Department of Environmental Conservation

Long Island Watershed Action Agenda

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Kathy Hochul, Governor | Amanda Lefton, Commissioner

Executive Summary

With its mix of urban cities, developing suburbs, dynamic coastline, and rural agricultural communities, Long Island is a New York State treasure, and a globally significant ecosystem. Key to the region's quality of life, health and economic vitality is the health of Long Island's water resources. Long Island Sound on the north shore, the Peconic Estuary on eastern Long Island, and the Atlantic Ocean on the south shore provide unparalleled recreational and commercial opportunities that define the region's connections to, and influences on, water quality.

Protecting water quality is a top priority for Governor Kathy Hochul, and to focus the state's efforts to safeguard Long Island's water and water dependent natural resources, the New York State Department of Environmental Conservation (NYSDEC) has developed the Long Island Watershed Action Agenda (Action Agenda). This 10-year strategic framework is designed to guide actions and investments to engage Long Island residents in the state's comprehensive efforts to improve water quality.

This Action Agenda builds from the foundation developed through the creation of the Long Island Nitrogen Action Plan (LINAP), which began in 2015. LINAP provided a strategic plan to address a priority water quality concern, nitrogen loading, as well as create a program that would facilitate collaboration and leverage ongoing nitrogen reduction work. Since its inception, $1.6 billion has been invested in Nassau and Suffolk counties to advance more than 300 projects and programs that reduce nitrogen pollution and restore water quality.

To ensure the continued success of these efforts and expand them to meet emerging challenges to the region's water resources, with this Action Agenda, NYSDEC is creating a Long Island Watershed Program that will establish a watershed approach to protecting the surface, coastal, and ground waters of Nassau and Suffolk counties. Developed with stakeholder input solicited through an Implementation Committee, the Action Agenda represents a transparent blueprint for water quality improvements, aquatic habitat conservation, groundwater protection, and the public engagement necessary to ensure success. Through the actions and priorities identified, New York State will bolster the resilience[1] and sustainability of Long Island's precious water resources.

The *Action Agenda* is organized into four main goals:

1. Clean Water
2. Healthy Habitats
3. Sustainable Groundwater Resources
4. Inspired & Engaged Public

These goals will guide the NYSDEC Long Island Watershed Program efforts to effectively organize federal, state and local partners to address the most urgent actions needed to protect and restore Long Island's watersheds. The Action Agenda will complement and augment the many water quality programs currently underway through

[1] Resilience in this document is defined as the ability of a system to withstand shocks and stresses while still maintaining its essential function.

LINAP and leverage emerging science and understanding to grow new and diverse partnerships, and a strong base of local champions necessary to achieve these goals.

Long Island Watershed Program

NYSDEC's Long Island Watershed Program will guide, partner, and educate on the water-related activities across Long Island. Long Island's water resources are vital to the residents, countless tourists, and the aquatic and terrestrial species that inhabit the island. The Long Island Watershed Program is guided by a strategic framework called the *Long Island Watershed Action Agenda*. The purpose of the Action Agenda is to guide the actions and next steps to improve and protect water and natural resources through implementation actions in Nassau and Suffolk counties.

LINAP, previously guided NYSDEC's efforts for water quality in Nassau and Suffolk counties. LINAP focused on the impacts caused by nitrogen to our surface water and groundwater and worked to implement strategies to reduce nitrogen at the source. Moving forward, the Action Agenda will build upon the success of LINAP and broaden the focus to include other water quality concerns, as well as address habitats, groundwater quantity, and education on water resource management topics in Nassau and Suffolk counties. The Action Agenda will complement and support plans such as Nassau County's *Nine Key Element Plan*, Suffolk County's *Subwatersheds Wastewater Plan*, and the *New York Ocean Action Plan*.

Using the Action Agenda, the Long Island Watershed Program will coordinate and collaborate with ongoing programs including the New York State Department of State's South Shore Estuary Reserve, and the U.S. Environmental Protection Agency's (EPA) Peconic Estuary Partnership and Long Island Sound Partnership to leverage and enhance these programs and avoid duplication of efforts underway in each program's respective Management Plan. DEC experts will continue to participate in the three estuary program's management committees and councils, technical advisory committees, and citizens advisory committees. Other committees include the Long Island Groundwater Sustainability Model Project Steering Committee and Suffolk County's Water Quality Restoration Fund Board of Trustees. The Long Island Watershed Program will participate in future ad hoc committees and other management networks as they arise to ensure this important coordination and collaboration maximizes implementation of programs.

NYSDEC brought together key stakeholders to assist in identifying priority water-related concerns and drafting the Action Agenda, creating the Long Island Watershed Action Agenda Implementation Committee. The Implementation Committee is comprised of regional stakeholders from other state agencies, environmental groups, and industry representatives. The goals, objectives, and actions within the Action Agenda reflect the shared vision of the Long Island Watershed Program and Implementation Committee members.

The Long Island Watershed Program will continue to be the regional facilitator and collaborator of these efforts, and will work with partners to:

- Continue to reduce nitrogen through LINAP;
- Protect and restore waterbodies for their best uses;
- Conserve and protect essential habitats;
- Encourage sustainable use and protect the water quality of the aquifer system;
- Promote behavioral changes that will lead to environmental benefits;
- Support activities that will lead to water quality improvements; and
- Enhance the resilience of Long Island's coastal resources.

Implementation of the Action Agenda relies on partnerships with federal and state agencies, municipalities, Indian Nations, nonprofits, academia, agriculture, business, landowners, and the general public.

About Long Island

As the largest island in the continental United States, Long Island is a unique landscape that makes up the most eastern portion of New York State and is home to over 2.8 million New Yorkers. The island is bordered by the Atlantic Ocean to the south and east, the Long Island Sound to the north, and the East River to the west. While geographically the island includes Queens and Brooklyn, the term Long Island typically only represents Nassau and Suffolk counties.

