Waterways Restored

The Clean Water Act's Impact on 15 American Rivers, Lakes and Bays

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Executive Summary

In the early 1970s, many American rivers and streams were environmental basket cases – lined with industrial facilities dumping toxic pollution virtually unchecked, choked with untreated sewage and trash, and, in many cases, devoid of aquatic life.

In 2014, 42 years after the passage of the Clean Water Act, many of these formerly degraded waterways are returning to health. From Puget Sound to Boston Harbor and from Monterey Bay to the Chattahoochee River, the Clean Water Act has played an essential role in restoring America's rivers, lakes and coastal waters as sources of recreation, engines of economic development, and critical habitat for wildlife.

America has a long way to go to meet the goal of making every river, stream and lake in the United States safe for fishing and swimming. But the powerful tools provided by the Clean Water Act – limits on discharges by industrial polluters, waterway-wide standards to limit runoff pollution, funding programs to help communities clean up sewer discharges and more – are essential to that effort.

Because of the Clean Water Act's protections and programs, waterways across the United States have been protected from pollution or restored to health. But Clean Water Act protection for many critical waterways is now in jeopardy. The Environmental Protection Agency (EPA) and Army Corps of Engineers should finalize their proposed rule to restore Clean Water Act protections to thousands of America's waterways.

When the Clean Water Act applies to waterways, it is a powerful and effective tool for improving water quality for humans and wildlife. The following case studies illustrate the many ways the Clean Water Act has helped American waterways.

Monterey Bay, California – Home to a national marine sanctuary known as the "Serengeti of the Sea" for its diversity of wildlife, Monterey Bay and its tributaries have long been threatened by the potential of runoff from rapid regional development. Funding made possible by the Clean Water Act helped conserve a key tract of land near the Bay – a step that will protect a global marine treasure.

Lake Lillinonah, Connecticut – This beautiful reservoir provides both outdoor recreation and drinking water supplies. All of the state's reservoirs, in addition to high quality trout streams and many other waterways, are protected from pollution running off of construction sites during storms thanks to the Clean Water Act's requirement for public comments on pollution permits.

Chattahoochee River, Georgia – Sewage discharges from Atlanta fouled the Chattahoochee for decades, contaminating the river with floating feces and harmful bacteria, making recreation unsafe, and damaging fish and wildlife. Action taken under the Clean Water Act has resulted in Atlanta reducing its sewage discharges to the river by 99 percent, and wildlife is beginning to return, as are boating and fishing opportunities.

Apple River, Illinois – Citizens in Illinois rallied to protect a river flowing through natural canyons and a national park from efforts by an out-of-state businessman to build two factory farms within the river's watershed. A dogged legal battle using the Clean Water Act stopped these polluting facilities from being completed, a victory for this local river.

Androscoggin River, Maine – Polluted by paper mills for more than a century, the Androscoggin once sported a layer of toxic foam described by a Maine farmer as "too thick to paddle, too thin to plow." The Clean Water Act forced paper mills to clean up their discharges into the river. Within five years, oxygen levels in the river had rebounded to the point that the river was supporting aquatic life and today the river supports an active sport fishery.

Anacostia River, Maryland and the District of Columbia – Known as the "forgotten river" in the D.C. region compared with the higher-profile Potomac, the Anacostia River has suffered from horrific pollution for decades. Now action required by the Clean Water Act is reducing dumping of trash into the river, leading some to hope that it can be made safe for fishing and swimming in little more than a decade.

Boston Harbor, Massachusetts – Boston Harbor became a potent symbol of environmental degradation during the 1988 presidential campaign, following centuries of sewage dumping. Today, thanks to lawsuits filed under the Clean Water Act, Boston Harbor is home to some of the cleanest urban swimming beaches in America.

Powderhorn Lake, Minnesota – State and federal efforts under the Clean Water Act have helped stop runoff from polluting the lake by restoring natural vegetation on its banks, among other measures. This led to its recognition by one newspaper as "Minneapolis' Best Lake" in 2013, thanks to its revived role as a centerpiece of the community.

Round Valley Reservoir, New Jersey – Sustained citizen effort over many years extended strong Clean Water Act protections to this drinking water supply and scenic recreation site and thousands of miles of other waterways around the state, preventing new sources of runoff pollution and direct discharges.

Hudson River, New York – Portions of this iconic waterway once changed color depending on the color of cars being made that day at an auto plant – just one of the Hudson's many sources of industrial pollution. The Clean Water Act empowered local citizens to monitor and take action against industrial polluters lining the Hudson, helping lead to the return of fish and wildlife to the river.

North Fork First Broad River, North Carolina – A pristine river in western North Carolina that supports a native trout population is now protected by an "anti-degradation" designation under the Clean Water Act that bars new sources of pollution nearby.

Cuyahoga River, Ohio – Notorious for a 1969 river fire that helped spark the drive for the Clean Water Act itself, the Cuyahoga once received pollution from slaughterhouses, paint manufacturers, steel mills and sewage treatment plants. As a result of the Clean Water Act, communities along the Cuyahoga are reducing combined sewer overflows, aiding a rebound that has brought fishing and boating back to the river.

Willamette River, Oregon – Once so polluted that salmon fingerlings placed in the river died within 15 minutes, the Willamette River is on its way back to health, thanks in part to enforcement of water quality standards required by the Clean Water Act. Today, after 20 years of effort, the volume of sewage overflows to the river has been cut by 94 percent, allowing Oregonians to once again swim in the Willamette.

Conemaugh River, Pennsylvania – Massive pollution from a major coal-fired power plant will be cleaned up from the Conemaugh River under the settlement of a Clean Water Act lawsuit that limits discharges of metals and other pollution from the power plant. The lawsuit was filed under an important provision of the Act that allows citizens to take action against polluters even when state regulators fail to act.

Puget Sound, Washington – Stormwater runoff is a major source of pollution of Puget Sound, with the Northwest's frequent rainstorms washing oil, grease, chemicals and heavy metals into the water. Efforts by local citizens groups under the Clean Water Act have forced countless industrial facilities to reduce the flow of toxic stormwater to the sound.

Clean Water Act protection has been essential for the restoration of countless waterways across the United States, and the Act remains a critical tool for confronting several of today's major threats to our waterways – including runoff pollution from development and the direct dumping of pollution from industrial facilities and sewage treatment plants.

To meet the Clean Water Act's promise of making all of America's water safe for fishing and swimming, the EPA and the Army Corps of Engineers should finalize their proposed rule that would restore the Act's protections to thousands of waterways across the nation.

In addition, **state and federal enforcement of the Clean Water Act's provisions should be strengthened**, including by:

- Ensuring that pollution permits have clear limits and no loopholes, are renewed on schedule, are strictly enforced, and have pollution levels ratcheted down over time, with the goal of achieving zero pollution discharge wherever possible.
- Requiring that all facilities that threaten our waters with pollution – including factory farms – obtain permits with clear numeric pollution limits and enforceable standards.
- Boldly and regularly applying other Clean Water Act tools to restore and protect America's waters, such as demanding significant reductions in pollution discharges and extending anti-degradation designations to more waterways.

When the Clean Water Act applies to waterways, it is a powerful and effective tool for improving water quality for humans and wildlife.

Introduction

The river fire that would become a crucial inspiration for the Clean Water Act and much of the modern environmental movement burned five stories high above the Cuyahoga River in Cleveland at noontime on a Sunday in late July 1969. Sparks cast by a passing train had landed on an oil slick floating on the surface of the river.[1] Two train trestles were damaged by the fire before firefighters on land and in a fireboat could control the flames.[2]

Startling as it may sound today, the event was so unremarkable at the time that the city's leading newspaper, the *Plain Dealer*, spent just 10 sentences on the event, buried deep inside the next day's edition.[3] In fact, by 1969, the problem of rivers catching fire was seen as commonplace.[4] The Cuyahoga itself had burned at least a dozen times over the previous century.[5] Not long after the 1969 Cuyahoga River, the Rouge River in Detroit burned, sending flames 50 feet into the air.[6] The Chicago River's fires became spectator events.[7]

The cause of all these fires was clear and commonly known: Industrial facilities were dumping their waste into the river.[8] By the late 1960s, Americans who had watched rivers and lakes where they had once fished and swam turn into lifeless, polluted sewers had had enough.

The 1969 Cuyahoga fire came at a time of national conversation about environmental pollution. It got an enormous amount of publicity, including national coverage in *Time* and *National Geographic*. It became clear that the diffuse, uncoordinated local and state water cleanup efforts that had been gaining steam for decades were no match for the scale and scope of America's water pollution problem.[9] If America was going to get serious about restoring its rivers, streams, lakes and coastal waters to health, it was going to take a national commitment.

Thanks to millions of people demanding action, and bipartisan Congressional support, that commitment came in the form of the Clean Water Act. The law, a foundational piece of American environmental protection, envisioned an America where *all waters* would be safe for swimming and fishing, and where no pollution contaminated any rivers, lakes, creeks or wetlands. To achieve those ambitious goals, the Clean Water Act created a set of tools that citizens and all levels of government have used to push polluters to clean up their acts – and the country's water.

