Long Island Nitrogen Action Plan (LINAP) - Newsletter

Summary of Partnership Accomplishments 2023

This newsletter showcases the significant progress our partners have made toward achieving the goals outlined in the Long Island Nitrogen Action Plan.

Department of Environmental Conservation

Last year, DEC continued to work closely with its partners on several LINAP initiatives while also completing the LINAP Embayment Water Exchange Study, which explored potential technologies available to exchange more sea water into embayments to improve the health of the waterbody.

The study evaluated water exchange technologies that could help meet water quality goals established by LINAP and the counties by enhancing the exchange of sea water in different types of waterbodies commonly found on Long Island. These included harbor with a sand spit, shallow, open harbor, tidal stream, coastal lagoon, and coastal ponds. Multiple water exchange practices were evaluated on the waterbodies including environmental dredging, sand spit removal, pipe-and-pump, culvert or pipe with tidal flow, and tide gates.

The results of the study show that water exchange technologies are not effective in addressing water quality concerns in large waterbodies like most of Long Island's embayments. Often, the physical size of the water exchange practice is small compared to the large waterbodies to which they are applied, which means their impact is limited. Water exchange projects may be useful in improving water quality, however, for smaller Long Island waterbodies, where the volume of increased water exchange approaches the volume of the overall waterbody.

A handbook has been developed to help communities understand the study, its results and what needs to be looked at besides water quality when considering these types of projects. The handbook outlines topics such as cost, constructability, social acceptance, and environmental concerns beyond water quality, among other things. Visit the LINAP Embayment Water Exchange webpage here.

Last year, the DEC officially debuted a redesigned public website. The redesigned site offers a more responsive design and intuitive functionality, whether visitors are using a desktop, laptop, tablet, or handheld device. Since this transition, LINAP has been working to update our webpages and newsletter archive and we will continue to do so throughout the year. This updated platform acts as a centralized hub for essential LINAP information. We encourage you to check out the new links and share with your stakeholders! Visit the LINAP webpage here.

Long Island Regional Planning Council

It was an eventful year at the Long Island Regional Planning Council (LIRPC)!

One of the many highlights of 2023 was the launch of the Long Island Garden Rewards Program, a collaborative effort with the DEC and NEIWPCC. This program provides up to $500 to property owners to undertake small-scale water improvement projects on their properties, including rain garden installations, native plant plantings, and the use of rain barrels. The three eligible practices all play a key role in reducing stormwater runoff and fertilizer usage. Rain gardens reduce and treat runoff by slowing the flow and allowing water to percolate through the garden's root and soil. Rain barrels capture stormwater, reducing runoff, and promoting water conservation. Native plants require less fertilizer, and can treat stormwater as well through their long, deep root systems. This program encourages Long Islanders to take action on their property and protect Long Island waterbodies. The program launched in May and has provided more than 200 participants with grants!

Last year also marked four years of the LIRPC's long-term commitment to the Hempstead Bay Water Quality Monitoring Program. The program provides a comprehensive framework for monitoring, analyzing, and reporting water quality within Hempstead Bay and its tributaries. It also monitors atmospheric nitrogen deposition in the area which is linked to emissions from fossil fuel-based energy production, fertilizer usage, and transportation emissions. The scope of work includes additional monitoring sites than in previous years and all of the water quality data for Hempstead Bay from 1976 through today has been uploaded to the EPA Water Quality Exchange (WQX) database making it accessible to the public. The long-term nature of this monitoring work will advance our understanding of the impacts of severe storms, residential and commercial development, and climate change on our water resources. The long-term data collected serves as a valuable resource, advancing our comprehension of environmental impacts. A report on the water quality trends in Hempstead Bay from 1968 – 2022 was published last year, comparing past water quality data with new data collected under the Program. The 2023 data will be added in early 2024.

Nitrogen Smart Communities (NSC) is a program that encourages municipalities to take meaningful and effective actions to reduce, prevent, or eliminate nitrogen in Long Island's waters through community-specific plans of action. Participating municipalities earn tiered levels of certification by following a series of steps to identify and reduce pollution in degraded waterbodies and protect areas specific to their community before impairment occurs. The program will be piloted with two municipalities including one in Nassau County and one in Suffolk County. By becoming a NSC, municipalities will be investing in water quality protection

and economic growth while also improving the community's public health and safety. LIRPC has contracted with a consultant to assist the two initial municipalities in navigating through the pilot program in preparation for a full-scale launch.