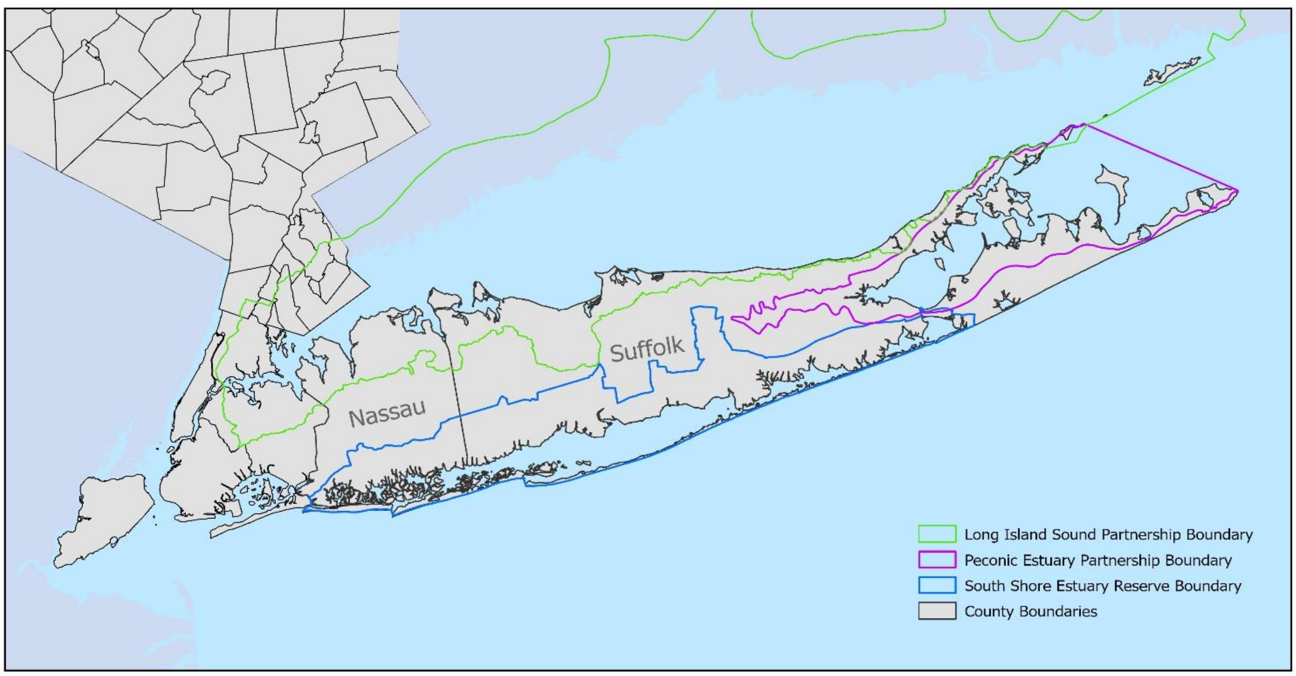

Figure1. Long Island counties

Long Island is 118 miles long and 23 miles wide at its widest point. With a land area of just over 1,400 square miles, Long Island is larger than the smallest state—Rhode Island. The land area of Long Island is largely high-density to low-density developed or residential areas. Areas of agricultural lands are present on the eastern end of the island and forested areas are present across the island, with the largest being the Pine Barrens in the eastern central portion of Suffolk County.

Long Island's landscape was shaped by indigenous peoples throughout history to the present day. Today, along the south shore of Long Island, the Shinnecock Indian Nation has both federal and state recognition while the Unkechaug Nation is a state recognized Indian Nation. The evidence of the history of the indigenous Algonquian people can be seen all around the island, with one example being the names of municipalities like Napeague and Acabonac, among others. These, along with other non-recognized Nations, are the original stewards of the natural resources of the island whose members remain engaged with it today. Those Nations continue to implement caretaking for the land, groundwater, and ocean in accordance with their traditional customs that have spanned centuries, and we acknowledge their continued efforts to preserve Long Island's natural environment.

One of the unique aspects of Long Island is its aquifer system, which is the only source of drinking water on the island. There are three main aquifers that make up the aquifer system of Long Island—Upper Glacial, Magothy, and Lloyd. The Upper Glacier aquifer is the shallowest and closest to the surface. The Magothy aquifer is the largest and is the main source of the drinking water supply. The Lloyd aquifer is the deepest and oldest water in the system.

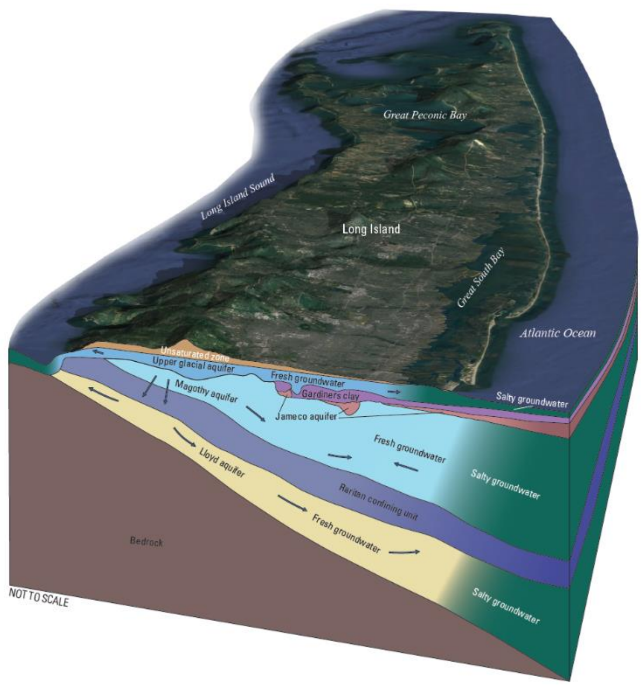

Figure 2. Long Island's aquifers - USGS SIR 2024-5044

The embayments surrounding the island are estuaries, or areas, where fresh water and saltwater meet. Three major estuary systems are recognized, including two EPA National Estuary Programs, the Long Island Sound Partnership and the Peconic Estuary Partnership, and the Department of State's South Shore Estuary Reserve. These estuary programs work to protect and restore the land and waters within their watersheds.

Protecting Our Water Resources

The water resources of Long Island play a vital role in everyday life for the residents of the island and countless tourists. With over 1,600 miles of coastline and numerous waterbodies, the water is used for leisure, tourism, commercial and recreational fishing, shellfishing, and numerous other activities.

The health of water resources on Long Island, both the surface water and groundwater are critical to environmental and public health. Achieving good water quality in the surface water is key to ensuring it is safe for human activities and maintaining healthy habitats for fish and wildlife. For groundwater, both good quality and sufficient quantity are imperative to support existing and future needs.

NYSDEC's Section 303(d) List of Impaired Waters Requiring a Total Maximum Daily Load identifies numerous Long Island waterbodies impaired for nitrogen, phosphorus, pathogens, and other parameters. While there are a variety of water-quality concerns on Long Island, nutrient pollution is one of the leading causes of water-quality impairment, with nitrogen being the main concern for marine waters and phosphorus for fresh waters. The main sources of nutrients are wastewater, fertilizer, and stormwater runoff. Excess nutrients from these sources are one of the factors that contribute to increased algal growth and an increased potential for the formation of harmful algal blooms (HABs).

HABs can vary across the island in color, size, and toxicity depending on the type of organism. HABs in marine systems, including Long Island waters, generally consist of phytoplankton or algae; red, brown, rust, and mahogany tides are the most common types of HABs documented in Long Island's marine environment. HABs in freshwater generally consist of cyanobacteria (also referred to as blue-green algae); cyanobacteria blooms have also been documented in Long Island's inland freshwater systems. HABs can contribute to the decline of shellfish harvests, fish kills, low oxygen conditions, loss of aquatic vegetation, and beach closures.