The stories in this report demonstrate the critical role of the Clean Water Act in restoring polluted waterways to health and protecting pristine waterways for continued enjoyment and use. Many similar stories could be told about waterways large and small in every part of the country.

And yet, there is much work to be done. At least one-third of our nation's waterways are still unsafe for swimming or fishing.[10] With passage of the Clean Water Act, our nation declared that *every* waterway in the United States should be clean. To realize that vision, we must first restore Clean Water Act protections to all of our waters.

The Clean Water Act Contains Powerful Tools for Protecting Our Waterways

The federal Clean Water Act is our nation's primary law designed to prevent pollution of our rivers, streams, lakes, wetlands and ocean waters. Enacted in 1972, the law established the goals of making all of the country's waterways safe for fishing, swimming and supplying drinking water by 1983, and ceasing all direct discharges of pollutants by 1985.[11] While these goals have not been met, the Clean Water Act has been used to drive significant improvements in water quality across the United States.

The Clean Water Act represented a bold step in the effort to clean up the nation's environment. Specifically, the law protected waters under its protection by:

- **Requiring permits for pollution.** The Clean Water Act made it illegal to dump pollution into waterways without a permit and required similar permits for pollution washing off of industrial sites and other facilities during storms.[12]
- **Setting technology-based standards.** The Act set standards that required industrial facilities to use up-to-date technologies to limit pollution discharges.[13]
- **Setting water quality standards and requiring plans to meet them.** The Act required states to set standards for water quality that would enable waterways to support "designated uses" such as fishing, swimming or supplying drinking water. States were required to identify those waterways that did not meet the standards and develop plans for bringing them into compliance. Those plans (known as total maximum daily loads, or TMDLs) might require steps such as reducing runoff from businesses or streets, improving sewage treatment, or ratcheting down the amount of pollution that could be released by industrial polluters.[14]
- **Preventing backsliding.** In addition to taking steps to clean up dirty waterways, the Act's "anti-degradation" policy prevents waterways that currently support beneficial uses, such as fishing or swimming, from backsliding into unusable condition. For some especially valuable and pristine waterways, no reduction in water quality is permitted at all.[15]
- **Providing funding for improvements.** Municipal governments looking to build or improve sewage treatment plants in an effort to reduce pollution are eligible for federal help in financing those improvements, through a funding program today called the Clean Water State Revolving Fund.[16]

- **Empowering citizens to enforce the law.** Often, state and federal regulators lack the resources to monitor pollution from industrial facilities and face pressure not to penalize facilities who break the law. The Clean Water Act enables citizens to enforce the law directly by suing polluters who fail to follow the law. The "citizen suit" provision has proven to be of critical importance for holding both industry and government accountable for protecting the environment.[17]

These powerful tools have been used by individuals and groups of citizens, as well as cities and state governments, to drive marked improvements in the quality of America's waterways.

The goals of the Act – cleaning up America's waterways so they are safe for people and wildlife – were so popular in 1972 that a bipartisan Congress overrode a veto from President Richard Nixon.[18] Concerns over water pollution are still high today.[19]

While the law hasn't been fully implemented as originally intended, the Clean Water Act has been used to help bring many once-polluted American waterways back from the dead, while ensuring that new generations of Americans can continue to enjoy the waterways where their parents and grandparents once fished and swam.

The Clean Water Act set the goals of making all of the country's waterways safe for fishing, swimming and supplying drinking water by 1983, and ceasing all direct discharges of pollutants to waterways by 1985.

America's Waters Are Healthier Thanks to the Clean Water Act

Since its passage, the provisions of the Clean Water Act have protected waterways big and small, popular and little-known. While many of our waters face major pollution challenges, old and new, the following 15 case studies (ordered alphabetically by state) demonstrate how, when it is applied and used, the Clean Water Act has helped make American waterways from coast to coast healthier for both wildlife and people to inhabit, explore and enjoy.

CALIFORNIA: Land Purchase Keeps Development Runoff Out of Big Sur Waterways, Monterey Bay National Marine Sanctuary

In 2001, Palo Corona Ranch, a 10,000-acre parcel of land in the heart of California's Big Sur region, went up for sale.[20] The highly valuable property, very attractive to developers, starts near the mouth of the Carmel River and stretches seven miles inland, encompassing one of the river's tributaries and the headwaters of several local streams. All watersheds in the area drain to the Monterey Bay National Marine Sanctuary, a federally protected area off the California coast known as the "Serengeti of the Sea" for its remarkable abundance of wildlife.[21]

Despite its environmental value, developers eyed the ranch for its profit-making potential. Local environmental groups, having recently seen a similar tract be subdivided for development, feared that residential or commercial development of the land would

Photo: National Oceanic and Atmospheric Administration

The world-renowned kelp forests of the Monterey Bay National Marine Sanctuary are better protected because of financing provided under the Clean Water Act for the purchase of property that preserves headwaters of several of the bay's tributaries.

pollute waterways both on and downstream of the property through increased sedimentation and stormwater runoff.[22] Runoff typically carries a variety of pollutants – from oil and grease to metals – into waterways where they can poison aquatic life and degrade water quality.

To protect local rivers and the Marine Sanctuary from this new pollution threat, concerned citizens and environmental groups had to obtain the land before developers did. A provision of the Clean Water Act helped make this possible: The Clean Water State Revolving Fund (CWSRF) helps states maintain loan funds to provide financing for projects including wastewater treatment, estuary protection activities and efforts to reduce or eliminate pollution from nonpoint sources. The latter can include activities such as watershed management, runoff control and habitat and wetlands protection.[23] In some cases, that means acquiring environmentally valuable or sensitive land, such as Palo Corona Ranch, to avoid development and pollution in the first place.

In 2004, the Nature Conservancy used a $9 million CWSRF loan to finalize the acquisition of the ranch.[24] The purchase protected Palo Corona's waterways – and waterways downstream – by establishing a buffer around the area's source waters and eliminating the threat of runoff pollution that results from laying pavement and building other impervious surfaces.[25]

Over the course of the next seven years, the Conservancy transferred the land to the California State Department of Fish and Game and the Monterey Peninsula Park District to begin the transition of the ranch into parkland. Today, the northern half of the former ranch comprises the new Palo Corona Regional Park, open to the public for hiking; the southern half of the parcel was added to the adjacent Joshua Creek Ecological Preserve.[26] The "gateway to Big Sur," the land now provides a safe home for coastal trout and the red-legged frog and tiger salamander in its perennial creeks, which are now likely to remain protected from runoff pollution for years to come.[27]

Photo: H. Morrow Long

Lake Lillinonah is a drinking water supply in Connecticut that is protected thanks to provisions of the Clean Water Act allowing public input into decisions about discharge permits.

CONNECTICUT: Construction Sites Must Manage Stormwater Runoff to Protect Vital Waterways

Lake Lillinonah is formed by the Housatonic River in western Connecticut, and ultimately flows out to Long Island Sound. The lake provides wintering and breeding habitat for as many as 40 bald eagles, and hosts bass and pike fishing, as well as drinking water for the six surrounding communities.[28]

It suffers from pollution from the discharge of phosphorus from the Danbury Wastewater Treatment Plant to one of its tributaries and is in an area of the state that has seen rapid growth in housing and commercial developments in recent decades.[29]

At least as far back as the 1990s, construction sites in Connecticut were polluting nearby waterways with stormwater runoff. Lots of different projects caused problems: In 1996, the state sued a builder of two Wal-Mart retail stores (in East Windsor and Tor-

rington) for causing erosion and silt buildup in the Connecticut River and some of its tributaries, as well as a nearby pond.[30] A company building a golf driving range was fined for letting silt run into the Eight-Mile River in Southington in 1997.[31] In 2002, New Britain residents near Schultz's Pond complained that runoff from the construction site of a city water filtration plant was clogging the pond, formerly so clear it had been used for ice harvesting in the early 20th century.[32]

Today, these waterways, Lake Lillinonah, and other Connecticut waters used for fishing and drinking water are better protected from construction site runoff, thanks to a permitting process required by the Clean Water Act.

Under the Act, all discharges of pollution to water, including dredged or fill material, require a permit. Most of the time, an individual permit is issued to a specific company to limit its discharges into a specific waterway. But the Clean Water Act also allows for what are called "general permits," setting conditions for projects that are expected to "have only minimal adverse effects," according to the law.[33] (The EPA offers such examples as "minor road activities" and "utility line backfill.")[34] The presence of several or many such projects can have a cumulative, negative effect on waterways, hence the need for limits on pollution. Those projects do not require individual permit applications or review, but they must still follow the rules in the general permit.

The Clean Water Act requires all permits – including general permits – to go through a process of public review and comment before they are issued or renewed.[35] This ensures the public's voice is heard – either to endorse a proposal or to offer ways to improve it.

