Palisades Park opened officially in 1909. The commissioners had bought, or been given, most of the **cliff face** and shoreline property they needed. The park stretched north 14 miles from Fort Lee, New Jersey, to the New York border. In 1910, it expanded inland after Edward and Mary Harriman donated 10,000 acres, prompting the creation of Harriman and Bear Mountain State Parks in New York. The Palisades Interstate Park Commission operated these facilities, along with other parks added later.

The ambitious construction of camps, trails, beaches, and boathouses, along with new roads and bridges, made the Palisades parks the most popular in the country. Millions of visitors had descended on the parks by the early 1920s. Some of the most enthusiastic were campers from organizations like the Boy Scouts, Girl Scouts, the Jewish Big Sisters, the Negro Fresh Air Committee, and the YMCA. As this list shows, organizations of this period were often separated by race.

Visitors came by ferry or by car, filled every campsite, and crowded the (increasingly polluted) Hudson River beaches. The parks were a common destination for Sunday drives, the place for affordable summer getaways. Yet their very existence was extraordinary. Near the most heavily urbanized, industrialized region in the country, miles and miles of land had been preserved through public and private action for shared enjoyment of the natural world.

Today, the Palisades Interstate Park Commission manages more than 100,000 acres of parks and historic sites for New York and New Jersey.



Top: *Camping at Bear Mountain*; Bottom: *A Palisades Park beach*. Photos courtesy of Palisades Interstate Park Commission Archives

PALISADES PARK *(continued)*

VOCABULARY

cliff face: The tall, vertical rock formation, the Palisades.

SUGGESTED ACTIVITIES

- Based on these photos, write a fictional account of a day (or more) at the park. Include how people traveled to the park, why they came, where they came from, what they did during their stay, and why the park mattered to them.
- Create a poster or travel brochure for a ferry company, urging people to spend a day at the park and advertising the attractions.

DISCUSSION QUESTIONS

- Why were the Palisades Parks popular?
- Where do people go today to escape the crowded city? How do they get there? What's the closest beach to you? The closest place to hike or camp?
- Opponents of dynamiting set out to stop quarry operations on the Palisades. In the end, this effort produced an enormous park system. Compare this unplanned result with the creation of Adirondack Park (Unit 1). Why are final outcomes sometimes different from original goals?



Left, top: A crowded parking lot at Palisades Park; Right, top and bottom: Arriving at the park by ferry. Photos courtesy of Palisades Interstate Park Commission Archives

STORM KING, 1960s–1980s

As it passes through the Hudson Highlands, the Hudson River suddenly narrows, and steep mountains rise on both sides. The Highlands stretch north from near the towns of Haverstraw and Croton-on-Hudson to Newburgh and Beacon. No part of the Hudson has been more praised for its beauty and history. And few campaigns to save the environment have had greater impact than the one conducted here.

By the early 1960s, power plants were rising along the Hudson to support the region's booming economy and sprawling population. When Consolidated Edison announced plans to build a power plant on Storm King Mountain, two new organizations formed to fight the proposal. Scenic Hudson hoped to save a beautiful and historic location in the stunning Highlands. The Hudson River Fishermen's Association was concerned with the health of the river's fish, particularly striped bass. Working separately and together, they fought the utility in the courts of law and public opinion for nearly 20 years.

In a compromise agreement, Con Edison eventually withdrew its plan.

KEY IDEAS

- Despite the growing demand for electrical power in the New York City area, courts viewed scenic beauty, historical significance, and the health of fish as assets to be protected.
- Con Edison's proposal was opposed by two grassroots activist groups, each with its own concerns, working together.
- The battle to protect Storm King Mountain required new skills, constant attention, scientific data, legal advice, and perseverance over many years.

ESSENTIAL QUESTIONS

What rights do people have to use the natural environment to meet human needs? What is the proper limit of those rights?

Is compromise the best, or the only, way to resolve disputes?

How does environmental change happen? What strategies ended the plan to build the Storm King power plant?

ROBERT BOYLE, 1928–2017

Fighting the Power Plant



Robert Boyle was a writer for *Sports Illustrated*. As a boy, he attended boarding school in the Hudson Highlands, the spectacular stretch where the river narrows and curves its way through mountainous terrain. He developed his love of fishing there. In his early thirties, after living on the West Coast, he bought a house in the Highlands. He soon discovered that his beloved Hudson was in trouble. Raw sewage and industrial waste were pouring into the water legally, every day.

Consolidated Edison (Con Edison) was focused on a different problem. This **utility** company provided power to fast-growing New York City and Westchester County. In 1963, to meet the demand for electricity, Con Edison opened a nuclear power plant at Indian Point, just a few miles north of Robert Boyle's home in Croton-on-Hudson, New York. The same year, it applied to the Federal Power Commission (FPC) for a license to build a non-nuclear plant in the Hudson Highlands. The location was Storm King Mountain, near the town of Cornwall. Con Edison's 1962 annual report, published in 1963, included an illustration of the proposed facility ([Resource 6](#)).

Con Edison promised to contribute to the local economy. It offered to create a park on Cornwall's deteriorating industrial waterfront, and many people nearby supported the plan for this reason. But some did not. Several Hudson Valley residents formed a group called Scenic Hudson in 1963. They were concerned about the beauty, recreational uses, history, and culture of the area, and they opposed the proposal.

Robert Boyle joined forces with Scenic Hudson early on, as it worked to prevent the licensing of the Storm King plant. He also continued to fish in the Hudson, and he heard distressing stories from other fishermen. They said there had been large numbers of dead fish in the water at Indian Point since the plant opened in 1963. They told Boyle that Con Edison carted dead fish to the dump regularly and that more fish kept dying.

In April 1965, Boyle published "A Stink of Dead Stripers" in *Sports Illustrated*. In the article, he vividly described what was happening to fish near Indian Point. He quoted an angry fisherman's description of a photo he had taken in early March 1963 at the dump where Con Edison disposed of carcasses. "The fish seen here were supposed to be about one or two days' accumulation. They were piled to a depth of several feet. They covered an area encompassing more than a city lot."

Boyle did not know why fish were dying, but he suspected they were attracted to the warm water discharged by Indian Point's cooling system, and then became trapped under the dock. (In 1969, he wrote that excess heat would lower oxygen levels in the water, make pollutants more toxic, and endanger fish in many other ways as well.) He was convinced that striped bass, a favorite among recreational and commercial fishermen, were at grave risk. He refuted Con Edison's claim that striped bass, or "stripers," **spawned** north of Storm King and would not be harmed by a new power plant there. Boyle cited a 1956 scientific study showing that they spawn in the Hudson Highlands.

ROBERT BOYLE, 1928–2017

Fighting the Power Plant (*continued*)

Fishermen, 1960s. Courtesy of Riverkeeper

Robert Boyle had studied fish biology and was a licensed New York State scientific collector for museums, universities, and laboratories. He wrote with authority when he warned in his article that striped bass eggs and young fish would be sucked into the plant's intake pipe and killed. And larger fish might die at Storm King, as they were dying at Indian Point. Both plants would use the same cooling technology, pulling cool water from the river and discharging heated water.

A month before Boyle's article appeared, the FPC granted Con Edison a license to build the Storm King plant. Scenic Hudson went to court to fight the decision. Con Edison claimed the plant was necessary, especially after a power outage threw

the entire Northeast and much of Canada into darkness on November 9, 1965. But Scenic Hudson won this round. The court ruled in late December that the FPC had to consider the environmental consequences of the plan, which they had not done. They had to assess the plant's effect on scenic beauty, recreational use, historical significance, and the striped bass. This ruling influenced the creation of the 1969 National Environmental Policy Act, which requires environmental review of federally approved projects. This law dramatically strengthened the hand of environmentalists in

future cases. But the battle over Storm King was just beginning.

For fishermen on the river, Con Edison posed one threat. Pollution posed another—sewage, industrial wastes and toxins from factories, oil released into the river by ships. “In 1962, my wife cooked a striped bass that was absolutely inedible. . . . It tasted like a refinery,” Robert Boyle wrote in his 1969 book, *The Hudson River*. Concerned about the river, a group of fishermen formed the Hudson River Fishermen's Association (HRFA) in 1966.

At an early HRFA meeting, Boyle suggested reviving two old federal antipollution laws to report violators. These laws mandated reward money for turning

in polluters, and the Fisherman's Association used the money to finance future efforts. Boyle soon became president of the Fishermen's Association and continued to write about the Hudson for *Sports Illustrated*. He was one of the first journalists to warn of PCB contamination in the Hudson and other waterways ([Unit 4](#)).

The FPC finished its environmental review in 1970. It claimed the Storm King plant “would not adversely affect . . . the natural beauty, the historical significance, or the recreational opportunities of the area. . . . The project will not adversely affect the fish resources of the Hudson River provided adequate protective facilities are installed.” Again, the FPC gave Con Edison the go-ahead to build the plant.

Scenic Hudson and the Fishermen's Association were working together by then, one advocating for the mountain and the scenery, the other for the river and the fish. Conducting studies of their own, they discovered that Con Edison had failed to consider the river's tides when calculating how many young fish would be sucked into the new plant. Presented with this new evidence, the appeals court ordered further studies of the striped bass, and in 1973 the project was again put on hold.

Finally, in August 1979, secret negotiations began between the two sides. The mediator was Russell Train, a former head of the Environmental Protection Agency who was known and respected by all involved. After 16 months of hard but civil bargaining, Robert Boyle was one of those who signed a compromise agreement nicknamed the Peace

ROBERT BOYLE, 1928–2017

Fighting the Power Plant (*continued*)

Treaty on the Hudson. Con Edison won important concessions but withdrew its proposal for Storm King ([Resource 7](#)).

The battle that led to this moment helped foster the modern environmental movement. It secured the legal right of ordinary American citizens to take action on behalf of the environment, marking the birth of true **grassroots** environmentalism. The Hudson River Fishermen's Association, today known as Riverkeeper, and Scenic Hudson are recognized as models for how to use laws, the courts, and public opinion to fight on behalf of the natural environment. Even if it takes years.

VOCABULARY

grassroots: Refers to ordinary people, as opposed to business or political leaders.

spawned: Laid or deposited eggs.

utility: An organization that supplies electricity, gas, or water to a community.

SUGGESTED ACTIVITIES

- Write a scene for a play in which fishermen tell Robert Boyle about the dead fish at Indian Point. Write another scene in which members of Scenic Hudson discuss Con Edison's proposal for Storm King. Compare the reasoning and concerns of the two groups.
- Compare Robert Boyle's story to [Cecilia Gaines's](#) (Unit 2). Analyze how each one advocated for the river and how their stories are different.
- Hold a debate between a supporter and an opponent of the Storm King plant. The supporter might be a resident of New York City who suffered in the 1965 blackout or a shop owner in Cornwall. The opponent might be a commercial fisherman trying to earn a living by catching striped bass or someone who owned a home with a view of the mountain.

SUGGESTED RESEARCH PROJECT

- Research the life cycle of Hudson River striped bass. Then write either a life story or a short piece of fiction about the fish.

DISCUSSION QUESTIONS

- What made Robert Boyle an effective advocate for the Hudson?
- What tools did the Fishermen's Association and Scenic Hudson use to prevent the building of the Storm King Plant? Which seem most important to you?
- Most of the opposition to the plant came from people and organizations nearby. Why would that be?
- How did the differences between Scenic Hudson and the Fishermen's Association make their efforts more effective?
- How does the Storm King struggle demonstrate changing ideas about the Hudson and about the environment more broadly?

THE PROPOSAL FOR STORM KING MOUNTAIN

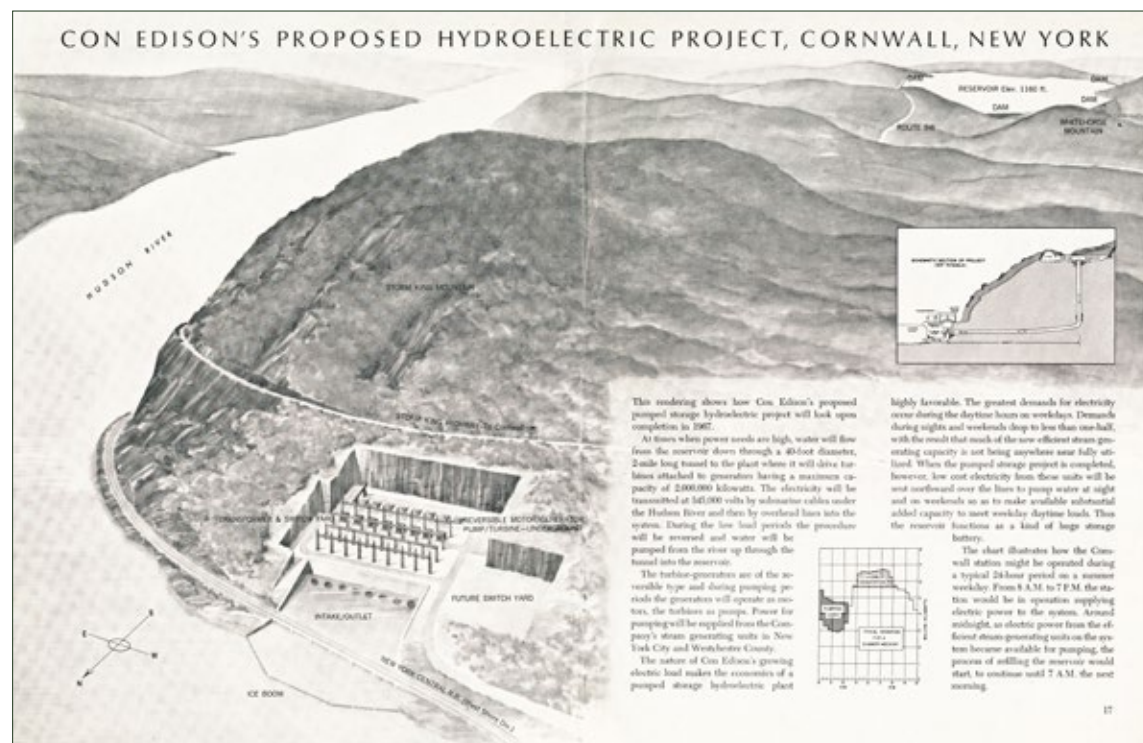
BACKGROUND

In 1962, Con Edison said it needed **peak-load capacity** to provide electricity, especially to New York City, 60 miles to the south. The **utility** was under pressure to prevent recurring **blackouts**. Its proposed power plant on Storm King Mountain would pump water to a storage reservoir high above the river. When demand was high, water would be released to rush downhill and generate electricity.

Con Edison referred to the proposed **hydroelectric** plant as the Cornwall project. The town of Cornwall is just north of Storm King Mountain. But the town did not appear in the **rendering**, and its location was obscured by the block of text.

The power plant would have extended 800 feet along the riverfront. The inset diagram shows the pipe leading up to the **storage reservoir** located southwest of the mountain. **Transmission lines** would have crossed the river just above the northern gateway to the Hudson Highlands, then run east through Putnam County, then south to New York City.

This rendering appeared in Con Edison's 1962 annual report, which was published in 1963. The audience was the company's shareholders, who stood to gain financially if Con Edison made good investments.



Rendering published in Con Edison 1962 shareholder's report, published in 1963. Marist College Archives and Special Collections, Poughkeepsie, NY

THE PROPOSAL FOR STORM KING MOUNTAIN *(continued)*

VOCABULARY

blackouts: Periods when electrical power supply fails and the lights go out.

hydroelectric: Refers to electricity generated by water power.

peak-load capacity: The utility's ability to provide enough electrical power during times of highest demand.

rendering: A drawing, in perspective, to show how a planned construction will look when finished.

storage reservoir: A natural or man-made pool to hold water until needed.

transmission lines: Electrical cables, often strung overhead on poles, that carry power from one location to another.

utility: An organization that supplies electricity, gas, or water to a community.

SUGGESTED ACTIVITIES

- Analyze the language included in the rendering. How did Con Edison present the potential benefits for shareholders? How might the language have been different if the audience were the general public? Is there any hint that Con Edison was aware of objections that might be raised?
- Analyze the rendering. What was it intended to communicate about the planned facility?
- How long is 800 feet? Make a chart or drawing to compare the 800-foot riverfront of the proposed plant to a structure you are familiar with, such as your school or the building where you live. If possible, take a photo of this structure from ground level. Based on this exercise, describe or draw how the Storm King plant would have appeared from water level. Why would Con Edison use this aerial view instead? What did this view suggest about the surrounding area?
- Use a map and online photographs to speculate about who would regularly see the Storm King plant. Cornwall residents? Fishermen? Homeowners on high ground? How would the likelihood of seeing the plant regularly affect people's attitudes toward the proposal?

DISCUSSION QUESTIONS

- Have you experienced a power outage? How long did it last? What was your reaction?
- What clues in the language on the rendering indicate the audience and the message?
- Why would Con Edison refer to this as the Cornwall plant, rather than the Storm King plant?
- How important is scenic beauty? How important are fish and other wildlife? How important are human energy needs? As a society, how should we answer these questions and balance these often competing priorities?

THE PEACE TREATY FOR THE HUDSON

BACKGROUND

Finally, in 1980, the contest over Con Edison's Storm King power plant was settled. This photo documents the signing of the agreement that became known as the Peace Treaty on the Hudson. Frances Stevens Reese, as chairperson, signed for Scenic Hudson. Seated to her right, **Robert Boyle** signed for the Fishermen's Association. George Berry (next to Boyle) signed for the Power Authority of the State of New York. The eight other signers included representatives of Con Edison and local **utilities**, as well as government officials. Russell Train, standing, helped the parties reach agreement. He was not required to sign the document.

The Peace Treaty marked a compromise. Con Edison surrendered its Storm King license and donated the land to the Palisades Interstate Park Commission. It agreed to modify its nearby Indian Point nuclear power plant to reduce fish kills and to **take the plant off-line** during striped bass **spawning season**. Con Edison also established a \$12 million **endowment** for Hudson River research.

In return, the agreement stipulated that Con Edison did not have to build expensive cooling towers at Indian Point. The towers had been **mandated** by the Environmental Protection Agency to replace the existing cooling system, which constantly sucked in river water along with eggs and young fish. Because the towers were designed to recirculate water, they would have drawn much less from the river, killing fewer eggs and young fish.

What resulted from the Storm King struggle? Citizens around the country now had standing to sue in court on behalf of environmental concerns. Federal agencies were now required to investigate all relevant facts before granting approvals for new construction projects. The scenic, historic, and recreational character of places could now be protected under the law.