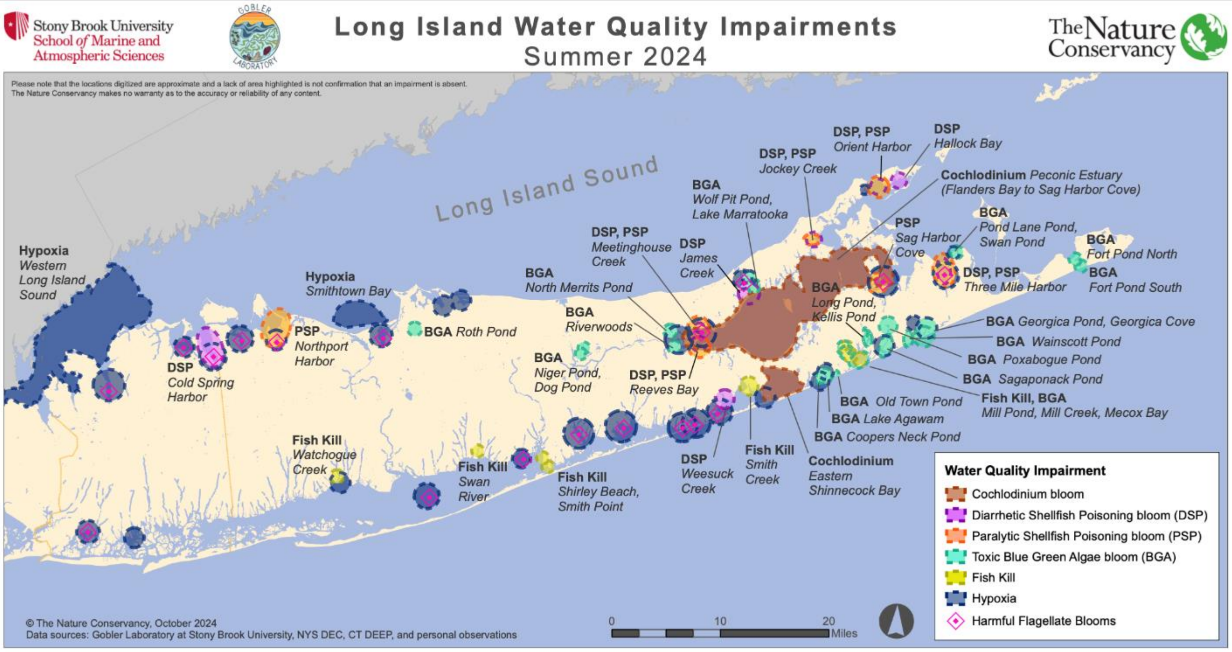

Figure 3. 2024 Marine HABs map (Dr. Gobler, SBU, TNC)

Excess nitrogen contributes to low oxygen conditions in the water, known as hypoxia. While some aquatic organisms are more tolerant of lower oxygen concentrations in the water, many cannot survive in low oxygen conditions. Hypoxia has been most prevalent in the waters on the north shore and in Long Island Sound, though many observable instances have been seen in shallow embayments across Long Island overnight.

Marine habitats are also affected by increased nitrogen levels. Submerged aquatic vegetation, or SAV, are impacted by the low light availability due to the excess algal growth, which reduces their ability to thrive. This in turn impacts critical habitat for shellfish, including Long Island's bay scallops, and various finfish. Wetlands, including salt marshes, are degraded when excess nitrogen causes vegetation to grow faster but with shallower root structures, leading to erosion. This decreases the level of natural protection wetlands provide to coastal communities from storms.

Nitrogen in groundwater can also be a concern. Groundwater is the only source of drinking water on the island and most areas are below the Maximum Contaminant Level (MCL)[2] set by New York State Department of Health for nitrogen in groundwater. However, it is essential to reduce the nitrogen sources going into the groundwater that migrates to the coast and discharges to surface waters.

Coastal and ocean acidification occurs when ocean water chemistry is adversely affected by climate change and human activities. In coastal areas, excess nutrients coming off the land and from groundwater can heighten the acidification of the waters. This can negatively affect aquatic life, including shellfish.

[2] https://www.health.ny.gov/environmental/water/drinking/annual_water_quality_report/docs/table1.pdf

Bacteria pollution around Long Island is another concern for the shellfish industry, as well as for the recreational use of the waters. Pathogenic bacteria present in the waters at concentrations above State Sanitary Code indicator levels are not safe for recreational swimming and may lead to beach closures. Additionally, shellfish should not be consumed in areas that are closed to harvesting in accordance with health and safety regulations.

While many pollution sources are well studied and documented, there are others that are not well understood in terms of how they may affect humans or the environment. These types of pollution sources are called emerging contaminants, and they can refer to a number of different types of chemicals. Recent emerging contaminants of concern on Long Island are 1,4-dioxine and per- and polyfluoroalkyl substances (PFAS). Though research continues, it is known that these types of chemicals can end up in our waterways and may have detrimental effects on humans, fish, and other wildlife.

Understanding these critical issues that affect Long Island surface water, habitats, and groundwater will ensure the proper steps are taken to have more resilient water resources now and into the future.

Long Island Nitrogen Action Plan

LINAP, began in 2015 and is a partnership between NYSDEC, the Long Island Regional Planning Council, and Nassau and Suffolk counties. The goal of LINAP was to provide an assessment of the nitrogen problem, determine the nitrogen sources, establish reduction endpoints, and develop implementation plans to achieve those reductions. *The LINAP Nitrogen Action Plan Scope* was developed to guide the program and was drafted with input from stakeholders.

The greatest strength of LINAP is the focus on partnerships—which has proven to be highly successful. The support available at the local, state, and federal levels have fostered a team effort and enacted true change. As of December 2024, LINAP and its partners have spent over $1.6 billion on 345 nitrogen reduction projects and programs. These projects and programs range from large-scale wastewater improvements and the septic system replacement grant program to more localized stormwater reduction projects.

Major successes to come out of LINAP in the past 10 years include:

- **Suffolk County Subwatershed Wastewater Plan**
    - The *Suffolk County Subwatersheds Wastewater Plan* (*SC SWP*) was completed in 2020 and was accepted as the first county-wide *Nine Element Plan* by NYSDEC. By assessing nitrogen loading at the parcel level, the *SC SWP* was able to identify the source(s) of nitrogen entering the surface water and groundwater. The largest source of nitrogen was determined to be the over 380,000 on-site wastewater treatment systems, including septic systems and cesspools. The *SC SWP* includes a 50-year implementation plan to address the nitrogen in wastewater.

- **Nassau County Nine Elements Watershed Plan**
    - The *Nassau County Nine Key Elements Plan*, completed in 2022, is also a county-wide nitrogen reduction plan and NYSDEC approved *Nine Element Plan*. It set the strategy for the nitrogen reduction efforts and outlined milestones for the county to follow related to sewering projects, septic upgrades, and nonpoint source reductions providing that funding is made available. While the plan shows the largest source for the county overall was wastewater, it showed that wastewater from on-site systems was of concern on the north shore and residential fertilizer was the largest source on the south shore, after the removal of the effluent from the Bay Park Wastewater Treatment Facility. There is a 10-year schedule included in the plan to address these sources.
- **Suffolk County Septic Improvement Program**
    - In response to the findings of the *SC SWP*, the county invested in replacing existing on-site wastewater systems (e.g. cesspools and septic systems) with advanced on-site wastewater treatment systems that treat nitrogen. Grant funding to replace the outdated systems is available to residents through the State's Septic System Replacement Program and the county's Septic Improvement Program, which provide grants of up to $30,000 toward the installation of an approved system. As of March 2025, 2,399 systems have been replaced through the grant programs.
- **Suffolk County Water Quality Restoration Act**
    - The passage of the Suffolk County Water Quality Restoration Act establishes a Countywide Wastewater Management District and secures a dedicated funding source to combat nitrogen pollution in surface and groundwater. Funded by a 0.125% sales tax increase, the Act is projected to generate $3.1 billion over 50 years, supporting sewer expansions, cesspool and septic system upgrades, and nitrogen reduction programs. It also extends the 0.25% sales tax supporting the Suffolk County Drinking Water Protection Program through 2060, ensuring long-term financial backing for water quality initiatives.
- **Nassau County S.E.P.T.I.C.**
    - The Septic Environmental Program to Improve Cleanliness, or S.E.P.T.I.C., is Nassau County's grant program that provides up to $10,000 in funding toward the installation of an approved on-site wastewater system. From January 2022 to December 2024, grantees were also eligible for $10,000 from Nassau County. While the S.E.P.T.I.C. Program is a county-wide program, the north shore of the county has large pockets of unsewered areas and is the focus of the S.E.P.T.I.C. Program. As of April 2025, 176 on-site wastewater systems have been replaced through the grant program, and an additional 128 program applicants have signed agreements and plan to install a new system within the next 12 months.
- **Suffolk County Coastal Resiliency Initiative**
    - Suffolk County is also tackling wastewater through major sewering initiatives, including the Suffolk County Coastal Resiliency Initiative which

is taking over 5,500 cesspools and septic systems offline and connecting those parcels to wastewater treatment systems on the south shore.