In the public comment period on a Connecticut proposal for a renewed general permit governing stormwater discharge from construction sites, citizens and the Connecticut Fund for the Environment pointed out that the state's proposal did not sufficiently protect pristine waterways – such as those used for drinking water and trout habitat; in fact, they noted that, in some cases, these waters would have less protection than waterways that were already polluted.[36]

The group also asked the Connecticut Department of Energy and Environmental Protection to improve the permit's water quality protections in other ways, such as by boosting prevention of stormwater pollution, limiting discharges into waters that were already polluted, and requiring monitoring of stormwater runoff to ensure it is within the permit's limits.[37]

As a result of those comments, the state revised its permit language to increase protection of water resources – including specifically extending maximum protection to drinking water supplies and trout streams, requiring regular monitoring of stormwater runoff during construction, and requiring inspection after the project is complete to ensure proper stormwater management.[38]

In other words, because of the public comment opportunity required by the Clean Water Act, construction projects are now releasing far less pollution into Connecticut's waters, helping to protect the state's drinking water and precious trout habitat.

GEORGIA: Reducing Sewage Heralds Return of Native Species to the Chattahoochee River

Atlanta is fairly unique among big American cities in that, because it sits in the headwaters of a major river, its pollution affects the entire length of the river.[39] Atlanta's sewage discharge has been a primary culprit in the river's degraded state.[40]

The river was clean enough for swimming in the 1940s. Yet by the 1960s, in large part because of the neglect of Atlanta's sewer system during the city's explosive growth, the river had become "grossly polluted," state environmental officials told Congress.[41]

Photo: National Park Service

A Clean Water Act lawsuit forced the city Atlanta to reduce the amount of raw sewage it dumped into the river, making the river safe for boating and better for wildlife.

Despite some significant improvements in the 1970s following the initial passage of the Clean Water Act, by the 1990s, Atlanta's sewer system had fallen into disrepair.[42] The city's failure to regularly invest in maintenance and upgrades and to repair thousands of leaks had a disastrous effect on water quality: hundreds of millions of gallons of raw sewage spilled into the Chattahoochee every year, carrying more than 4 million tons of phosphorus. The river often had sewage floating on its surface.[43] The West Point Lake, formed by the Chattahoochee downstream from Atlanta, was said by scientists to be "exhibiting the classic signs of death by pollution" and was completely devoid of oxygen much of the year.[44]

Despite deteriorating water quality, the city of Atlanta delayed paying to upgrade its sewer system, instead opting to shell out millions of dollars in EPA fines for exceeding pollution limits.[45]

So in 1995, the Chattahoochee Riverkeeper, acting under the Clean Water Act's citizen suit provision, sued Atlanta for violating the conditions of its National Pollutant Discharge Elimination System (NPDES) permit. The U.S. District Court found that Atlanta's discharges – which included metals and as much as 5,000 times the allowable level of fecal coliform bacteria – caused the river to violate Georgia's Clean Water Act-mandated water quality standards.[46]

In July 1998, to settle the lawsuit, the mayor of Atlanta signed a federal consent decree committing the city to end water quality violations resulting from combined sewer overflows and to complete upgrades by 2014. (An extension until 2027 was granted in 2012, after the city had completed much of the work.)[47] The consent decree led to a wide range of improvements.[48] Repairs to leaking water and sewer pipes skyrocketed, from 750 in 2002 to nearly 10,000 in 2009. A deep sewer tunnel able to hold 177 million gallons of rain and sewage was built to reduce combined sewer overflows from 300 times a year to just four.[49]

As a result of the upgrades, more than 400 million gallons of sewer spills per year were eliminated, and, by 2014, the volume of untreated sewage that flowed into the river and its tributaries had been reduced by 99 percent compared with the 1990s.[50]

The Chattahoochee still suffers from urban and construction runoff pollution.[51] Nevertheless, the river's improvements have been dramatic, and Georgians are beginning to return to its waters for recreation.[52] The city has begun an extensive water monitoring program to track improvements.[53] Some signs suggest that native species are making a comeback – a U.S. Geological Survey scientist monitoring water quality in the river was surprised recently when he

Photo: Andy McMurray

When state officials refused to act, citizens stepped up and used the Clean Water Act to defeat a proposed factory farm, protecting the Apple River and the state park through which it passes.

spotted a native mussel having returned to the water south of Atlanta.[54] After years of neglect, the Chattahoochee is on the path to recovery.[55]

ILLINOIS: Small Town Residents Defend the Apple River Against Massive Livestock Farms

The Apple River in Jo Daviess County, Illinois, is a local treasure. As the water source that has carved the Apple River Canyon for centuries and a tributary of the Mississippi River, the river attracts tourists to Apple River Canyon State Park from all over the country to enjoy hiking, picnicking and the charm of the surrounding small towns.[56] Thanks to the Clean Water Act, the area has been protected from factory farm pollution, which would have put the river's health at risk.

In November 2007, A.J. Bos, a businessman from California, announced that he was planning to build two huge dairy farms (with 5,500 animals each) in the county.[57]

Numerous studies have shown that animal feed operations of this size post significant risks of surface and groundwater contamination. The EPA says these operations "congregate animals, feed, manure and urine, dead animals, and production operations on a small land area."[58] They produce animal waste containing pathogens, pharmaceuticals, heavy metals, pesticides and naturally excreted hormones.[59] This animal waste often makes it into local waters through runoff and absorption into the soil, and is a risk to public health.[60]

In opposing Bos's factory farm plans, local residents pointed out that, in addition to the risks of direct surface runoff, the geology of the area made the Apple River especially vulnerable to aquifer and tributary contamination from the farm.[61] The group, called Helping Others Maintain Environmental Standards (HOMES), said the contamination could jeopardize the $200 million tourist industry.[62]

Traditions Dairy Farm sought to fill 300 feet of an Apple River tributary as part of constructing a 127 million gallon manure pit – a clear pollution threat. The Army Corps of Engineers asked the farm to modify its design and ordered Bos to prove that the revised design would comply with the Clean Water Act.[63]

In May 2008, the Illinois Department of Agriculture overruled the Jo Daviess County Board's rejection of Bos's application to build Traditions Dairy Farm.[64] In reaction, HOMES filed a lawsuit alleging violation of state laws implementing the Clean Water Act and sought a court injunction to halt construction.[65] In October 2008, a temporary injunction order was issued that blocked the operation of a dairy portion of the farm, but the farm was still able to work on non-dairy portions such as slabs, barns and other farm infrastructure.[66] In just three months, the farm produced and stored 26,000 tons of corn silage (fermented corn fodder) on the site in anticipation of the permit to operate.

In 2009, runoff from the silage was mishandled, twice turning the Apple River tributary black.[67] Improper management of this liquid, called silage leachate, can lead to environmental hazards.[68] It is estimated that one gallon of leachate discharge can contaminate 10,000 gallons of river water, with the potential to cause mass fish kills.[69]

In October 2010, another silage leachate discharge turned an Apple River tributary purple.[70] After investigators from the Illinois Environmental Protection Agency and the Environmental Protection Agency surveyed the contamination, the case was sent to the state attorney general.

In April 2011, the Illinois State Attorney General filed a lawsuit against Traditions Dairy Farm for five violations of the Clean Water Act, including polluting water and discharging without a permit. The final nail in the coffin was the state's ruling that Traditions had not proved its manure pit would comply with water quality standards set under the Clean Water Act.[71]

Bos gave up and shut down the farm before ever bringing cows to the site, ensuring that the Apple River would not be subject to pollution from a major factory farm.[72] Local citizens had used the Clean Water Act to protect the Apple River even when state officials initially would not act.

MAINE: Once Covered in Toxic Foam, the Androscoggin River Is Now a Sportfishing Destination

In the late 1960s, the pollution of the Androscoggin River in New Hampshire and Maine was a chief inspiration for the Clean Water Act, which was principally written by U.S. Senator Ed Muskie, who grew up along the river. For decades, the Androscoggin was used as a sewer for communities and industries along the river. It was known for cascading drifts of toxic foam and for noxious fumes detectable miles downriver. Today, thanks in large part to the Clean Water Act, the Androscoggin has become a home to fishing and recreation.

The Androscoggin has a long history of pollution and poor treatment. By the early 1800s, illegally constructed dams had destroyed the river's enormous

Photo: Flickr User HeartLover1717

Balloonists fly over – and make a spectacle of dipping into – the scenic Androscoggin River during the annual Great Falls Balloon Festival in Lewiston and Auburn, Maine.

fish runs and inspired a citizen petition to the Legislature protesting the loss of the fishing "with which nature had before bountifully supplied."[73] By the end of the 19th century, the river had become home to some of the largest paper-producing companies in the world.[74]

In 1888, Maine's paper mills introduced sulfite into their pulping process, which had a devastating effect on the Androscoggin. Because of sulfite's interaction with certain bacteria, the new process dramatically lowered the river's levels of dissolved oxygen, rendering the water nearly incapable of supporting life and destroying the fish population.[75]

Mill and sewage pollution continued mostly unabated throughout the first decades of the 20th century. A 1957 study found dissolved oxygen levels under 2 parts per million, as low as they had ever been, and too low to sustain fish life. In the 1960s, the Androscoggin reportedly stank of rotten eggs, and toxic foam from paper mills was described by one Maine farmer as "too thick to paddle, too thin to plow."[76]

By the time the Act was enacted in 1972, championed by Senator Muskie, the river's decades of unrestricted discharge and damming had made it almost uninhabitable for fish and other aquatic life.[77]

The Act quickly led to dramatic improvements in water quality by providing funding for municipal sewage waste treatment, requiring the construction of new paper mill treatment facilities, and laying the groundwork for Maine's creation of stringent fresh water classifications.