Signing the Peace Treaty, 1980. Scenic Hudson

And important environmental organizations, including Scenic Hudson and the Hudson River Fishermen's Association (now Riverkeeper), changed the nature of environmental **stewardship** in the Hudson region and beyond. The Hudson River Foundation, using the endowment funds from Con Edison, began the first-ever sustained research on the complex ecology of the Hudson.

When Con Edison withdrew its Storm King proposal, energy demand was starting to drop because of slower economic growth, higher prices, and energy conservation programs. The utility decided to rely on available power sources and encourage customers to save energy.

THE PEACE TREATY FOR THE HUDSON *(continued)*

VOCABULARY

endowment: A fund of money meant to be used over time.

mandated: Demanded or required.

spawning season: The period in the spring when water warms and fish lay their eggs.

stewardship: Providing care and protection.

take the plant off-line: Turn a plant's power off temporarily.

utilities: Organizations that supply electricity, gas, or water to a community.

SUGGESTED ACTIVITIES

- Use all the materials in this unit to compose a diary entry that Boyle might have written on the night of the signing. What do you think he was thinking and feeling?
- Take the role of the Con Edison management and write a letter that tells shareholders about the settlement agreement. Explain why the utility decided to sign and what it plans to do next.

SUGGESTED RESEARCH PROJECT

- On January 8, 2017, after a years-long battle over the safety of the Indian Point nuclear plant, an agreement was reached to close it by 2021. Signers of the agreement were Riverkeeper, New York State, and Entergy Nuclear, the owners of the plant. Research the agreement and compare it to the Peace Treaty on the Hudson.

DISCUSSION QUESTIONS

- What's the right balance between our need for electrical power and the protection of the environment?
- Why did it take so long to reach the Storm King agreement? Why did each side keep fighting?
- Do you think Robert Boyle saw the agreement as a victory? Did Con Edison? The local fishermen? Scenic Hudson?
- How did the outcome of this struggle affect the Hudson River? How did it strengthen the environmental movement?

THE ENVIRONMENTAL MOVEMENT, 1960s–1980s

During the long struggle over Storm King (**Unit 3**), ecological awareness was growing, all along the Hudson. Citizens and government officials began challenging the status quo around pollution. The river had become a cesspool.

By the 1980s, dramatic change had occurred. Citizens could legally intervene to stop projects that put treasured natural resources at risk. New laws, including the 1972 Clean Water Act, regulated the ability to pollute and the handling of raw sewage. Organizations to protect the environment sprang up along the Hudson and throughout the country.

The river is now clean enough for kayakers and healthy enough for some species of fish to begin their return. Its banks are largely free of trash, and special vistas are mostly cleared of obstructions. But many fish in the river are so contaminated with a deadly industrial chemical, polychlorinated biphenyls (PCBs), that they are not safe to eat. Reclaiming the river from this scourge has put the dream of clean, safe water to its toughest test.

KEY IDEAS

- For decades, towns and industries up and down the Hudson emptied sewage, trash, and toxic waste into the river.
- Activists began campaigns to change the way people thought and felt about the river.
- The trash problem is now more under control, and sewage treatment facilities have been built along the river, but PCB contamination still threatens the health of the river, wildlife, and people.

ESSENTIAL QUESTIONS

What makes people become dedicated leaders of reform movements?

What is the role of public support in environmental protection efforts?

**How does environmental change happen?
Between the 1960s and 1980s, what strategies did environmentalists use to protect the Hudson?**

PETE SEEGER, 1919–2014

Fighting for a Clean Hudson



Folksinger Pete Seeger helped publicize the Hudson River's dire condition and left a lasting mark on the environmental movement. But he often called himself just a banjo-picker and a **lefty**. Music and social justice were linked for him, as they were for his family when he was growing up. His father was a music professor, **pacifist**, and political radical. His mother was a violinist and social activist, and his stepmother an accomplished composer. Peggy Seeger, his stepsister, became a noted folksinger and activist.

Pete Seeger saw music as a way to entertain, educate, and bring people together. He was a popular performer for decades. But his left-wing politics put him at odds with much of the country. In 1949, the Ku Klux Klan pelted him with rocks after a concert in Peekskill, New York. In 1955, the House Un-American Activities Committee questioned him about his beliefs. He politely refused to answer and was blacklisted from radio and television for years. But he was still a banjo-picker and a lefty. He marched with Dr. Martin Luther King, Jr., and was a constant presence in protests against the Vietnam War. He often led huge crowds singing "We Shall Overcome."

Several experiences turned Pete Seeger toward environmentalism in the 1960s. He read *Silent Spring*, Rachel Carson's 1962 book about **pesticides** killing fish and birds, which he called a turning point in his life. He bought a little boat and began sailing on the Hudson. After he saw lumps of sewage floating past, he wrote a song about "one million toilet chains" draining into his river. (See [Resource 8](#) for a map of the polluted river in 1965.) In the midst of his reading and sailing, a friend lent him a book about the famed

Hudson River **sloops** of the nineteenth century (for more about the nineteenth century Hudson, see the [Introductory Activity](#)). Inspired by the beautiful old boats, he thought, Why not build a replica?

Seeger was soon leading a group, later known as Clearwater, and giving concerts to raise money for the new sloop. Finally, on May 17, 1969, the *Clearwater* was launched at Bristol, Maine. With its crew of musician-sailors, it reached New York City 37 days later. Mayor John Lindsay came aboard, and a Coast Guard launch provided escort as fireboats shot up plumes of water in celebration. Under full sail, the sloop was a spectacular sight, and it was meant to be. Seeger believed that if people loved the boat, they would love the river again. And if they didn't love the river, it would remain a trash-filled sewer.

The *Clearwater* appeared at the dawn of the modern environmental movement. It was just a year old when it sailed to Washington, DC, for the first Earth Day in 1970. Organizers of the event hoped it would publicize environmental pollution and build support for finding remedies. ([Resource 9](#) is a timeline of landmark environmental events.)

Two years later, the passage of the Clean Water Act provided a national legal platform for challenging pollution. National and state laws, and hard work by *Clearwater* and other organizations, halted the Hudson's downward spiral from trash, sewage, and chemical pollutants. But even today, untreated sewage flows into the Hudson during heavy rainstorms.

PETE SEEGER, 1919–2014

Fighting for a Clean Hudson (*continued*)

Sloop Clearwater sailing by Newburgh junkyard, 1970. United Press International Photograph Collection, Frank Mt Pleasant Library of Special Collections and Archives, Chapman University, CA./ Getty Images

In the early 1970s, Seeger gave up managing the *Clearwater*. He remained its public face while the sloop's team pursued hard-core polluters who were shirking their responsibilities to the river. One of the group's strategies was to position the boat where it would draw attention to specific polluters. The sloop was easily recognized and had become much loved, as Seeger had predicted. No company that poured foul material into the river wanted to see those distinctive sails nearby.

As the *Clearwater* began patrolling the river, a new source of chemical pollution came to light: polychlorinated biphenyls, or **PCBs**. This compound resists extreme temperatures and was used in industrial applications worldwide. General Electric (GE) used PCBs to manufacture electrical equipment at their plants in Hudson Falls and Fort Edward, just below Glens Falls.

Beginning in the 1940s, GE released PCBs into the Hudson River ([Resource 10](#)). Their oily **residue** accumulated on the river bottom and remains lethal to this day. It sticks to plants and the bodies of creatures that are food sources for many fish. These fish are then eaten by other fish. In this way, PCBs have entered the **food chain** of marine life in the Hudson and New York Harbor.

Under the terms of the federal **Superfund law**, passed in 1980, GE was required to pay for removing the PCBs. The company resisted for decades, but between 2009 and 2015, it carried out **dredging** operations and declared its job done. Clearwater is one of many organizations still demanding a more wide-ranging and thorough job. Today, almost 50 years after the PCB threat was discovered, fish from the Hudson watershed are not safe to eat, ever, for a child under 15 or a woman under 50. For others, the dos and don'ts depend on location and type of fish, but the government's message is clear: caution strongly advised.

Pete Seeger was angry about the condition of the river but optimistic about the power of individuals working together. He attended the meetings of the Beacon Sloop Club, one of the Clearwater groups located in towns along the river. He brought food for potluck suppers and his own microphone and speaker so people could be heard. He appeared at the Clearwater Festival, held every year in Croton-on-Hudson. In his 90s, he was still leading people in songs about justice and the river, putting his hand to his ear to signal "Sing louder!"

"My Dirty Stream," 1966

Written and performed by Pete Seeger

Sailing down my dirty stream,
Still I love it and I'll keep the dream
That some day, though maybe not this year,
My Hudson River will once again run clear,
It starts high in the mountains of the north,
Crystal clear and icy, trickles forth,
With just a few floating wrappers of chewing
gum
Dropped by some hikers to warn of things
to come.
At Glens Falls, five thousand honest hands
Work at the consolidated paper plant.
Five million gallons of waste a day.
Why should we do it any other way?
Down the valley, one million toilet chains
Find my Hudson so convenient place
to drain.
And each little city says, "Who, me?"
Do you think that sewage plants come free?"
Out in the ocean, they say the water's clear,
But I live right at Beacon here,
Half way between the mountains and the sea.
Tacking to and fro, this thought returns to me,
Well, it's sailing up my dirty stream.
Still I love it, and I'll dream
That some day, though maybe not this year,
My Hudson River and my country will
run clear.

My Dirty Stream

Words and Music by Pete Seeger

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PETE SEEGER, 1919–2014

Fighting for a Clean Hudson (*continued*)

VOCABULARY

dredging: Scooping material up from the river bottom, often with a machine called a dredge or dredger.

food chain: Living organisms linked because one kind feeds on the next.

lefty: A person who supports left-wing (liberal or socialist) ideals.

pacifist: A person who opposes using war and violence to settle disputes.

PCBs: The short name for polychlorinated biphenyls, a chemical compound used in manufacturing that has severely polluted the Hudson River.

pesticides: Chemical substances that kill insects or other organisms, often to protect crops or animals.

residue: The material remaining at the end of a process. In this case, the PCB-polluted substance on the river bottom.

sloops: Small sailboats with one mast—the tall post that holds the bigger sail.

Superfund law: This law empowers the government to designate hazardous sites and requires polluters to pay cleanup costs.

SUGGESTED ACTIVITIES

- In small groups, analyze the lyrics of “My Dirty Stream.” How do they reflect Seeger’s approach to environmentalism? His personality and experiences? His view of the problem? What words would you use to define the message of this song?
- Write a song, in any style, about your environmental concerns and hopes. Or write a poem, paint a picture, or mount a display of photographs. Or make a playlist of ten songs that reflect your environmental concerns and hopes, with a one-sentence explanation for each song choice. (See below for information about a young activist who raps about the environment.)
- Research a young indigenous environmentalist named Xiuhtezcatl (pronounced Shu-tez-cot) Martinez, who uses rap music and public appearances to encourage activism. He began speaking about the environment as a six-year-old, and he is now one of the plaintiffs suing the US government for failing to take action against climate change (*Juliana v. United States*). He is widely covered in the media. (See <https://www.youtube.com/watch?v=97a-WhYpFfE> for one 4-minute clip.) After your research, compare Martinez and Pete Seeger, focusing on their backgrounds, goals, and strategies.

DISCUSSION QUESTIONS

- What did Pete Seeger bring to the environmental movement? What made this famous folksinger an important voice for the Hudson?
- Why is entertainment a factor in political movements? What did it add to the fight for a cleaner Hudson? Can you think of celebrities today who use their high-profile platform to highlight problems in society?
- What made the *Clearwater* a powerful symbol and actor in efforts to protect the river? Why is it still powerful after half a century?
- Why would the *Clearwater* team focus on education, especially of young people?
- What body of water is closest to where you live? How well do you know it? How could you find out if this water is healthy?
- How does environmental change happen? What strategies did activists use in the 1960s and 1970s to improve the health of the Hudson? What new strategies do activists use today to bring about environmental change?

A HUDSON SNAPSHOT, 1965

BACKGROUND

This map shows some of the pollutants entering the Hudson in 1965. The same year, a series of articles in the *New York Times* and a shocking report from the US Public Health Service may have helped persuade New York State voters to pass a Pure Waters Bond Act.

*“I remember the river as polluted with sewage, **butcher waste**, industrial chemicals, and **heavy metals**. People swam in the river, but at their own risk. People fished in the Hudson, but the fish tasted like oil. On any given day, the creeks might change color from industrial dyes.”*

Frances Dunwell, author and Hudson River Estuary Coordinator,
NYS Department of Environmental Conservation

A POLLUTED RIVER

1. Oil, Chemicals, Heavy Metals

Hastings-on-Hudson

From 1929 to 1975, Anaconda Wire and Cable in Hastings dumped oil, metals, **solvents**, and **PCBs** directly into the river. The factory has been demolished, and the site is being cleaned up under the State Superfund program.

2. Oil, Paint

Tarrytown

In Tarrytown, General Motors ran an automobile factory in the boom years after World War II. Fishermen said they could tell what color GM was painting the cars just by looking at the color of the river.

3. Heavy Oil

Croton-on-Hudson

For decades, Penn Central Railroad discharged oil into the Croton River **tributary** to the Hudson. Oil coated large expanses of the river, drowned ducks, and ruined the edibility of local fish and crabs.



A HUDSON SNAPSHOT, 1965 (continued)

4. Junkyards

Newburgh

Junkyards dotted the Hudson shoreline in the 1960s. Like this one near Newburgh, they scarred the scenic landscape, and also **leached** oil and toxic chemicals into the ground that then seeped into the river.

5. Paper Sludge

Castleton-on-Hudson

“From the paper mills that grind up Adirondack wood for greeting cards, stationery, and fittingly, toilet paper, thick, gray mats of pulp wastes bob along the surface of the Hudson. In some places, the wastes are 10 to 20 feet thick.”

Robert H. Boyle, *The Hudson River*, 1969

6. Dead Fish

Rensselaer

For 20 to 30 miles south of the Troy Dam, the river was so polluted and devoid of dissolved oxygen that fish could not survive there, especially during the summer.

7. PCB Insulating Oil

Hudson Falls & Fort Edward

Before the chemical was banned, General Electric plants at Hudson Falls and Fort Edward dumped up to five tons of toxic **polychlorinated biphenyls** (PCBs) into the river each year from 1946 to 1977.



Clockwise from top left:
1. Anaconda Wire and Cable factory, ca. 1960. Hastings Historical Society
2. General Motors assembly plant, 1960s. Westchester County Historical Society
3. Effluent from Penn Central Railroad Line, ca. 1968. Bob Hoebner / Riverkeeper
4. Sloop Clearwater sailing by Newburgh junkyard, 1970. United Press International Photograph Collection, Frank Mt. Pleasant Library of Special Collections and Archives, Chapman University, CA / Getty Images

POLLUTION NEW YORK CITY

A HUDSON SNAPSHOT, 1965 (continued)

Oil

Fuel oil dominated 20th-century cargo shipments on the Hudson. From the 1940s to the 1970s, just counting major spills, 30 million gallons of fuel oil, **crude oil**, and other **petroleum** products were dumped into New York Harbor.

Raw Sewage

“Each day the West Side of Manhattan alone pours 175 million gallons of absolutely **raw sewage** into the Hudson. It floats down the drains that gird the streets and empties straight into the Hudson, where the tides rock it back and forth.”

Robert H. Boyle, *The Hudson River*, 1969

Trash

Floating debris in New York Harbor menaced navigation. In the 1960s, the Army Corps of Engineers scooped up 24,000 tons of trash from the harbor each year using its specially designed vessel.

TYPES OF POLLUTANTS

Toxic

Acids, chemicals, heavy metals, oil, and **fossil fuel by-products** poison plant and animal life in the river and can travel up the food chain.

Waste

Waste from slaughtering animals, processing food, and manufacturing paper and **textiles** reduces oxygen in the river, making it uninhabitable for most plants and animals.

Sewage

Harmful bacteria from human **intestinal tracts** make the river unsafe for humans and most other living organisms.



Clockwise from top left:

5. Fisherman Everett Nack holds up paper-pulp sludge, 1971. Associated Press

6. Dead fish at Rensselaer, 1953. Times Union, Albany, NY

7. Discarded empty barrel of insulating oil, 1982. Times Union, Albany, NY

A HUDSON SNAPSHOT, 1965 *(continued)*

VOCABULARY

acids: Harsh chemicals, usually liquids.

butcher waste: Parts of animals that cannot be sold as meat, including bones, tendons, and skin.

crude oil: Unrefined petroleum.

fossil fuel byproducts: Harmful materials produced by burning fossil fuels, especially petroleum.

fuel oil: The kind of oil used in engines and furnaces.

heavy metals: High-density metals, like mercury and lead, that are toxic in low doses.

heavy oil: A thick, sticky substance derived from petroleum and similar materials.

intestinal tract: The organ in the human body that digests food and produces solid waste, or feces.

leached: Leaked slowly through a material.

paper sludge: The waste material left over after wood is made into paper.

petroleum: A liquid present in certain kinds of rock. Called “crude oil” until extracted and refined to produce gasoline and other fuels.

polychlorinated biphenyls (PCBs): A toxic chemical compound used as insulating oil and

released in industrial pollution.

raw sewage: Untreated human feces.

remediated: Repaired.

solvents: Substances, usually liquids, that dissolve other substances.

textiles: Cloth or fabrics.

tributary: A river or stream that flows into a lake or larger river.

SUGGESTED ACTIVITIES

- Describe this map in a sentence or two. What important message or messages does it convey? Write a subtitle, caption, or tweet that captures what you think it means.
- Use Google Images or other online sources to survey what the 1965 pollution sites look like today. Work in small groups to cover all the locations noted on the map. Where is the most dramatic change? Which sites appear to still have problems?
- What happened after 1965? Use the timeline of the environmental movement ([Resource 9](#)) to identify important actions through the 1980s.

DISCUSSION QUESTIONS

- Why would industries dump foul material into the river in 1965? Why would it be allowed? What does it indicate about how people viewed the river? Do people see the river in the same way today?
- Much of the Hudson’s pollution, including PCB contamination, is now out of sight. How might that affect people’s commitment to addressing the problem? Brainstorm ways to bring the issue to people’s attention.

THE ENVIRONMENTAL MOVEMENT, 1960s–1980s

BACKGROUND

This timeline highlights some of the landmark events over two decades of the environmental movement. In 1962, Rachel Carson's *Silent Spring* was the opening salvo that alerted so many to the harm posed by pesticides. By 1983, several grassroots organizations had formed and matured, advocating for the river, arousing public concern, and pressuring government for protective legislation.