- **South Shore Water Reclamation Facility**
  - The South Shore Water Reclamation Facility (SSWRF), formerly known as the Bay Park Sewage Treatment Plant, is the largest source of nitrogen entering the western bays complex on the south shore of Nassau County. Major upgrades have been completed at the facility, including biological nutrient removal processes which have reduced approximately 60% of the nitrogen in the effluent. Storm protection measures have also been implemented at the facility to improve resilience and provide protection during storms. The Bay Park Conveyance Project will make the most significant reduction of nitrogen entering the western bays by diverting nearly all the effluent to the Cedar Creek Water Pollution Control Plant's ocean outfall, which discharges three miles offshore in the Atlantic Ocean. Compounded with the conversion of the Long Beach Wastewater Treatment Plant into a fortified storm resilient pump station that will redirect the water for treatment to the upgraded SSWRF, approximately 60 million gallons per day will be diverted from the western bays.
- **New York State Center for Clean Water Technology**
  - The Center for Clean Water Technology was created in 2015, aligning with the start of LINAP. The Center is developing and commercializing cost-effective water quality protection and restoration solutions. Its focus is to deliver affordable, high-performance technology to efficiently remove nitrogen and other contaminants from household wastewater through replacing or retrofitting existing cesspools and septic systems. Current research is being done on nitrogen removing biofilters, constructed wetlands, and permeable reactive barriers, among other technologies.
- **Fertilizer Recommendations**
  - The LINAP Fertilizer Management Workgroup held multiple meetings to discuss a path forward in managing lawn fertilizers. The final recommendations of the workgroup were published in the *Recommendations for Fertilizer Nitrogen Applications on Residential and Commercial Turfgrass*, which is posted on NYSDEC's webpage. The recommendations include the single and annual application rates, use of 50% slow-release nitrogen, and updates to packaging to make it easier for the user. The recommendations also include some best management practices (BMPs) such as irrigating properly and calibrating a spreader.
- **Long Island Garden Rewards Program**
  - The Long Island Garden Rewards Program is a stormwater reduction and treatment program that reimburses property owners up to $500 for installing a rain garden, using a rain barrel, and/or planting native plants. Since the program's inception in 2023, over $100,000 in reimbursements has been issued.
- **Long Island Water Quality Challenge**
  - The Long Island Water Quality Challenge is a LINAP initiative that promotes project-based learning in Science, Technology, Engineering, Arts, and Mathematics (STEAM) in Long Island schools, encouraging

enthusiasm for STEAM and an interest in STEAM-related careers. It is an opportunity for students in grades 6–12 to play an important role in improving water quality on Long Island by reducing nitrogen pollution on school grounds coming from stormwater. Winning proposals are provided a grant of up to $2,500 dollars to implement their project. As of December 2024, over 280 students across 41 schools have competed in the challenge.

- **Nutrient Bioextraction Initiative**
    - While the reducing sources of nitrogen is ongoing, efforts to remove nitrogen in waters through the Nutrient Bioextraction Initiative are also underway. Nutrient bioextraction is the growing and harvesting of seaweed and shellfish for the purpose of removing nitrogen from coastal waters. With financial support from EPA's Long Island Sound Partnership, the Nutrient Bioextraction Initiative includes researching and speaking with experts to understand the potential for a sustainable bioextraction industry on Long Island that would efficiently remove the nitrogen from impacted waters and turn the harvested shellfish and seaweed into a commercially viable product.

About the Action Agenda

While LINAP focused efforts on reducing nitrogen for the past decade, this Action Agenda takes a more holistic approach and supports effective watershed management and implementation on Long Island to sustain water quality and quantity, protect aquatic habitats, ensure human health, and promote the long-term resilience of Long Island's water resources.

The Action Agenda follows the principles of ecosystem-based management (EBM) with an emphasis on water quality and quantity protection. The EBM approach recognizes the complexity of the interconnected ecosystem with the services it provides, including the impacts from human activities. The core principles of EBM will be factored into decision-making, including recognizing connections, understanding cumulative impacts, and learning from past experiences. Utilizing the principles of EBM, the Action Agenda will take an adaptive approach to watershed management, ensuring sustainable and comprehensive solutions to complex water quality and quantity challenges as projects are implemented and new and emerging science advances.

[Figure 4. EBM figure]

Implementation Committee

A Long Island Watershed Action Agenda Implementation Committee was assembled to identify key water quality and quantity issues, habitat concerns, and public stewardship efforts that need to be addressed, and to support implementation projects across Long Island. The organizations that are members of the Implementation Committee are listed in the table below. These member organizations have been critical to the development of this strategic plan and will take the lead on many of the actions outlined. The successful implementation of the Action Agenda will rely on the partners on the Committee, as well as other partners across the island.

Implementation Committee Members
County Agencies
Nassau County Department of Public Works Nassau County Department of Public Works, Planning Division Nassau County Health Suffolk County Executive Suffolk County Department of Health Services

Suffolk County Department of Planning
Estuary Programs
Long Island Sound Partnership Peconic Estuary Partnership South Shore Estuary Reserve (Department of State)
Environmental Organizations
Group for the East End The Nature Conservancy Citizens Campaign for the Environment
Soil and Water Conservation Districts
Nassau County Soil and Water Conservation District Suffolk County Soil and Water Conservation District
Academia
Stony Brook University Cornell Cooperative Extension
Agriculture
Long Island Farm Bureau
Protection Committees
Hempstead Harbor Protection Committee
Water Conservation
Long Island Water Conference Long Island Commission for Aquifer Protection Suffolk County Water Authority Western Nassau Aquifer Commission
Tourism & Business
Discover Long Island Long Island Builders Institute
Regional Planning
Long Island Regional Planning Council
Indian Nations
Shinnecock Nation
Marine
Aquaculture Industry The Nature Conservancy–Marine Program Cornell Cooperative Extension–Marine Program
State Agencies
Agriculture & Markets Office of Parks, Recreation, and Historic Preservation Department of Transportation Department of Environmental Conservation

Within each goal of the Action Agenda, implementation actions were drafted and approved by the Implementation Committee. Alongside each action is a list of implementation partners that are already implementing the corresponding action or are planning to implement it in the future. These assignments are nonbinding and do not commit partners to implementing specific actions, nor do they limit the possibility of other organizations (e.g. state agencies such as NYS Department of Health or NYS Homes and Community Renewal) or individuals acting as partners on specific actions.