Paper mills, forced by the Clean Water Act to adhere to limits on their discharges of pollution to the river, began to build new treatment facilities.[78] The major source of pollution in the Androscoggin's headwaters was the Brown Co. paper plant in Berlin, New Hampshire. Brown's waste treatment facility went online in 1976.[79] Other mill waste treatment facilities also went live in Gorham, New Hampshire, and in Bethel, Topsham and Mechanic Falls, Maine.[80] Meanwhile, municipalities began construction of sewage treatment plants, aided by federal funds provided under the Clean Water Act.[81]

The new industrial and municipal treatment facilities dramatically improved water quality in the Androscoggin.[82] By 1977, just five years after the Act's passage, most sections of the Androscoggin had oxygen levels above 5 ppm – high enough to support fish life.[83] By 1987, Dennis Purington of the Maine Department of Environmental Protection (DEP) was able to say, in praise of the Act: "The Androscoggin was an open sewer . . . It's relatively clean now."[84]

In 1986, Maine overhauled its fresh surface water classification system, setting new water quality goals that refused to accept unfishable and unswimmable conditions in Maine waterways.[85] (New Hampshire set similarly high standards in 1991.)[86] Since 1986, the Maine standards have served, as stated by the Maine DEP, "as powerful statements about our willingness to not let the status quo define our expectations."[87] After a 2005 citizen lawsuit seeking to enforce the Clean Water Act, state environmental officials ordered two paper mills on the Androscoggin to meet these new water pollution standards.[88]

While the Androscoggin continues to face pollution, including nutrient waste and algae blooms, it is almost unrecognizable from its previous state. The river is now home to numerous boating and kayaking tour companies and is now able to support aquatic life. Smallmouth bass, largemouth bass and chain pickerel have made a resurgence with the help of restocking projects.[89]

Today, the Androscoggin still has a long way to go. Yet this 164-mile river, once a veritable sewer running through Maine and New Hampshire, has now been largely freed of its reputation for toxic waste and rotten smells, and reclaimed as a source of recreation for New Englanders.

Photo: National Park Service

Citizen and government efforts to reduce trash in the Anacostia River have cleaned up the river and create hope for swimming and fishing there in coming years.

MARYLAND and the DISTRICT OF COLUMBIA: The Nation's Capital Takes on Discarded Plastic Bags, Beverage Containers and Other Trash in the Anacostia River

Often called the "Forgotten River" because of the attention paid to its more famous neighbor, the Potomac, the Anacostia River in Maryland and the District of Columbia (D.C.) is, as the Natural Resources Defense Council puts it, the "poster child" for neglected and polluted urban waterways.[90] The river still suffers from the pollution of the past, but the Clean Water Act provides hope for the future.

Though the river's main stem is just eight miles long, historically its banks have been thick with industrial sites. It has become surrounded by rapid development in its watershed, 70 percent of which is now dominated by cityscape or suburb and attendant infrastructure.[91] The consequences for the river have been severe. Several toxic legacy sites along the river's banks, including a former D.C. landfill that was allowed to extend into the river itself until the 1970s, have been sources of PCB and metals contamination either through direct dumping or nonpoint source runoff.[92] Toxic contamination is one of the primary reasons officials warn against swimming in, and eating fish from, the river.[93]

Besides toxic contaminants, the Anacostia is polluted by fecal bacteria. Like many older cities in the northeastern United States, D.C.'s sewage infrastructure makes use of combined sewer overflows (CSOs). CSOs combine stormwater with city sewage and, in the wake of heavy rain events, expel overflows of the mixture directly into the river, putting public health at risk.[94] The Anacostia receives nearly 1.5 billion gallons of such untreated overflow annually.[95]

Physical trash – plastic bags, beverage containers and so on – is another source of degradation for the river, harming both wildlife and the waterway's aesthetic. Each year, illegal dumping and stormwater runoff send hundreds of tons of trash into the Anacostia.[96]

For decades, community leaders have organized volunteer efforts to pick up the trash from the river and its banks, but it wasn't enough: The garbage just kept coming, while sewage fouled the river.[97]

In 1989, the Anacostia Watershed Society formed and took up legal fights over potential damage from riverfront development and toxic dumping into the Anacostia, defending the river against being partially filled in to allow construction of a new NFL football stadium, demanding the U.S. Navy clean up a toxic mess at the Washington Navy Yard, and forcing the District of Columbia to virtually eliminate combined sewage overflows.[98] But despite those significant improvements, the river was still troubled.

In 2006, both Maryland and the District of Columbia designated the Anacostia as impaired for trash under the Clean Water Act.[99]

Now, provisions of the Clean Water Act are forcing action to restore the river to fishable and swimmable quality.[100] Under the Act, in order to discharge pollutants into waterways, entities must acquire a permit specifying the maximum allowed amount of discharge. Collectively, the permits cannot exceed prescribed limits, called Total Maximum Daily Loads (TMDLs). States must develop waterways' TMDLs by calculating the maximum amount of a given pollutant a waterway can receive and still comply with water quality standards. Municipalities, which receive permits for stormwater runoff discharges, must also comply with the TMDLs.[101]

Both D.C. and Maryland have established TMDLs that were accepted by the EPA to control oil and grease pollution, bacteria levels, and even trash volumes on the river.[102] The Anacostia's trash TMDL was announced in 2010.[103]

That same year, specifically citing the need to follow the TMDL and reduce trash pollution in the Anacostia, the District of Columbia imposed a five-cent fee on the use of disposable shopping bags – both paper and plastic – and required any such bags be made of recyclable material and labeled to ask users to recycle them.[104] While not as strong as a direct ban on plastic bags, the fee is reducing bag use and raising money to clean up the river.[105] In 2011, Montgomery County, Maryland, through which the Anacostia flows before getting to D.C., passed a similar bag fee.[106]

Styrofoam food containers are another common trash item found in the Anacostia.[107] In late summer 2014, the District expanded its efforts to eliminate trash in the river by banning the use of Styrofoam containers by food-service establishments starting in 2016.[108] Montgomery County is considering such a ban as well.

The Anacostia River's restoration is undoubtedly a work in progress, with years of effort remaining to return the waterway to fishable and swimmable quality – including addressing combined sewer overflows that still foul the river after rainstorms and the toxic legacy sites on its banks.[109] But the establishment of the trash TMDL in recent years instigated a cleanup effort that is showing promise. In early 2012, "trash traps," mechanisms to separate trash from stormwater runoff before it entered the river, were collecting 800 pounds of garbage a month, and more were in the process of being installed.[110] Though overall scores were low, the Anacostia Watershed Society's (AWS) 2014 report card for the river announced that trash levels are dropping, as are fecal bacteria counts.[111] The AWS hopes the river will be declared fishable and swimmable by 2025.[112]

MASSACHUSETTS: Boston Harbor Goes from "Dirtiest in America" to "Great American Jewel"

Boston Harbor has long been one of America's most economically important waterways, as well as the scene of history-making events, such as the Boston Tea Party.

Over the centuries, however, much more than British tea was dumped into Boston Harbor. Until 1952, the city's raw sewage flowed directly into the harbor, and, for decades after, sewage from combined sewer overflows continued to be dumped there after heavy rains. As much as 25 percent of the sewage discharged into the harbor was entirely untreated.[113] Added to the noxious mix were pollutants carried off of city streets and from industrial sites – such as oil, grease and pesticides.[114]

After decades of abuse, the harbor posed a public health risk. A 1984 study of the harbor's sediment reported significantly elevated levels of cancer-causing chemical compounds known as PCBs.[115] Sustained sewage dumping led to over-enrichment of nutrients in the water and an explosion in the growth of oxygen-depleting algae, which contributed to fish kills.[116] Of the fish that remained in the harbor, many were diseased. A 1984 study found that 17 percent suffered from liver cancer, the highest rate ever recorded.[117] In June 1988, government authorities advised limiting consumption of harbor fish and shellfish due to the potential for high levels of toxic contamination.[118]

Perhaps the most vivid sign of the harbor's ill health was on the sea floor: with only limited flushing of the harbor during the tidal cycle, much of the sewage pumped into the water stagnated and settled into layers of sludge up to nine feet deep.[119] Likened by divers to "black mayonnaise," it caused concentrations of coliform bacteria – an indicator that disease-causing pathogens may be present – to skyrocket.[120] In 1988, the harbor became an issue in the presidential campaign, with Republican candidate George H.W. Bush running television ads blaming his Democratic opponent, Massachusetts Governor Michael Dukakis, for failing to clean it up.

Photo: Captain Bill Smith, Draggin' Fly Charters

Fishing, boating and swimming, as well as commerce and development, have returned to Boston Harbor as the water has gotten cleaner, thanks to the Clean Water Act.