1962

Silent Spring

Scientist Rachel Carson's book describes the dangers of chemical **pesticides** in words that galvanize public sentiment. Her work helps produce a ban on **DDT** and energizes popular organizing.

1963

Clean Air Act

Congress passes legislation to lessen air pollution. New York State takes action against the **smog** choking New York City and the industrial burning of coal creating harmful **acid rain**.

1965

Scenic Hudson Preservation Conference v. Federal Power Commission

A landmark lawsuit allows environmentalists to sue in the public interest, and requires federal agencies to consider how development will impact the environment, including its wildlife, scenic beauty, and historical sites.

New York State Pure Waters Bond Act

Voters approve Governor Rockefeller's \$1 billion **bond act** to clean the Hudson River. The funds pay for sewage treatment plants in cities along the Hudson.

Water Quality Act

Public outcry over water pollution leads Congress to require that states set water-quality standards. The federal government is charged with

enforcement. Interstate waterways, like the Hudson, particularly benefit.

1967

Environmental Defense Fund

Scientists, lawyers, and conservationists organize on behalf of the environment. Their first lawsuit stops the use of the toxic pesticide DDT on Long Island.

1968

1899 Refuse Act

Bounty

The Hudson River Fishermen's Association successfully sues Penn Central

Railroad for dumping oil into the river. They use an old law that provides a **bounty** for catching polluters. Other successful lawsuits and bounties follow.



1969

National Environmental Policy Act

Groundbreaking legislation follows the terms of the legal decision in *Scenic Hudson v. Federal Power Commission* (1965). Federal agencies must study the environmental consequences of all federal projects and explain how adverse impacts could be avoided or lessened. New York passes similar statewide legislation.

Left: *Silent Spring*. New-York Historical Society
Right: *Fishermen*, 1960s. Patterson Shafer / Riverkeeper

THE ENVIRONMENTAL MOVEMENT, 1960s–1980s (continued)

The Clearwater

Folk singer and activist **Pete Seeger** launches the sloop *Clearwater* into the Hudson to draw people to the river and highlight its plight. The project monitors pollution and conducts environmental education.

1970

Natural Resources Defense Council

Lawyers and activists involved in *Scenic Hudson v. Federal Power Commission* organize to save the environment. Representing the Hudson River Fishermen's Association, they start by suing power plants whose operations harm **aquatic life**.



Earth Day

The first Earth Day, April 22, 1970, brings out 20 million Americans to rally for a cleaner environment. NYC Mayor Lindsay shuts down Fifth Avenue for the march and

welcomes masses of demonstrators to Union Square.

PCBs in Hudson River Fish

Sports Illustrated writer Robert Boyle exposes high levels of toxic chemicals—including **mercury**, DDT, and **PCBs**—in fish from the Hudson River. The PCBs are later traced to two General Electric plants.

Environmental Protection Agency

President Nixon's administration creates a new federal agency to implement national environmental standards. EPA hearings about the harm to fish from Hudson River power plants influence the **Storm King settlement**.



People's Pipewatch collects incriminating evidence against Tuck Tape of Beacon, leading to the first successful New York State lawsuit under the act.

1975

Westway

Clearwater, Hudson River Fishermen's Association, NYC Clean Air Campaign, and others fight an expressway proposed for Manhattan's Hudson waterfront. A determination of harmful impact on Hudson striped bass ends the plan.



1980

Hudson River Foundation

The **Storm King settlement** funds a large endowment for **ecological** studies of the Hudson

1972

Clean Water Act

Congress passes landmark federal legislation to combat water pollution and protect **wetlands**. The Clearwater-affiliated

River **watershed**. The Hudson River Foundation continues its scientific and public-policy research today.

1982

Hudson River National Estuarine Sanctuary

The federal government establishes four wetlands on the Hudson as special sites for research, education, and conservation of sensitive habitats. Today they are known as the **Estuarine** Research Reserve.



1983

Riverkeeper Patrol Boat

Launched The Hudson River Fishermen's Association, soon to be

known as Riverkeeper, begins a full-time river patrol. On John Cronin's first day, he confronts an Exxon tanker discharging polluted **ballast** water into the river.

1987

Hudson River Estuary Management Act

New York State's Department of Environmental Conservation is charged with conserving the river, its fish, and its watershed **ecosystem**, under the leadership of Hudson River Estuary coordinator Fran Dunwell.

Left: *Earth Day* pin. New-York Historical Society
Center, top: *People's Pipewatch*. Clearwater
Center, bottom: *Westway* protesters. Robert Swirsky / Creative Commons S-SA
Right: *John Cronin of Riverkeeper and Exxon tanker*, 1983. Don Nice / Riverkeeper

THE ENVIRONMENTAL MOVEMENT, 1960s–1980s (*continued*)

VOCABULARY

acid rain: Precipitation, either rain or snow, that carries acidic pollution harmful to plants and fish.

aquatic life: Plants and animals that live in water.

ballast: Gravel, sand, water, or other heavy material, placed low in a boat to improve its stability.

bond act: A measure in which voters decide whether to spend additional public funds on a particular project.

bounty: A cash reward.

DDT: A poison used to kill insects. Water-soluble and lethal, its dangers to people and all life on earth were exposed by Rachel Carson's *Silent Spring*. The abbreviation stands for dichloro-diphenyl-trichloroethane.

ecological: Concerning the relationship among living organisms.

ecosystem: A community of interacting organisms, and the environment where they live.

estuarine: Related to an estuary, a body of salty or partly salty water where a river meets the sea. The Hudson is an estuary from New York City to Troy.

mercury: A naturally occurring, highly toxic chemical that enters the Hudson River in industrial waste and untreated sewage. It lodges

in the bodies of fish and harms people who eat the fish.

PCBs: A toxic chemical compound, released in industrial pollution, that has created a severe, long-term, and expensive crisis for the Hudson River. The abbreviation stands for polychlorinated biphenyls.

pesticides: Chemical substances that kill insects or other organisms, often to protect crops or animals.

smog: Fog combined with smoke and other pollutants.

watershed: A land area from which rainwater and melting snow drain to a particular stream, river, or ocean.

wetlands: Areas where water covers the soil or is close to the surface, year-round or seasonally.

SUGGESTED ACTIVITIES

- Identify the key turning points in the environmental movement since the 1960s. Poll the class to determine which entries were identified most often. Hold a class discussion about the top choices. What steps were most important? What did they accomplish? Without them, what would have been different?
- Identify one or two social, political, or economic forces that are advancing the environmental movement. Identify one or two

that are preventing environmental progress.

- Work in small groups to expand the timeline by adding up to a dozen other events from American history. For example, these might include important moments from the Vietnam War, Watergate, social movements for civil rights, gay rights, and women's rights, or landmarks in popular culture. What does this project indicate about how the environmental movement fit into the spirit of the years between 1962 and 1987?

SUGGESTED RESEARCH PROJECT

- Research the environmental movement today. What problems is it addressing? What has changed since 1962, or since 1987?

DISCUSSION QUESTIONS

- What strategies for change do you see in this timeline?
- What actions were taken by federal or state legislators? What actions were taken by individuals or groups?
- Between 1962 and 1987, did the environment keep getting better? Based on what you know, what has happened environmentally since 1987?
- What is the state of the environmental movement today? What does it tell you about the role of individuals and the government in protecting the environment?

LETHAL PCBs

BACKGROUND

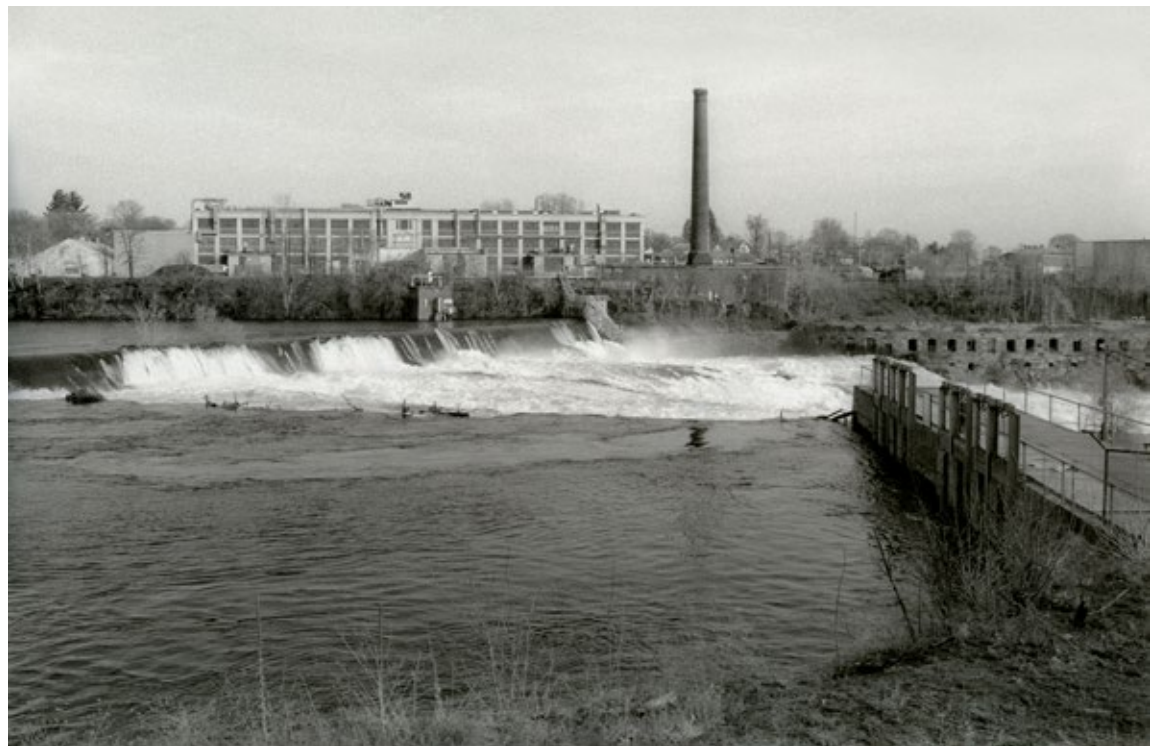
Like many companies worldwide in the twentieth century, General Electric (GE) used **polychlorinated biphenyls**, or **PCBs**, in manufacturing. GE plants at Hudson Falls and Fort Edward, near Glens Falls, New York, released over a million pounds of the toxic substance into the river, beginning in the late 1940s. Most of it lodged in the riverbed **sediment** and stayed behind the Fort Edward dam. But in 1973, for unrelated reasons, the dam was demolished. PCB-contaminated sediment moved down the Hudson. Around the same time, scientists discovered a link between PCBs and human health problems, including liver cancer and **neurological** and **developmental** abnormalities.

When scientists began finding PCBs in animals, the fisherman and journalist Robert Boyle (**Unit 4**) sent five Hudson River striped bass for testing. The bass showed high levels of PCBs and other toxins. Boyle wrote about the results in *Sports Illustrated*, a magazine that covers American sports. His articles sparked an ongoing struggle over how to rid the Hudson of this toxic menace. GE denied responsibility. Government authorities found severe PCB contamination around the nation, and declared the Hudson River to be the “most contaminated water system” on the Atlantic coast. In 1977, the Environmental Protection Agency (EPA) banned the discharge of PCBs into waterways. In 1980, Congress passed the Superfund Act. This law empowers the government to designate hazardous sites and requires polluters to pay cleanup costs. Four years later, the EPA listed a 200-mile stretch of the river, from Hudson Falls to the Battery in New York City, as a Superfund site.

Eventually, government agencies directed GE to **dredge** and remove PCB-contaminated sediment from 40 “**hotspots**” in a 40-mile stretch of the Upper Hudson. GE carried out this work between 2009 and 2015 and now believes it has fulfilled its obligation. Environmental groups and responsible government agencies disagree—their viewpoint was

Poisonous chemical compounds in the flesh and eggs of some of the most popular American saltwater sport fishes have reached levels that are alarming to health authorities and fishery biologists. . . . Dr. Robert Risebrough of the Institute of Marine Resources at the University of California at Berkeley . . . found PCBs in samples of mother’s milk from women in San Francisco and Los Angeles. . . . He called for the establishment of tolerance limits of the compound in human food. Thus far, the FDA [Food and Drug Administration] has set no standard. . . . PCBs are present in the flesh and eggs of all samples. . . . The highest PCB residues in flesh are in the Hudson River striped bass.

Robert Boyle, “Poison Roams Our Coastal Seas,” also identified by the title “Poisoned Fish, Troubled Waters.” *Sports Illustrated*, October 26, 1970.



GE plant at Hudson Falls. Photo by Joseph Squillante

LETHAL PCBs (continued)

bolstered by a 2014 *Albany Times Union* investigation that examined internal GE documents. Tests of river water have shown far more contamination than previously believed. PCBs continue to leak into the water from difficult-to-reach deposits. In December 2018, Governor Andrew Cuomo and the New York State Department of Environmental Conservation released a new study that showed continuing, harmful PCB contamination.

VOCABULARY

contaminated: Made impure or harmful by the addition of a dangerous or poisonous material. Contamination is the state of being impure or harmful.

developmental: Related to the process of growth and change, especially in a child.

dredge: To scoop out material, often with a machine called a dredge or dredger.

hotspots: Places of extreme activity or danger.

neurological: Related to the brain and nervous system.

PCBs: A toxic chemical compound, released in industrial pollution, that has created a severe, long-term, and expensive crisis for the Hudson River. The abbreviation stands for polychlorinated biphenyls.

polychlorinated biphenyls: A chemical

compound that resists extreme temperatures and was widely used in industrial applications. Also called PCBs.

sediment: Matter that settles to the bottom of a liquid.

tolerance limits: The quantity of a substance that a person can absorb without suffering harm.

SUGGESTED ACTIVITIES

- In small groups, list the reasons PCBs are considered such a serious environmental threat. Write a paragraph that summarizes the arguments for removing PCBs from the Hudson.
- Make a timeline of the PCB contamination of the Hudson.
- In small groups, use the summary paragraph and timeline to design a poster that argues for continued dredging of the river.

SUGGESTED RESEARCH PROJECT

- Research the most recent steps taken to remove PCBs from the Hudson. Bring the story as close to the present day as you can. How much has been accomplished? What remains to be done?
- The 40-mile stretch of hotspots in the Upper Hudson lies between Troy and Fort Edward.

In these and nearby communities, the median income is less than average for the United States. Inequities like this exist in many places and have prompted activists to argue for what they term “environmental justice.” Research this term and steps lawyers and others are taking to help communities suffering disproportionately from environmental harm.

DISCUSSION QUESTIONS

- Does potential harm to humans change the way people think about environmental risk? Should it? What if only fish were harmed?
- How should we advocate for the voiceless, including the fish that live in the Hudson?
- Who should bear responsibility for large-scale, deadly environmental pollution?
- What would it take to significantly address the Hudson’s remaining PCB contamination?

A RISING TIDE, TODAY

Two hundred years ago, Hudson River steamboats helped initiate an industrial age driven by the use of fossil fuels. We all now live with its impacts—both positive and negative. What climate change will mean for the Hudson is not fully known. But extreme storms and rising seas have already brought concerns about global climate change to the local level. More and more, scientists and policy makers accept nature’s unpredictability as part of the planning process.

Citizen and government collaborations are underway throughout the Hudson River region, especially in New York Harbor, where the river meets the sea. The New York Governor’s Office of Storm Recovery and the landscape architecture firm SCAPE are implementing a series of “living breakwaters” in Raritan Bay, off the coast of Staten Island. These reef-like structures are designed to lessen wave impacts and restore the shoreline. They will also restore lost habitat for aquatic creatures, including one valued old friend: the eastern oyster.

KEY IDEAS

- The future will be watery, and flexible preparations are needed.
- Nature and history provide important lessons for protecting shorelines and restoring habitat.
- Ingenuity, planning, engineering, and community involvement will help us prepare and build resilience.

ESSENTIAL QUESTIONS

How should we prepare for climate change?

What are the responsibilities of governments, scientists, and citizens? Do young people have special responsibilities?

What makes people sometimes ignore serious threats? What makes them take action?

Designing for a Watery Future



In college, Kate Orff was not thinking about the work that would become her career. She studied political and social thought, took art courses, and worked at a plant nursery. But after graduation she merged these interests and skills. She attended design school and became a landscape architect. In 2007, she founded SCAPE, a landscape architecture firm in lower Manhattan. Ten years later, she won a MacArthur Fellowship, the “genius grant” given every year to 25 people who show exceptional creativity in addressing urgent problems. Orff is the first landscape architect to win the distinguished prize.

Traditionally, landscape architecture has focused on the design of gardens and large spaces like parks. But many professionals today, including Orff, are using their tools and skills to restore natural areas that have been disturbed by humans. “In this era of climate uncertainty,” she says, “landscape architecture can’t just continue as before. We really need to be inspired by the actual physical changes in the environment.”

Few events have brought as much dramatic physical change to New York City as **Superstorm** Sandy in October 2012. Other storms have delivered higher winds and more rain, but Sandy’s storm surge—the wall of water that flooded low-lying areas near the coast—was unprecedented (**Resource 11, Chart 1**). Tottenville, the town at the southern end of Staten Island, saw the most destructive storm surge in the city. On the nearby coastline of New Jersey, beaches were destroyed and beach houses left in splinters. Buildings in lower Manhattan, including SCAPE’s office, were flooded and lost power for days. The

Breezy Point neighborhood of Queens burned nearly to the ground when flood water sparked electrical fires. Forty-three people in New York City died.

The science of climate change predicts more storms in the future, even stronger than Sandy (**Resource 11, Chart 2**). The critical thing, says Orff, “is not to wall ourselves off from rising waters. We have to acknowledge the watery century ahead, and reduce risk.”

In December 2012, New York City’s Mayor Michael Bloomberg brought together experts in many fields and asked them to think about how the city should prepare for a changed climate and more water. Kate Orff described this effort as “working in a ‘war room’ context as part of a team of engineers, cost estimators, and planners.” Her team focused on ways to protect the coastlines of the city’s five boroughs. “We did not presume there would be one thing, a silver bullet, that would solve everything. We need a multi-prong plan: make buildings stronger, **attenuate** waves, strengthen shorelines, reestablish diversity.” The report of the experts’ work, *A Stronger, More Resilient New York*, detailed dozens of initiatives the city could undertake.