The LIRPC partnered with the Town of Hempstead for the preparation of an aquaculture license/lease feasibility study for Hempstead Bay. The feasibility study, which began at the end of 2022, is near completion and will provide essential information needed by the Town to consider and adopt a lease/license program. Establishment of a properly planned and implemented aquaculture program will enable the Town to improve water quality, reduce nitrogen levels, and generate economic activity in marine related businesses.

Last year also marked the fifth year of the Long Island Water Quality STEM Challenge which promotes nitrogen related, project-based learning in Science, Technology, Engineering, and Mathematics (STEM) in Long Island schools. Student teams participating in the Challenge design green infrastructure projects aimed at addressing nitrogen pollution caused by stormwater runoff on their school grounds.

The 2023 Challenge winning proposals came from Plainedge Middle School, South Woods Middle School (Syosset School District), Sayville High School, and South Side High School (Rockville Center School District). Each school designed distinct projects: Plainedge Middle School will install a native plant garden and three lysimeters to monitor groundwater nitrogen levels, while South Woods Middle School is focusing on a low-input native plant garden, forming a gardening club, and raising community awareness about nitrogen pollution through curriculum integration. West Sayville High School will introduce a wood chip biochar filter to manage stormwater runoff, and South Side High School will implement a rain garden and permeable pavement to control runoff and filter pollutants. In recognition of their efforts, each team was awarded a $2,500 grant to execute their project.

Rich Guardino, LIPRC Executive Director, awards South Woods Middle School a grant for their winning project in 2023 Long Island Water Quality Challenge. Photo Credit: LIRPC

To read more about LIRPC's initiatives, check out our two newsletters from April 2023 (I & II).

Nassau County

Last year was a milestone year for Nassau County, achieving significant progress across multiple initiatives aimed at reducing nitrogen pollution and enhancing wastewater treatment systems. These efforts encompassed a range of resiliency and sustainability projects designed to enhance the water quality of the Western Bays.

The projects include the Bay Park Conveyance Project, which will convey treated wastewater from the improved South Shore Water Reclamation Facility (SSWRF), formerly known as Bay Park Sewage Treatment Plan, to the Cedar Creek Water Pollution Control Plant (WPCP) ocean outfall pipe. Over 80 percent of construction is already complete and is designed to divert up to 75 million gallons of treated wastewater per day, reducing nitrogen loading in Reynolds Channel and the Western Bays by up to 90 percent. The Bay Park Conveyance Project will foster ecological recovery and protect coastal communities.

Micro tunneling technique used to install piping for the Bay Park Conveyance Project. Photo credit Nassau County

The County is also working on the consolidation of the Long Beach Water Pollution Control Plant. The project includes converting the plant to a pump station and rerouting Long Beach's sewage to the SSWRF, where it will be treated to a higher standard through the new enhanced nitrogen removal processes Biological Nutrient Removal (BNR) and Sidestream Centrate. Since the implementation of BNR, the average nitrogen load went from 15,000 lbs/day to 11,534 lbs/day- a 23 percent reduction. Sidestream Centrate Treatment just recently began full scale implementation and is expected to bring the nitrogen load down to 8,700 lbs/day. Once the Bay Park Conveyance Project is operational the projected average is expected to go down to 1,650 lbs/day - this will be an 89 percent reduction in nitrogen overall!

Point Lookout is one of the few areas on Nassau County's south shore that remains unsewered, relying on outdated cesspools and septic systems. This year Nassau County hired a consulting

firm to complete a sewering feasibility study. If the study shows sewering is feasible, new era of public wastewater treatment for the 800 homes and businesses in Point Lookout will begin.

These strides signify the County's commitment to safeguarding our waters and ensuring a sustainable future for Nassau County.

Information on Nassau's septic replacement program is below in the Nassau Soil and Water Conservation District section. To learn more about Nassau County's nitrogen mitigation efforts, read the November 2023 newsletter here.