Structure

The Action Agenda follows other similar strategic planning structures and foundational principles—starting broadly with a Mission and Vision and ending with specific Actions. The Implementation Committee worked together to define the foundational aspects of the Action Agenda.

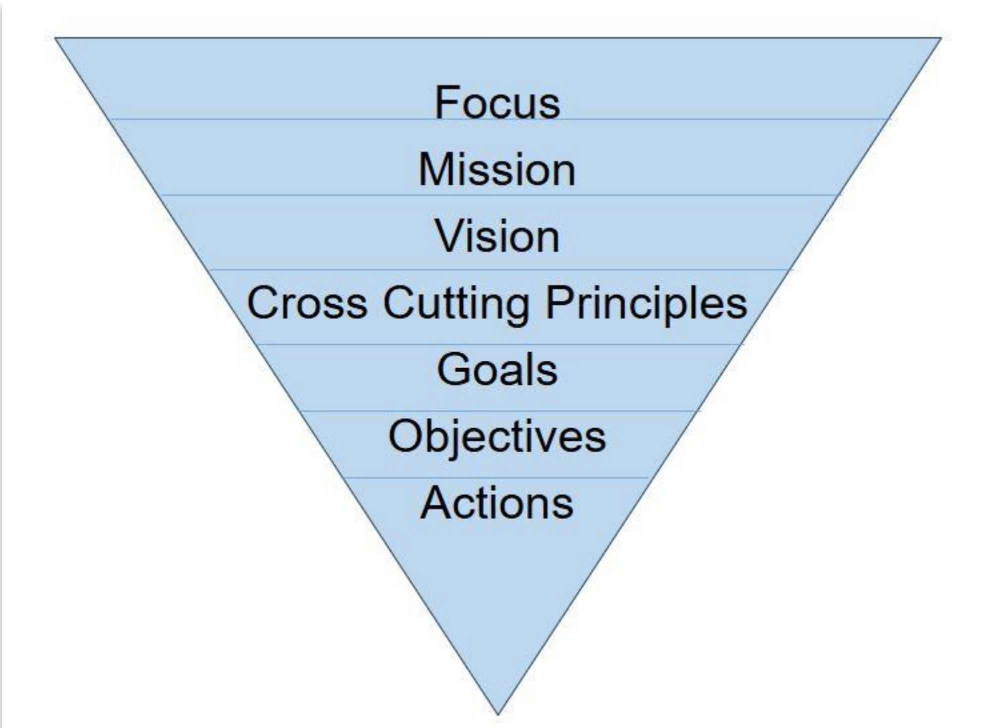

Figure 5. Upside down triangle with mission to actions

Focus

Focus statement: Address water quality issues across Long Island and items that are influenced by the status of water quality through federal, state, and local partnerships.

Mission and Vision

Mission statement: Protect and restore Long Island's water resources for a healthy environment and sustainable future.

Vision statement: A Long Island with clean, healthy, and sustainable water resources and habitats achieved through innovative strategies and an engaged public.

Cross-Cutting Principles

Several concepts were identified by the Implementation Committee as critical to the success of the Action Agenda. These cross-cutting principles are items that will be considered in each of the actions moved forward.

- **Environmental Justice**
  - An environmental justice[3] or disadvantaged community[4] is one that experiences disproportionate adverse environmental impacts, which may include industrial air pollution, substandard water quality, and lack of access to open space. To determine if or how projects will address inadequacies to environmental justice or disadvantaged communities, the NYSDEC's Potential Environmental Justice Areas map, and the Disadvantaged Communities Criteria Map will be used.
- **Climate Change**
  - Warmer temperatures, changing precipitation patterns, and increased frequency and intensity of storm events affect every aspect of water resources on Long Island. Projected climatic changes and cumulative impacts on water resources and habitats will be considered during project planning and implementation. Work within the Action Agenda will consider and integrate climate mitigation, adaptation, and resilience benefits to ensure sustainable outcomes.
- **Science-Based Decision-Making**
  - Science-based decision-making refers to the practice of utilizing data and tools from high-quality science to inform management decisions. Science-based decision-making also encompasses the idea of purposeful and deliberate science. Work under the Action Agenda will use science-based decision-making. For example, data being quality assured, analysis done using State certified laboratory standards, and meeting State reporting standards, like adding data to EPA's Water Quality Exchange database.
- **Partnerships**
  - Strong partnerships are crucial to implementing the goals, objectives, and actions of the Action Agenda. Under LINAP many partnerships and collaborative initiatives were made, and those partnerships will continue. As the Action Agenda is implemented it is anticipated that partnerships will be expanded. Utilizing partner strengths to leverage and coordinate ongoing efforts will lead to effective and efficient results.
- **Innovative Strategies**
  - To achieve the mission and vision of the Action Agenda, it is essential to innovate. The Action Agenda aims to promote testing new ideas, scaling up successful pilot projects, and expanding the adoption of impactful approaches for the next generation. It is imperative that innovation is utilized with a clear purpose and toward the goal of success.

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[3] https://www.nysenate.gov/legislation/laws/ENV/75-0111

[4] https://www.nysenate.gov/legislation/laws/ENV/75-0111

Goals

There are four main goal categories that are the foundation of the Action Agenda. They are Clean Water, Sustainable Groundwater Resources, Healthy Habitats, and Inspired & Engaged Public. Each of the categories focus on actions that are needed to realize their goals. While they are separate categories, all these efforts are interconnected and work together to result in a more sustainable and resilient watershed that is able to withstand ever changing environmental conditions. Within each goal is a list of supporting efforts, highlighting already established programs and plans that connect with that goal. Like cross-cutting principles, these plans and efforts will be considered in the work and projects implemented under the Action Agenda.

Clean Water

Goal statement: Understand, improve, and protect surface water and groundwater quality to meet or surpass ecological and public health targets.

Long Island ecosystems and residents are reliant on clean water. Long Island is home to multiple estuary systems, streams, lakes, rivers, and, unique to the rest of New York State, the ocean and coastal systems. Poor water quality impacts both aquatic and terrestrial ecosystems, and ultimately affects public health, quality of life, and economic development. Through supporting efforts such as those listed below, some nutrient reduction targets have been met, while progress continues to address water quality impacts that impact Long Island's surface waters and groundwater. These impacts can be felt when beaches close due to the public health concern from pathogens or the risk of exposure to HABs, the shellfishing industry struggles to operate, and recreation and tourism are negatively impacted due to declining water quality.

Other stressors that affect waterbodies and watersheds include increased area covered by impervious surfaces and loss of vegetative cover, polluted runoff, overapplying fertilizer on lawns and green spaces, failing on-site wastewater treatment systems, pollutant discharges, increased heavy rainfall and storms, and sea level rise. To reduce the impact of these stressors, the Action Agenda recommends research and implementation work to better understand nutrient pollution, sources of bacteria, and emerging contaminants. The Action Agenda also recommends work to implement wastewater reduction initiatives, address the adverse impacts of stormwater runoff, and proactively address land-use planning and practices in relation to climate change.

The actions, when implemented, will include key initiatives: clean water BMPs such as riparian buffers, replacing impervious surfaces with green infrastructure, implementing agricultural Best Management Practices (BMPs), researching, and developing innovative approaches to wastewater treatment, and more. Additionally, an important sentiment carried throughout the Clean Water actions, and water-quality improvement efforts overall, is to first and foremost address pollution at the source.