In 2013, the federal government took another step. The Department of Housing and Urban Development (HUD) held a global design competition for specific proposals to help New York City adapt to climate change. A year later, the proposal submitted by Kate Orff and the SCAPE team was one of the six winners. Their project will build a series of breakwaters off Tottenville, Staten Island, in Raritan Bay.

KATE ORFF, 1971–

Designing for a Watery Future (*continued*)

A breakwater is an obstacle built near a shoreline to calm rough seas. It is an ancient technology used by coastal peoples. But SCAPE's project, called Living Breakwaters, is designed not only to protect the shoreline during future storms but to create habitats for marine life. The breakwaters will not be solid walls, which would just redirect water to cause damage elsewhere. Instead, they will be **porous** structures, with spaces that fish can swim through and water can move through.

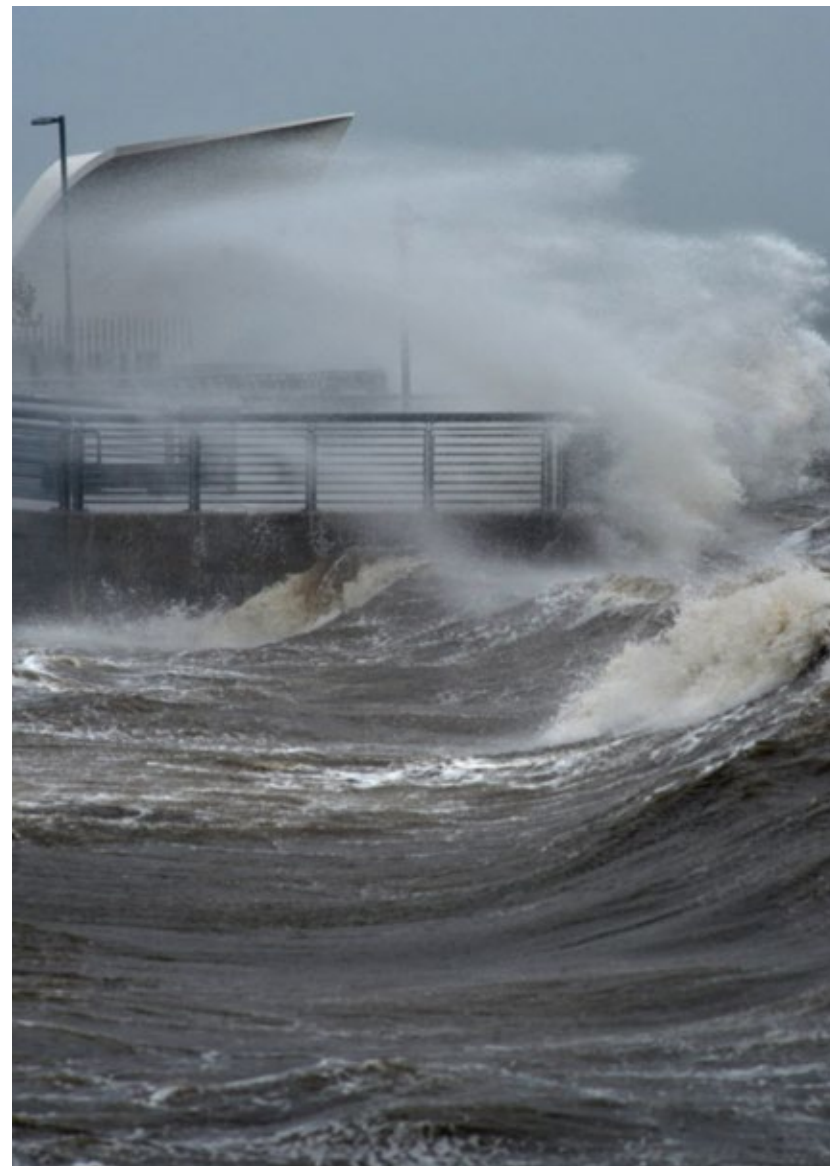
Construction begins in 2019. When complete, Orff says, “a necklace of individual breakwaters will attenuate waves and replenish the fish habitat.” The breakwaters will be seeded with eastern oysters, which once lived in New York Harbor by the millions. These modest creatures, which Orff calls “my new heroes,” will do double duty. As natural filters, they will remove pollutants as they eat, making the water cleaner. And as the colony grows, it will add bulk to the breakwaters, forming structures very similar to the oyster reefs that once covered a quarter of New York Harbor and protected nearby shorelines.

For Orff, collaboration has been critical to the project. In designing Living Breakwaters, she has teamed with economists, engineers, biologists, city planners, local residents, and many others. One essential partner is the Billion Oyster Project ([Resource 13](#)) at the New York Harbor School, a public high school on Governors Island. Students and staff have been working since 2014 to restore New York's oyster population, and they will operate oyster nurseries at Tottenville. These nurseries will hatch baby oysters that will later be moved to the

breakwaters, where they will attach, grow, and reproduce.

One of the major goals of Living Breakwaters is what Kate Orff calls social resilience. “It's not just a physical project. It's a project combining social life on shore, fishermen, students.” The shoreline will be accessible and welcoming. Several “water hubs” will provide facilities for orientation, school groups, **kayak** rentals, and other purposes.

“Importantly,” Orff says, “the project aims to increase the perception of risk by not blocking views to the water.” As people go for walks, take classes, or paddle in kayaks, Orff believes they will better understand the challenges and risks climate change presents. She hopes they will develop a sense of stewardship, of working together to care for the environment. Climate change is a major challenge, but “this is no time for cynicism,” says Orff. “We have to *try*. Acting in your immediate environment, with fellow-citizen activists, is our one source of hope.”



Bill Lyons, *St. George, Staten Island, as Hurricane Sandy approached, October 29, 2012.* Bill Lyons/Staten Island Advance

KATE ORFF, 1971–

Designing for a Watery Future (*continued*)

VOCABULARY

attenuate: Weaken.

kayak: A slim, lightweight boat similar to a canoe but propelled by a two-blade paddle.

mitigate: Make less serious.

porous: Having spaces that water or air can pass through.

superstorm: A weather event that is more complex than a classic hurricane, massive in scale, and extremely destructive.

SUGGESTED ACTIVITIES

- Interview people who lived through Superstorm Sandy or other major storms. What were their experiences? What happened in their neighborhood? Have they taken steps to protect themselves from a future storm?
- Write a short summary of Kate Orff's view of climate change. What does she think could happen in New York Harbor in the future? What role does she believe people should play?
- Compare the work of Kate Orff with that of **Verplanck Colvin**, **Cecilia Gaines**, **Robert Boyle**, and/or **Pete Seeger**. What did each see as a serious threat to the environment? What was their training or background? How did they work within groups to suggest a solution? Based on this work, write a short description of an environmental activist.
- Other drawings of the Living Breakwaters are available at <https://www.scapestudio.com/projects/living-breakwaters-design-implementation>. Choose one and summarize what it shows about how the breakwaters will work.

DISCUSSION QUESTIONS

- What role should different groups take in addressing climate change? Governments? Professionals like scientists and designers? Ordinary citizens? People your age?
- How do you feel about the future of the environment? What do you think will happen during your lifetime?
- What steps should we be taking now to **mitigate** future damage from climate change? In protecting people and the environment, what should our priorities be?
- The word resilience is often used to describe what it means to live with climate change. What does the word mean to you?

SUPERSTORM SANDY AND NYC’S FUTURE RISK

BACKGROUND

The Red Cross reported 117 deaths from **Superstorm** Sandy, spread across Connecticut, Maryland, New Jersey, New York, Pennsylvania, and West Virginia. New York State’s total was the highest—53 deaths, including 43 in New York City. The major cause of death was not trauma from flying or falling debris—it was drowning. Sandy’s most deadly threat was water that rose many feet above normal **sea level**.

In 2013, New York City produced *A Stronger, More **Resilient** New York*. This report analyzes the damage from Superstorm Sandy, identifies future risks, and suggests steps to help the city prepare. These charts were included in the report. Chart 1 shows New York City areas where the **storm surges** from Sandy were greatest. The surge heights were based on a national measurement system known as the North American Vertical Datum of 1988 (NAVD 88).

Chart 2 shows the risks New York City faces from climate change now and in the future. Storm surges from major storms present the greatest danger. But sea levels are rising gradually every year. Today, low-lying areas of the city are already prone to flooding, even without big storms.

VOCABULARY

resilient: Able to withstand difficulty or recover quickly.

sea level: The height of the ocean relative to land. Usually measured as the height of the water between low and high tide. Climate change is causing Arctic ice to melt, raising sea levels around the globe.

storm surges: Walls of water pushed onshore by strong storm winds.

superstorm: A weather event that is more complex than a classic hurricane, massive in scale, and extremely destructive.

CHART 1

PEAK STORM SURGE ELEVATIONS IN NEW YORK CITY DURING SANDY		
LOCATION	TIME Oct. 29, 2012	WATER LEVEL IN FEET (NAVD88)
1. Tottenville, Staten Island	8:38 p.m.	+16.0
2. Great Kills Harbor, Staten Island	8:52 p.m.	+13.2
3. South Beach, Staten Island	8:32 p.m.	+15.0
4. Sea Gate, Brooklyn	8:23 p.m.	+13.3
5. Gowanus Canal, Brooklyn	9:04 p.m.	+11.1
6. Broad Channel, Queens	9:18 p.m.	+10.4
7. Howard Beach, Queens	9:23 p.m.	+11.2
8. Whitestone, Queens	10:06 p.m.	+10.6
9. World’s Fair Marina, Queens	10:06 p.m.	+10.4
10. Inwood, Manhattan	10:06 p.m.	+9.5
11. The Battery, Manhattan	9:24 p.m.	+11.3*

* Equivalent to 14 feet above Mean Lower Low Water (MLLW)

A Stronger, More Resilient New York, p. 42

SUPERSTORM SANDY AND NYC'S FUTURE RISK *(continued)*

CHART 2

RISK ASSESSMENT: THE IMPACT OF CLIMATE CHANGE ON COASTAL PROTECTION IN NEW YORK CITY				
	SCALE OF IMPACT			
HAZARD	TODAY	2020s	2050s	Comments
Gradual				
Sea level rise	Minor Risk	Minor Risk	Moderate Risk	Could cause daily or weekly flooding in low-lying neighborhoods
Increased precipitation	Minor Risk	Minor Risk	Minor Risk	Minimal impact
Higher average temperature	Minor Risk	Minor Risk	Minor Risk	Minimal impact
Extreme Events				
Storm surge	Major Risk	Major Risk	Major Risk	Risk likely would increase as sea levels rise
Heavy downpour	Minor Risk	Minor Risk	Minor Risk	Minimal impact
Heat wave	Minor Risk	Minor Risk	Minor Risk	Minimal impact
High winds	Minor Risk	Minor Risk	Minor Risk	Minimal impact

Major Risk Moderate Risk Minor Risk

A Stronger, More Resilient New York, p. 44

SUGGESTED ACTIVITIES

- Analyze Chart 1 and write a short summary of the data. Find the locations on a map of New York City and, using the timetable in the chart, show the path of the storm surge. What do you learn from this exercise? What questions does it raise?
- How would a storm surge, ten or more feet tall, affect where you live? Measure the height of

things in your neighborhood, like buildings, cars, or store windows. Where would the water line have been?

- Visit one of the areas listed in Chart 1. What is it like today? Find photos of this area after the storm or interview people who lived through it. What was it like then?
- Analyze Chart 2 and write a short summary. What is the most important information in this chart? Write an attention-grabbing headline for a newspaper article about the information in this chart.
- Write a plan for a podcast about Superstorm Sandy in New York City. Without photos, charts, or maps, describe how you would communicate what happened in the city and what might happen in the future. What title would you give your podcast?

Discussion Questions

- How should we use past experience to plan for the future?
- What's the best way to address big problems? Is climate change a different kind of problem? Does it require different kinds of solutions?
- How do these charts make you feel about problems you might face as an adult? What do you think you should do?

HOW A LIVING BREAKWATER WORKS

BACKGROUND

Breakwaters have been used since ancient times. They are barriers, usually made of rocks or concrete, built in the water near a shoreline to calm rough seas. A *living* breakwater is one that also provides habitat for sea life. This drawing was created by the landscape architecture firm SCAPE to show how a living breakwater is constructed. It is not a solid wall, which would relocate water to do harm elsewhere and would fail if incoming waves were too big. Instead, these breakwaters are **porous**. They are designed with spaces so water can flow through and fish can swim through. But they are still obstacles in the water, and waves lose force when they hit them. In this drawing, high waves can be seen on the left. But because of the breakwater, the water closest to the beach is calm enough for **kayaking**.

The drawing shows the location of high and low tides as white perforated lines. Areas identified as “subtidal” are below the low-tide line. Those identified as “intertidal” are between the high- and low-tide lines. Reef streets are specially designed areas in the breakwaters where aquatic life can swim, feed, and establish habitats.

The living breakwaters at Tottenville will be on average 1,000 feet from shore, and their low profile will be visible from the beach. The black cubes that appear on the surface of the breakwaters, identified as EConcrete® units, will house oysters grown by high school students in the Billion Oyster Project ([Resource 13](#)).



A Living Breakwater. Courtesy of SCAPE

KEY:

1. Existing Sea Floor

Breakwater placement avoids hard clam habitat and other critical species.

2. Subtidal Reef Street

Subtidal rock enhancements provide structure for juvenile finfish and lobsters.

3. Intertidal Reef Street

Intertidal shallow water rock enhancements for juvenile fish, lobsters, and mussels.

4. Upland Island

Exposed island habitat free from predators can be used by seals and birds.

5. Subtidal Rocky Substrate

Subtidal shallow water rock enhancements for juvenile **finfish**, lobsters, and shellfish.

6. Mudflats

Zones of moderate **sedimentation** create habitat for hard clams, **benthic fish**, and **eelgrass**.

HOW A LIVING BREAKWATER WORKS *(continued)*

VOCABULARY

benthic fish: Those that live on or near the sea bottom.

eelgrass: An aquatic plant with long, narrow leaves that grows in coastal waters.

finfish: Fish with bones or cartilage, as opposed to shellfish like oysters.

kayaking: Using a slim, lightweight boat similar to a canoe but propelled by a two-blade paddle.

porous: Having spaces that water or air can pass through.

sedimentation: The process in which particles settle to the bottom of a body of water.

SUGGESTED ACTIVITIES

- Imagine that you're on the beach in the upper right corner of the drawing. Write a text to a friend, describing what you can see of the breakwaters and why they're there.
- Working in small groups, prepare a presentation for Tottenville residents, explaining how a breakwater works and how it will help them in a future storm.

DISCUSSION QUESTIONS

- How does the Living Breakwaters project apply lessons from nature and from history?
- When planning for climate change, how much is enough? What should the goals be?
- Why would the Living Breakwaters project try to weaken and slow waves, rather than stop them entirely? Why isn't it a wall?

THE BILLION OYSTER PROJECT

BACKGROUND

Oysters were once common around New York City. Their reefs—the underwater habitats where young oysters attach to the shells of other oysters—covered a quarter of the harbor. By 1900, they had been killed off by pollution and overfishing. Today, high-school students in the Billion Oyster Project (BOP) are working hard to bring them back. The BOP was founded in 2014 by the New York Harbor School on Governors Island. The project's goal is a billion oysters on 100 acres of oyster reefs by 2035. More than 70 New York City restaurants donate empty oyster shells to use in building the reefs.

This photo shows Harbor School students in the Professional Diving Program, the only one of its kind in the United States. Trained as **scuba divers**, they are monitoring an oyster reef that BOP installed at Bush Terminals Park in Brooklyn's Sunset Park neighborhood. Students from local schools and community groups work with Harbor School students and BOP staff to monitor these reefs for oyster growth and survival, **biodiversity**, and water quality.

As oyster experts, students and staff at the Billion Oyster Project are essential to the Living Breakwaters project. Based on its own equipment designs, BOP invented a unique restoration technique for the EConcrete® units on the Living Breakwaters ([Resource 12](#)). The oysters will attach permanently and clean the water as they feed. They will reproduce, and the colony will grow. In this way, the breakwaters will become larger over time and will further strengthen the protective necklace around Tottenville.



Benjamin Von Wong. *Students in the Billion Oyster Project*. Vonwong.com

THE BILLION OYSTER PROJECT *(continued)*

VOCABULARY

biodiversity: The variety of life in the world or, in this case, in the water around the Bush Terminals Park reef.

scuba divers: People trained to swim underwater using special breathing equipment.

SUGGESTED ACTIVITIES

- Write an open letter to restaurants in the New York region, asking them to donate empty oyster shells and explaining why they are needed.
- Using this resource along with the life story of **Kate Orff** and **Resource 12**, write an explanation of how students will contribute to the protection of Tottenville's shoreline.
- Consider what you would like to do to help the environment. Outline a project or special class your school could offer to teach you the skills you would need. Using the model of the Billion Oyster Project, write a proposal or make a presentation to persuade school leaders to begin this program.

DISCUSSION QUESTIONS

- What skills do young people have that older people might lack? How could these skills help address the problems of climate change?
- What role should young people play in addressing climate change? What role could you play?
- Who is responsible for the health of the environment?
- How do people become committed to a cause? What do people your age care most about? How do they act on their commitments?

SOURCE NOTES

GENERAL

Frances F. Dunwell, *The Hudson: America's River* (New York: Columbia University Press, 2008); Robert E. Henshaw, ed., *Environmental History of the Hudson River: Human Uses that Changed the Ecology, Ecology that Changed Human Uses* (Albany, NY: State University of New York Press, 2011); Tom Lewis, *The Hudson: A History* (New Haven, CT: Yale University Press, 2005); David Schuyler, *Embattled River: The Hudson and Modern American Environmentalism* (Ithaca, NY: Cornell University Press, 2018).

CURRICULUM INTRODUCTION

THE HUDSON RIVER SCHOOL

Linda S. Ferber and the New-York Historical Society, *The Hudson River School: Nature and the American Vision* (New York: Skira Rizzoli, 2009).

UNIT 1

THE ADIRONDACKS, 1870S–1890s

Frances F. Dunwell, *The Hudson: America's River* (New York: Columbia University Press, 2008); Jeffrey L. Horrell, *Seneca Ray Stoddard: Transforming the Adirondacks in Text and Image* (Syracuse, NY: Syracuse University Press, 1999); David Lowenthal, *George Perkins Marsh: Prophet of Conservation* (Seattle: University of Washington Press, 2000); Paul Schaefer, ed., *Adirondack Explorations: Nature Writings of Verplanck Colvin* (Syracuse, NY: Syracuse University Press, 1997); Philip G. Terrie,

Forever Wild: A Cultural History of Wilderness in the Adirondacks (Syracuse, NY: Syracuse University Press, 1994); Michael Williams, *Americans and Their Forests: A Historical Geography* (Cambridge, UK: Cambridge University Press, 1989).

