



UNDERWATER NATURALIST

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10 YEARS LATER:

How are we preparing
for the next Sandy?



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On the Cover: Flooded streets are becoming a more common occurrence in many coastal towns yet building and development have continued. Image shows flooding in Ocean City, NJ from a winter storm in 2013. Photo courtesy of US Coast Guard.

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From the **EXECUTIVE DIRECTOR**



Modern newspapers don't commonly use exclamation points in their headlines anymore. There was a time long ago that "big news" warranted large type and often many exclamation points – sometimes on both sides of the headline.

You could tell that the writers of recent headlines about the impacts of Hurricane Ida wanted badly to resurrect that old practice as they described the trail of flooding, death and destruction that went from Louisiana through New York and New Jersey.

The vulnerability of coastal communities in the hurricane's path, the billions of dollars in property damage, and – and most of all – the loss of life should be of utmost concern and deserve the public's attention.

The seriousness of these issues notwithstanding, the storm's toll should not come as a surprise or "big news" to anyone.

At this point we should be well informed and well-aware of the hazards of poorly sited development along the coast. Most coastal communities have their own long history with storms.

The consequences of building and living in hazardous areas are hard earned. Unfortunately, these lessons are often not well learned. Communities rebuild in the same places, using the same practices and designs. It should be no surprise – no big news – that we deal with the same results of damage, cost and loss time and time again.

Climate change has upped the ante: more ferocious storms, perhaps more frequently. There is a new urgency to wrestling with the old news of how to reduce our vulnerability to wind and rain, tidal surge and coastal erosion, as well as the warming and rising seas.

In this issue of the Underwater Naturalist we look at some of what is being done and not being done in the New York-New Jersey region on this 10th Anniversary of Hurricane Sandy.

The challenges to reducing vulnerability and increasing resiliency along the coast in a time of changing climate are numerous – not the least of which is to stop reacting to each storm as if it, and its impacts, were unexpected.

The opposite of surprise is anticipation, which requires taking steps to prepare for what we know is coming.



Tim Dillingham



A NOAA satellite captured this visible image of Superstorm Sandy as it rolled inland on Tuesday, Oct. 30. In the United States, Hurricane Sandy affected 24 states, including the entire eastern seaboard from Florida to Maine, caused \$65 billion in damage, and left 147 dead.

10 YEARS PAST: What's Been Done to Prepare for the Next Sandy

By Tyler Taba, Climate Policy, Waterfront Alliance

Almost a decade after Hurricane Sandy hit the coast of New Jersey, Hurricane Ian tore across Florida and then swerved into South Carolina. One of the most powerful storms to ever hit the United States and significantly stronger than Sandy, which was a Category 2 before landing near Brigantine, NJ, Ian may also signal something like a new normal for Atlantic hurricanes. Nine of 10 costliest hurricanes in U.S. history have occurred in the last 20 years and Ian will likely join that unfortunate list just above or below Sandy, with damage in Florida expected to top \$50 billion.

As we anxiously watched Hurricane Ian's catastrophic battering of the state of Florida and tracked the giant storm as it moved across the southeast United States, we couldn't help but ask: What have we learned in the past decade? What have we done to prepare for storms like Sandy and Ian?

While Sandy affected neighborhoods across New York City, the October 2012 storm hit five coastal areas particularly hard—the Brooklyn-Queens waterfront, the East and South shores of Staten Island, South Queens, southern Brooklyn, and southern Manhattan. Across the five areas—which are

home to 685,000 people—physical and economic damage was extensive and long-lasting. In areas with particularly strong flooding, subway systems were paralyzed. Over 8 million people lost power during the storm. Outages lingered for days in some places, while outlying areas were without power for weeks.

In New Jersey, over two million households in the state lost power in the storm, 346,000 homes were damaged or destroyed, and 38 people were killed. Storm surge and flooding affected a large swath of the state. An unusual combination of hurricane conditions and cold fronts made Sandy particularly potent. The National Oceanic and Atmospheric Administration estimates Sandy caused at least \$70 billion in damages¹, making it among the costliest storms in U.S. history.²

Long after the storm, in some cases up to five years later, residents were still rebuilding, with many relocating to higher ground. Thousands of people were temporarily left homeless, and more than 20,000 households were still displaced a year after the storm hit. At the time, Sandy was the fourth most expensive storm in U.S. history. The government of New York City

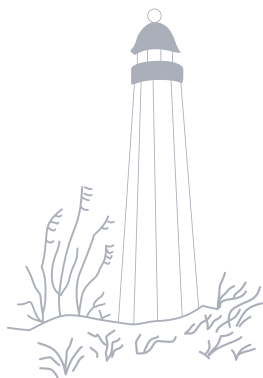
estimates that \$19 billion in damage was inflicted on the city alone.³ Even up to five years after Sandy, more than a thousand New Jersey residents reported still being unable to return home.⁴

Hurricane Sandy's arrival on the evening of October 29, 2012, coincided almost exactly with high tide on the Atlantic Ocean and in New York Harbor. This meant that water levels along much of the city's southern coastline already were elevated, with typical high tides about five feet higher than water levels at low tide. And, on the night of Sandy's arrival, it was not just a normal high tide but a "spring" tide, meaning the moon was full, and the tide was at the very peak of its monthly cycle.

DAMAGE ACROSS THE REGION

Almost all areas south of the Empire State Building lost power when floodwaters inundated several of the city's substations in southern Manhattan.

The neighborhood of Red Hook, on a peninsula in southwest Brooklyn, lies directly in the Zone A floodplain—a low-lying coastal area with the highest risk of flooding during a hurricane-strength storm. Red Hook is so low-lying that nearly the entire community fell within the city's mandatory evacuation zone. The neighborhood is comprised of a mix of working waterfront, industrial sites, public housing, and



RISE TO RESILIENCE

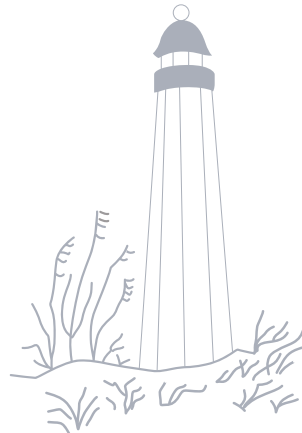
The Rise to Resilience campaign and coalition was launched in May 2020. Following declarations of support from NJ Senator Cory Booker and New York City Comptroller Scott Stringer, a prominent slate of 14 speakers from across the region highlighted diverse themes of true resilience. Among them, Dr. Nicky Sheats of Thomas Edison State University spoke eloquently of a rise to justice, Heather Morgan of AECOM Technology Corporation examined the rise to design using a transdisciplinary approach that empowers all stakeholders; Thomas Flynn, floodplain manager of the Township of Woodbridge, New Jersey, explored the difficult but necessary rise to risk as he discussed making hard decisions on where and where not to build; and Pamela Pettyjohn of the Coney Island Beautification Project called for a strong rise to action.

One speaker, Dr. Carolyn Kousky, Executive Director of the University of Pennsylvania's Wharton Risk Center, suggested using insurance not just for recovery but for broader adaptation goals, saying: "It's important to turn the idea of

new developments that cannot be directly or easily accessed by the subway. In the aftermath of Sandy, the New York City Housing Authority confirmed that 3,600 Red Hook Houses residents remained without power, and over 4,000 residents had no heat and hot water.⁵

The extent of the flooding was startling, but the depth of the floodwater was also unprecedented. In the Brooklyn neighborhoods of Coney Island and Sea Gate, flood waters reached up to 11 feet above ground level. In some parts of Staten Island, like Tottenville, flood waters reached 14 feet above ground level.