As late as 1990, a report card published by the Massachusetts Water Resources Authority (MWRA) awarded Boston Harbor a "D+" for overall quality, citing poor beach conditions, pathogen contamination in fish, some of the worst sediment contamination in the United States, and high concentrations of PCBs.[121]

The Clean Water Act's provisions for sewage treatment and enforcement made the subsequent transformation of Boston Harbor into an attractive, vibrant waterway possible. Not that transformation came quickly. Boston was immediately out of compliance upon enactment of the Clean Water Act in 1972, but years of study and decades of delaying actions stalled the necessary cleanup.[122]

In 1982, the coastal community of Quincy sued the Commonwealth of Massachusetts for violating the Clean Water Act by disposing of untreated sewage in the harbor.[123] The following year the Conservation Law Foundation (CLF) filed a similar Clean Water Act citizens' suit against the state and the EPA.

So began an extended legal battle CLF carried through the decades, skillfully using the law and the power of the courts to prevail in an effort that has become Boston – and American – legend. The judge in the case, Paul Garrity, made clear that if the state failed to address Boston's massive sewage overflows, his court would assume control of the local sewer system and bar any new connections to it. When Beacon Hill lawmakers refused to act, Judge Garrity made good on his threat. The prospect of major downtown developments deprived of sewer connections finally shook the legislature into action, ultimately creating the Massachusetts Water Resources Authority (MWRA) to handle the systems and the cleanup.[124]

The EPA joined the effort too, taking the case to federal court, where Judge David Mazzone kept up the pressure on those responsible for the cleanup to work out the details while sticking to strict timelines.[125]

The lawsuits, and the planning process, took years – and the cleanup process itself took more than two decades.[126]

The MWRA's efforts – both voluntary and begrudging – oversaw remediation activities and a multi-billion dollar effort to upgrade sewage treatment facilities and address pollution from stormwater runoff. Boston Harbor is now something Bay Staters can be proud of: an increasingly healthy natural habitat and picturesque setting for vibrant commerce and recreation.[127] According to the MWRA, bacteria counts have decreased in the harbor, as have concentrations of metal and organic chemical contaminants in the waste, which is now thoroughly treated before its release into the water.[128] The color and smell of the water have also improved, harbor fish have fewer tumors than before, and regular beach closings are a thing of the past.[129]

The city's beaches, once plagued by average of eight closures each summer, now draw many visitors and rank among the cleanest urban beaches in the United States, forced to close at most once every five years.[130] Boston Harbor's revitalization is ongoing, but the progress already made due to the Clean Water Act and the lawsuit it facilitated has taken it from "dirtiest harbor in America" to "great American jewel."[131]

MINNESOTA: A Community Cleans Up Its Runoff, Taking Pride in Powderhorn Lake

When Powderhorn Lake was first created in the 1920s as the centerpiece of a Minnesota neighborhood park, local residents enjoyed swimming in it.[132] But the construction of a nearby highway in the 1960s cut off its natural water supply. After that, nearly all the water flowing into the lake, located just south of downtown Minneapolis, was storm runoff, carrying chemicals, trash and other debris from the surrounding residential neighborhood.[133] Today, thanks to efforts stemming from requirements of the Clean Water Act, the lake is once again a source of neighborhood pride. While its natural water supply has not been restored, and may never be, the lake's improvements were behind the results of a 2013 newspaper

Photo: Brian Dunnette, Minnesota's Office of the Governor

Once filled with floating trash, Minneapolis's Powderhorn Lake has been cleaned up and is now a focus of community events, including this May Day celebration in 2013.

poll in which Powderhorn was voted Minneapolis's best lake.[134]

In recent memory, Powderhorn Lake was "an extreme example of an algae-covered lake suffering from stormwater runoff in a heavily urbanized area," according to a legislative report.[135] By the mid-1990s, the only way fish could survive in the lake was to be stocked by state officials – even then, only the operation of mechanical aerators kept oxygen levels in the water high enough for fish to survive.[136] When an aerator broke in the winter of 1998, killing all the fish, residents of the neighborhood banded together to explore ways to restore the lake.[137]

With the additional public attention, regulators began paying closer attention to the lake, leading to its 2002 placement on the state's Clean Water Act-mandated list of waters impaired by pollution.[138]

Starting in 2001, city officials boosted their efforts to clean up the stormwater flowing into the lake, as required under the terms of the city's Clean Water Act discharge permit, including following best management practices for handling runoff.[139] This included filtering both chemicals and large debris out of stormwater before it flowed into the Powderhorn.[140]

The city paid to build big underground concrete basins that allow debris to settle out of the runoff, and the state-run Environment and Natural Resources Trust Fund supported a local effort to create rain gardens in lawns around the community, another best management practice to filter stormwater before it even hits the settling chambers.[141] State funding also supported efforts to reduce algae formation along the shoreline and replant native vegetation.[142]

Thanks to that work, in 2012 the lake was removed from the state's list of impaired waters – an important foundation point for any polluted waterway's recovery.[143] By then, the lake was already "one of the most popular fishing spots in the city," according to a local newspaper report.[144] The following year, readers of another local paper voted Powderhorn the city's best lake.[145]

Today, though not safe to swim in, and with many barriers between its current state and a return to full health, the community takes pride in Powderhorn Lake. This was evidenced by its selection in a community-wide vote as the summer 2014 home for Minne the Lake Creature, a floating public art project coordinated by the Minneapolis Parks Foundation, which is a non-profit group marshaling public attention and support for the city's public spaces.[146]

NEW JERSEY: Citizen Efforts Protect Thousands of Miles of Waterways Under Anti-Degradation Rules

New Jersey once had the deserved reputation of being heavily contaminated by industrial water pollution. But, by the early 1990s, the state was well on its way to putting a lid on the flow of toxics from industrial discharge pipes into waterways. A multi-year grassroots campaign resulted in the 1990 passage of New Jersey's Clean Water Enforcement Act, one of the strongest clean water laws in the country at the time.[147] It created mandatory minimum fines on polluters and finally gave teeth to the federal Clean Water Act's language.[148]

A decade later, however, the state's waterways faced a new danger: polluted stormwater runoff. During the development boom of the 1990s, increasing amounts of runoff from newly constructed roads, lawns and homes flowed into local waterways. As development spread outwards from the New York and Philadelphia areas to previously rural parts of the state, pristine waterways – including many that provided drinking water or recreational opportunities to New Jerseyans – came under threat.

Photo: New Jersey Department of Environmental Protection

New Jersey's Round Valley Reservoir, also home to a popular recreation area, is protected from runoff caused by increasing development, thanks to state protections under a system created by the Clean Water Act.

An early 2001 report by a predecessor organization to Environment New Jersey Research & Policy Center cited EPA data saying half of the state's waters were suffering "serious water quality problems," and 93 percent of the state's waterways were "highly vulnerable to further declines in water quality."[149] The cause was significant land development, which threatened some of the largest drinking water reservoirs and rivers in the state.[150]

The Clean Water Act has a provision designed to protect waterways from pollution before it occurs. The anti-degradation component of the Act requires all states to have a tiered system to protect waterways before they became polluted.[151]

The state's Surface Water Quality Standards clearly recognized the need to preserve waterways that serve as drinking water sources and those that provide "exceptional ecological and recreational significance."[152] But beyond waterways within state and federal wildlife refuges, many key waterways, including some of the state's largest drinking water reservoirs, lacked adequate protection.[153]

Sustained citizen efforts won support from key decision makers, including two successive governors, repeatedly extending Clean Water Act protections to more and more of the state's waterways.

In late 2001, for example, a coalition of environmental and outdoor recreation groups named New Jersey's "Top 30 Threatened Waterways," including the state's largest reservoir – the Wanaque Reservoir in North Jersey, which provides 2.5 million New Jerseyans with their drinking water – and rivers like the Metedeconk River along the Jersey Shore.[154]

They sought for these waterways the highest level of protection available under New Jersey's Clean Water

Act anti-degradation rules. Called Category One, the designation created a buffer zone within which development was barred and also banned any discharge that would measurably degrade the water quality.[155]

On Earth Day 2002, Governor Jim McGreevey announced his intention to extend Category One protections to 15 water bodies, including the Wanaque Reservoir, the Metedeconk River and a smaller waterway, the Sidney Brook, which was threatened by a massive development project.[156] The move protected 82 river miles.[157] In December of that year, he proposed protecting seven additional trout streams.[158]

Support was widespread, including more than 50 mayors across the state and signatures of more than 10,000 backers.[159] And the need was great: Development was already damaging the state's waterways.[160] In a move that showed how much developers had at stake, the state builders' association sued, but failed to block the expanded protections.[161]

The citizen advocacy didn't stop there. Thanks to the coalition's continued efforts, in 2003, McGreevey announced another round of additions to the Category One list, protecting more than 500 river miles.[162]

In 2004, he updated the state's stormwater runoff rules to expand the buffer zone around Category One waters to 300 feet – the length of a football field. He also extended those protections to tributaries of Category One waters.[163] That added significant protection to the 3,300 miles of Category One waterways in the state and to 2,700 miles of their tributaries.[164]

Building on this momentum, Environment New Jersey and its allies, including thousands of New Jerseyans determined to prevent a reprise of their state's toxic legacy, called on succeeding administrations to designate more pristine streams and drinking water sources for protection.