UNIT 2

THE PALISADES, 1890S–1950s

Robert O. Binnewies, *Palisades: 100,000 Acres in 100 Years* (New York: Fordham University and Palisades Interstate Park Commission, 2001); Frances F. Dunwell, *The Hudson: America's River* (New York: Columbia University Press, 2008); Cecilia Gaines Holland, “Saving the Palisades: Historical Papers of Cecilia Gaines Holland, Second President, New Jersey State Federation of Women's Clubs, 1896–1898” (Unpublished, New Jersey State Federation of Women's Clubs); Neil M. Maher, *Nature's New Deal: The Civilian Conservation Corps and the Roots of the American Environmental Movement* (New York: Oxford University Press, 2008); The New Jersey State Federation of Women's Clubs, *A History of the New Jersey State Federation of Women's Clubs, 1894–1958* (Caldwell, NJ: Progress Publishing, 1958); Alison M. Parker, “Clubwomen, Reformers, Workers, and Feminists of the Gilded Age and Progressive Era,” in *Women's Rights: People and Perspectives*, ed. Crista DeLuzio (Santa Barbara, CA: ABC-CLIO, 2010); David Schuyler, *Sanctified Landscape: Writers, Artists, and the Hudson River Valley, 1820–1909* (Ithaca, NY: Cornell University Press, 2012).

UNIT 3

STORM KING, 1960S–1980s

Robert H. Boyle, *The Hudson River: A Natural and Unnatural History* (New York: W.W. Norton, 1969); Frances F. Dunwell, *The Hudson: America's River* (New York: Columbia University Press, 2008); Robert D. Lifset, *Power on the Hudson: Storm King Mountain and the Emergence of Modern American Environmentalism* (Pittsburgh, PA: University of Pittsburgh Press, 2014); Riverkeeper, “A Brief History,” <https://www.riverkeeper.org/riverkeeper-mission/our-story/a-brief-history/> (accessed 2/1/2019 by M. Waters); David Schuyler, *Embattled River: The Hudson and Modern American Environmentalism* (Ithaca, NY: Cornell University Press, 2018).

UNIT 4

THE ENVIRONMENTAL MOVEMENT, 1960S–1980s

Clearwater, “The Clearwater Story” and “The Sloop: History and Specifications,” <https://www.clearwater.org> (accessed 2/1/2019 by M. Waters); David King Dunaway, *How Can I Keep from Singing? The Ballad of Pete Seeger* (New York: Villard Books, 2008); Frances F. Dunwell, *The Hudson: America's River* (New York: Columbia University Press, 2008); Rob Rosenthal and Sam Rosenthal, eds., *Pete Seeger: In His Own Words* (Boulder, CO: Paradigm Publishers, 2012); David Schuyler, *Embattled River: The Hudson and Modern American Environmentalism* (Ithaca, NY: Cornell University Press, 2018); David

SOURCE NOTES *(continued)*

L. Strayer, *The Hudson River Primer: The Ecology of an Iconic River* (Berkeley: University of California Press, 2011); Alec Wilkinson, *The Protest Singer: An Intimate Portrait of Pete Seeger* (New York: Vintage Books, 2010).

UNIT 5

CLIMATE CHANGE, TODAY

New York City Economic Development Corporation, June 11, 2013, *A Stronger, More Resilient New York*, <https://www.nycedc.com/resource/stronger-more-resilient-new-york> (accessed 1/4/2019 by M. Waters); Guy Nordenson, Catherine Seavitt, and Adam Yarinsky, *On the Water: Palisade Bay* (New York: Museum of Modern Art, 2010); Kate Orff/SCAPE, *Toward an Urban Ecology* (New York: Monacelli Press, 2016); SCAPE, “Living Breakwaters Design and Implementation,” <https://www.scapestudio.com/projects/living-breakwaters-design-implementation> (accessed 1/3/19 by M. Waters).

RECOMMENDED BOOKS AND WEBSITES

BOOKS

Boyle, Robert H. *The Hudson River: A Natural and Unnatural History*. New York: W. W. Norton & Company, Inc., 1969.

Dunwell, Frances F. *The Hudson: America's River*. New York: Columbia University Press, 2008.

Ferber, Linda S. and the New-York Historical Society *The Hudson River School: Nature and the American Vision*. New York: Skira Rizzoli, 2009.

Henshaw, Robert E., ed. *Environmental History of the Hudson River: Human Uses that Changed the Ecology, Ecology that Changed Human Uses*. Albany: State University of New York Press, 2011.

Lewis, Tom. *The Hudson: A History*. New Haven, CT: Yale University Press, 2005.

Lifset, Robert D. *Power on the Hudson: Storm King Mountain and the Emergence of Modern American Environmentalism*. Pittsburgh, PA: University of Pittsburgh Press, 2014.

Schuyler, David. *Embattled River: The Hudson and Modern American Environmentalism*. Ithaca, NY: Cornell University Press, 2018.

Stanne, Stephen P, Roger G. Panetta, and Brian Forist. *The Hudson: An Illustrated Guide to the Living River*. Piscataway, NJ: Rutgers University Press, 2007.

WEBSITES

UNIT 1

ADIRONDACKS, 1870s–1890s

About the Adirondack Park. A description and map of the park today. <https://www.adirondackcouncil.org/page/the-adirondack-park-19.html>

The Adirondacks: Logging. A 7-minute PBS clip about logging then and now.

<https://www.youtube.com/watch?v=Frp0egKBkXA/>

Fact Sheet: Hudson River Channel, NY (40 Ft.). About dredging operations today. <https://www.nan.usace.army.mil/Media/Fact-Sheets/Fact-Sheet-Article-View/Article/487535/fact-sheet-hudson-river-channel-ny-40-ft/>

UNIT 2

THE PALISADES, 1890s–1950s

Palisades Interstate Park in New Jersey.

<http://www.njpalisades.org/index.html>

Palisades Park Conservancy, which supports all the parks in the Palisades Interstate Park system. <https://www.palisadesparksconservancy.org/parks.php>

UNIT 3

STORM KING, 1960s–1980s

Robert H. Boyle: The Unofficial Defender of the Hudson River. A 6½-minute film made in 2002 by Billmoyers.com. <https://vimeo.com/218993385/>

UNIT 4

THE ENVIRONMENTAL MOVEMENT, 1960s–1980s

Hudson River Cleanup. Environmental Protection Agency. <https://www3.epa.gov/hudson/cleanup.html>

Hudson River PCBs. Riverkeeper. <https://www.riverkeeper.org/campaigns/stop-polluters/pcbs/>

Hudson River Stories. Short films on PCBs and other subjects. <http://www.hudsonriverstories.com>

Documerica. National Archives. Photos from around the country commissioned by the new EPA in the 1970s. <https://www.archives.gov/publications/prologue/2009/spring/documerica.html>. Also available at <https://www.flickr.com/search/?text=Documerica>

Pete Seeger's appearance at 2010 Clearwater Festival, with an interview. <https://www.youtube.com/watch?v=z2yFRONGAWI>

RECOMMENDED BOOKS AND WEBSITES *(continued)*

UNIT 5

A RISING TIDE, TODAY

Billion Oyster Project. An ongoing oyster-restoration project of the New York Harbor School on Governors Island. <https://billionoysterproject.org>

Hurricane Sandy as It Happened. A 7-minute *Wall Street Journal* video. <https://www.youtube.com/watch?v=KeaG1jRLIBw>

Hurricane Sandy: 100 Dramatic Photos from 2012. https://www.silive.com/news/2017/10/remembering_hurricane_sandy_10.html

New York City Flood Hazard Mapper. An interactive to explore flood risk throughout the five boroughs. <https://www1.nyc.gov/site/planning/data-maps/flood-hazard-mapper.page>

NEW YORK STATE LEARNING STANDARDS FOR SOCIAL STUDIES

STANDARD 1: HISTORY OF THE UNITED STATES AND NEW YORK

Students will use a variety of intellectual skills to demonstrate their understanding of major ideas, eras, themes, developments, and turning points in the history of the United States and New York.

STANDARD 3: GEOGRAPHY

Students will use a variety of intellectual skills to demonstrate their understanding of the geography of the interdependent world in which we live—local, national, and global—including the distribution of people, places, and environments over Earth’s surface.

STANDARD 4: ECONOMICS

Students will use a variety of intellectual skills to demonstrate their understanding of how the United States and other societies develop economic systems and associated institutions to allocate scarce resources, how major decision-making units function in the United States and other national economies, and how an economy solves the scarcity problem through market and non-market mechanisms.

STANDARD 5: CIVICS, CITIZENSHIP, AND GOVERNMENT

Students will use a variety of intellectual skills to demonstrate their understanding of the necessity for establishing governments; the governmental systems of the United States and other nations; the United States Constitution; the basic civic values of American constitutional democracy; and the roles, rights, and responsibilities of citizenship, including avenues of participation.

4TH GRADE

4.1 GEOGRAPHY OF NEW YORK STATE: New York State has a diverse geography. Various maps can be used to represent and examine the geography of New York State.

	Unit 1	Unit 2	Unit 3	Unit 4	Unit 5
4.1a Physical and thematic maps can be used to explore New York State’s diverse geography.	✓			✓	
4.6 WESTWARD MOVEMENT AND INDUSTRIALIZATION: New York State played an important role in the growth of the United States. During the 1800s, people traveled west looking for opportunities. Economic activities in New York State are varied and have changed over time, with improvements in transportation and technology.					
4.6b In order to connect the Great Lakes with the Atlantic Ocean, the Erie Canal was built. Existing towns expanded and new towns grew along the canal. New York City became the busiest port in the country.	✓				
4.6d Farming, mining, lumbering, and finance are important economic activities associated with New York State.	✓				
4.6g As manufacturing moved out of New York State, service industries and high-technology industries have grown.			✓	✓	

NEW YORK STATE LEARNING STANDARDS FOR SOCIAL STUDIES *(continued)*

8TH GRADE

8.2 A CHANGING SOCIETY: Industrialization and immigration contributed to the urbanization of America. Problems resulting from these changes sparked the Progressive movement and increased calls for reform.					
	Unit 1	Unit 2	Unit 3	Unit 4	Unit 5
8.2a Technological developments changed the modes of production, and access to natural resources facilitated increased industrialization. The demand for labor in urban industrial areas resulted in increased migration from rural areas and a rapid increase in immigration to the United States. New York City became the nation's largest city, and other cities in New York State also experienced growth at this time.	✓	✓	✓	✓	✓
8.2e Progressive reformers sought to address political and social issues at the local, state, and federal levels of government between 1890 and 1920. These efforts brought renewed attention to women's rights and the suffrage movement and spurred the creation of government reform policies.		✓			
8.8 DEMOGRAPHIC CHANGE: After World War II, the population of the United States rose sharply as a result of both natural increases and immigration. Population movements have resulted in changes to the American landscape and shifting political power. An aging population is affecting the economy and straining public resources.					
8.8c Pollution, population growth, the consumption of natural resources, clearing of land for human sustenance, and large-scale industrialization have put added stress on the global environment.			✓	✓	✓

8.9 DOMESTIC POLITICS AND REFORM: The civil rights movement and the Great Society were attempts by people and the government to address major social, legal, economic, and environmental problems. Subsequent economic recession called for a new economic program.					
	Unit 1	Unit 2	Unit 3	Unit 4	Unit 5
8.9b The civil rights movement prompted renewed efforts for equality by women and other groups.				✓	

NEW YORK STATE LEARNING STANDARDS FOR SOCIAL STUDIES *(continued)*

10TH GRADE

10.3 CAUSES AND EFFECTS OF THE INDUSTRIAL REVOLUTION: Innovations in agriculture, production, and transportation led to the Industrial Revolution, which originated in Western Europe and spread over time to Japan and other regions. This led to major population shifts and transformed economic and social systems.					
	Unit 1	Unit 2	Unit 3	Unit 4	Unit 5
10.3b Factors including new economic theories and practices, new sources of energy, and technological innovations influenced the development of new communication and transportation systems and new methods of production. These developments had numerous effects.			✓	✓	✓
10.9 GLOBALIZATION AND A CHANGING GLOBAL ENVIRONMENT (1990–PRESENT): Technological changes have resulted in a more interconnected world, affecting economic and political relations and in some cases leading to conflict and in others to efforts to cooperate. Globalization and population pressures have led to strains on the environment.					
10.9c Population pressures, industrialization, and urbanization have increased demands for limited natural resources and food resources, often straining the environment.					✓

11TH GRADE

11.5 INDUSTRIALIZATION AND URBANIZATION (1870 – 1920): The United States was transformed from an agrarian to an increasingly industrial and urbanized society. Although this transformation created new economic opportunities, it also created societal problems that were addressed by a variety of reform efforts.					
	Unit 1	Unit 2	Unit 3	Unit 4	Unit 5
11.5a New technologies and economic models created rapid industrial growth and transformed the United States.	✓		✓	✓	
11.5b Rapid industrialization and urbanization created significant challenges and societal problems that were addressed by a variety of reform efforts.		✓			
11.10 SOCIAL AND ECONOMIC CHANGE/DOMESTIC ISSUES (1945 – present): Racial, gender, and socioeconomic inequalities were addressed by individuals, groups, and organizations. Varying political philosophies prompted debates over the role of the federal government in regulating the economy and providing a social safety net.					
11.10b Individuals, diverse groups, and organizations have sought to bring about change in American society through a variety of methods.				✓	✓

NEW YORK STATE LEARNING STANDARDS FOR SOCIAL STUDIES *(continued)*

Common Core State Standards for English Language Arts & Literacy in History/Social Studies

GRADES 6–8

Key Ideas and Details	Unit 1	Unit 2	Unit 3	Unit 4	Unit 5
1) Cite specific textual evidence to support analysis of primary and secondary sources.	✓	✓	✓	✓	✓
2) Determine the central ideas or information of a primary or secondary source; provide an accurate summary of the source distinct from prior knowledge or opinions.	✓	✓	✓	✓	✓
Craft and Structure					
4) Determine the meaning of words and phrases as they are used in a text, including vocabulary specific to domains related to history/social studies.	✓	✓	✓	✓	✓
5) Describe how a text presents information (e.g., sequentially, comparatively, causally).	✓	✓	✓	✓	
6) Identify aspects of a text that reveal an author's point of view or purpose (e.g., loaded language, inclusion or avoidance of particular facts).		✓	✓	✓	
Integration of Knowledge and Ideas					
7) Integrate visual information (e.g., in charts, graphs, photographs, videos, or maps) with other information in print and digital texts.	✓	✓	✓	✓	✓
8) Distinguish among fact, opinion, and reasoned judgment in a text.		✓		✓	
9) Analyze the relationship between a primary and secondary source on the same topic.	✓	✓	✓	✓	✓
Range of Reading and Level of Text Complexity					
10) By the end of grade 8, read and comprehend history/social studies texts in the grades 6-8 text complexity band independently and proficiently.	✓	✓	✓	✓	

NEW YORK STATE LEARNING STANDARDS FOR SOCIAL STUDIES *(continued)*

Common Core State Standards for English Language Arts & Literacy in History/Social Studies

GRADES 11–12

Key Ideas and Details	Unit 1	Unit 2	Unit 3	Unit 4	Unit 5
1) Cite specific textual evidence to support analysis of primary and secondary sources, connecting insights gained from specific details to an understanding of the text as a whole.	✓	✓	✓	✓	✓
2) Determine the central ideas or information of a primary or secondary source; provide an accurate summary that makes clear the relationships among the key details and ideas.	✓	✓	✓	✓	✓
3) Evaluate various explanations for actions or events and determine which explanation best accords with textual evidence, acknowledging where the text leaves matters uncertain.		✓	✓	✓	
Craft and Structure					
4) Determine the meaning of words and phrases as they are used in a text, including analyzing how an author uses and refines the meaning of a key term over the course of a text (e.g., how Madison defines faction in Federalist No. 10).	✓	✓	✓	✓	✓
5) Analyze in detail how a complex primary source is structured, including how key sentences, paragraphs, and larger portions of the text contribute to the whole.			✓		
6) Evaluate authors' differing points of view on the same historical event or issue by assessing the authors' claims, reasoning, and evidence.		✓			

Integration of Knowledge and Ideas	Unit 1	Unit 2	Unit 3	Unit 4	Unit 5
7) Integrate and evaluate multiple sources of information presented in diverse formats and media (e.g., visually, quantitatively, as well as in words) in order to address a question or solve a problem.	✓	✓	✓	✓	✓
8) Evaluate an author's premises, claims, and evidence by corroborating or challenging them with other information.		✓	✓	✓	
9) Integrate information from diverse sources, both primary and secondary, into a coherent understanding of an idea or event, noting discrepancies among sources.	✓	✓	✓	✓	
Range of Reading and Level of Text Complexity					
10) By the end of grade 12, read and comprehend history/social studies texts in the grades 11-CCR text complexity band independently and proficiently.	✓	✓	✓	✓	



INTRODUCTORY ACTIVITY: THE HUDSON RIVER SCHOOL

Jasper Francis Cropsey (1823–1900), *A Sketch of Castle Garden, New York*, 1851. New-York Historical Society, Thomas Jefferson Bryan Fund



INTRODUCTORY ACTIVITY: THE HUDSON RIVER SCHOOL

George Harvey (1799–1880), *Afternoon Hastings Landing, Palisades Rocks in Shadow, New York, 1836–37*. New-York Historical Society, Gift of Charles E. Dunlap