The Clean Water goal aims to continue implementing pollution-source reduction projects, such as stormwater reduction, as well as support new, innovative ways to achieve pollution-source reduction where possible. This goal also seeks to continue water-quality monitoring through established sampling programs and gaging stations and conduct new sampling to assist with research of emerging water quality parameters. Continuing and building upon monitoring and research efforts within this goal will help make informed management decisions. Finally, the Clean Water goal aims to implement land-use practices to increase sustainability and make our waters more resilient to water quality issues.

Supporting Efforts:

- Long Island Sound Partnership Comprehensive Conservation and Management Plan
- NOAA Mid-Atlantic Marine Debris Action Plan
- Nassau County Nine Key Element Watershed Plan
- Peconic Estuary Partnership Comprehensive Conservation and Management Plan
- Peconic Estuary Partnership Shoreline Assessment
- South Shore Estuary Reserve Comprehensive Management Plan
- Suffolk County Agricultural Stewardship Plan
- Suffolk County HABs Action Plan
- Suffolk County Long Term Monitoring Plan *(in development)*
- Suffolk County Subwatersheds Wastewater Plan
- Local, state, and federal regulations

Objective 1: Prevent and reduce nonpoint source pollution.

Actions	Implementation Partners
Reduce the discharge of pollutants from urban stormwater to the maximum extent practicable through the Municipal Separate Storm Sewer System General Permit (MS4 GP) or Individual SPDES Permit.	NYSDEC, Protection Committees, NYSDOT, County Agencies, Estuary Programs, Academia, SWCD, Marine, MS4 Operators
Reduce the discharge of pollutants from industrial stormwater through the Multi-sector General Permit (MSGP).	NYSDEC, County Agencies, SWCD, MSGP Permittees
Support the development and implementation of conservation plans[5] including soil health programs and agricultural BMPs.	NYSDEC, NYSDOT, NYSAGM, Agriculture, SWCDs, County Agencies, Indian Nations
Reduce stormwater pollution sources and runoff on a property-by-property basis.	Academia, SWCD, ENGOs, Protection Committees, NYS Parks, Estuary Programs, County Agencies, Indian Nations
Implement removal and prevention practices for trash, litter, and debris.	NYSDEC, Estuary Programs, Academia, NYSDOT, Protection Committees, SWCD, NYS Parks, ENGOs, County Agencies

Objective 2: Implement and build upon Nassau County's and Suffolk County's wastewater efforts through upgrading and expanding treatment facilities, cesspool and septic replacement, and other technologies and practices.

Action(s)	Implementation Partners
Complete the wastewater treatment facility projects outlined in the Nassau and Suffolk counties Nine Element plans.	NYSDEC, ENGOs, Protection Committees, NYSDEC, Estuary Programs, County Agencies
Replace cesspools and inadequate septic systems with advanced on-site wastewater treatment systems in Nassau and Suffolk counties, pursuant to their Nine Element plans.	NYSDEC, ENGOs, Protection Committees, Estuary Programs, County Agencies, Marine, Indian Nations, SWCD
Support research for advanced on-site wastewater treatment systems pursuant to adopted standards, regulations, and codes.	NYSDEC, Academia, ENGOs, Protection Committees, NYSDEC, Estuary Programs, County Agencies, SWCD, Water Conservation

[5] Examples of conservation plans are New York State Agriculture and Markets AEM Nutrient Management Plans and Suffolk County's Agriculture Stewardship Plan.

Conduct studies to further the implementation of centralized, decentralized, and on-site wastewater treatment systems.	NYSDEC, Academia, NYS Parks, Estuary Programs, County Agencies

Objective 3: Understand water quality through purposeful monitoring and research of parameters including nitrogen, phosphorus, pathogens, and emerging contaminants.

Action(s)	Implementation Partners
Support action-oriented water-quality monitoring and research using science-based approaches.	NYSDEC, Estuary Programs, Academia, Protection Committees, ENGOs, SWCD, NYS Parks, County Agencies
Share monitoring results and deliver findings to local decision-makers to support management decisions and show progress in the recovery of ecosystems.	NYSDEC, Academia, Protection Committees, NYS Parks, Estuary Programs, Regional Planning, County Agencies, Indian Nations
Support research to better understand climate-related water-quality issues or impacts, including coastal acidification.	NYSDEC, ENGOs, Protection Committees, NYS Parks, Academia, Agriculture, SWCD, Regional Planning, Estuary Programs, Water Conservation, Marine, County Agencies, Indian Nations
Support research to address contamination when source control alone will not meet desired end points.	NYSDEC, ENGOs, NYS Parks, Academia, SWCD, Regional Planning, Water Conservation, County Agencies, Estuary Programs
Conduct field investigations to better understand sources of pollutants, including nutrients, emerging contaminants, and pathogens.	NYSDEC, Academia, County Agencies, Protection Committees, Marine

Objective 4: Create and foster innovative land preservation and land-use strategies for greater sustainability.

Action(s)	Implementation Partners
Evaluate, update, and integrate relevant land use and land protection plans and programs in accordance with the latest science and adopted water quality plans.	NYSDEC, ENGOs, NYSDOT, NYS Parks, NYSAGM, Estuary Programs, County Agencies, Marine, SWCD, Indian Nations

Support development of projects and programs that reduce flood risk and damage through flood plain management, including planned retreat.	NYSDEC, NYSDOT, ENGOs, Protection Committees, NYS Parks, Academia, NYSAGM, Estuary Programs, County Agencies, SWCD, Tourism & Business, Indian Nations
Prioritize the retention of existing natural shorelines.	NYSDEC, ENGOs, Protection Committees, NYS Parks, Estuary Programs, County Agencies, SWCD, Indian Nations
Evaluate the extent of hardened shorelines and pursue opportunities to soften existing hardened shorelines.	NYSDEC, ENGOs, Protection Committees, NYS Parks, SWCD, Estuary Programs
Facilitate development of next generation regulations at the local level, promoting natural infrastructure, nature-based features and land use decisions that protect water quality and essential habitat.	NYSDEC, ENGOs, Protection Committees, Estuary Programs, County Agencies, SWCD

Healthy Habitats

Goal statement: Protect, restore, and enhance habitats to sustain the long-term viability of healthy and holistic ecosystem functions to benefit people and nature.

Long Island is home to an array of habitat types that are not only a natural environment for wildlife, but also, when functioning properly, can provide essential ecological services like reducing risk from flooding and storm surges, providing water filtration, sequestering carbon, and other essential functions. These functions are critical for coastal resiliency, and supporting efforts to strengthen these habitats will lead to an increased ability to withstand and recover from storm and flooding impacts and changing conditions.

Within the context of the Action Agenda, essential habitat is defined as coastal marine and/or freshwater habitat that impacts water quality, or habitat affected by water quality. This includes but is not limited to wetlands, submerged aquatic vegetation (SAV), and shellfish beds.

While NYSDEC and its partners have made progress in restoring and protecting essential habitats, it is imperative this work advance. Innovation, adaptation, and proactiveness is necessary when working in habitat restoration and conservation. Throughout the Healthy Habitats actions, the sentiment of “restoration readiness” is present. This is the accepted and widely used project preparation strategy of evaluating the condition to identify the reasons for loss or degradation and address them before implementing restoration strategies. This approach not only begins to address habitat loss at the source, but also allows for groups to learn from what has, and has not, worked in the past. Without habitat restoration, protection, and management, Long Island habitats and ecosystem services will be significantly diminished.