In 2007, Governor Jon Corzine's commissioner of the Department of Environmental Protection, future EPA Administrator Lisa Jackson, extended Category One protections to an additional 900 miles of waterways across the state, including the Ramapo and Toms rivers, which feed the Shore.[165]

Today, thanks in large part to those citizen campaigns – which continue – more than 4,500 miles of streams and rivers and more than 12,000 acres of lakes and reservoirs are protected as Category One waters by New Jersey's strictest anti-degradation rules under the Clean Water Act.[166] The Clean Water Act's anti-degradation provisions have enabled a state once maligned for its toxic legacy to permanently protect more waters than any other state in the nation.

NEW YORK: Pioneering Riverkeepers on the Hudson Force Industry to Clean Up

For decades before the Clean Water Act, much of the Hudson River was heavily polluted on a daily basis with industrial runoff and wastewater discharge. The Clean Water Act led to a dramatic reversal, sparking industrial cleanup and huge investment in sewage system upgrades.

The Hudson River begins in northeastern New York, and flows south, past Albany and into the Atlantic at New York City. For most of the 20th century, it was known as a dirty river. Legend had it that the water was so toxic that sailors used it to kill parasites on the bottoms of their boats. The folk singer Pete Seeger, who led activism to clean the river, wrote a song about the Hudson called "Sailing Up My Dirty Stream," with the line "five million gallons of waste a day, why should we do it any other way?"[167]

The Act's passage in 1972 ultimately led to significant progress against two of the Hudson's most damaging sources of pollution: industrial plants, which dumped waste into the river, and municipalities, which released untreated sewage.

Photo: Hudson River Valley Greenway

Thanks to the Clean Water Act, the Hudson River is now safe for swimming and boating events like the Great Hudson River Paddle, pictured here.

Industrial pollution had a terrible impact on the river, with dozens of factories discharging into its waters.[168] Residents downstream from the General Motors site in Sleepy Hollow would "know what color they were painting the cars that day because of the discharge of polluted waste water," according to a recollection in a newspaper story marking the 40th anniversary of the Clean Water Act.[169] The Anaconda Wire and Cable Company in Hastings-on-Hudson dumped chemicals and metal filings straight into the river. [170]

The passage of the Clean Water Act helped ordinary citizens to hold these polluting industries accountable. Local fishermen on the Hudson had, in previous years, sought legal and regulatory restrictions on industrial polluters.[171] The Clean Water Act gave them a new and stronger way to pursue those goals. In 1972, the Hudson River Fishermen's Association launched the country's first "riverkeeper" effort, appointing a person to travel up and down the river documenting cases of suspected Clean Water Act violations and handing evidence over to the EPA.[172] In one early instance, a riverkeeper sailing on Pete Seeger's boat *Clearwater* investigated pollution from an adhesive tape manufacturing company. As a result of the evidence collected, the company was found guilty of 12 violations of the Clean Water Act.[173]

According to Phillip Musegaas, Hudson River Program Director for the fishermen's group that later renamed itself Riverkeeper, "the passage of the Clean Water Act, with its seminal citizen enforcement provision, allowed us to . . . [bring] Clean Water Act enforcement actions against polluters in federal court, often resulting in the cessation of pollution and improved protection of the Hudson."[174] In the years following the passage of the Clean Water Act, through litigation or its threat, many polluters of the Hudson gradually reduced their pollution.[175]

The Act also forced the cleanup of sewage pollution in the Hudson. Sewage had devastated the Hudson River and its wildlife all along the course of the river. By the late 1960s, bacteria levels in the Hudson River were 170 times above the safe limit.[176]

"The river from Troy to the south of Albany is one septic tank that has been rendered nearly useless for water supply, for swimming, or to support the rich fish life that once abounded there," said Nelson A. Rockefeller, governor of New York in 1965.[177] The sewage waste released from Troy and Albany caused a severe reduction in dissolved oxygen levels and wiped out almost all fish for nearly 24 miles downstream.[178] A 1970 study of fish in the area found them "swimming slowly at the surface, gulping air, and disturbing an oil film which covered the water surface."[179]

Pollution downstream, near Manhattan, was nearly as bad, with New York City discharging 170 million gallons of raw sewage into the Hudson every day (and 450 million gallons per day into all of the city's surrounding waters).[180]

Clean Water Act requirements and funding for the abatement of sewage discharge dramatically improved the health of the Hudson. Treatment plants opened in Albany and Troy in 1975 and 1976, respectively. Within just two years, many species of fish could once again be found as far north as Troy.[181]

Delays in construction of wastewater treatment in New York City meant its sewage pollution continued for longer.[182] Upgrades in 1986 led to the elimination of New York's daily discharge of raw sewage into the Hudson River for the first time in its history.[183] By 1994, all but one of New York City's 14 water pollution control plants had been upgraded to full secondary treatment, now treating more than 99.9 percent of the city's dry weather sewage for several contaminants (although rain still causes overflows).[184]

The Hudson is not home free. Today, much of the river is a Superfund site, due to the residue from the use of PCBs, a class of toxic chemical, at General Electric's Hudson equipment manufacturing plant. Four power plants discharge huge quantities of heated water into the Hudson, harming wildlife. And battles over pollution continue – one recent citizen suit resulted in the energy company Entergy paying $1.2 million for Clean Water Act violations following a release of petroleum.[185]

Nevertheless, the Hudson is now dramatically cleaner than it once was. Dissolved oxygen levels in the river near Albany and Troy are five times higher than they used to be.[186] Measurements of fecal bacteria in the Hudson River have declined significantly.[187] The cleaner Hudson has led to the return of fish and wildlife.[188] New York's Department of Environmental Conservation now says that, after years of dangerously high levels of sewage and other pollutants, swimming in the river is generally safe.[189]

NORTH CAROLINA: A Pristine River Is Spared from Runoff Pollution

The North Fork First Broad River in western North Carolina is a pristine mountain river, large sections of which sustain natural trout populations and allow year-round sportfishing.[190] A tributary of the First Broad River, the North Fork drains a beautiful area used for hunting, fishing and hiking and protected by the state of North Carolina as park and game lands.[191] The river is home to several species not found elsewhere, as well as others that are rare or endangered.[192] Thanks to protections provided by the Clean Water Act, future pollution discharges into the North Fork and its tributaries are banned, and all nearby development must be constructed to prevent pollutants from being washed into the river.[193]

Photo: Jeff DeBerardinis, North Carolina Division of Water Quality

The North Fork First Broad River is a pristine waterway, home to a native trout population and several rare species. It has been protected by the state of North Carolina under state regulations implementing the Clean Water Act.

A key reason the North Fork First Broad had remained pristine for so long is that it had not been plagued with the runoff pollution that often comes with sprawling shoreline development. But, by the end of the 20th century, the risk of runoff pollution into the river was growing. Between 1982 and 2002, developed land in the overall Broad River basin grew by 72,200 acres; by 2020, the basin's population is expected to grow from 342,000 in 2000 to more than 400,000 people.[194]

Fortunately, the Clean Water Act contains provisions not only to clean up polluted waters but also to preserve pristine ones by requiring states to develop "anti-degradation" policies to protect these waters.[195] In North Carolina, the highest level of protection is given by classifying a waterway as "outstanding resource waters," preventing any reduction in water quality from any source.

In the early 2000s, local residents asked the state to consider extending anti-degradation protections to the North Fork First Broad.[196] A North Carolina legislative report said the North Fork First Broad "contains an impressive array of high quality natural communities, rare animal populations . . . [and] excellent water quality."[197] An Environment North Carolina Research & Policy Center report in 2006 bolstered and focused the already strong public support for protecting the North Fork First Broad and other unspoiled waters across the state.[198]

In light of those characteristics, in 2007, state officials designated a 14-square mile area of the river "outstanding resource waters."[199] The North Fork First Broad River continues to be a pristine treasure for North Carolinians. In recent years the river has been listed among the state's best fishing rivers.[200] Thanks to the anti-degradation program of the Clean Water Act, residents are confident it will remain that way for years to come.

OHIO: No Longer a Fire Hazard, Cleveland's Cuyahoga River Is Again Home to Wildlife

By the mid-1960s, fuel, chemicals and debris floating on the surface of the Cuyahoga River had caught fire a dozen times in 100 years, and no fish in the river could survive. Thanks to efforts stemming from the passage of the Clean Water Act, the river today supports sportfishing as well as canoe and kayak tours of downtown Cleveland.

Photo: National Park Service

Downstream of the Akron sewage discharge, the Cuyahoga Valley National Park provides opportunities for fishing and viewing wildlife.