Hurricane Sandy left its mark all over Coney Island. The massive storm surge merged with water overflowing from Coney Island Creek and sewage from overflowing storm sewers to flood nearly the entire neighborhood. Power at public housing projects, nursing homes, and Coney Island Hospital was lost. The flooding left cars floating on roads, inundated supermarkets, and prompted the evacuation of the local police precinct.⁶ Most of the New York City Housing Authority buildings had their mechanical equipment on the first floor or in the basement, leaving tenants without power and without boilers for a long time.



insurance from being a recovery tool to being a risk reduction tool. It's about how to use insurance to stop a cascade of consequences."

NYC Council Member Costa Constantinides said: "We have to rebuild our city in a way that protects the most vulnerable. The neighborhoods that are on the frontline of climate change are the same neighborhoods that are being polluted, that can't retreat from flooding."

The Rise to Resilience coalition points of unity are both a rallying point and a common sense call to action:

- Public housing must be safe and resilient.
- Adaptation strategies must be based in science and community driven.
- Information needs to be transparent and accessible—we all have the right to know our risk.
- Public investments in resilience must flow to all, but especially those at greatest risk: low-income communities and communities of color.
- Well-paying, locally hired, long-term green jobs are the basis of a resilient economy for all.
- Solutions need to address both human needs and protect and restore wildlife and their habitats.

The American Littoral Society is proud to be a partner in the Rise to Resilience coalition. To learn more visit:

rise2resilience.org/



When the state of New York offered to buyout the flood-prone neighborhood of Oakwood Beach, the vast majority of homeowners decided to take the buyout and head to higher ground. Of the roughly 300 homes there before Sandy, all but 18 have been purchased under the program.

REBUILDING AND BUYOUTS

Most communities across New York City rebuilt after Sandy, following the mantra of Mayor Bloomberg and the 'Build it Back' program. But some did not, particularly a few neighborhoods on Staten Island. In some cases, residents opted to eliminate the chance of another Sandy-like storm taking lives and devastating their neighborhood by retreating from the floodplain entirely. The most famous case of this took place at Oakwood Beach, where residents organized and formed a buyout committee, asking the City and State to buy them out of their homes. Other neighborhoods, like Ocean Breeze and Midland Beach, followed. Since Sandy, more than 600 homes in New York have participated in the State's buyout program.⁷

New Jersey has a similar program, called Blue Acres, where more than 760 properties have been bought out.⁸ The Blue Acres program, established in 1995, is a nationally recognized example of an established and forward-thinking

buyout program. Both New York and New Jersey buyout programs are completely voluntary.

In the aftermath of Sandy, numerous articles, debates, and reports have assessed the effectiveness and success of buyouts. This idea of “managed retreat” will likely continue to gain traction as a robust tool in the climate resilience and adaptation toolkit.

SANDY FORCED AWARENESS ABOUT ENVIRONMENTAL JUSTICE

For many, Sandy was the first real insight into how climate change can wreak havoc on coastal communities across New York and New Jersey. Although the region had seen hurricanes in the past, Sandy felt like a new tide. Several organizations, like the American Littoral Society and Waterfront Alliance, began to give greater attention to the need for climate resilience — the ability to prepare for, recover from, and adapt to the effects of climate change — and environmental justice along the region’s waterfronts.

Like the communities that reside in them, our waterfronts are diverse, and so, too, are the climate risks they face. The waterfronts of New York and New Jersey support residential, commercial, recreational, industrial, and maritime uses. Sea level rise and storm surge pose the greatest climate risks to the coastline, but these impacts won’t be felt the same way

across nearly 700 miles of New York City and New Jersey coastline. Some of this risk variance can be attributed to low-lying land, waterfronts that are more exposed than others, or areas that were built atop filled wetlands, but we must recognize that much of it is attributed to a legacy of environmental injustice.

In 2019, nearly seven years after Sandy, Waterfront Alliance formed a “Resilience Task Force” with more than 400 leaders across New York and New Jersey. The goal was to build consensus on a comprehensive set of policies and investments needed to develop regional resilience. One year later, in collaboration with over 100 organizations across the bi-state region, the Rise to Resilience coalition was formed. Rise to Resilience brings together organizations in the fields of environmental science, labor, community development, environmental justice, business, design, emergency response, and others, to advocate for, and highlight, the value that climate resilience provides across a diversity of sectors.

Together, members advocate for comprehensive planning, coupled with adequate levels of funding and staffing to ensure that resilience projects can come to life. Additionally, the coalition fights for a transparent, equitable, and green approach to climate resilience. Transparent in the sense that residents should be aware of their level of flood risk through policies like flood disclosure. Equitable in the sense that environmental justice communities and those who face the



Three neighborhoods on Staten Island's eastern shore are among the few examples of significant participation in a state buyout program targeting coastal areas prone to frequent flooding.

highest risk are receiving the highest priorities for investment. Green in the sense that we must prioritize natural and nature-based solutions to climate change and sea-level rise, especially those that restore floodplains and ecosystems, and provide public access and open space. Waterfront Alliance and partners in the climate resiliency space recognizes there is no single solution to climate change. For 700 miles of waterfront, there will be no “silver bullet” solution, especially given the different community desires along the coastline. This is where coordination among federal, state, and local agencies comes into play. Community engagement and visioning is a critical component of climate resilience.

THE INFRASTRUCTURE RESPONSE

Since Sandy, billions of dollars in funding have been allocated to parts of New York and New Jersey. This has taken shape in the many ways, among them Lower Manhattan Coastal Resiliency; Resilient Northeastern NJ, the Coney Island Creek Resilience Study, and the New York—New Jersey Harbor and Tributaries Study (NYNJHATS). Some of these projects, especially those along the lower parts of Manhattan were developed through Rebuild by Design, which was President Obama’s innovative design competition for rebuilding after Hurricane Sandy. In partnership with federal agencies, NGOs, and academic institutions, the multi-stage

competition guided participants through in-depth research, cross-sector, cross-professional collaboration, and iterative design.⁹ Across New York and New Jersey, several of these projects have been funded and are beginning to be constructed. The Rebuild by Design Hurricane Sandy Design Competition helped change the way governments respond to disasters.

NYNJHATS is a massive infrastructure project and investigation by the US Army Corps of Engineers (USACE) to manage future flood risk and reduce the economic costs and risks associated with flood and storm events for harbors and tributaries along New York and New Jersey. This project falls within USACE's broader North Atlantic Coast Comprehensive Study, which evaluated coastal storm and flood risk to vulnerable populations, property, ecosystems, and infrastructure affected by Hurricane Sandy in the United States' North Atlantic region.

In 2017, USACE put forward five proposed projects based on this study—the most controversial option being the \$119 billion storm surge barrier. Sea walls, barriers, and other hardened infrastructures are very much traditional solutions for flooding.

In 2019, a lack of federal funding for the USACE NYNJHATS project halted the project. During that time, many climate advocates urged Congress to reinstitute funding for the project, while also considering a more holistic and iterative approach using a mix of green and grey infrastructure solutions. In 2020, the Water

Resources Development Act (WRDA) successfully reauthorized funding to the USACE.

In September of 2022, USACE announced their new tentatively selected plan for the NYNJHATS project—alternative 3B—which is a mix of shoreline-based measures and smaller gates. There is a sense of optimism that USACE has committed to natural and nature-based solutions along many of New York and New Jersey's most flood-vulnerable communities.