Key initiatives within the Healthy Habitats goal include proactively identifying habitat in need of protection or restoration, and increasing the area of essential habitat under protection, restoration, and/or conservation efforts. Monitoring and research are also crucial to this goal, with initiatives focused on better understanding innovative approaches to restoration and conservation through pilot projects, as well as furthering the monitoring and mapping of essential habitat to better understand habitat status and trends.

Supporting Efforts:

- Long Island Sound Partnership Comprehensive Conservation and Management Plan
- NYS Ocean Action Plan
- NYS Open Space Conservation Plan
- Peconic Estuary Comprehensive Conservation and Management Plan
- South Shore Estuary Reserve Seagrass Conservation Management Plan
- South Shore Estuary Reserve Action Plan
- Local, state, and federal regulations

Objective 1: Conserve, protect, and increase the area and function of essential habitat.

Action(s) –	Implementation Partners
Identify essential habitat in need of protection and/or restoration by developing new or enhancing existing prioritization criteria.	NYSDEC, NYS Parks, Academia, Estuary Programs, SWCD, County Agencies
Support open space protection at the state and local level for essential habitats.	NYSDEC, ENGOs, NYS Parks, Estuary Programs, County Agencies, SWCD, Indian Nations
Support conservation and restoration through science-based methods and pilot projects.	NYSDEC, ENGOs, NYSDOT, Protection Committees, NYS Parks, Academia, NYSAGM, SWCD, Estuary Programs, County Agencies Marine, Indian Nations

Objective 2: Monitor the status, trends, and function of essential habitat.

Action(s) –	Implementation Partners
Identify the reasons for habitat loss or degradation, and develop and implement actions to address those threats.	NYSDEC, NYS Parks, Academia, Estuary Programs, County Agencies, Marine, SWCD, Indian Nations

Support the development and use of modeling and forecasting tools for protection and/or restoration of essential habitat.	NYSDEC, Protection Committees, NYS Parks, Academia, SWCD, County Agencies, Estuary Programs, ENGOs
Support monitoring and mapping of essential habitat using the best available science-based approaches.	NYSDEC, ENGOs, NYS Parks, Academia, County Agencies, Estuary Programs, SWCD
Assess the effectiveness of new and existing priority conservation and restoration techniques.	NYSDEC, ENGOs, NYS Parks, Academia, SWCD, Estuary Programs, NYSDEC, County Agencies

Sustainable Groundwater Resources

Goal statement: Achieve sustainable use of water resources through protection, conservation, and management efforts to ensure a dependable supply of clean water now and into the future.

Compared to the rest of New York State, Long Island has unique hydrology and geology with sandy soils, minimal fresh surface water, and a large sole-source aquifer system underlying the island that connects to marine embayments. More than 2.8 million New Yorkers rely on the sole-source aquifer that supplies drinking water. Factors such as over-pumping, population increase, pollutants, and impacts of climate change and sea-level rise, such as drought, erratic rainfall, and saltwater intrusion, can stress the aquifer system and public water supplies. To sustain Long Island’s groundwater resources, water conservation initiatives must continue, expand, innovate, and improve.

One focus of the actions identified is water conservation and protection initiatives that any Long Island resident could put into practice. This includes irrigation BMPs, green infrastructure, and sustainable landscaping. Irrigation BMPs include smart irrigation controllers that are attuned to current conditions and can reduce the need to irrigate by integrating weather and landscape conditions, as well as soil moisture, into the timing and duration of irrigation events. Other irrigation BMPs include rainwater capture, xeriscaping (the process of landscaping or gardening that reduces or eliminates the need for irrigation), and proper native plant selection and placement. Sustainable landscaping refers to the way homeowners and businesses can design portions of their property to result in significant positive benefits for water quality, the environment, and public health. Encouraging Long Islanders to better understand the connection between practices performed on land and how it could impact water quality and quantity, in tandem with providing avenues for them to take action, will lead to long-term, sustainable behavioral changes that improve water conservation.

Actions within this goal will advance water conservation on a regional level, including conservation efforts made through Public Water Suppliers. Public Water Suppliers maintain the infrastructure and provide the service of delivering water to residents and businesses. Public Water Suppliers report monthly pumpage to the NYSDEC, as well as an annual water conservation report. The Action Agenda recommends actions for suppliers to manage water loss and better understand the way the water is being used. Additionally, collaboration between key partners such as municipal planning and zoning boards will need to take place to support programs that will manage the use of the public water supply efficiently.

Water reuse can be another way to reduce the need to pump from the aquifer. Water reuse refers to the process where wastewater, storm water, or graywater (non-sewage wastewater from sinks, baths, and laundry) is treated and used for another purpose, such as irrigation.

Also note that some of the actions and practices highlighted under this goal have a co-benefit of filtering contaminants, which will protect the water quality and allow for a more resilient drinking water supply. Protection of groundwater quality will take on some of the same efforts outlined in the Clean Water goal. The Action Agenda recommends engaging local communities in their drinking water protection.

The Sustainable Groundwater Resources goal aims to increase water conservation on properties (residential, commercial, industrial) through water-efficient practices like sustainable landscaping or best irrigation practices, as well as through supporting programs that encourage WaterSense retrofits. The goal also aims to expand and implement regional water conservation initiatives and protect source water to ensure an abundant and safe drinking water supply.

Supporting Efforts:

- LICAP Our Water Our Lives
- Long Island Groundwater Sustainability Project
- NYSDEC Drinking Water Source Protection Program
- Local, state, and federal regulations

Objective 1: Increase water conservation measures on a property-by-property basis.

Action(s) –	Implementation Partners
Advance the adoption of sustainable landscaping.	NYSDEC, ENGOs, NYSDOT, Water Conservation, Protection Committees, NYS Parks, SWCD, Academia, Regional Planning, Marine, County Agencies, Indian Nations
Further the adoption and implementation of irrigation BMPs.	NYSDEC, Water Conservation, ENGOs, Protection Committees, NYS Parks, NYSAGM, Agriculture, SWCD, Academia, Regional Planning, County Agencies

Support programs that encourage WaterSense fixtures, appliances, and other retrofits.	NYSDEC, ENGOs, Water Conservation, Protection Committees, NYS Parks, Academia, SWCD, Regional Planning, County Agencies

Objective 2: Expand existing and implement new regional water conservation initiatives.

Action(s) –	Implementation
Enhance, promote, and support water loss and use characterization programs at Public Water Suppliers.	NYSDEC, Water Conservation, ENGOs, SWCD, County Agencies
Support and grow programs that promote the efficient use of the public water supply.	NYSDEC, Water Conservation, ENGOs, Protection Committees, NYS Parks, Academia, NYSDEC, Estuary Programs, Tourism & Business, SWCD, County Agencies
Promote water reuse infrastructure in new construction and retrofits in existing facilities.	NYSDEC, ENGOs, Academia, County Agencies, Marine, Tourism & Business, SWCD
Prioritize working with high volume water users to use public water more efficiently.	NYSDEC, Water Conservation, County Agencies, SWCD

Objective 3: Protect the quality and quantity of drinking water sources.