Starting in the mid-19th century, industrial facilities poured waste into the Cuyahoga from as many as 100 pipes on both banks:[201] blood, fat and animal parts from slaughterhouses; dye from paint manufacturers; acids from steel mills (which also released hot water used to cool equipment, ensuring the river never froze over); oil slicks; debris washed downstream by floodwaters; and sewage from Cleveland and Akron.[202]

After a 1952 fire, the 12th in a century, a 56-foot boat was commissioned to travel the lower reaches of the river trying to clean things up.[203] "In a 16-hour day, we could pick up 100 cubic yards of debris and 15,000 gallons of oil," the boat's owner recalled in a 2009 newspaper interview.[204] Some spills – including one of 164,000 gallons of gasoline – took several days to clean up, he said.[205]

By 1968, the lower Cuyahoga was filled with raw sewage and industrial waste, including rubber particles, acids and toxic chemicals.[206] Its water provided "intolerable conditions for fish life," according to a state health department study.[207]

In 1969, the river caught fire again. It was a much smaller fire than the 1952 blaze, but widespread media coverage, including a striking photo of a fireboat battling flames on a railroad trestle (which was actually from the 1952 fire), became a national symbol of industrial pollution.[208] This focused officials at the local, state and national levels on the problem.[209]

Following the Clean Water Act's passage, industrial sites were required to treat wastewater before it was discharged.[210] Meanwhile, Clean Water Act enforcement actions forced the sewer systems of Cleveland and Akron to clean up what they discharge into the river, specifically targeting combined sewer overflows (CSOs), which handle not just sewage from homes and businesses but also rain that flows into storm drains. During large rainstorms, when treatment plants could not process the amount of wastewater coming in, they released the overflow – including both rainwater and raw human sewage – directly into local waterways.[211]

In 1994, under the auspices of the Clean Water Act, the U.S. EPA issued a policy setting out practices by which communities with CSOs were required to control the releases.[212] This triggered the state's review of the Cuyahoga's sewage discharges.

By the early 2000s, the Ohio Environmental Protection Agency had completed the long process laid out by the Clean Water Act to determine how much pollution could be released into the Cuyahoga and its tributaries while still meeting water quality standards. The Ohio EPA allocated specific amounts and types of discharges to both individual sewage plants and private businesses.[213]

Those new limits have sparked action up and down the Cuyahoga. In the Cleveland area, as a result of a Clean Water Act lawsuit filed by the EPA and the state, the Northeast Ohio Regional Sewer District, which had already cut its CSO discharge volume to half its 1972 level, will remove 90 percent of the remaining CSO discharges by 2035.[214] Similarly, Akron, which also discharges into the Cuyahoga and had already reduced its CSO volume by 40 percent,[215] was sued by the federal and state governments to reduce its remaining CSO discharges, which totaled "more than one billion gallons of untreated combined sewage and wastewater" into local waterways, according to a U.S. Justice Department press release.[216] The settlement of that suit, finalized by a federal judge in January 2014, requires Akron to completely remove all CSO discharges and further improve the river's water quality by removing a dam.[217]

Despite the reductions in industrial pollution and sewage discharge, the Cuyahoga remains a work in progress. In a 2008 assessment, the entire river – including sections running through the Cuyahoga Valley National Park – was listed as impaired for fish, shellfish, and wildlife protection and propagation, and much of it was still too polluted for recreational use.[218]

But there are signs of recovery. In 1968, biologists trying to check the health of the fish in the lower Cuyahoga found no fish at all between Akron and Cleveland.[219] In the mid-1980s, they found very few fish, and those they did find were often unhealthy.[220] By 2009, though, 34 native fish species were classified as occasional, common, or abundant in the lower Cuyahoga, including such sportfish as rock bass, smallmouth bass, and largemouth bass.[221]

While there remains more to be done, wildlife are returning to the Cuyahoga at all levels of the food web, from insects fish eat, to beavers, to apex predators like bald eagles.[222] People are returning, too. Today, thanks in part to the Clean Water Act, people can take canoe or kayak tours of the river through downtown Cleveland — something that would have been unthinkable – and dangerous – 40 years ago.[223]

Photo: Human Access Project

Thanks to cleanup efforts, the Willamette River is now safe for swimming, a fact celebrated three times weekly throughout the summer by the River Hugger Swim Team.

OREGON: Removing Sewage Discharges Lets People Swim in the Willamette River

Portland is known for being an outdoorsy, ecology-friendly community. But the river running through its heart was for years contaminated by raw sewage. In 1991, citizens frustrated with the low quality of the water asked a federal court to enforce Portland's obligations under the Clean Water Act. That case triggered a massive overhaul of its sewage system that finally stopped a major source of pollution for the Willamette and the nearby Columbia Slough, making the river swimmable and creating potential for real protection and rehabilitation.

Portland was founded at the confluence of the Willamette and Columbia rivers. The Columbia Slough is an area of lakes, wetlands and slow-moving channels parallel to the Columbia River and contained entirely within Portland's metro area.[224] From its earliest days, Portland dumped raw sewage into the Willamette and the Slough, and by the mid-1930s pollution levels from sewage and industrial sites were so high that salmon fingerlings placed in the Willamette died within 15 minutes.[225] It was depleted of oxygen, filled with disease-causing bacteria, and unsafe for swimming.[226]

While Portland and the state put in (and then expanded) a sewage treatment plant in the mid-20th century, by the beginning of the 1990s the pipes weren't big enough to handle the demand.[227] In the notoriously rainy northwest, Portland's combined sewer overflow would exceed its capacity at times of even light rain, diverting a toxic mix of raw sewage and rainwater directly into the Willamette and the Slough.[228] There were between 50 and 80 sewage discharges occurring every year.[229]

Clearly, if the Willamette was going to see real improvement, there would have to be robust enforcement of discharge permits to uphold the state's clean water standards – and that is just what the Clean

Water Act allowed for. In February 1991, Northwest Environmental Advocates (NWEA), an environmental advocacy group, sued the City of Portland, alleging that Portland's sewer discharges were violating a condition of its discharge permit barring it from violating state water quality standards set under the Clean Water Act. Shortly after the lawsuit was filed, Oregon's Department of Environmental Quality ordered the city to dramatically reduce CSO pollution, using its authority through the federal Clean Water Act.[230] NWEA's 1995 court victory resulted in a consent decree adding a federal court's requirement that Portland obey that state order.[231]

By the end of 2011, the CSO program had reduced annual CSO volume to the Columbia Slough by 99 percent and to the Willamette River by 94 percent.[232] The number of discharges was expected to drop to a maximum of four each winter and one every third summer.[233] And while Portland Harbor is still the site of a Superfund cleanup effort to remove industrial pollutants, the reduction in sewage contamination means the Willamette is now considered generally safe for swimming.[234]

PENNSYLVANIA: Bass Population Begins to Recover from Industrial Contamination in the Conemaugh River

Located in heart of Pennsylvania's coal country, the Conemaugh River watershed has long been a center of industrial production. Coal mines perforate the landscape, and coal-fired power plants sit on the riverbanks.

Both the mines and the power plants have generated toxic discharges that have contaminated the Conemaugh River, as well as many of its tributaries.[235] Fish in the waterways struggled to survive.[236] The pollution had decreased food supply for bottom-feeding fish and clogged gills with metal particles.[237] Because the

Photo: Zach Frailey

A stone arch bridge showcases the scenic beauty of the Conemaugh River, where bass populations are beginning to return following a power plant's Clean Water Act-mandated cleanup.

Conemaugh is so polluted by mine runoff, parts of it have been designated an impaired waterway under the Clean Water Act.[238] Pennsylvania has taken steps to address the heavily polluted drainage from abandoned mines, but when it came to protecting the Conemaugh from active polluters, the state took a different tack.[239]

In 2001, the Conemaugh Generating Station received a permit under the Clean Water Act's National Pollutant Discharge Elimination System, specifying how much boron, selenium, manganese, aluminum and iron it was allowed to discharge.[240]

In 2007, PennEnvironment and the Sierra Club and their local members, represented by the National Environmental Law Center, sued the power plant's owner, GenOn Northeast Management Company, in federal court, alleging that the plant was discharging wastewater in the Conemaugh River containing chemical levels above those allowed by its 2001 NPDES permit.[241] The suit was brought under the Clean Water Act's "citizen suit" provision, which allows private groups and citizens to sue violators on their own when there has been an absence of effective government enforcement.[242]

Once the lawsuit began, a review of agency files revealed that the state of Pennsylvania had entered into a side deal with GenOn, allowing the company to delay complying with its pollution permit without fear of state agency enforcement.[243]

In 2011, however, the federal court ruled that the state's permission to delay compliance was not a free pass to violate federal law, and found GenOn guilty of 8,684 violations of its permit. The ruling led to a pretrial settlement that required GenOn to install cutting edge wastewater treatment systems and pay a $3.75 million penalty, most of which was directed to the Foundation for Pennsylvania Watersheds.[244]

The ruling in the GenOn case reinforced why *federal* authority is particularly critical to the protection of water quality by giving citizens recourse through the federal court system when state governments fail to act appropriately to protect the environment and public health.[245] The court decided that although the states may administer programs and authorize permits, they do not have the ultimate power to delay implementation of Clean Water Act requirements via side negotiations and deals.