The USACE project is certainly a major resiliency project, but it is just one of many. Waterfront Alliance and its partners will continue to call for an increase in funding for resiliency projects across the region. This effort requires not only allocation, but nimble local and state agencies that can bring these projects to life.



CONCLUSION

The role of coalitions, like Rise to Resilience, will play an integral role in advocating for greater attention to climate resilience and adaptation. Building coalition strength by increasing representation among the diverse stakeholders along the floodplain and elevating the voices of disadvantaged communities is of the highest priority.

The increasing risks of climate change have been shown in the years after Sandy. It's clear that 10 years later, vulnerabilities to people,

infrastructure, and our natural environment still exist. Likewise, questions are increasing about not just the cost but also the effectiveness of programs — such as federal flood insurance — that encourage “build it back” action in places where the threat of new disaster is dramatically increasing.

However, this remembrance of Hurricane Sandy can serve as a moment of reflection. Where

challenges exist, opportunities await. Climate resiliency offers a paradoxical moment to rethink and shape our coastline.

Uncertainty about the future should be channeled into a creative imagination so that our response to the repercussions of Sandy ring in a new era for the great natural resource and economic engine of our region: Our waterfront.

About the author: Tyler Taba is Senior Manager for Climate Policy at the Waterfront Alliance. The Alliance began as a project of The Municipal Art Society of New York. It became an independent organization in 2007 when a group of leading activists, businesses, foundations, and civic organizations came together with the goal of making the New York and New Jersey harbor a shared, resilient, and accessible resource for all. Since then, the Waterfront Alliance has grown into a coalition of more than 1,100 organizations working together to bring about real change to our region's waterways and 700 miles of shoreline.



Holding ponds and wetlands, such as these on Staten Island, have been among the green climate resilience approaches used by New York in the wake of Hurricane Sandy.

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TO SAVE AMERICA'S COASTS, DON'T ALWAYS REBUILD THEM

By Robert S. Young

Photo above: Barrier islands, such as New Jersey's Long Beach Island, are especially vulnerable to storms. However, many current disaster relief programs, federal flood insurance, and even beach replenishment projects have encouraged repeated rebuilding and new development in places that are most likely to bear the brunt of future storms. Photo by Greg Thompson/USFWS



Local emergency managers know all too well which places in their communities should not be built back after a storm. But they are rebuilt, because the federal government and states provide multiple incentives to rebuild rather

than to relocate. The assumption is that taxpayers will always be there to back up private investment after even predictable natural hazards.

Mantoloking, New Jersey, was a poster child in 2012 for Hurricane Sandy's destructiveness. The barrier island that the borough sits on was ripped in half. Homes were destroyed. Even the areas of greatest destruction were rebuilt. We know it will happen again.

The money for such rebuilding comes largely through the public assistance sections of the 1988 Stafford Act. This legislation created the federal system of emergency response. When the president makes a federal disaster declaration for a county, aid dollars flow in with few strings attached.

Outside of disaster aid, billions of dollars a year are spent by the federal government on resilience projects. The bipartisan infrastructure act of 2021 allocated some \$47 billion over several years for resiliency. Most of the funded projects are designed to protect existing infrastructure, in most cases with no demands for the recipients to improve long-term planning for disasters or to change patterns of future flood plain development.

Federal and state taxpayers have spent billions of dollars over the past four decades pumping up beaches in front of coastal properties in what are known as beach nourishment projects. In Florida alone, almost \$3 billion in public funds has

been spent just to keep beaches in front of investment homes and oceanfront infrastructure. Studies in Florida have shown that these beach projects increase oceanfront development. Government spending is incentivizing this expansion into danger zones — a classic example of moral hazard, in which there is no reason to protect against risk when the government or federally subsidized flood insurance is there to pick up the tab.

I am not callous about storm relief. There are many people who need help in Ian's aftermath, and the first order of business must be ensuring they get that assistance. But a national conversation is long overdue about the dollars we invest in rebuilding coastal resort communities and what we should expect in return. At the moment, taxpayers are getting little back from these investments. The federal funds come with few restrictions at the local level to provide meaningful adaptation to future sea level rise and intensifying storms.

I frequently speak to community groups that ask me what the first step should be for adapting to sea level rise and storm impacts. My answer is simple. The easiest way to limit damage and loss of life is not to create vulnerabilities.

In Charleston, South Carolina., the city is considering moving forward with a \$1.1 billion project, largely funded with federal money, to build an eight-mile-long sea wall

to protect infrastructure at the same time it has approved a development on what is largely Guggenheim family land to place thousands of new structures in the flood plain. To me, that's a problem.

It really shouldn't be like this. Taxpayers should not be subsidizing the risk of irresponsible development, and we clearly shouldn't be rebuilding areas of known hazard multiple times. We need to encourage meaningful coastal adaptation to storms and sea level rise. At the very least, we need to demand that communities accepting public funds for rebuilding or resilience stop putting new infrastructure in harm's way.

Hurricane Ian is a chance to change that calculus in Florida. Let's hope that federal, state and local governments can come together to rebuild infrastructure in a way that will reduce future vulnerability and limit taxpayer exposure.

There are some places from which we need to pull back. For instance, should we rebuild all of the areas of Fort Myers Beach, Florida., wiped away by storm surge? Communities are often reluctant to give up even a small portion of their tax base. Some also incorrectly believe that, as the saying goes, if the first row goes, we are all doomed. They will spend money on protection until the bitter end.

We should walk away from the most vulnerable areas of our



This home in Sayreville, NJ, was the first house to be demolished as part of the post-Sandy Blue Acres buyout program. Demolition took place in March 2014. Photo by Rosanna Arias/FEMA

oceanfront and spend the money saved on buttressing the more sustainable parts of the community. We should be demanding this approach in the allocation of federal funds. This is not about abandoning the coastal economy. This is how we preserve it.

About the author: Robert S. Young is a professor at Western Carolina University, where he directs the program for the study of developed shorelines. This article originally appeared as a guest essay in The New York Times.





RESILIENCE:

For Some a Buzzword,
For the Littoral Society a
Pillar of Our Work

By David Hawkins

A new oyster reef sits just offshore of Forked River Beach in Lacey Township, NJ. The reef was built to help control erosion that has brought the bay almost into resident's homes. Photo by David Hawkins/American Littoral Society

A rollercoaster in the Atlantic Ocean. A home sheared in half. Entire towns buried in sand and saltwater. A new inlet from bay to sea where houses and a highway used to be.

Those images of Hurricane Sandy's destruction in New Jersey and New York became iconic, showing the stark reality of how storms could overturn the things humans have built.

Less seen and remarked was the toll of that storm on Delaware Bay's less populated beaches. Known mostly by locals and often miles from population centers, the main inhabitants of many were the same creatures that had been visiting for millions of years — horseshoe crabs and migratory shorebirds.

The crabs and birds share an adamant and imperative relationship, but they build no permanent structures and have little voice in human affairs. But Sandy threatened the ages-old custom that bound them together. Since the time of the dinosaurs, the crabs have come to those beaches during a prescribed time to lay eggs and migrating birds have met them there for a feast to fuel their journey.

The storm surge stripped the sand from the bays' beaches and re-covered them with debris, making them inhospitable for the spawning crabs, which could have left the table bare for the birds that bulk up on their protein-rich eggs.

Addressing that problem ushered in a new era of sorts for the American Littoral Society's



restoration work, as the Society joined with government entities, other non-profits and the people living near those beaches in an effort to make them habitable again before the spring spawn.