Action(s) –	Implementation Partners
Maximize participation and implementation of the strategies outlined in the New York State Drinking Water Source Protection Program (DWSP2).	NYSDEC, ENGOs, Estuary Programs, Water Conservation, Marine, SWCD, County Agencies
Support the completion and utilization of information made available through the Long Island Groundwater Sustainability Project for management decisions.	NYSDEC, Water Conservation, ENGOs, Regional Planning, County Agencies, Indian Nations, Estuary Programs, SWCD
Expand land acquisition for the purpose of source water protection.	NYSDEC, ENGOs, NYSAGM, Estuary Programs, County Agencies, Tourism & Business, SWCD

Inspired & Engaged Public

Goal statement: Engage the public in the protection of Long Island’s waters to create and foster stewardship which inspires change and mobilizes community support for personal, enduring, and effective environmental action.

Much of the water quality improvement work that has been achieved on Long Island can be attributed to strong partnerships and public engagement. Creating networks of effective partners across different agencies, organizations, and groups can lead to leveraging and coordinating ongoing water quality improvement efforts. Strong partnerships can in turn create strong public support for environmental actions and plans like the Action Agenda, as well as strengthen public engagement and stewardship for water and ecosystems.

Through this goal, the Action Agenda will target outreach to a variety of groups—recreational water users, tourists, the public, environmental groups, Indian Nations, and more —by providing educational material and opportunities to participate in community science, with the goal of increasing overall stewardship of Long Island's waters. Recreational water users refers to the group of people who use water to recreate (swim, fish, boat, surf, etc.). Engaging this group provides an opportunity to promote best environmental practices like proper boat pump-out techniques, reducing plastic waste, and respecting wildlife habitats—empowering recreational water users to make choices that protect and sustain water quality to make water resources are more resilient.

There are many opportunities to improve and expand community science efforts across the island. Community science is the practice of public participation and collaboration in scientific research to increase scientific knowledge or understanding, and there are multiple opportunities for individuals to get involved in community science on Long Island. The three estuary programs, Long Island Sound Partnership, Peconic Estuary Partnership, and the South Shore Estuary Reserve, as well as many not-for-profit groups, host community events ranging from wildlife monitoring to beach cleanups. It is essential that community science is goal-oriented, whether that goal is to educate the public or engage residents who are familiar with water quality monitoring, or community groups that conduct monitoring.

The Inspired & Engaged Public goal aims to educate the public on issues and challenges related to water quality and quantity, and how they can get involved in protecting these resources. This goal seeks to find new and innovative approaches to energize and engage the public to participate in volunteer events, community science, educational events, and more. It involves communicating with the public and stakeholders about our accomplishments, progress, and ongoing challenges related to the mission and vision of the Action Agenda. Ultimately, the Inspired & Engaged Public goal intends to foster stewardship that will lead to long-term behavioral changes and support actions that will drive change

Objective 1: Educate the public on how to protect, improve, and sustain water resources for the future.

Action(s) –	Implementation Partners
Create and disseminate material to advance the goals of the Action Agenda.	NYSDEC, ENGOs, Protection Committees, NYS Parks, Academia, SWCD, Regional Planning, Tourism

	& Business, Estuary Programs, Water Conservation, County Agencies
Develop and promote education and outreach campaigns to advance the goals of the Action Agenda.	NYSDEC, ENGOs, Protection Committees, NYS Parks, SWCD, Academia, Regional Planning, Estuary Programs, Water Conservation, County Agencies, Indian Nations
Advance education and outreach programs to school aged children (K–12) to help develop an understanding of vital water resources.	NYSDEC, ENGOs, Water Conservation, Protection Committees, SWCD, NYS Parks, Estuary Programs, Regional Planning, County Agencies
Support public education efforts that lead to long-term behavioral changes.	NYSDEC, ENGOs, NYSDOT, Water Conservation, Protection Committees, NYS Parks, Academia, NYSDEC, County Agencies, Marine, Tourism & Business, Indian Nations, SWCD

Objective 2: Improve public participation and stewardship in protecting, improving, and sustaining water quality and quantity.

Action(s) –	Implementation Partners
Encourage the public to participate in volunteer events.	NYSDEC, ENGOs, Protection Committees, NYS Parks, Academia, SWCD, Regional Planning, Water Conservation, Estuary Programs, Tourism & Business, Marine, County Agencies, Indian Nations
Conduct and support goal-oriented community science.	NYSDEC, ENGOs, NYS Parks, Academia, NYSDEC, SWCD, Regional Planning, Estuary Programs, County Agencies, Indian Nations
Promote and demonstrate best environmental and water conservation practices for increased adoption.	NYSDEC, ENGOs, Water Conservation, Protection Committees, NYS Parks, Academia, NYSAGM, SWCD, Regional Planning, Estuary Programs, County Agencies, Tourism & Business, Indian Nations
Advance water-related public participation efforts.	NYSDEC, ENGOs, Water Conservation, Protection Committees, Academia, SWCD,

	Regional Planning, Tourism & Business, Estuary Programs, County Agencies, Indian Nations

Objective 3: Communicate the program's mission, progress, accomplishments, and challenges.

Action(s) –	Implementation Partners
Publish newsletters that provide information on ongoing initiatives and activities, including program progress.	NYSDEC, ENGOs, Water Conservation, Protection Committees, Academia, SWCD, Tourism & Business, Estuary Programs, County Agencies
Reach a variety of audiences through various outreach mediums or platforms.	NYSDEC, ENGOs, Water Conservation, Protection Committees, Academia, SWCD, Regional Planning, Tourism & Business, County Agencies, Estuary Programs, Marine
Participate in and promote outreach events.	NYSDEC, ENGOs, Water Conservation, Protection Committees, NYS Parks, Academia, SWCD, Regional Planning, Estuary Programs, Tourism & Business, County Agencies, Indian Nations

Implementation

With historic investments in water quality improvements through Governor Hochul's leadership, New York is poised to make even more progress to address water quality and quantity concerns across Long Island.
While much has been achieved since LINAP's inception in 2015, the *Long Island Watershed Action Agenda* builds on these accomplishments and sets forth an aspirational vision and strategic framework to enhance the Long Island Watershed.

We challenge you to heed the call outlined in the Action Agenda, learn more about your Long Island watershed, and get involved in the comprehensive efforts to protect these vital resources. There are many ways to join with others to protect Long Island's water and natural resources, from education and outreach on water quality and quantity concerns to participating in community science and volunteer opportunities. There are many beach cleanup events, water quality monitoring, wildlife surveying, and other volunteer opportunities already occurring that you can participate in.

The Action Agenda's Implementation Committee will work on implementing the actions outlined in each goal and meet periodically to assess progress. Connect with Implementation Committee organizations through their websites and outreach events to learn about ways you can participate. Involvement can range from on the ground implementation to supporting education and outreach efforts. These partnerships are paramount in enabling us to accomplish the goals outlined in the Action Agenda.

While the Action Agenda is a 10-year strategic plan, the progress toward meeting the goals and objectives will be evaluated in five years and an adaptive management approach will be used throughout the 10-year plan to ensure continued success. The Long Island Watershed Program will gather information from the Implementation Committee and partners on their implementation efforts to support the actions and consult with Committee members to evaluate the program's progress. This information will inform the next phase of the Action Agenda to ensure priorities are being met and work is on track and being accomplished.

Visit our webpage and subscribe to our newsletter to stay involved and informed about ongoing water quality successes and challenges, as well as stewardship opportunities. We invite everyone to work with us to help keep our Long Island waters clean!