Suffolk County

It was another historic year for the County as great progress was made in the expansion of sewer systems through the Suffolk County Coastal Resiliency Initiative and with the assistance of federal, state, and town funding. The numerous sewering projects underway are poised to eliminate over 7,000 cesspools and septic systems, representing the largest expansion of sewer infrastructure in Suffolk County in nearly 50 years!

Groundbreaking in Central Islip. Photo Credit: Suffolk County

In areas where sewers aren't viable, the County's Septic Improvement Program offers grants to homeowners for Innovative Alternative Onsite Wastewater System (I/A OWTS) installations. In 2023, public interest in the program continued to remain exceptionally high with the County consistently receiving more than 70 applications per month. To date, the County has issued over 4,800 grants, underscoring the program's widespread impact and necessity within the community.

Last year also marked the successful completion of Phase 1 of the Subwatersheds Wastewater Plan (SWP), the County's parcel-specific roadmap for addressing the nitrogen crisis. It outlines a 50-year strategy to eliminate 299,000 septic systems through sewer connections or I/A OWTS.

Phase 1 saw the installations of thousands of I/A OWTS and the groundbreaking at several sewer expansion projects. Phase 2 begins in 2024 and aims to upgrade 35,000 parcels to sewers and 264,000 to I/A OWTS. The County is poised to make Phase 2 a success with ongoing efforts to streamline the grant application process.

For more information about Suffolk County's nitrogen mitigation efforts, read the November 2023 newsletter here.

**Please note there was an error in the November LINAP Newsletter. The Kings Park Sewer Project is to be connected to Sewer District No. 6.*

Center for Clean Water Technologies

The Center for Clean Water Technologies had a transformative year in 2023 particularly with advancements in the use of Nitrogen Removing Biofilters (NRBs). These filters, installed by the Center across Suffolk County and at the Shinnecock Nation, remove nitrogen and other pollutants from wastewater by nitrification in a sand bed followed by denitrification in an anoxic (oxygen free) sand/woodchip biofilter. The Center has developed three variations of NRBs: unlined, lined, and a nitrifying sand bed coupled with a saturated woodchip box. Recent testing revealed that the lined and woodchip box NRBs achieve 85 percent and 90 percent removal rates, respectively, of total organic nitrogen, outperforming the unlined version. The Center obtained provisional approval from the Suffolk County Department of Health Services for the lined systems in April and plans to train more engineers and contractors to implement them. Additionally, they're working on modifications to the unlined design to enhance its denitrification capabilities.

The Center also received funding to design and install constructed wetland wastewater treatment systems. These systems use recirculating gravel filters for nitrification, woodchip boxes for denitrification and plants for nutrient uptake. Installation has begun at three locations in Suffolk County and based on preliminary results, they are expected to produce final effluent with nitrogen levels well below the Article 19 thresholds of 19mg/l.

Innovation at the Center's Wastewater Research and Innovation Facility (WRIF) continued in 2023, including the installation and testing of the Flex Treat system designed to optimize nitrogen removal from wastewater. Flex Treat packages nitrification and denitrification into a compact, precast, concrete box which can be delivered and installed to residences in a short-time and allows flexibility to adjust wastewater loading rates, aeration, and wastewater recirculation. In August, the Center identified ways to make the system work even better while also reducing the costs of running and maintaining it. These systems continue to be tested to determine their effectiveness of reducing nitrogen.

The Center was also testing the use of permeable reactive barrier (PRB) to mitigate legacy nitrogen in groundwater. The Center's efforts involve testing a woodchip-based bulkhead PRB in Hampton Bays, intercepting nitrogen-contaminated groundwater heading towards Shinnecock Bay. This project is expected to eliminate over 1.5 metric tons of nitrogen over 20 years! Monitoring for the PRB continues.

This past year the Center also formed a new company, Verified Water, to initiate widespread commercial development of a nitrogen sensor which measures nitrate and ammonia in wastewater and final treated effluent. The company has begun installations for customers in Cape Cod and in Suffolk County.

To learn more about the Center for Clean Water Technology, read the January 2023 newsletter here.

Bioextraction Initiative

Now in its 5th year, the Nutrient Bioextraction Initiative continues to make great strides in improving the quality of marine waters in New York and Connecticut by researching how to remove excess nitrogen through the cultivation and harvest of seaweed and shellfish.