The result has been a succession of action and analysis that has driven and informed the Society's efforts to build coastal resilience using nature's tools in ways that benefit plants and dunes, crabs and birds, oysters and fish, and the humans who are also an irrevocable part of our coastal landscape.

Over the past decade that word — resilience — has become a bit of a buzzword, as many have joined conversations about approaches that

not only protect places but also help them recover from the rising seas and strengthening storms driven by climate change.

For the Littoral Society, the practical aspects of resilience can be seen. While those images may not be as indelible as the aftermath of Hurricane Sandy, they are in many ways just as important. What the storm showed was mistakes made in the past. What we're doing now is building a path toward a more resilient future.



BEACH RESTORATION

While restoration has long been part of the Littoral Society's portfolio, restoring beaches became a significant aspect of our work after Hurricane Sandy dumped tons of debris onto Delaware Bay beaches and stripped them of sand.

The immediate concern was that the bay held the largest horseshoe crab population in the world and nearly 70 percent of their spawning grounds had been destroyed. The loss imperiled not only the crabs but also shorebirds like the endangered Red Knot, which stop on those beaches each



In 2019, Littoral Society staff and volunteers completed a reef at Reeds Beach along New Jersey's Delaware Bayshore. Reeds Beach was one of the Bayshore beaches restored by the Society after Hurricane Sandy. Photo by David Hawkins/American Littoral Society

spring to feed on crab eggs before flying to their nesting grounds in the Canadian Arctic. The birds and crabs fuel a multi-million-dollar annual ecotourism industry in New Jersey's Bayshore region and the horseshoe crabs eggs are the foundation of the Delaware Bay ecosystem.

Almost immediately after the storm passed, the American Littoral Society — working with a wide range of partners, including federal and state agencies, county and local municipalities, business groups, universities, and private foundations — began work to restore beaches along the Delaware Bayshore.

“It was a crisis response; we were racing against a firm deadline of the horseshoe crabs arriving on the beach,” said Tim Dillingham, Executive Director of the American Littoral Society. “But we were also intent on rebuilding habitats along Delaware Bay in order to strengthen the ecology, communities, and economy of that area. We set out to build partnerships and relationships that would invest everyone in working for a healthy and resilient Delaware Bay.”

With funding from the US Fish and Wildlife Service (USFWS) and the National Fish and Wildlife Foundation (NFWF), the Littoral Society and partners expanded the scope of the initial restoration work, removing rubble and replacing sand on several beaches, with the first being Thompsons Beach in 2013.

In 2018, the American Shore & Beach Preservation Association (ASBPA) named Thompsons Beach

one of the best restored beaches in the United States. The project was recognized because it had both environmental and economic benefits, used a science-based process, and showed the benefits of public/private partnerships. In 2020, ASBPA recognized Cooks Beach, another of the Sandy restoration sites, as one of America's Best Restored Shores.

But the restoration work didn't stop there. Following Sandy, the U.S. Department of the Interior provided hundreds of millions in funding for resilience projects. Not just recovery — the building-back of damaged areas — but the strengthening and restoration of vital natural systems like marshes, wetlands and rivers that can help protect people and wildlife from storm impacts.

Those grants contributed to marsh restoration projects around Delaware, Barnegat and Jamaica Bay, including one at Basket Flats, a vulnerable marsh at the mouth of the Maurice River.

Basket Flats — which is home to residents of Cumberland County, NJ, and protects the oyster docks at Bivalve and Matts Landing, as well as rare wildlife such as the Saltmarsh Sparrow — has been eroding at an alarming rate, losing more than 100 feet of shoreline in the past three years.

To build back the marsh and prevent future erosion, the Society — in concert with the Wildlife Restoration Partnership, Stockton University, Mount Construction Company, NFWF, USFWS and NJ Department of Environmental Protection — undertook the biggest

on-going nature-based shoreline restoration project in the Garden State. The project will involve installing hybrid breakwaters (a combination of rock, shell, mussels, and marsh plantings) to protect the existing shoreline as well as the natural and human-built communities located upriver, while reducing the force of waves on the shoreline.

“We are protecting both the communities and local economies of Delaware Bay and its ecology with the Mouth of the Maurice River restoration project,” said Dillingham. “These projects, because they are larger in scale, will give us a chance to prove that they can be done, and that they can be done collaboratively.”

OYSTER REEFS

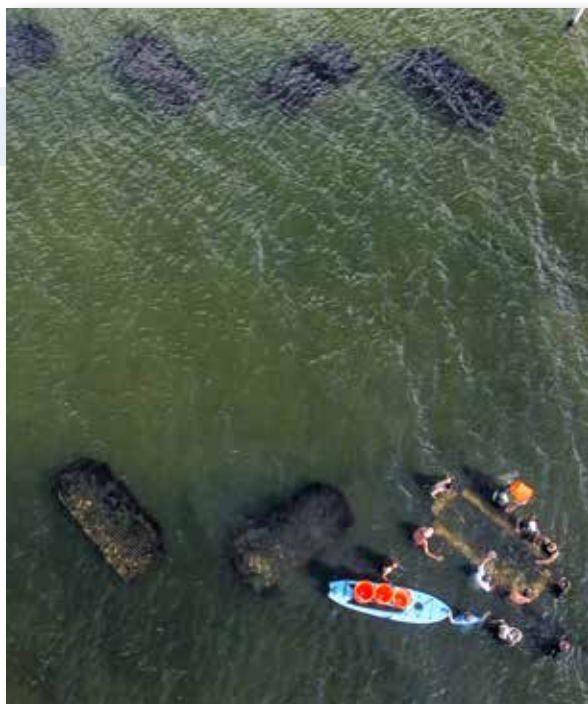
Oyster reefs became one of the Littoral Society’s restoration strategies because simply repairing a beach won’t protect it from future problems.

Shellfish once provided reefs for shoreline protection and water filtering services to many New Jersey bays and estuaries. Historically, Barnegat Bay alone had more than 12,000 acres of oyster beds and a single adult oyster can clean up to 50 gallons of water a day.

However, over-harvesting, disease, and decades of pollution, accelerated by rampant development, decimated New Jersey’s natural oyster population. So, the Society, with the help of volunteers and partner organizations, began building shell-bag reefs along all of the Delaware Bay beaches restored after Sandy.

Currently, the Society and partners have created eight reefs that protect more than 85 acres of restored beaches in Delaware Bay. Those beaches that are quintessential to horseshoe crab spawning, shorebird foraging, and the survival of the Delaware Bay ecosystem.

Using the knowledge and expertise gained from the earlier work, the Society began its largest single reef-building project in 2021. That reef, located at Forked River Beach in Lacey Township, NJ, is the Society’s second in Barnegat Bay. The first is located just off Good Luck Point.



Littoral Society staff and residents from Lacey Township build an oyster reef at Forked River Beach, NJ. The reef was built with special steel baskets that were filled with stone and shell seeded with oyster larvae. Photo by David Hawkins/American Littoral Society

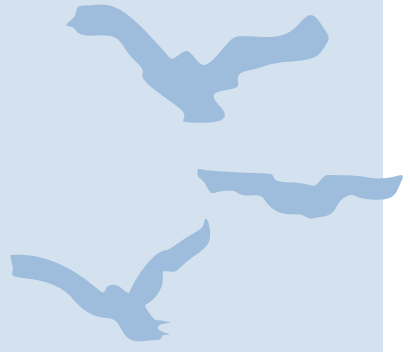
For the Forked River project, reef segments were constructed using galvanized steel baskets called HESCOs. The interior of each basket was filled with rock, while outer sections received recycled shell from Ocean County restaurants seeded with millions of oyster larvae.