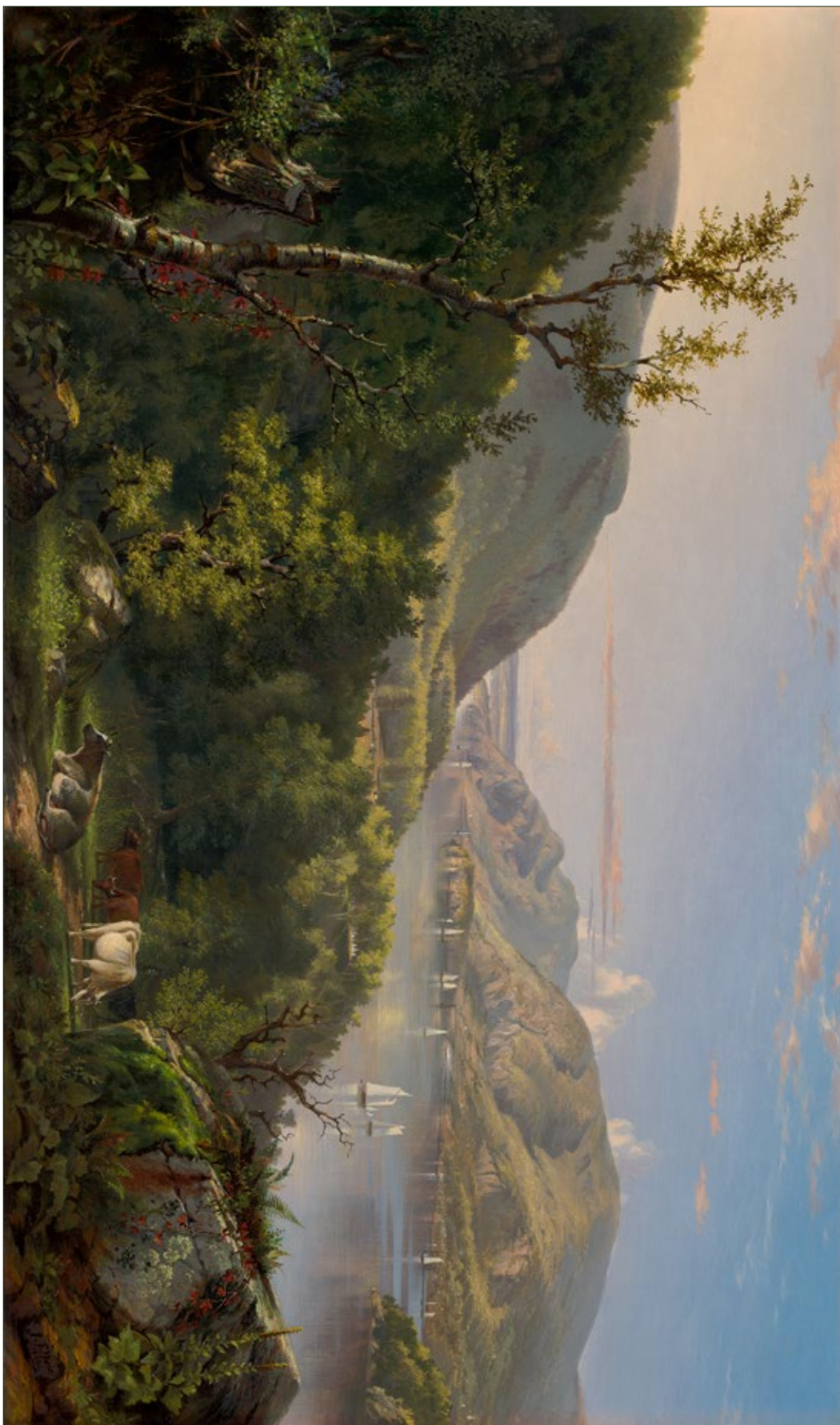
INTRODUCTORY ACTIVITY: THE HUDSON RIVER SCHOOL

Robert Havell (1793–1878), *View of the Hudson River from Tarrytown Heights*, ca. 1842. New-York Historical Society, Gift of Harry Peck Havell



INTRODUCTORY ACTIVITY: THE HUDSON RIVER SCHOOL

John V. Cornell (b. 1813), *Steamboat Iron Witch*, 1846. New-York Historical Society, Gift of Samuel Verplanck Hoffman



INTRODUCTORY ACTIVITY: THE HUDSON RIVER SCHOOL

John Ferguson Weir (1841–1926), *View of the Highlands from West Point*, 1862. New-York Historical Society, Robert L. Stuart Collection



INTRODUCTORY ACTIVITY: THE HUDSON RIVER SCHOOL

Asher Brown Durand (1796–1886), *Beacon Hills on the Hudson River, Opposite Newburgh—Painted on the Spot*, ca. 1852. New-York Historical Society, Gift of Lucy Maria Durand Woodman



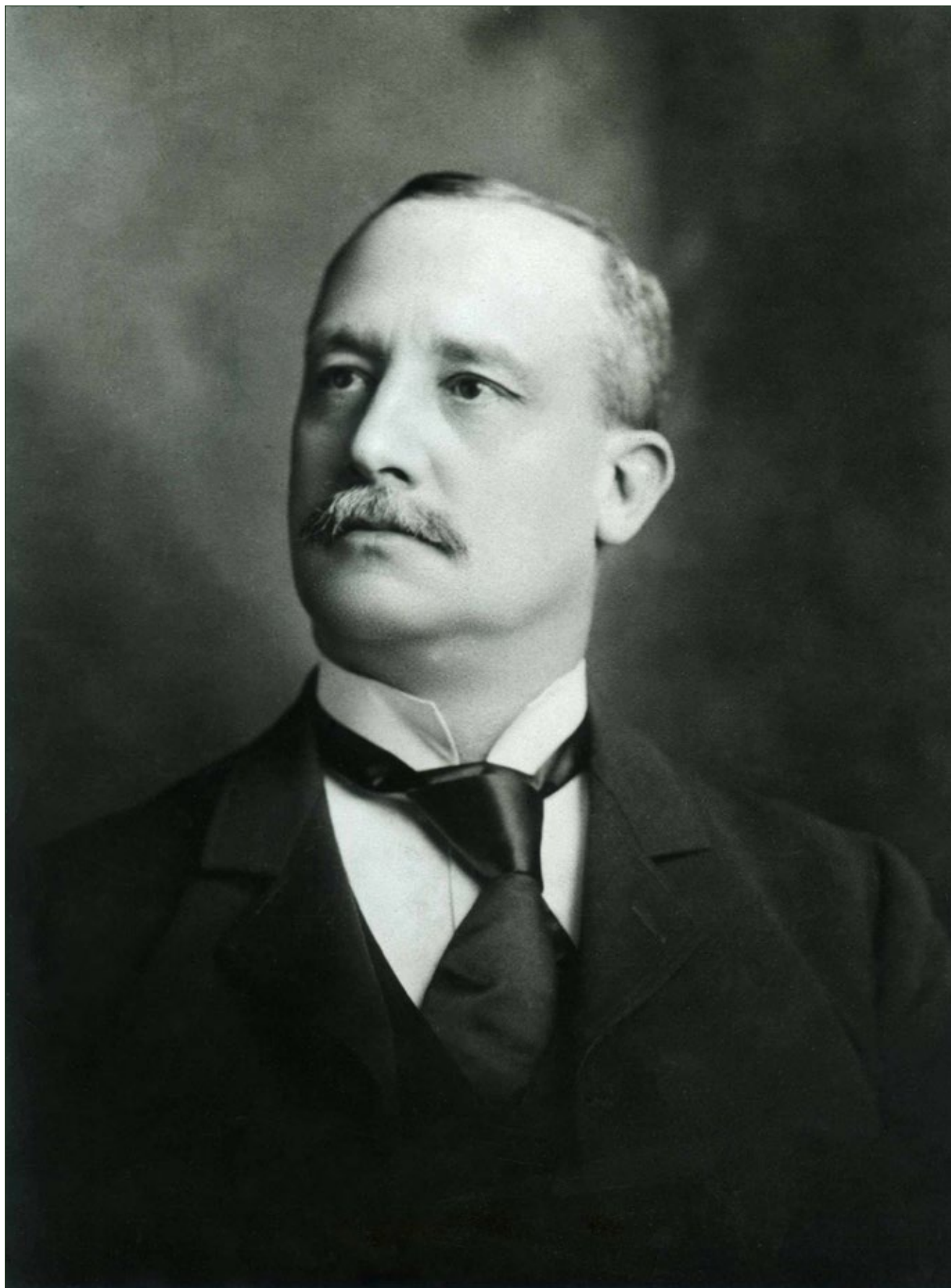
INTRODUCTORY ACTIVITY: THE HUDSON RIVER SCHOOL

William Guy Wall (1792–after 1964), *View near Fishkill, New York*, 1820. New-York Historical Society, Louis Durr Fund



INTRODUCTORY ACTIVITY: THE HUDSON RIVER SCHOOL

Worthington Whittredge (1820–1910), *A Window, House on the Hudson River*, 1863. New-York Historical Society, Robert L. Stuart Collection



LIFE STORY: VERPLANCK COLVIN

Verplanck Colvin, ca. 1885. Courtesy of Adirondack Experience



LIFE STORY: VERPLANCK COLVIN

Seneca Ray Stoddard, *Bog River Falls, Adirondacks*, ca. 1880. New York State Museum



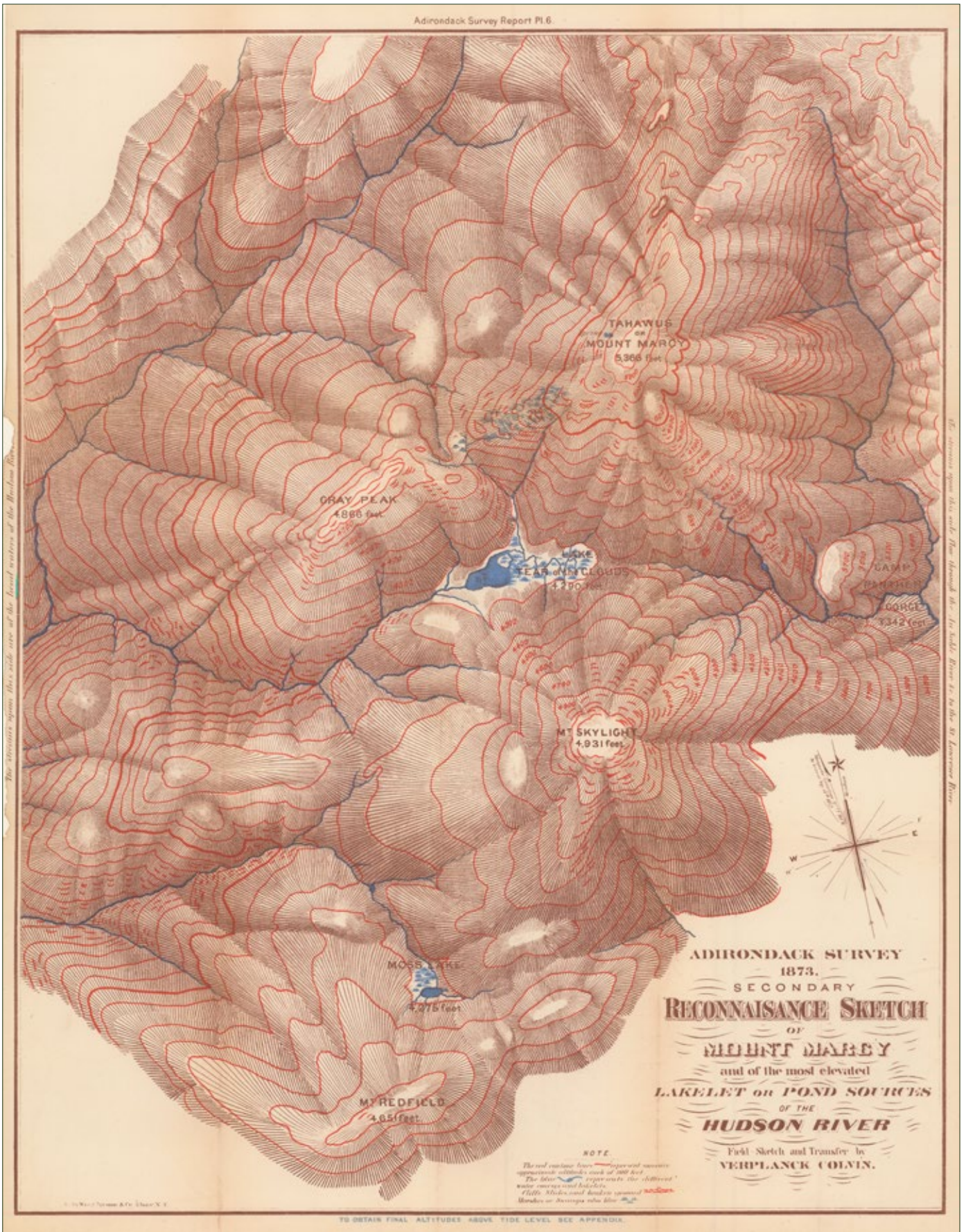
LIFE STORY: VERPLANCK COLVIN

Seneca Ray Stoddard, *The drowned lands of the lower Raquette*, ca. 1888. Library of Congress, Prints and Photographs Division



RESOURCE 1: AN ARTIST'S VIEW OF THE ADIRONDACKS

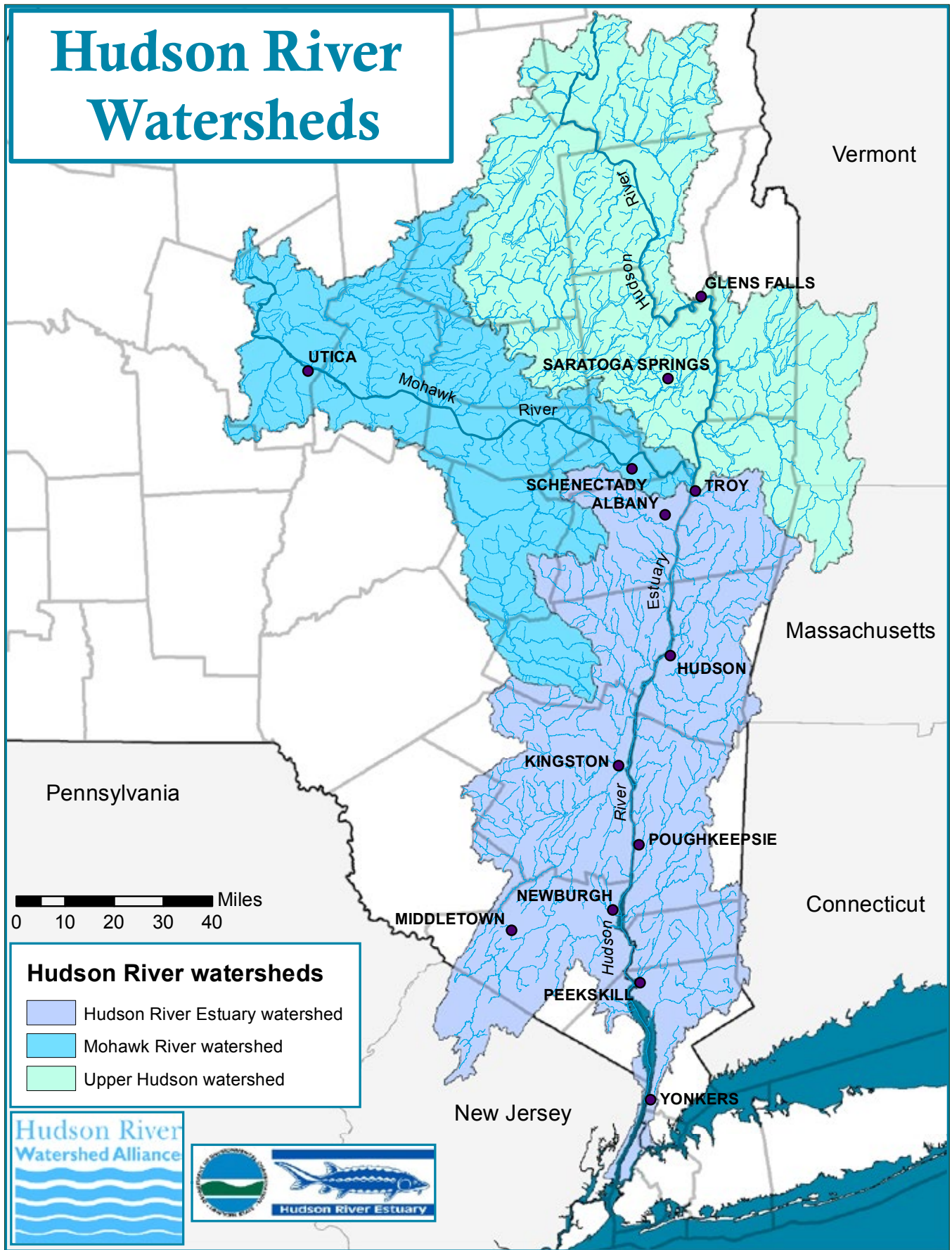
Asher Brown Durand (1796–1886), *Adirondack Mountains, New York*, ca. 1870. New-York Historical Society, Gift of Miss Nora Durand Woodman



RESOURCE 2: WHERE DOES THE HUDSON GET ITS WATER?

Verplanck Colvin, *Secondary reconnaissance sketch of Mount Marcy and the most elevated lakelets or pond sources of the Hudson River*, 1873. Courtesy of Adirondack Experience

Hudson River Watersheds



RESOURCE 2: WHERE DOES THE HUDSON GET ITS WATER?
Hudson River Watersheds, Hudson River Watershed Alliance

1885: Creating The Forest Preserve

All the lands now owned or which may hereafter be acquired by the state of New York, within the counties of Clinton, excepting the towns of Altona and Dannemora, Essex, Franklin, Fulton, Hamilton, Herkimer, Lewis, Saratoga, St. Lawrence, Warren, Washington, Greene, Ulster, and Sullivan, shall constitute and be known as the forest preserve.

The lands now or hereafter constituting the forest preserve shall be forever kept as wild forest lands. They shall not be sold, nor shall they be leased or taken by any person or corporation, public or private....

It shall be the duty of the [forest] commission to maintain and protect the forests...and to promote ... the further growth of forests

The forest commission shall ...prepare ... concise advice ... for the starting of new plantations upon lands that have been denuded, exhausted by cultivation, eroded by torrents, or injured by fire

1892: Adirondack Park

All lands now owned or hereafter acquired by the State within the county of Hamilton; the towns of Newcomb, Minerva, Schroon, North Hudson, Keene, North Elba, Saint Armand and Wilmington, in the county of Essex; the towns of Harristown, Santa Clara, Altamont, Waverly and Brighton, in the county of Franklin; the town of Wilmart, in the county of Herkimer; the towns of Hopkinton, Colton, Clifton and Fine, in the county of Saint Lawrence, and the towns of Johnsburch, Stony Creek, and Thurman, and the islands in Lake George, in the county of Warren; except such lands as may be sold as provided in this article, shall constitute the Adirondack park. Such park shall be forever reserved, maintained and cared for as ground open for the free use of all the people for their health and pleasure and as forest lands, necessary to the preservation of the headwaters of the chief rivers of the state, and a future timber supply; and shall remain part of the forest preserve.