Cleanup efforts, boosted by the settlement money, continue to make progress in helping the Conemaugh recover from the horrific legacy of more than a century of intense pollution.[246] Fish species continue to re-inhabit the waters, with the Conemaugh River Lake reporting catch rates of 36 bass per hour in 2013, a significant increase from seven bass per hour in 1996.[247] In April 2013, the lake water was found to have a pH of 7.5, a big quality improvement from 1993 when the pH was 4.8, and a testimony to the progress made in efforts to limit acid mine drainage that was supported by the settlement and other state programs.[248] Most organisms cannot live in waters with a pH under 5.5.[249] The state is also confident enough in the continuing recovery that it is marketing the river as a kayaking and canoeing travel destination.[250]

WASHINGTON: Citizens Fight Polluted Runoff to Protect Puget Sound

Puget Sound is the second largest estuary in the United States, the nexus of 19 different river basins, which gather all the rainwater that falls on the Olympic and Cascade mountain ranges. The waters of the Sound support recreation and tourism for the more than 4 million people who live in its vicinity, as well as a habitat for hundreds of fish, bird and mammal species, including the iconic orca.[251]

Puget Sound and its wildlife face many pressures and dangers, among them toxics polluting the waters of the Sound and the surrounding basin. Washington's Department of Ecology estimates that the Sound receives millions of pounds of toxic chemicals each year, including oil and grease, PCBs, phthalates (substances added to plastics to increase their flexibility and durability, among other things), and heavy metals like copper and zinc.[252] Periods of heavy rainfall also bring untreated sewage into the Sound via combined sewer overflows.[253] In 2006,

Photo: Mark Sears, Puget Sound Orca Research

An orca breaches in Puget Sound, within sight of downtown Seattle. The orcas in Puget Sound are among the most contaminated in the world, but citizens are forcing cleanup efforts to protect the ecosystem.

researchers reported that the Sound was filled with fish poisoned by flame retardants that can enter the marine environment via surface runoff and industrial point sources, and some of its tributary urban creeks suffered fish kills from overwhelming pollution.[254] In 2005, all this pollution caused 72 percent of coho salmon returning to West Seattle's Longfellow Creek to die before even depositing their eggs.[255] The orcas in southern Puget Sound are among the most PCB-contaminated mammals on the planet, while harbor seals in the Sound are seven times more contaminated than those living in the adjoining Strait of Georgia in Canada.[256]

Both municipal wastewater outfall pipes and polluted storm water runoff contribute to pollution in the Sound.[257] Since 1960, the Puget Sound region has urbanized heavily and more than doubled in population. Rapid and widespread development covered ever more land with pavement and buildings, speeding the flow of rainwater (which falls regularly in the notoriously wet Pacific Northwest) into the Sound, picking up oil, grease and other pollutants from roadways and gutters along the way.[258]

Protecting and cleaning up major waterways is not always simple or quick. It takes persistence and often multiple legal actions over time. The Clean Water Act provides the tools to keep the cleanup process moving by allowing citizens to sue polluters who violate the law and by letting the public appeal terms of discharge permits to ensure polluters are kept in check.[259]

In Washington, the Puget Soundkeeper Alliance has undertaken more than 150 legal actions resulting in more than $3.7 million in penalties and contributions to restoration projects.[260]

For example, the Alliance reviews Clean Water Act pollution permits for local industries and businesses, comparing the paperwork with real world conditions to identify violators. Then it ensures they clean their parking lots and work yards to minimize pollution carried away by rainfall.[261] After the conclusion of one suit, a metal-coating factory showed a 650-fold reduction in zinc runoff, while copper flows reduced 98 percent.[262] In 2012 alone, similar legal action concluded against entities including the King Country International Airport and freight rail behemoth BNSF Railway, forcing the installation of storm water treatment systems, development of pollution prevention plans, and the coating of structures to eliminate zinc contributions to runoff.[263]

The Alliance has won stricter pollution discharge limits by appealing permits issued to a pulp mill, a shipyard and an oil refinery,[264] as well as cases requiring reductions in discharge of raw sewage.[265]

Cleaning up Puget Sound is an ongoing process, set to take many years. But victories are adding up. From 2004 to 2012, the percentage of swimming beaches meeting water quality standards rose – and in 2012 the state reopened nearly 1,400 acres of shellfish beds that had been closed because of contamination.[266]

One of the great successes of the Clean Water Act is its invitation to citizens to become a part of that process, allowing local residents to act as watchdogs and enforcers to quicken the restoration of the area's waterways. With the state Department of Ecology typically unable to send an inspector to review a business' compliance with the Act more than once every five years, citizen-enforcement powers are a major factor in the restoration of local waters.[267] Every victory won through citizens' legal action is another step toward a cleaner, healthier Puget Sound.

The EPA Should Extend the Clean Water Act's Protections to All American Waterways

The federal Clean Water Act is the nation's primary bulwark against pollution of our waterways. Yet, for too long, implementation of the Clean Water Act has failed to live up to the vision of pollution-free waterways embraced by its authors.

The nation still faces major water pollution threats. Discharges from industrial and sewage plants contaminate rivers with poisons and harmful bacteria. Runoff from factories and industrial farms pours nutrients into water, leading to algal blooms and "dead zones" in waterways such as Lake Erie, the Gulf of Mexico and Chesapeake Bay. Oil and gas drilling, including fracking, threatens waterways through erosion and discharge of pollutants to waterways.

Clean Water Act protection has been essential for the cleanup and restoration of countless waterways across the United States, and the Act remains a critical tool for confronting today's major threats. Where the Clean Water Act has been applied to waterways, it has been a powerful force for improving water quality. If we want to be successful in attacking the nation's water pollution problems, we need to ensure that the Clean Water Act once again protects all waterways.

To meet the Clean Water Act's promise of fishable and swimmable waterways for all Americans, the EPA and the Army Corps of Engineers should finalize their proposed rule that restores Clean Water Act protections to thousands of streams and other waterways across the country.

Restore Protections for All of America's Waters

Our great waterways – from the Chesapeake Bay to Puget Sound – depend on the health of the countless streams that feed them and the wetlands that help keep them clean. No places are more vulnerable or more important to the overall protection of waterways than headwaters and tributaries.

However, a series of court cases brought by polluters, culminating in the U.S. Supreme Court's 2006 decision in the case of *Rapanos v. United States*, have threatened the protection that thousands of streams and millions of acres of wetlands have traditionally enjoyed under the Clean Water Act. Across the country, 58 percent of all streams are at risk of increased pollution due to these court decisions.[268] Nationwide, EPA estimates that 117 million people are served by drinking water systems that draw their water from headwaters streams or intermittent waterways.[269]

The implications of these court-created loopholes should be readily apparent from the success stories in this report. The Clean Water Act's critical tools – including federally enforceable discharge permits, cleanup plans, citizens' suits or funding programs – are no longer available to protect these waters.

In April 2014, the Army Corps of Engineers and the EPA jointly addressed this threat by proposing a rule that would restore Clean Water Act protections to thousands of streams and wetlands across the coun-

try. As the very next step in realizing the Act's vision of making all of our waters safe for swimming and fishing, the Obama administration should finalize this proposed clean water rule in 2015.

Strengthen Enforcement of the Clean Water Act

The Clean Water Act is America's main source of protection against water pollution, but it has not always been adequately enforced. States (which are primarily responsible for enforcing the law in most of the country) have often been unwilling to tighten pollution limits on industrial dischargers and have often let illegal polluters get away with exceeding their permitted pollution levels without penalty or with only a slap on the wrist.

State and federal officials must take several steps to address these shortcomings, including but not limited to:

- Ensuring that pollution permits have clear numeric limits and no loopholes, are renewed on schedule, are strictly enforced, and have pollution levels ratcheted down over time, with the goal of achieving zero pollution discharge wherever possible. As of March 2013, nearly one out of every four discharge permits for major industrial facilities had expired.[270] Timely renewal of permits, coupled with reductions in the amount of pollution allowed at each permit renewal, can move the nation closer to achieving the original zero-discharge goal of the Clean Water Act.
- Requiring that all facilities that threaten our waters with pollution – including factory farms – obtain permits with clear numeric pollution limits and enforceable standards.
- Boldly and regularly applying other Clean Water Act tools to restore and protect America's waters, such as demanding significant reductions in pollution discharges and extending heightened antidegradation designations to more waterways.
- Enforcing pollution limits by regularly imposing tough penalties for Clean Water Act violations. Too often, officials lack the resources or political will to penalize polluters, even after multiple violations of the law. Establishing mandatory minimum penalties for violations of the Clean Water Act would ensure that illegal pollution does not go unpunished and act as a deterrent to illegal polluters. One way or another, enforcement agencies must consistently apply tough penalties to create an adequate deterrent effect.

As illustrated by the success stories in this report, the Clean Water Act has provided critical aid in restoring and protecting many of America's rivers, bays, lakes and streams. But if we truly want *all* of our waters to be clean, there is much work to be done.

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