The Forked River Beach site lost over 150 feet of shoreline since from 1995 until the start of the project and erosion there has been accelerating since Hurricane Sandy. Increased sediment in water from shoreline erosion has also impacted the water quality of Barnegat Bay.

While the reef installation is largely complete, proposed future work at the site will involve shoreline restoration.

Project partners and funders for the Forked River project include the New Jersey Department of Environmental Protection, New Jersey Corporate Wetlands Restoration Partnership, Lacey Township, Bayside Beach Club, Stockton University, Albert Marine, USFWS, ReClam the Bay, Jetty Rock Foundation, Parsons Mariculture, and Wildlife Restoration Partnerships.

Although much smaller than the Forked River project, the Good Luck point reef marked the Society's first foray into seeding shell with live oysters. Since 2015, the Society has raised oyster larvae at two sites in New Jersey. The shell with attached baby oysters — also known as spat — have been transported to the Good Luck Point reef site in an annual parade of boats involving volunteers from the surrounding community.



The shell with attached baby oysters — also known as spat — have been transported to the Good Luck Point reef site in an annual parade of boats involving volunteers from the surrounding community.

The Society is working with Stockton University and a suite of other partners on similar reef restoration opportunities in Seaside Park and Lavallette.



The shoreline at Slade Dale Nature Sanctuary in Point Pleasant, NJ, has lost more than 300 feet to erosion since 1930. The Littoral Society began work on a living shoreline at the site in 2018. Photo by David Hawkins/American Littoral Society

LIVING SHORELINES

Many Littoral Society restoration projects include a living shoreline component. Living shorelines use plants or other natural elements — sometimes in combination with harder structures — to stabilize the waterfront, while also helping it withstand rising seas.

Living shorelines also tend to be far less expensive to construct and maintain than hard structures, such as seawalls or bulkheads, and they can grow over time.

A 2015 project to restore Wreck Pond, located in Spring Lake, NJ, involved extensive plans for living shorelines. However, the over-arching purpose of the project was to help clean the coastal pond, provide a passage to the ocean for migratory fish, and reduce a long-standing flooding issue in the surrounding communities.

An ongoing living shoreline project at the Slade Dale Nature Sanctuary in Point Pleasant Borough, NJ, is focused on erosion control

along Beaverdam Creek. The shoreline there has lost about 300 feet since 1930.

“The sanctuary has been losing ground for years,” said Zack Royle, American Littoral Society Habitat Restoration Project Manager. “What our work will do is not only stop the loss, but help nature build it back into something that is both protective and beautiful.”

Begun in 2018, initial work involved building an offshore framework to hold recycled Christmas trees donated by the community. These branchbox breakwaters help reduce the force of currents along the shoreline, while also trapping sediment carried by the water.

The Sanctuary’s pine-oak forest, hardwood swamp, and salt marsh provide a space of protected wilderness in an otherwise heavily developed coastal area of NJ. The salt marsh at Slade Dale also helps protect upstream areas from flooding during storms, while providing nursery habitat for fish, and foraging habitat for birds such as osprey, egrets, and bald eagles.

“This is a great opportunity to show how living shorelines can provide a low-cost, natural solution to a long-term problem,” according to Capt. Al Modjeski, Habitat Restoration Program Director for the Littoral Society.

Future work on the project will involve shoreline stabilization and planting. Project partners include the New Jersey Corporate Wetlands Partnership, the Borough of Point Pleasant, The Nature Conservancy, Point Pleasant Rotary Club, Princeton Hydro and the Pinelands Nursery.

Other Littoral Society living shoreline projects that have been completed or are still underway include:

- Two near the Shark River Inlet, the first at the northwestern tip of Shark River Island, which involved the creation of a marsh sill, placement of concrete mattresses, and the expansion of existing marsh. The other is along 2,000 feet of shoreline at South Riverside Drive in Shark River Hills. That work builds on the restoration experience gained at Delaware Bayshore beach restoration projects and should restore valuable horseshoe crab spawning beach while protecting nearby residences.
- A half-acre project in Fair Haven, NJ, which was designed to stabilize a small coastal bluff that has experienced historic erosion. The ongoing work will include beach restoration, berm creation, installation of a reef, and native plants.
- Dune planting in Bradley Beach, Asbury Park, and on Sandy Hook. Those projects have involved volunteers, young people from the Littoral Society’s Beach Grasses in Classes program, and students from state universities. Sand dunes provide natural coastal protection against storm surge and high waves, preventing or reducing coastal flooding and structural damage, as well as providing important ecological habitat. Plants, such as beach grass and amaranth, help dunes maintain themselves.
- Conversion of a parking area in Bradley Beach to a maritime forest. The restored natural area will provide storm protection, habitat for wildlife, a decrease in rainwater runoff, and improvement in water quality of the adjacent lake.

The Society has been using this living shoreline work to train and educate future habitat restoration practitioners in New Jersey.

About the Author:

David Hawkins is Communications Manager for the American Littoral Society



TO HELP US CONTINUE THIS RESTORATION WORK,

please consider making an additional donation to the Society.
littoralsociety.org/donate



WHAT'S BEING DONE

NJ and NY Take Similar Approaches to Preparing For Next Big Storm

Hurricane Sandy was heralded by many as a harbinger of what's to come with regard to climate change. The largest Atlantic hurricane on record, it had tropical-storm-force winds spanning 1,150 miles and cut a path of death and destruction from the Caribbean into Canada.

The storm became an inflection point as governments and other entities began to talk seriously about how to change past practices, such as the role of flood insurance and other public assistance (e.g. the Federal Emergency Management Agency's Disaster Relief Fund), which often encouraged rebuilding in places that had been storm damaged in the past or were extremely likely to experience it repeatedly in the future.

However, while Sandy may have started leaders and policy makers thinking, it didn't always succeed in changing what people were doing. Some new policies have been put in place and some existing programs have been re-focused or upgraded, but many other changes have been stalled by the changing political climate in the United States, the value of property along the shore, and the overwhelming cost of addressing issues such as long-outdated stormwater infrastructure. The following articles examine some of the policies and programs New



Jersey and New York are using in an attempt to combat climate risk and enhance coastal resilience — the ability of people and communities to recover from future storms — such as property buyouts, enhanced flood

Hurricane Sandy, the largest Atlantic hurricane on record, it had tropical-storm-force winds spanning 1,150 miles and cut a path of death and destruction from the Caribbean into Canada.



rules, and funding for upgrading stormwater utilities.

The following reports have been compiled by David Hawkins, Communications Manager for the American Littoral Society.

Communities on New Jersey's Long Beach Island were hit hard by Hurricane Sandy. However, within two years of the storm property values were climbing and, as of today, homes there are selling for about double the average in 2010, despite the risk of future flooding for three out of four of them.

DO BUYOUT PROGRAMS OFFER PATH FOR MANAGED RETREAT?

Government buyouts of flood prone properties have long been an approach used to help homeowners move to less risky locations. The practice is seen as a practical method for not only reducing danger to people, but also the public cost for emergency response, which has cost the US more than \$1 trillion since 2020.

However, even in flood-prone areas where many residents want to relocate, the issue can be practically and politically fraught, with community members and public officials reporting that buyout assistance is too slow, limited, and difficult or impossible to access.