1894: Forever Wild Amendment

The lands of the state, now owned or hereafter acquired, constituting the forest preserve as now fixed by law, shall be forever kept as wild forest lands. They shall not be leased, sold or exchanged, or be taken by any corporation, public or private, nor shall the timber thereon be sold, removed or destroyed.

RESOURCE 3: PROTECT THE FORESTS TO PROTECT THE HUDSON

Laws of New York, 1885, Chapter 283. *First Annual Report of the Forest Commission of the State of New York for the Year 1885* (Albany: Argus Company, 1886).

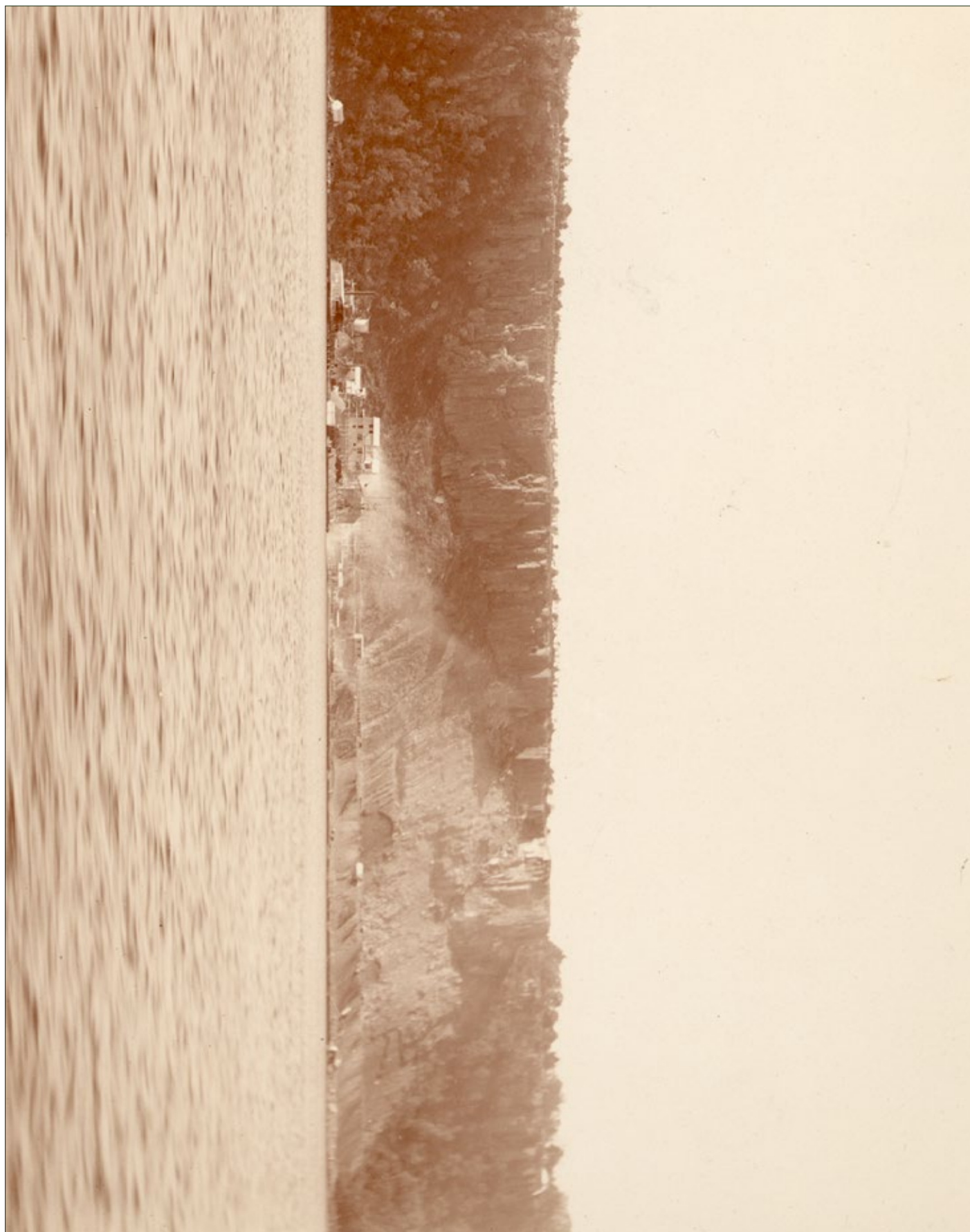
Laws of the State of New York, 1892, Article XIII, Section 290. *First Annual Report of the Commissioners of Fisheries, Game and Forests of the State of New York* (New York and Albany: Wynkoop Hallenbeck Crawford Co., 1896).

New York State Constitutional Amendment, Article VII (Now XIV), 1894.



LIFE STORY: CECILIA GAINES

Cecilia Gaines. New-York Historical Society



LIFE STORY: CECILIA GAINES

Carpenter Brothers quarry in Fort Lee. Palisades Interstate Park Commission Archives

Demolition Begins

The brawny arm of the boss blaster flew high as he drew the “plunger” out to its full length. Then he forced it back with a quick, vicious thrust. The ground for hundreds of yards back from the brink of the cliff shook and trembled. There was an enormous all-pervading crash and roar. The solid face of the cliff bellied out at the middle and then the whole great surface collapsed and crumbled with a rush. Echoes of the explosion and fall reverberated along the cliffs and shores for six minutes. Where the Indian Head had been there was a huge, raw-looking concavity in the side of the Palisades, with a great pile of broken rock heaped at the bottom.

New York Times, March 5, 1898.

Demolition Ends

Memorial Day was signaled by the final destruction of one of the most historical points on the Palisades of the Hudson, known as Indian Head. A blast in which at least 10,000 pounds of dynamite were used was fired off at the quarries of the Carpenter Bros., located at Coytesville, near Fort Lee. The blast brought down about 200,000 tons of earth. It was the most successful effort ever made and brought out of the Palisades a vast amount of earth. . . . Huge masses of rock were thrown to the river, some of them falling into the river. Blocks that lay in the roadway were three times the height of a man.

Indian Head, the point finally demolished yesterday, is about 500 yards from Washington Point, at which Gen. Washington arrived after the defeat of his forces in New York. The declivity which he climbed still stands. Indian Head a few days ago projected 150 feet into the North River beyond the point at which the demolition commenced.

Los Angeles Herald, June 1, 1899.



RESOURCE 5: PALISADES PARK

Camping at Bear Mountain. Palisades Interstate Park Commission Archives



RESOURCE 5: PALISADES PARK

A Palisades Park beach. Palisades Interstate Park Commission Archives



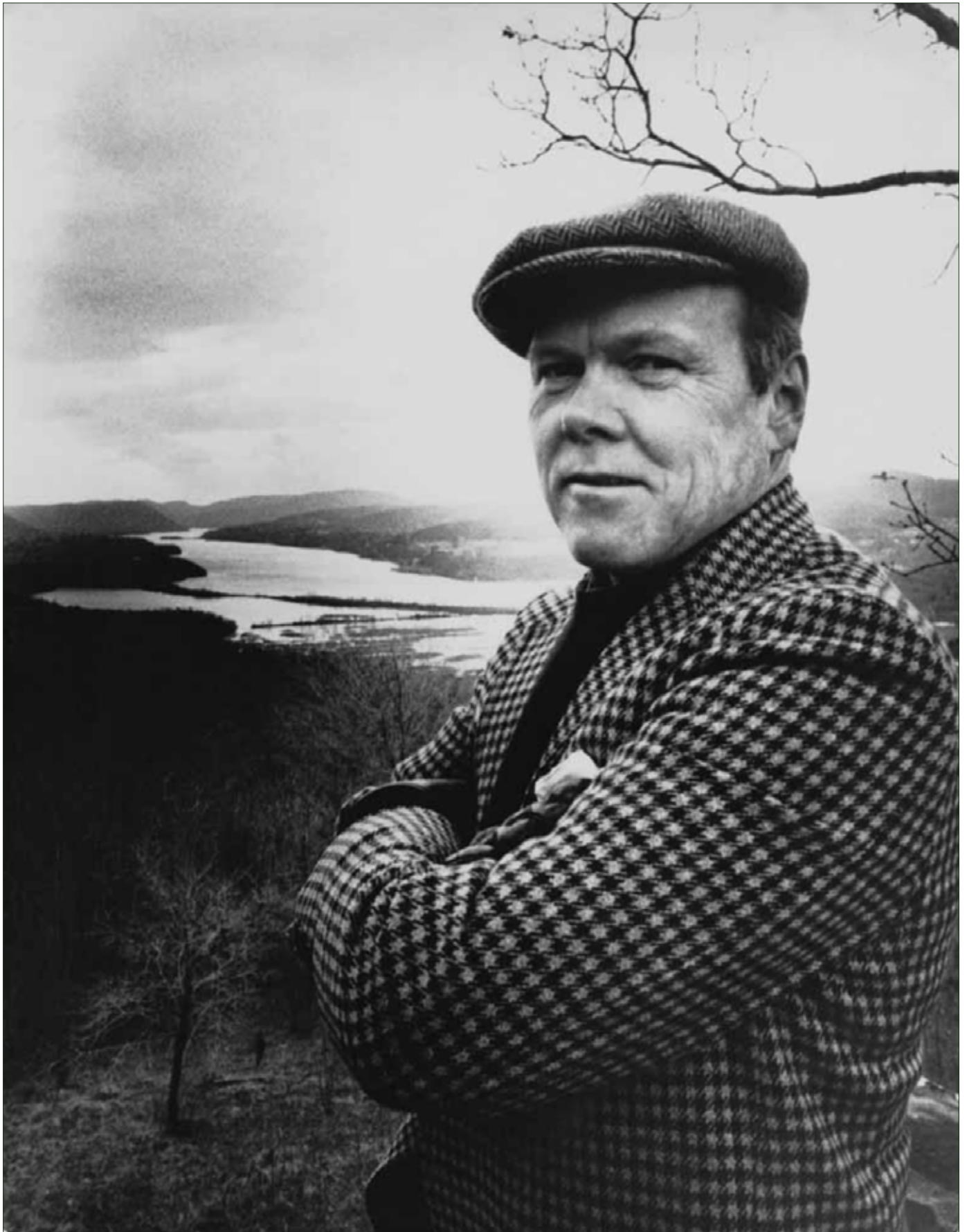
RESOURCE 5: PALISADES PARK

Arriving at the park by ferry. Palisades Interstate Park Commission Archives



RESOURCE 5: PALISADES PARK

A crowded parking lot at Palisades Park. Palisades Interstate Park Commission Archives



LIFE STORY: ROBERT BOYLE

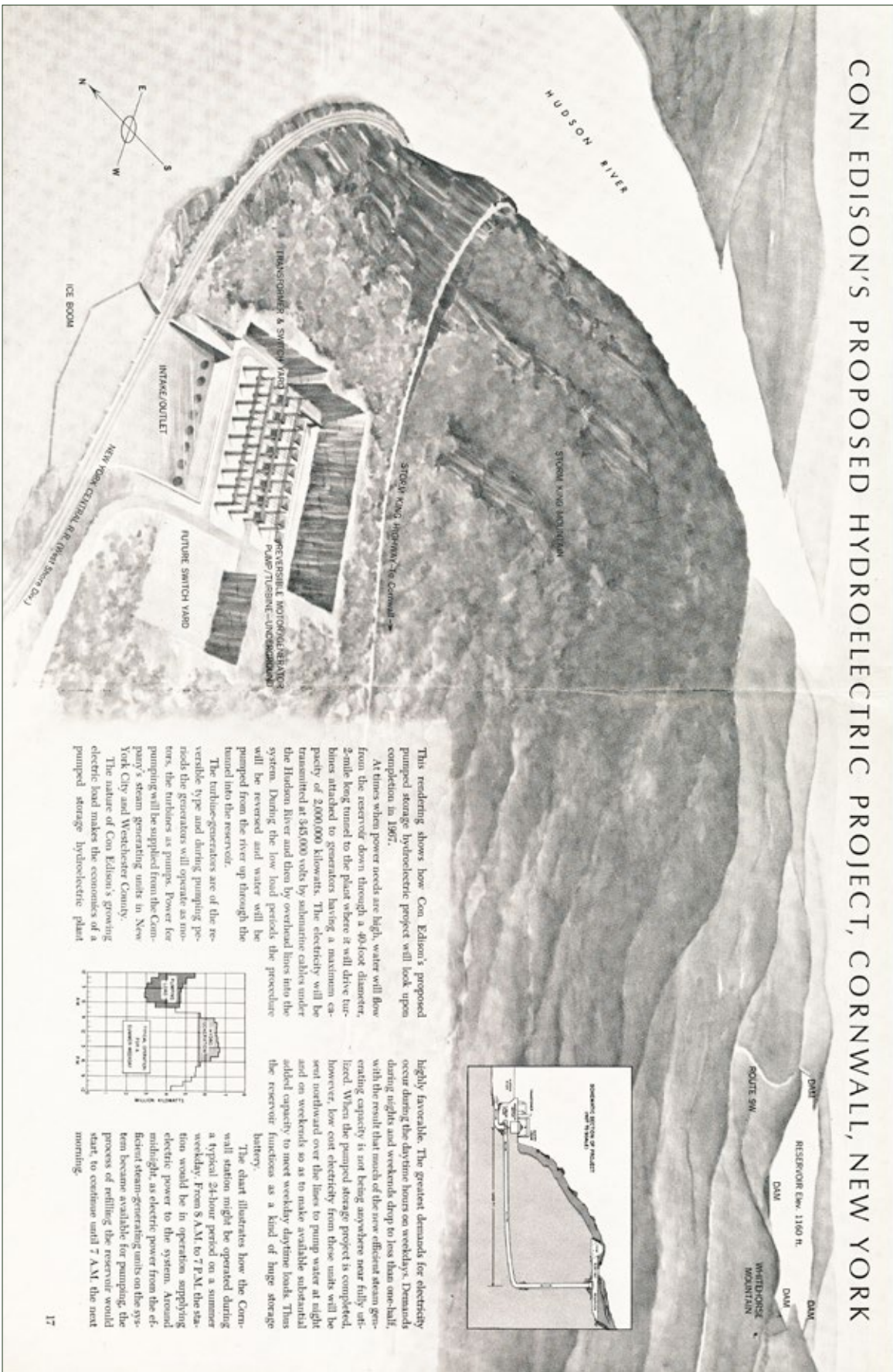
Kathryn Belous Boyle, *Robert Boyle*. Courtesy of Robert Alexander Boyle



LIFE STORY: ROBERT BOYLE

Fishermen, 1960s. Courtesy of Riverkeeper

CON EDISON'S PROPOSED HYDROELECTRIC PROJECT, CORNWALL, NEW YORK



This rendering shows how Con. Edison's proposed pumped storage hydroelectric project will look upon completion in 1967.

At times when power needs are high, water will flow from the reservoir down through a 40-foot diameter, 2-mile long tunnel to the plant where it will drive turbines attached to generators having a maximum capacity of 2,000,000 kilowatts. The electricity will be transmitted at 345,000 volts by submarine cables under the Hudson River and then by overhead lines into the system. During the low load periods the procedure will be reversed and water will be pumped from the river up through the tunnel into the reservoir.

The turbine-generators are of the reversible type and during pumping periods the generators will operate as motors, the turbines as pumps. Power for pumping will be supplied from the Company's steam generating units in New York City and Westchester County.

The nature of Con Edison's growing electric load makes the economics of a pumped storage hydroelectric plant

highly favorable. The greatest demands for electricity occur during the daytime hours on weekdays. Demands during nights and weekends drop to less than one-half, with the result that much of the new efficient steam generating capacity is not being anywhere near fully utilized. When the pumped storage project is completed, however, low cost electricity from these units will be sent northward over the lines to pump water at night and on weekends so as to make available substantial added capacity to meet weekday daytime loads. Thus the reservoir functions as a kind of huge storage battery.

The chart illustrates how the Cornwall station might be operated during a typical 24-hour period on a summer weekday. From 5 A.M. to 7 P.M. the station would be in operation supplying electric power to the system. Around midnight, as electric power from the efficient steam generating units on the system became available for pumping, the process of refilling the reservoir would start, to continue until 7 A.M. the next morning.