Economics have been a vital component of the Bioextraction Initiative from the start. To better understand the capacity of bioextraction as an industry, a Bioextraction Economic Feasibility/Market study is being conducted to determine the feasibility of commercial operations using seaweed and/or shellfish in the Long Island Sound for the purpose of bioextraction. The results of the study will make preliminary recommendations about the most economically viable species and markets for bioextraction. The results of Phase One of the study are expected in early 2024 and will make recommendations about Long Island seaweed and/or shellfish species, and uses for those species, that have the most potential to be profitable for a company to harvest and sell. A second phase of the study, slated to start soon after Phase One is completed, will provide more detailed economic and market information on the recommended markets and species. The study results will be made public and will be part of the effort to encourage a strong bioextraction industry on Long Island.

Sugar kelp, a locally sourced alternative to imported seaweed fertilizers, is being studied for its potential in aiding both Long Island's marine and agricultural industries. Pilot projects by Cornell Cooperative Extension of Suffolk County are converting locally grown sugar kelp into fertilizer amendments and testing their impact on crop growth. The study is in its final year and results are expected to be available in 2024. Data from Year 1 and Year 2 of the trial can be found in the NEIWPCC Resource Library.

Meanwhile, ribbed mussels, non-commercial due to taste, are being explored for their ability to extract nutrients from water, with ongoing research and development aimed at potential commercial use without disrupting their native habitats.

Ribbed mussel sample collection, September 2022, in Huntington Harbor. Photo Credit: Kristin Kraseski.

The Long Island Sound Study (LISS) Nutrient Bioextraction webpage continues to be updated. In 2024, it is anticipated that an interactive map showcasing ongoing and historical bioextraction projects within the Long Island Sound will go live. These additions will provide valuable insight into project focuses, involved organizations, and accessible final reports and papers, contributing to a richer understanding of bioextraction initiatives in the region.

To read more about Bioextraction initiatives, check out our two newsletters from June 2023 (I & II).

Nassau County Soil and Water Conservation District (NCSWCD)

Throughout 2023, NCSWCD's initiatives left a significant mark, showcasing a range of impactful initiatives. Notably, the District's administration of the Septic Environmental Program to Improve Cleanliness (S.E.P.T.I.C.) which has garnered over 540 applications to date, from residents seeking grants of up to $20,000 to replace failing septic systems with nitrogen-reducing Innovative and I/A OWTS. The District recently just reached the milestone of 100 IA installs! Recently more state funds were announced, providing the County with additional funds for 2024.

Continuing its support of stormwater reduction initiatives, this year the District helped revitalize neglected rain gardens at five different locations across Nassau County. These green infrastructure projects, utilizing native plants, filter polluted stormwater, benefiting the environment and reduced the need for fertilizers. Further, a collaboration with Friends of the Hempstead Plains led to the restoration of an additional raingarden at the Hempstead Plains Preserve, replanting over 300 native plants and replacing invasive species.

The NCSWCD works with the Friends of the Hempstead Plains to restore a raingarden at the Hempstead Plains Preserve on the campus of Nassau Community College which was predominately populated by invasive species. The District enlisted the help of Nassau's local Girl Scouts of America to replace the invasive species with over 300 native plants. Photo credit: NCSWCD.

Continuing their support, NCSWCD granted funding to the Town of North Hempstead for a second year, to facilitate rebates to homeowners for replacing lawn grass with native plant gardens or rain gardens. The program was able to provide rebates to 25 homeowners this year!

Arbor Day saw the annual sapling giveaway, distributing over 200 native saplings, bushes, and perennial flowers to the community, advocating for native plants and sustainable planting practices. NCSWCD's commitment extended to offering guidance on rain garden installations and soil testing to interested residents.

For more information about the District's initiatives, read the May 2023 newsletter here.

Suffolk County Soil and Water Conservation District (SCSWCD)

Throughout 2023, the Suffolk County Soil and Water Conservation District (SCSWCD) achieved remarkable progress. The Regional Conservation Partnership Program (RCPP) played a pivotal role in providing funding and technical guidance to farmers within the Peconic Estuary, facilitating the adoption of best management practices that reduce nitrogen impacts on both surface and groundwater. Additionally, the Soil Health Testing Program has supported over 140 growers in assessing and enhancing their fields' soil health, contributing to the preservation of over 750 acres of farmland.