New Jersey and New York both turned to buyout programs in the wake of Hurricane Sandy. The following is a brief examination of the results.

NEW JERSEY'S BLUE ACRES

New Jersey's Blue Acres program began in 1995 with \$30 million of funding. It was envisioned as a corollary to the state's Green Acres program, which aimed to preserve open space by buying up property that might otherwise be developed. The idea was for the state to buy homes at market prices that were subject to repeated flooding and

return the land to a more natural state, such as parks and wetlands, that could help surrounding areas be better protected from sea level rise and the effects of storms.

While steadily funded since the start, a major expansion of the program followed Hurricane Sandy, as the state government sought to add hundreds of millions in federal disaster recovery money to the mix in an effort to purchase more than a thousand properties damaged or destroyed during the storm.

Within five years after the storm, the Blue Acres program had bought out hundreds of flood-prone homes, but few of them were along the Jersey Shore and coast of the Delaware Bay – with notable exceptions such as Money Island in New Jersey's Downe Township, where the state program has purchased most of the more than 40 properties. However, the program is voluntary and communities like Sea Bright, where dozens of homes, businesses and government buildings were demolished due to damage from Sandy, as well as the Union Beach, Mantoloking, and the Ortley Beach section of Toms River, where many residents still hadn't rebuilt homes three years after the storm, refused to even consider pursuing Blue Acres money.

As a result, many of the coastal towns devastated by Sandy have

simply rebuilt largely as they were before, with the only change being that in some new or repaired buildings have to meet new building code requirements, which may involve elevating or wind-protecting structures.

Still, in 2019, the New Jersey legislature established dedicated funding for the Blue Acres program and Gov. Phil Murphy allocated tens of millions more following Hurricane Ida in 2021.

“New Jersey is Ground Zero for some of the worst impacts of climate change,” DEP Commissioner Shawn LaTourette said at a state legislative hearing in 2022. “It’s the single greatest threat we face to our communities, our economies, our way of life.”

While it is the nation’s fourth smallest state by land area, New Jersey ranks third in payments that property owners have received from the federal government’s flood insurance program, behind only Louisiana and Texas and ahead of Florida and New York.

NEW YORK BUYOUT & ACQUISITION PROGRAMS

Spurred by the devastation from hurricanes Irene (2011), Lee (2011) and Sandy (2012), New York state and New York City launched federally-funded programs to help remove or rebuild homes. Both the city and state efforts were voluntary and two-pronged, focused on returning

some property to a natural state and redeveloping others in a resilient manner to protect future occupants of the home and maintain the housing stock in storm-impacted communities.

Gov. Andrew Cuomo launched the New York Rising Community Reconstruction program in July 2013. This federally funded, \$750 million initiative aimed to finance repair projects and install infrastructure across the state to improve resiliency against future disasters.

However, less than half of the 301 projects that were underway have been completed, according to a June 2021 report from the Governor’s Office for Storm Recovery. Many who have attempted to participate have complained of a bureaucratic maze and constantly changing personnel.

The state-administered New York Rising Buyout Program focused on acquiring properties that would be returned to a natural state and perpetually preserved as open space. The program saw its greatest success in three Staten Island neighborhoods—Oakwood Beach, Graham Beach and Ocean Breeze, where a 2017 study published in the Proceedings of the National Academies of Science predicted Sandy-level flooding—or worse—every five years. In those neighborhoods nearly \$203 million was spent to buy out 504 properties.

Liz Koslov, an urban planning, and sustainability professor at UCLA who is writing a book about managed retreat in New York City post-Sandy, said the state’s buyout program in Staten Island was a success because the effort was community-led and happened quickly.



October 30, 2012

Mantoloking was hit hard by Hurricane Sandy – every one of the town's more than 500 homes was either damaged or destroyed. However, within a short time new and repaired homes were appearing, some right around the inlet the storm tore through the barrier island (orange arrow). One of the steps taken to mitigate future storms was installation of a \$40 million steel wall along the beach for the length of the town and neighboring Brick (green arrow). While the wall served to protect makeshift dunes, storms and tides have regularly carried away the beach in front of it.



October 8, 2015

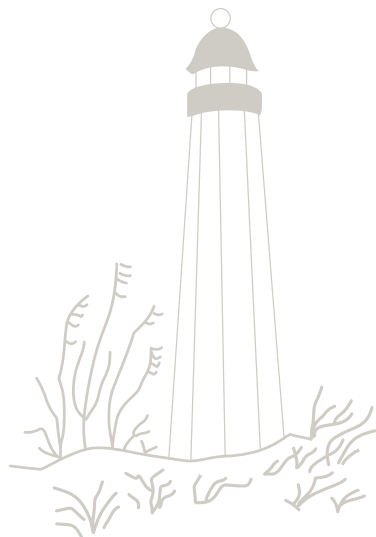
Concerned about the tax-base implications of managed retreat plans, New York City Mayor Michael Bloomberg launched the Build It Back program in 2013.



Oakwood Beach had formed a Flood Victims' Committee after a nor'easter in 1992. Only days after Sandy struck, residents held a meeting to discuss rebuilding the neighborhood. Instead, the nearly 200 attendees voted unanimously to seek a state buyout.

Gov. Kathy Hochul recently proposed adding \$1 billion to the state's Environmental Bond Act, which could provide \$4 billion funding source for managed retreat, among other programs.

Concerned about the tax-base implications of managed retreat plans, New York City Mayor Michael Bloomberg launched the Build It Back program in 2013. Under it the city spent about \$116 million to buy out 57 properties and acquire 63 properties for redevelopment, according to the city Office of Housing Recovery Operations. It also offered "resettlement incentives" to help tenants and homeowners find other places to live outside the 100-year floodplain. Several hundred homes have also been elevated or rebuilt to new flood elevation standards.





Special flood rules called for by NJ Gov. Phil Murphy aim to prepare the state for rising seas and stronger storms.

NJ CLIMATE PLAN STALLED DESPITE CALAMITIES

In January 2020, New Jersey Gov. Phil Murphy signed a lengthy executive order that included a directive for state environmental officials to “integrate climate change considerations” into a wide array of regulations for things such as land use, water supply, air quality and stormwater planning. The order included a two-year deadline for action.

While the order was sprawling and a bit light on details, NJ officials subsequently made clear the intent to install major limits on development in flood-prone areas, including through the creation of a restricted zone along the state’s iconic Jersey Shore.

Called New Jersey Protecting Against Climate Threats (NJPACT), the two overarching initiatives were:

- Modernizing environmental land use rules to respond to climate change by considering risks such as sea level rise and chronic flooding, and to facilitate climate resilience by supporting green infrastructure and renewable energy.
- Strengthening air pollution rules to help reduce future greenhouse gas (GHG) and other climate emissions by improving the State's GHG reporting and inventory system and reducing emissions of carbon dioxide and short-lived climate pollutants.

Heralded as a major shift that could set a new national standard for how state officials control development and protect against the impact of climate change, one of the primary aspects of the new approach was to stop planning based on the past and start looking toward tomorrow.

As part of that, the NJ Department of Environmental Protection began using flood projections that extend to 2150, when sea levels in New Jersey are likely to be 2 feet or more above where they were in 2000.

The approach is seen as a rejection of the federal government's approach, which uses historic flood data that will continue to allow unrestricted development in areas that will be at even greater risk of future flooding.

"We're trying to anticipate the future consequences of climate change rather than build models based on what's happened the past few decades," said Tim Dillingham, executive director of the American Littoral Society, a coastal-protection group. "That's way ahead of what a lot of folks are doing, but necessary because of how significantly sea level rise will effect New Jersey."

