Peconic Estuary Partnership

Fall Newsletter 2021

Photo Credit: Kaitlin Morris

What's Inside?

Adaptation and Resilience in a Changing Climate

Peconic Estuary Partnership is hard at work with local communities to lead scientifically informed, proactive adaptation efforts that can reduce the negative impacts of climate change on the Peconic Estuary and surrounding communities. In this issue, learn how climate change is projected to impact the Peconic Estuary and its watershed, and how PEP and partnering organizations are preparing to limit climate change impacts while fostering resilience on the East End.

Why Care About Climate Change?

Healthy aquatic systems provide many ecosystem services that directly benefit human health and local economies. To maintain these essential resources and services, we need to consider climate change as we adapt coastal planning strategies. If we do not prepare for the future, our ecosystems, communities, and economies can be unnecessarily damaged by the challenges of climate change. Below are some of the ecosystem services that the Peconic Estuary provides.

Protection: Healthy coastal ecosystems, including salt marshes and sand dunes, mitigate flooding by buffering coastlines from sea-level rise and storms. Salt marshes also reduce coastal flooding by re-absorbing excess water, preventing it from flooding roads and damaging homes.

Climate change mitigation: Marine ecosystems, such as marshes, actually help to sequester carbon dioxide by removing it from the atmosphere and storing it in the sediment and plant life. This carbon stored in healthy marshes and other marine ecosystems is called "blue carbon," and research shows that it may actually offer more carbon-storing benefits than terrestrial ecosystems.

Water quality: Healthy wetlands improve water quality by filtering pollutants and excess nutrients out of stormwater runoff before it enters our waters. However, diminished populations of filter feeding bivalves, such as mussels, clams, and oysters and the marsh grasses they depend on can negatively impact the water cleaning service that healthy and biodiverse marsh communities provide.

Photo Credit: Kaitlin Morris

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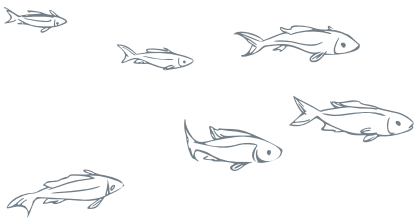


Fisheries: The Peconic Estuary's diverse assemblage of fish and invertebrates attracts many recreational anglers, sustains commercial fisheries and coastal economies, and provides a healthy and local source of nutrition. Increased stormwater runoff and other sources of pollution, Harmful Algal Blooms (HABs), and rising temperatures are just some of the impacts of climate change that can negatively impact local fisheries.

Tourism: The natural beauty of the Peconic Estuary and the land within its watershed attracts tourists from afar to enjoy the aesthetic beauty and a variety of recreational activities. Tourism supports a variety of local industries, including hospitality, recreation, fisheries, local businesses and non-profit organizations, and beyond. The loss of this revenue to the East End's tourist-driven economy due to declining ecosystem health would be a huge hit to our community.

Resilient Communities Prepared for Climate Change

The influence of climate change on the Peconic Estuary and the communities around it will grow profoundly far into the future. One of PEP's CCMP 2020 goals is to help local communities to take meaningful, well-informed action to prepare for and adapt to climate change impacts on the Peconic Estuary. Scientifically informed, proactive efforts can reduce the negative impacts of climate change on the estuary's delicate ecosystems and surrounding coastal communities, infrastructure, and economies. Learn more about how Peconic Estuary Partnership is working to address and adapt to climate change in our 2020 Comprehensive Conservation and Management Plan.

Projected changes in precipitation patterns, particularly increases in extreme rain events, will likely lead to greater runoff of nutrients, pathogens, and other pollutants from land into the Estuary and may also increase atmospheric deposition of pollutants. Rising sea levels are expected to result in increasingly frequent inundation of drinking water wells and septic systems on coastal properties, leading to more nitrogen and pathogens entering groundwater, surface waters, and the Estuary. In turn, greater nitrogen loading of the Peconic Estuary can be expected to result in more frequent harmful algal blooms (HABs), reduced water clarity, and a general degradation of coastal habitats. Excessive pathogens may lead to more frequent closures of bathing beaches and shellfish harvesting areas due to the risks to human health, while herbicides and pesticides are increasingly being linked to losses of important seagrasses and other marine habitats that serve as vital feeding and nursery areas for recreationally, commercially, and ecologically important fish species.