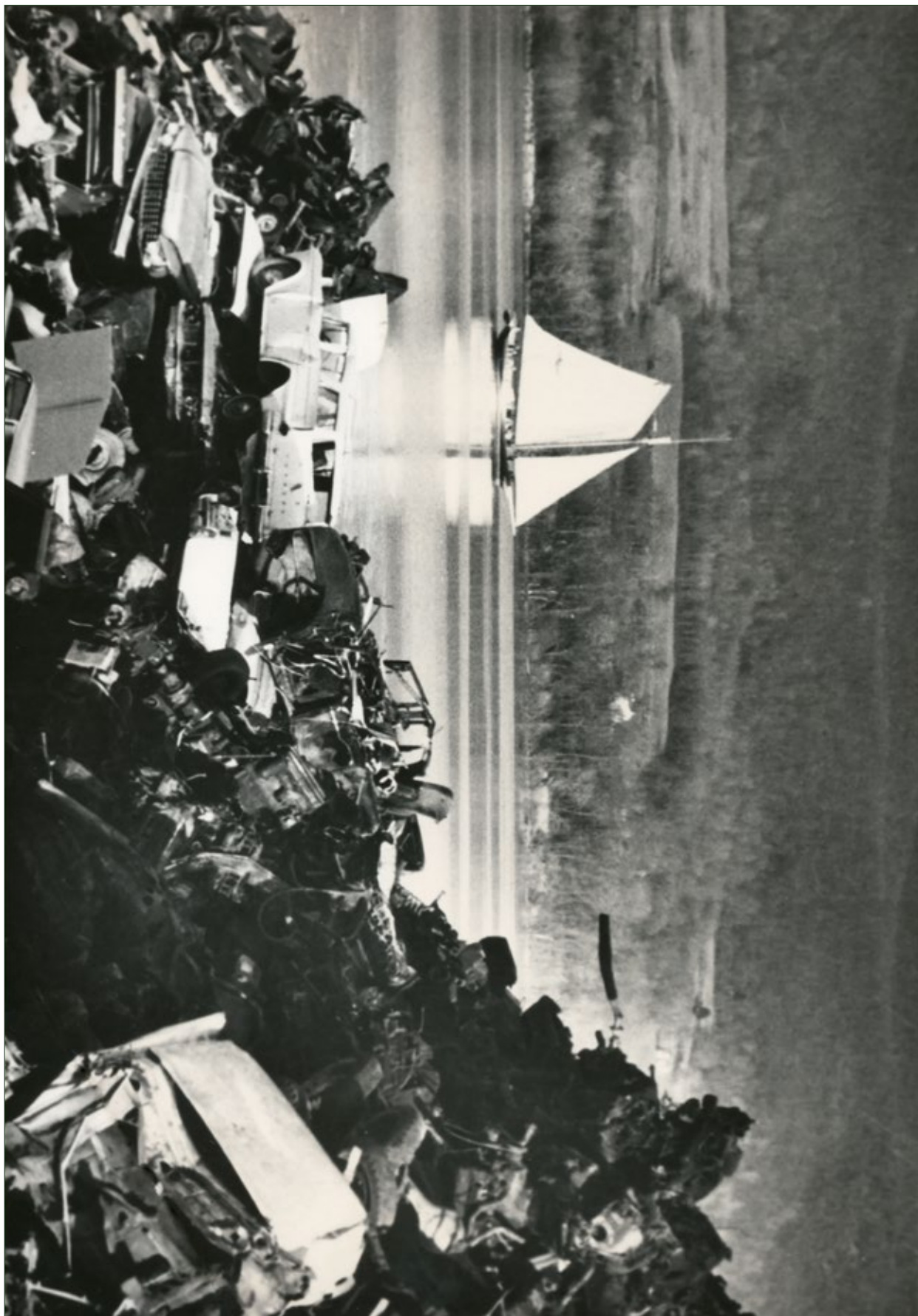


RESOURCE 7: THE PEACE TREATY FOR THE HUDSON
Signing the Peace Treaty, 1980. Scenic Hudson



LIFE STORY: PETE SEEGER

Chris Felver, *Pete Seeger*, 1995. Courtesy of the photographer



LIFE STORY: PETE SEEGER AND RESOURCE 8

Sloop Clearwater sailing by Newburgh junkyard, 1970. United Press International Photograph Collection, Frank Mt Pleasant Library of Special Collections and Archives, Chapman University, CA./ Getty Images

A POLLUTED RIVER

PCB INSULATING OIL
Hudson Falls & Fort Edward

DEAD FISH
Rensselaer

HEAVY OIL
Croton-on-Hudson

OIL, PAINT
Tarrytown

OIL, CHEMICALS, HEAVY METALS
Hastings-on-Hudson

PAPER SLUDGE
Castleton-on-Hudson

JUNKYARDS
Newburgh

SEWAGE

WASTE

TOXIC

TYPES OF POLLUTANTS

Atlantic Ocean

Long Island Sound

Long Island

There is a link between the amount of pollution in the river and the health of the river. The more pollution, the less healthy the river is.

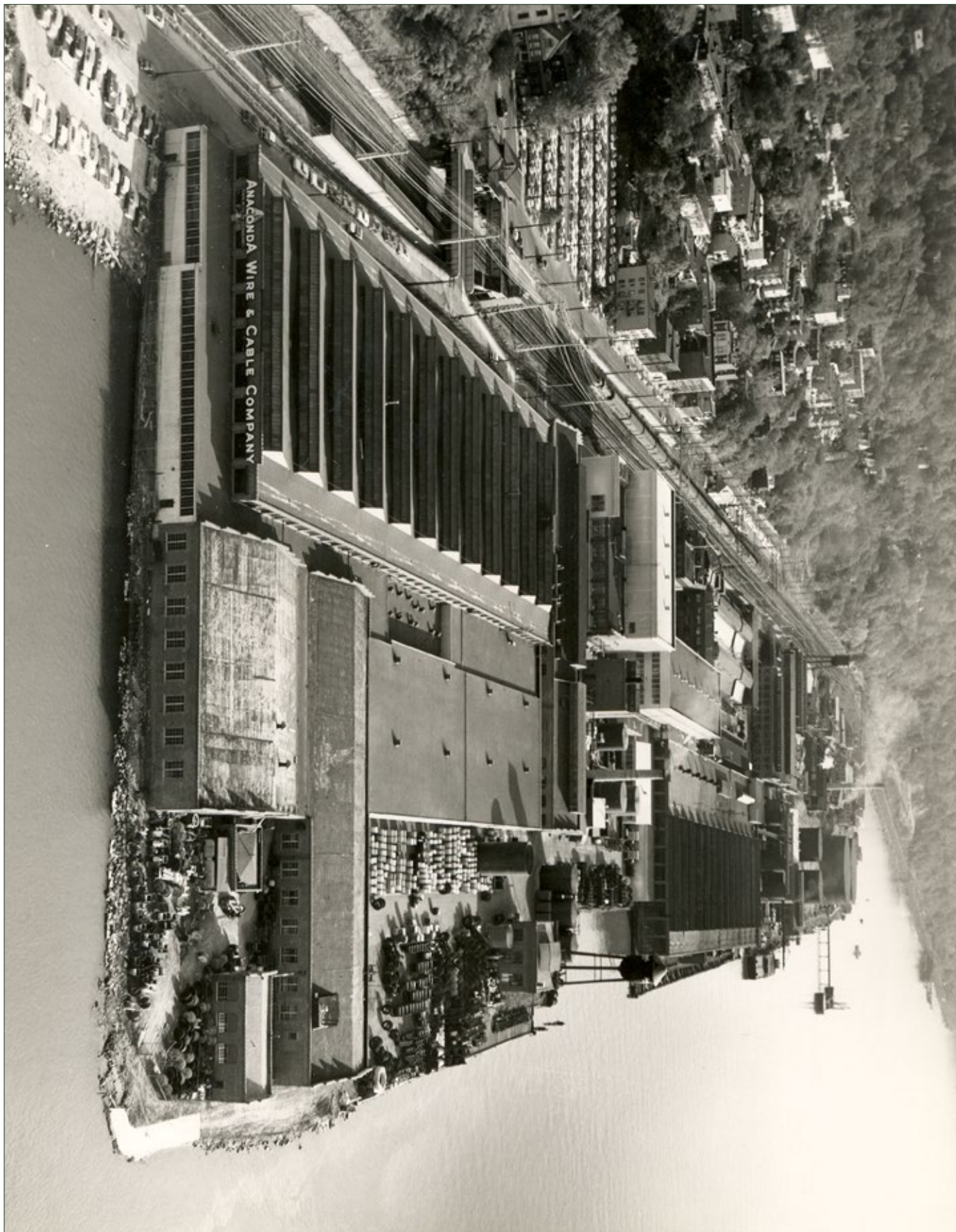
Fuel oil dominated 20th-century cargo shipments on the Hudson. From the 1940s to the 1970s, just counting major spills, 30 million gallons of fuel oil, crude oil, and other petroleum products were dumped into New York Harbor.

"Each day the West Side of Manhattan alone pours 175 million gallons of absolutely raw sewage into the Hudson. It floats down the drains that grid the streets and empties straight into the Hudson, where the tides rock it back and forth."

—Robert H. Boyle, *The Hudson River*, 1969

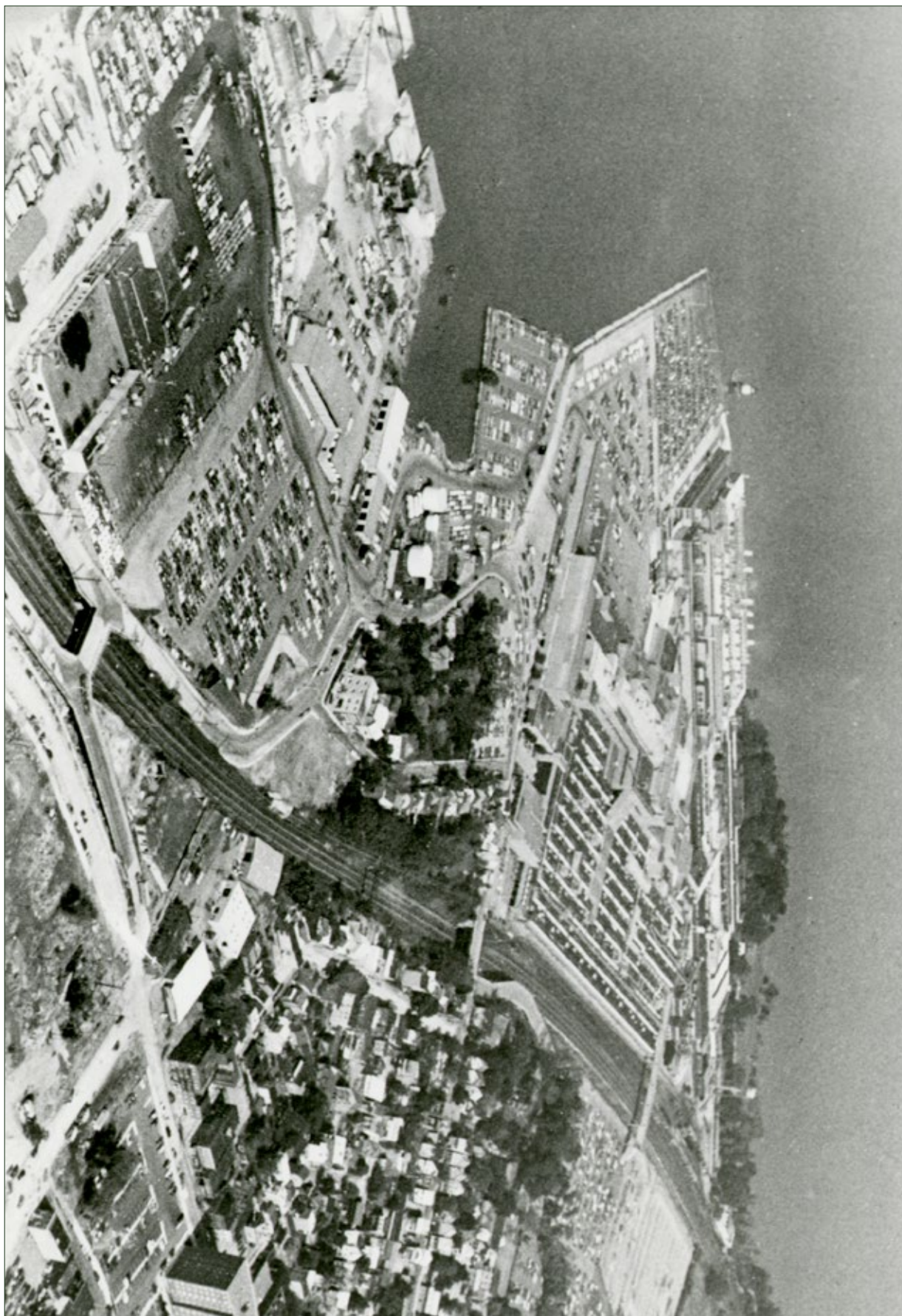
menaced
corps of
trash
specially

Floating debris in New York Harbor menaced navigation. In the 1960s, the Army Corps of Engineers scooped up 24,000 tons of trash from the harbor each year using its specially designed vessel.



RESOURCE 8: A HUDSON SNAPSHOT

Anaconda Wire and Cable factory, ca. 1960. Hastings Historical Society



RESOURCE 8: A HUDSON SNAPSHOT

General Motors assembly plant, 1960s. Westchester County Historical Society



RESOURCE 8: A HUDSON SNAPSHOT

Effluent from Penn Central Railroad Line, ca. 1968. Bob Hoebnerman / Riverkeeper



RESOURCE 8: A HUDSON SNAPSHOT

Fisherman Everett Nack holds up paper-pulp sludge, 1971. Associated Press



RESOURCE 8: A HUDSON SNAPSHOT

Dead fish at Rensselaer, 1953. Times Union, Albany, NY



RESOURCE 8: A HUDSON SNAPSHOT

Discarded empty barrel of insulating oil, 1982. Times Union, Albany, NY



1962

Silent Spring

Scientist Rachel Carson's book describes the dangers of chemical pesticides in words that galvanize public sentiment. Her work helps produce a ban on DDT and energizes popular organizing.

1963

Clean Air Act

Congress passes legislation to lessen air pollution. New York State takes action against the smog choking New York City and the industrial burning of coal creating harmful acid rain.

1965

Scenic Hudson Preservation Conference v. Federal Power Commission

A landmark lawsuit allows environmentalists to sue in the public interest, and requires federal agencies to consider how development will impact the environment, including its wildlife, scenic beauty, and historical sites.

New York State Pure Waters Bond Act

Voters approve Governor Rockefeller's \$1 billion bond act to clean the Hudson River. The funds pay for sewage treatment plants in cities along the Hudson.

Water Quality Act

Public outcry over water pollution leads Congress to require that states set water-quality standards. The federal government is charged with enforcement. Interstate waterways, like the Hudson, particularly benefit.

1967

Environmental Defense Fund

Scientists, lawyers, and conservationists organize on

behalf of the environment. Their first lawsuit stops the use of the toxic pesticide DDT on Long Island.

1968

1899 Refuse Act

Bounty

The Hudson River Fishermen's

Association

successfully sues

Penn Central

Railroad for

dumping oil into

the river. They use

an old law that provides a bounty for catching

polluters. Other successful lawsuits and bounties follow.



1969

National Environmental Policy Act

Groundbreaking legislation follows the terms of the legal decision in *Scenic Hudson v. Federal Power Commission* (1965). Federal agencies must study the environmental consequences of all federal projects and explain how adverse impacts could be avoided or lessened. New York passes similar statewide legislation.

The Clearwater

Folk singer and activist **Pete Seeger** launches the sloop *Clearwater* into the Hudson to draw people to the river and highlight its plight. The project monitors pollution and conducts environmental education.

1970

Natural Resources Defense Council

Lawyers and activists involved in *Scenic Hudson v. Federal Power Commission* organize to save the environment. Representing the Hudson River Fishermen's Association, they start by suing power plants whose operations harm aquatic life.

RESOURCE 9: THE ENVIRONMENTAL MOVEMENT

Left: *Silent Spring*. New-York Historical Society
Right: *Fishermen*, 1960s. Patterson Shafer / Riverkeeper



Earth Day

The first Earth Day, April 22, 1970, brings out 20 million Americans to rally for a cleaner environment. Mayor Lindsay shuts down Fifth Avenue for the

march and welcomes masses of demonstrators to Union Square.

PCBs in Hudson River Fish

Sports Illustrated writer Robert Boyle exposes high levels of toxic chemicals—including mercury, DDT, and PCBs—in fish from the Hudson River. The PCBs are later traced to two General Electric plants.

Environmental Protection Agency

President Nixon's administration creates a new federal agency to implement national environmental standards. EPA hearings about the harm to fish from Hudson River power plants influence the **Storm King settlement**.

1972

Clean Water Act

Congress passes landmark federal legislation to combat water pollution and protect wetlands. The Clearwater-affiliated People's Pipewatch collects incriminating evidence against Tuck Tape of Beacon, leading to the first successful New York State lawsuit under the act.



1975

Westway
Clearwater,
Hudson River
Fishermen's
Association, NYC
Clean Air

Campaign, and others fight an expressway proposed for Manhattan's Hudson waterfront. A determination of harmful impact on Hudson striped bass ends the plan.

1980

Hudson River Foundation

The **Storm King settlement** funds a large endowment for ecological studies of the Hudson River watershed. The Hudson River Foundation continues its scientific and public-policy research today.

1982

Hudson River National Estuarine Sanctuary

The federal government establishes four wetlands on the Hudson as special sites for research, education, and conservation of sensitive habitats. Today they are known as the Estuarine Research Reserve.

1983

Riverkeeper Patrol Boat Launched

The Hudson River Fishermen's Association, soon to be known as Riverkeeper, begins a full-time river patrol. On John Cronin's first day, he confronts an Exxon tanker discharging polluted ballast water into the river.

1987

Hudson River Estuary Management Act

New York State's Department of Environmental Conservation is charged with conserving the river, its fish, and its watershed ecosystem, under the leadership of Hudson River Estuary coordinator Fran Dunwell.



RESOURCE 9: THE ENVIRONMENTAL MOVEMENT

Top, left: *Earth Day* pin. New-York Historical Society

Middle, left: *People's Pipewatch*. Clearwater

Bottom, left: *Westway* protesters. Robert Swirsky / Creative Commons S-SA

Bottom, right: *John Cronin of Riverkeeper and Exxon tanker*, 1983. Don Nice / Riverkeeper



RESOURCE 10: LETHAL PCBS

GE plant at Hudson Falls. Photo by Joseph Squillante



LIFE STORY: KATE ORFF
Kate Orff, Courtesy of SCAPE



LIFE STORY: KATE ORFF

Bill Lyons, *St. George, Staten Island*, as Hurricane Sandy approached, October 29, 2012. Bill Lyons/Staten Island Advance

CHART 1

PEAK STORM SURGE ELEVATIONS IN NEW YORK CITY DURING SANDY		
LOCATION	TIME Oct. 29, 2012	WATER LEVEL IN FEET (NAVD88)
1. Tottenville, Staten Island	8:38 p.m.	+16.0
2. Great Kills Harbor, Staten Island	8:52 p.m.	+13.2
3. South Beach, Staten Island	8:32 p.m.	+15.0
4. Sea Gate, Brooklyn	8:23 p.m.	+13.3
5. Gowanus Canal, Brooklyn	9:04 p.m.	+11.1
6. Broad Channel, Queens	9:18 p.m.	+10.4
7. Howard Beach, Queens	9:23 p.m.	+11.2
8. Whitestone, Queens	10:06 p.m.	+10.6
9. World's Fair Marina, Queens	10:06 p.m.	+10.4
10. Inwood, Manhattan	10:06 p.m.	+9.5
11. The Battery, Manhattan	9:24 p.m.	+11.3*

* Equivalent to 14 feet above Mean Lower Low Water (MLLW)

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CHART 2

RISK ASSESSMENT: THE IMPACT OF CLIMATE CHANGE ON COASTAL PROTECTION IN NEW YORK CITY				
	SCALE OF IMPACT			
HAZARD	TODAY	2020s	2050s	Comments
Gradual				
Sea level rise				Could cause daily or weekly flooding in low-lying neighborhoods
Increased precipitation				Minimal impact
Higher average temperature				Minimal impact
Extreme Events				
Storm surge				Risk likely would increase as sea levels rise
Heavy downpour				Minimal impact
Heat wave				Minimal impact
High winds				Minimal impact

■ Major Risk
 ■ Moderate Risk
 ■ Minor Risk

A Stronger, More Resilient New York, p. 44

RESOURCE 11: SUPERSTORM SANDY AND NYC'S FUTURE RISK

Top: *A Stronger, More Resilient New York*, p. 42

Bottom: *A Stronger, More Resilient New York*, p. 44.