Among the issues facing the state is that rising seas and more frequent coastal flooding could have a significant impact on the tax base because some of NJ's most expensive land is on or near the Atlantic coast. In Atlantic County, according to a report from Climate Central, more than 4,000 properties now above the high tide line are projected to fall below it the next three decades. That represents \$131 million of assessed taxable value.

Beyond the tax implications, the increased frequency of tidal flooding is expected to lower property values while simultaneously increasing government expenses for things like road repairs, stormwater management, providing public water, and emergency response.

Unfortunately, the two-year deadline set in the initial executive order passed without implementation of any NJPACT regulations. Plans to introduce them prior to the onset of the 2022 hurricane season were indefinitely delayed after protests from business and industry groups that questioned the state's use of emergency authority, which allows agencies to skip the review and public



While Hurricane Sandy caused extensive damage to the Jersey Shore, coastal flooding has become a regular occurrence in the state. Today, New Jersey has 352,000 people at risk of coastal flooding. By 2050, an additional 110,000 people are projected to be at risk due to sea level rise, according to Climate Central. Photo by Greg Thompson/USFWS

comment process that usually precedes new regulations.

Among the issues cited by opponents was that the rule would block development of hundreds of thousands of acres, and any new rules on inland flooding should be subject to the normal regulatory process.

The New Jersey Business and Industry Association has said the new rules on development would make most of the state subject to 500-year flood standards without any sound scientific basis and force retreat from cities such as Hoboken and Atlantic City. The organization also took issue with the Governor's efforts on clean air regulations and accelerating the move to clean energy.

Following the failure to roll out the regulatory plan in June 2022, a group of 30 environmental organizations (including the American Littoral Society) wrote the Governor a letter expressing disappointment with "your administration's continued

delays in adopting strong land use regulations to protect New Jersey from climate change.”

While state officials have said they are seeking greater buy-in from some stakeholders, environmental advocates and some civic leaders insist that Tropical Storm Ida, which caused 30 deaths and led to \$250 million in FEMA payouts to 45,000 New Jersey residents, showed there is no time for delay.

“Our flood maps and rainfall data haven’t been updated since 1999 and include data going back to 1899. He was right to order DEP to strengthen these rules 2.5 years ago to better keep people and property out of harm’s way from the increased rainfall and flooding due to the climate emergency,” Cranford Mayor Kathleen Miller Prunty said in a September 2022 statement. “DEP was right in May to announce expediting these long-promised and long-delayed flood hazard and stormwater rules. They can’t be implemented fast enough, before the next Ida.”

“What the Governor is trying to do is a really aggressive approach for the state to take but prohibiting development in higher hazard areas is the most effective way to prepare for the future,” according to Dillingham.

When checked in October 2022, the state’s NJPACT website contained proposed rules for greenhouse gas monitoring, an advanced clean truck program, cargo handling at the state’s ports, and control of carbon dioxide emissions. However, the section on modernizing land use rules only held archives of meetings and presentations.



NJ Gov. Phil Murphy talks with residents of an area hit by flooding in 2018 after nearly 8 inches of rain fell on portions of the state.

However, in late October the Murphy administration released an Inland Flood Protection Rule¹ and scheduled “engagement sessions” to help people better understand both the threat and how the new rule would “ensure that investments in new and reconstructed development are more resilient.”²

Environmental advocates remain concerned because in moving forward the state is no longer trying to implement the changes on an emergency basis. As a result, it is uncertain how quickly the rules can be implemented or how strong they will be.



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NY AND NJ GO GREEN TO UPDATE STORMWATER SYSTEMS

In the past, municipal storm drains aimed to move water from streets directly to nearby streams and bodies of water. Now, in both New York and New Jersey, natural solutions are becoming a bigger part of the stormwater management mix.

In the time before humans populated the earth, when rain fell it soaked into the ground and slowly traveled to the nearest body of water. However, the advent of towns and cities disrupted the natural flow of stormwater.

Roofs and paved streets made impervious surfaces, which prevented rain from seeping into the ground. Such hard surfaces also made water flow faster, which increased the likelihood of flooding and erosion.

Stormwater management systems became the response. Some of the earliest models for such systems have been found in the ruins of ancient Greek cities. These systems of gutters, pipes, and tunnels that move stormwater away from where we live to treatment plants or straight to local water bodies have become known as gray infrastructure.

While the urban and developed areas of New Jersey and New York City aren't nearly as old as those from early Greece, many experts consider them outdated in both design and concept, as well as inadequate for the level of development that has occurred. The result is often flooding even from relatively small storms. In combined systems, where stormwater is transported to treatment plants, sewer overflows frequently follow rainstorms. In separate systems, the result is heightened levels of pollution in nearby bays and estuaries, which end up as concentration points for the garbage, chemicals and fertilizers that wash off of streets, parking lots and even farm fields.

Both New York and New Jersey have made changing how stormwater

is handled a part of their approach to reducing climate change risk. Green infrastructure is prioritized in these new solutions.

Green infrastructure practices include natural and engineered systems, such as rain gardens, permeable pavements, green roofs, infiltration planters, trees and tree boxes, and rainwater harvesting systems. These practices are designed to mimic nature by capturing stormwater runoff and allowing it to slowly be reabsorbed into the ground. Some practices also store water for reuse, such as rain barrels and cisterns.

NEW YORK

During the 1990s, Staten Island became ground zero for a new program aimed at preserving natural drainage corridors in New York City, such as streams, ponds, and wetlands – while enhancing their functions of conveying, storing, and filtering runoff precipitation or stormwater. These corridors provide the added benefit of creating greenspaces and wildlife habitat.

Called the Bluebelt Program, it focused on using natural elements, like grass and trees, in conjunction with more traditional stormwater structures, such as pipes and catch basins. It has existed for 25 years, and the city has built dozens of Bluebelts across Staten Island and parts of Queens and the Bronx.

Following Hurricane Sandy, U.S. Senator Charles E. Schumer and NYC Mayor Bill de Blasio secured roughly \$40 million to expand the Staten

Island Bluebelt. In 2020, a \$75 million expansion of the award-winning Bluebelt program was launched in the Mid-Island section of Staten Island.

The 2017 completion of a \$48 million infrastructure upgrade for Staten Island's South Shore neighborhood added more than three miles of storm sewers, installed hundreds of catch basins, and replaced existing water mains. The catch basins are designed to move precipitation from roadways into the new storm sewers, which will then direct it to the Bluebelt wetland where it will be naturally filtered.

While the Bluebelts have helped reduce neighborhood flooding from rainfall and helped reduce pollution flowing into Raritan Bay and New York harbor, they are not a solution for issues like storm surge, which caused most of the damage from Hurricane Sandy.

In April 2022, the New York City Department of Environmental Protection (DEP) announced that a new, Unified Stormwater Rule (USWR) would require newly developed or redeveloped properties to manage stormwater on-site more effectively. By retaining more stormwater on site, the USWR should help prevent the City's drainage system from being overwhelmed during heavy rainstorms.

Modeling projects suggest the new rule will result in the reduction of overflows in the city from combined systems (those that carry both stormwater and sewage) by approximately 360 million gallons annually by 2030.

“We have all witnessed how climate change is creating stronger and more damaging storms in New York City and this commonsense update to our Rules enlists property developers in our collective effort to create a more resilient city,” said DEP Commissioner Rit Aggarwala. “Cities across the world are following our green infrastructure model where we have committed nearly \$2 billion and built more than 11,000 stormwater assets and now, as properties are newly developed or redeveloped, they will include plans to retain stormwater on site to help to reduce flooding, enhance public safety and improve the health of our waterways.”