This year the Soil Health Equipment Loan Program continued to aid multiple growers by providing access to specialized agricultural equipment. The equipment in the fleet is specifically designed to encourage soil Health Best Management Practices, such as no-till, spreading compost and mulch. By reducing tillage, soil structure is preserved, and soil disturbance is

minimized, which helps to retain nutrients in the soil and reduce nitrogen leaching into groundwater or runoff into surface water.

Photo Credit: LIRPC

The District continues to provide native plant technical assistance to Suffolk County property owners. Assistance on selecting appropriate species for specific site conditions, plant requirements/tolerances, and management goals for agricultural and habitat restoration practices can be provided. The District's commitment to promoting native plant assistance to property owners ensures the selection of suitable native plants, aiding in habitat restoration practices, and reducing dependency on fertilizers and irrigation while effectively filtering stormwater. If you are interested in receiving assistance, visit the District's technical assistance webpage here.

To read more about SCSWCD initiatives, read the May 2023 newsletter here.

South Shore Estuary Reserve (SSER)

In commemorating its 30th anniversary, the Long Island South Shore Estuary Reserve (SSER) proudly marked another year of concerted efforts toward water quality enhancement and habitat restoration.

In 2023, the SSER received unprecedented support with a historic $2 million allocation from the NYS Budget. The $2 million dollar appropriation will help to create a more resilient South Shore and advance implementation of priority activities identified in the Comprehensive Management Plan's (CMP), which was recently updated to prioritize nitrogen reduction and enhance the region's resilience. A strategic five-year action plan, jointly crafted with the USGS, is underway to identify specific short and long-term activities and prioritize actions identified in the CMP.

Key endeavors in 2023 included the Fire Island Wastewater Management Plan, that will provide decision makers with a detailed analysis of options for wastewater management across Fire

Island and the associated cost estimates. Currently, there is only one small sewage treatment plant that serves the Village of Ocean Beach, while the rest of Fire Island relies on antiquated septic and cesspool systems. These aging systems contribute to water quality impairments, harmful algal blooms, and loss of fisheries in the Great South Bay. The Fire Island Wastewater Management Plan is expected to be released in early 2024.

Additionally, the Blue Carbon Seagrass Restoration Project, a collaboration with Cornell Cooperative Extension of Suffolk County, continued to focus on re-establishing eelgrass to benefit marine life, stabilize coastlines, and sequester carbon. Two eelgrass restoration plantings were completed this past summer. The data being collected from sites throughout the SSER will be used to further identify potential successful restoration sites.

To read more about SSER initiatives, read the July 2023 newsletter here.

Peconic Estuary Partnership

The Peconic Estuary Partnership's (PEP) made significant progress on many nitrogen focused projects such as the Solute Transport Model, which was developed to better understand legacy nitrogen within the aquifer system. The Model is being used to run scenarios that will help decision makers understand how certain management actions might reduce nitrogen in groundwater that flows into marine waters. These results will help inform decisions about where and how nitrogen reduction efforts might be beneficial. It will also provide realistic expectations on when improvements might be seen, as the travel time of the groundwater in some areas is decades long. The model is expected to be released next year.

The Peconic Estuary Nitrogen Load Reduction Cost Assessment tool was developed to aid the Peconic Estuary Partnership and its stakeholders in achieving nitrogen load reductions to groundwater within the watershed. The tool determines the cost per pound of nitrogen reduction for a multitude of best management practices (BMPs) available in the Peconic Estuary Watershed. The BMPs take into account the geographical, environmental, and climate-based factors in eastern Suffolk County and have been carefully chosen to mitigate nitrogen from primary sources within the Peconic Estuary watershed.

PEP's outreach initiatives, notably with the https://reclaimourwater.info/Septic-Improvement-Programproved successful in 2023. To date, there are over 1,420 Innovative/Alternative Onsite Wastewater Treatment Systems (I/A OWTS) installed within the Peconic Estuary. Encouraged by this success, PEP continued its support by allocating $95,000 in funding to Suffolk County to aid low-income families in maintaining these crucial nitrogen-reducing systems.