NEW JERSEY

Problems with flooding in New Jersey haven't been reserved to major storm events, and the state's aging systems for handling stormwater receive much of the blame. In many places they send water directly into state waterways – enhancing the threat of flooding. In other places they are combined with municipal sewer systems - which has led to raw sewage overflowing into surrounding areas. Also, according to NJ Department of Environmental Protection (NJDEP) Commissioner Shawn LaTourette, because they are based on obsolete data, many are inadequate for the level of development in the state.¹

As a consequence, about half the water bodies in NJ violate state water quality standards because of runoff pollution. The U.S. Environmental

Protection Agency has found that stormwater is responsible for degrading more waterways in New Jersey than any other pollution source.

Exacerbating the issue is that many of these municipally controlled systems are more than a century old and updating them would likely cost more than \$30 billion if the work started today.

Early in his term, Gov. Phil Murphy created the Interagency Council on Climate Resilience, and that group released the state's first "Climate Change Resiliency Strategy." The first chapter of that report focused on ways to assist towns with their efforts to integrate climate resilience into their planning. The Strategy was mandated through Governor Murphy's 2019 Executive Order 89², which appointed the state's first Chief Resilience Officer and established an Interagency Council on Climate Resilience.

The Climate Change Resilience Strategy is intended to serve as a science-based blueprint for protecting New Jersey's vulnerable communities, environment, economy, and infrastructure from the impacts of climate change. It outlines six state priorities to guide state and local government climate action and includes over 100 recommendations to strengthen New Jersey against climate impacts, including sea-level rise, chronic flooding, rising temperatures, and more frequent and intense storm events.

The state is pursuing a number of different approaches to address the issue, among them: new development

rules implemented by NJDEP in 2021, a 2019 law allowing municipalities to establish stormwater utilities, and new federal funding (\$1 billion over five years as part of the 2021 federal infrastructure act).

The new development rules require public and private developments to include green infrastructure to the "maximum extent practicable" on any development resulting in a disturbance of more than 1 acre of land or creation on ¼ acre impervious surface. It also requires green infrastructure practices to be distributed around a site rather than centralized in one oversized basin.

Distributed green infrastructure enhances the reliability and effectiveness of stormwater management and maximizes developable area on a site, and developers will now receive credit for its use toward their stormwater management requirements, according to NJ Future. NJ Future is a nonprofit, nonpartisan organization that promotes sensible and equitable growth, redevelopment, and infrastructure investments in the state. All municipalities in New Jersey are required to update their existing development rules to the new standards set by NJDEP.

It took more than a decade for New Jersey to pass the Clean Stormwater and Flood Reduction Act – which allowed but did not require towns to set up stormwater utilities – due in no small part to opposition from business lobbyists and many Republican lawmakers

IT TOOK MORE THAN A DECADE FOR NEW JERSEY TO PASS THE CLEAN STORMWATER AND FLOOD REDUCTION ACT



who dubbed the bill a “rain tax,” echoing opposition in Maryland and Pennsylvania.

The idea was not just to give municipalities authorization to create stormwater management entities, but also a mechanism for funding them through fees on parking lots and other impervious surfaces.

While similar approaches have been adopted by more than 1,500 communities across 41 states, according to NJSpotlight News, there have been no takers in NJ.

In the wake of Hurricane Ida in 2021, NJ State Sen. Bob Smith (D-Middlesex) said that the growing frequency of major storms and flooding events, coupled with growing fiscal constraints, could encourage communities to begin looking at stormwater utilities as a method to help solve recurrent problems in an equitable way.

Daniel Van Abs, a former NJDEP water expert and an associate professor at Rutgers University, has predicted that 30 to 40 stormwater utilities would be established in the state by 2040.

In July 2022, NJDEP made \$10 million available to modernize stormwater systems and to pay for feasibility studies on setting up stormwater utilities, which allow municipalities to charge landowners a fee based on the amount of paved surface on their properties. Hoboken recently began such a feasibility study.

While acknowledging that \$1 billion in additional federal funding over five years seems insignificant in the face of the larger costs, NJDEP’s LaTourette called it an opportunity to begin a process that should have begun years ago.

“This is really a historic investment in water infrastructure,” said Andy Kricun, co-chair of Jersey Water Works, a 600-member collaborative that advocates for infrastructure investment. “It’s the biggest step forward in the last 30-35 years.”

The American Littoral Society is a partner in Jersey Water Works.

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GATES AND BARRIERS COMING BACK TO FLOOD CONTROL DISCUSSION



An artist's rendering shows a proposed flood gate near the Marine Parkway Bridge at the entrance to New York's Jamaica Bay.

Talk of flood gates and hard barriers to protect storm-vulnerable sections of New York and New Jersey began decades ago. Following a 1968 hurricane that flooded Staten Island's South Shore, the US Army Corps of Engineers (USACE) proposed a New Orleans-type barrier-and-pump system that would have cost billions at that time.

Since then, similar projects have come up on a regular basis. One involving a sea wall and retractable gates that would have stretched from Breezy Point, NY to Sandy Hook, NJ was proposed in 2017, only to have study of the plan, as well as the four less intensive and expensive proposals,

indefinitely postponed in 2020 after then-President Donald Trump tweeted that it would be “costly, foolish and environmentally unfriendly” and it “probably wouldn't work anyway.”

Support for the planning process was restored in 2021 by President Joe Biden, and the USACE recently issued a new proposal (the NY & NJ Harbor & Tributaries Focus Area Feasibility Study (NYNJHATS)) that envisions large flood gates near 18 low-lying communities facing direct exposure to catastrophic storm surges, including Jamaica Bay, Coney Island Creek, Newtown Creek, the Gowanus Canal, Sheepshead Bay, and Flushing Creek, as well as Arthur Kill and Kill Van

Kull (which separate Staten Island from New Jersey).

USACE estimated a cost of \$52 billion for the project, and a timeline of eight years for approval, followed by a construction start in 2030, and expected completion in 2044.

Other more localized concepts are already gearing up for construction, such as a 5.3-mile-long barrier from the Verrazzano-Narrows Bridge to Oakwood Beach on Staten Island's south shore. After years of planning, USACE is preparing contracts for the \$615 million project, and expects to complete the South Shore of Staten Island Coastal Storm Risk Management Project in about four years.

The effort includes a 4.3-mile seawall with a public promenade built atop, a mile of levees and flood walls, and more than 180 acres of newly excavated stormwater detention ponds.


The American Littoral Society accepts that hard structures might be necessary in some places but has

also often pointed out that they often enhance risk to adjacent areas.

“The lesson we’re not learning well is that there are places the water is always going to want to go,” said Tim Dillingham, Executive Director of the American Littoral Society. “If you block it from going there, it will find somewhere else.”

The Littoral Society has advocated for and initiated numerous small and large restoration projects focused on more natural solutions, such as living shorelines and reefs intended to replace the coastal protection provided by shellfish before over-harvesting and disease essentially erased them from New Jersey's bays and estuaries.

“It’s time to learn to live with the coast, not just on it,” Dillingham said. “There will no doubt be more walls someday, in some places, but let’s hope we’re wise enough to not try and build walls and gates up and down the entire coast in a vain attempt to keep the ocean out.”



The Littoral Society has advocated for and initiated numerous small and large restoration projects focused on more natural solutions

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