This year also marked the second year of PEP funding for the Stony Brook University's School of Marine and Atmospheric Sciences Gobler Laboratory research on harmful algal blooms (HABs) in designated priority embayments. The study is analyzing three HABs (rust tide, mahogany tide, and toxic blue green algae) that recur annually across the Estuary. The goals are to assess how the changes in nutrients over time affect HABs within bloom prone regions, the ability of nitrogen and phosphorus to intensify HABs, and the levels of nutrient load reduction needed to lessen the intensity of these HABs. This cutting-edge research will identify specific nitrogen

reduction targets needed to prevent blooms of each of the three species of HABs being studied. The study is expected to be complete this year.

In 2022, the Cornell Cooperative Extension (CCE) of Suffolk County installed a carbon emulsion permeable reactive barrier (PRB) in Tanbark Creek to treat groundwater nitrate entering Three Mile Harbor. This year CCE has been monitoring the effectiveness of the PRB, this project will add to a repository of PRB performance data and inform several long-term goals for PRB implementation in the estuary.

To read more about PEP's initiatives, read the September 2023 newsletter.

Long Island Sound Study

Through comprehensive water quality monitoring, habitat restoration, pioneering research, and robust grant programs the Long Island Sound Study (LISS) has made significant strides this year in safeguarding and revitalizing the water quality of the Long Island Sound.

LISS is actively involved in various water quality monitoring programs. These programs, including ship-based monitoring, real-time buoy monitoring, citizen science initiatives and collaborations with the United States Geological Survey (USGS) for stream and river monitoring, significantly contribute to the understanding and management of the estuary's conditions. This year, to address coastal acidification, a growing concern linked to excess nitrogen, LISS initiated a robust long-term effort to monitor coastal acidification to understand its coastal implications on water quality, hypoxia, and climate change.

The Habitat Restoration Initiative aims to revitalize tidal wetlands along the Sound's shoreline, crucial for wildlife and flood protection. This year, LISS and DEC began efforts to restore Flax Pond in Old Field where sediment from the inlet will be removed to restore tidal flushing, mitigating possible hypoxic events and revitalizing the wetland back to its 1972 condition.

In response to declining eelgrass due in part to nitrogen pollution, a comprehensive Long Island Sound Eelgrass Management and Restoration Strategy was crafted. This strategy guides immediate actions and long-term plans. In the past year, progress was made on a web tool that helps show how water quality and climate affect eelgrass. This tool uses smart computer techniques to estimate where eelgrass is and how healthy it is by looking at satellite imagery. Eelgrass data layers are overlaid with bay-specific water and sediment quality parameters (such as temperature, water clarity, and sediment grain size) to better understand their impacts on eelgrass beds in each bay. The EPA is working with LISS partners to validate the web tool which is expected to be available next year.

Eelgrass Beds off Plum Island. Photo Credit: Long Island Sound Study

This year, the Long Island Sound Research Grant Program allocated a record-breaking $4.2 million across nine projects marking the largest research investment in LISS history. Noteworthy projects include using geohistorical data to understand nitrogen levels over decades, employing household surveys to predict and target nitrogen-reduction campaigns, and leveraging satellite data to monitor harmful algal blooms. Concurrently, LISS launched the Long Island Sound Community Impact Fund (LISCIF) to empower at-risk communities by offering support and technical assistance, fostering proposals that enhance Sound access while minimizing environmental risks. The Long Island Sound Futures Fund, an essential pillar since its inception in 2005, has contributed $97 million to conservation efforts, underscores the significant strides made in safeguarding the ecological integrity and sustainability of the Long Island Sound watershed. This year the LISFF will fund several projects including the installation of 4,200 square feet of raingardens in Northport Village and removing invasive plants and replacing them with native plants to improve 40 acres of coastal forest at West Meadow Beach in Stony Brook.

If you are interested in applying for LISS grants next year, start preparing now! Visit the LISS Grant webpage here for a list of all grant opportunities, application requirements, and deadlines.

To read more about LISS initiatives, check out our two newsletters from August 2023 (I & II).