Peconic Estuary Partnership Staff monitoring salt marsh elevation, an indicator of sea level rise, at Indian Island County Park, Riverhead.

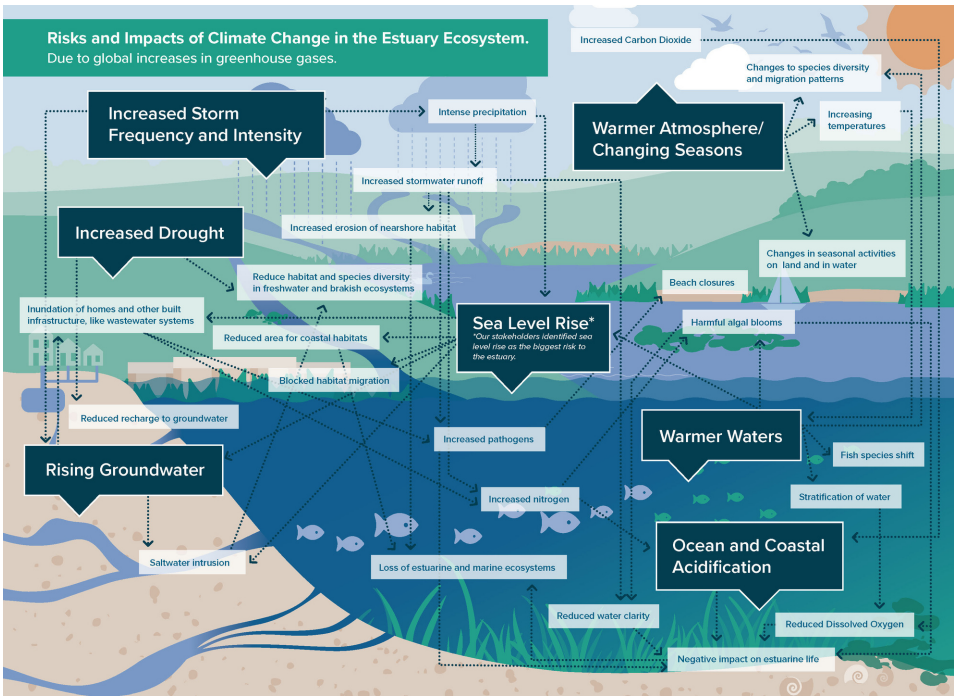
As temperatures increase, sea levels rise (SLR), and precipitation occurs with increasing intensity, estuarine species and habitats may shift geographically or adapt to the changed environmental conditions. Where there is significant coastal development and shoreline hardening through manmade structures like bulkheads and seawalls, important habitats such as salt marshes could be blocked from migrating landward and growing in elevation as sea levels rise. Changes in air and water temperatures may lead to shifts in the relative abundance of fish and other estuarine species, or alter their seasonal feeding, spawning, and migration patterns. Species once thought to be more southerly or warm-adapted may become more common, while those adapted to cooler climatic conditions may decline in our area. Ocean and coastal acidification due to increased atmospheric carbon dioxide could negatively affect shell-building creatures, local corals, and many other types of estuarine life. Changes in the abundance or health of prey species will lead to cascading effects on species dependent on them for nutrition. The dynamic nature of the Peconic Estuary's natural resources will require protection of critical habitats both where they exist today and where they may exist in the future.

Completed in 2019, the Peconic Estuary Partnership Climate Vulnerability Assessment and Action Plan, as well as other scientific resources, informed the CCMP 2020 development process and detailed the following information on climate change impacts. To read the full CCMP 2020, visit www.peconicestuary.org/ccmp2020.

Climate Change Impacts in the Peconic Estuary

Temperature: Conservative projections for the Long Island region include air temperature increases ranging from 3°F to 6.6°F by 2050, along with greater temperature variability, increased seasonality, and higher frequency of extreme temperature events. Ocean temperatures in our region are expected to rise between 4°F and 8°F over the next century.

Precipitation: While increases in annual precipitation are expected to be relatively minor, the amount of precipitation falling as part of an "extreme" precipitation event and the frequency of such events is expected to increase, an increase in total rainfall of 1% to13% by 2050—periods of drought are also expected to increase.



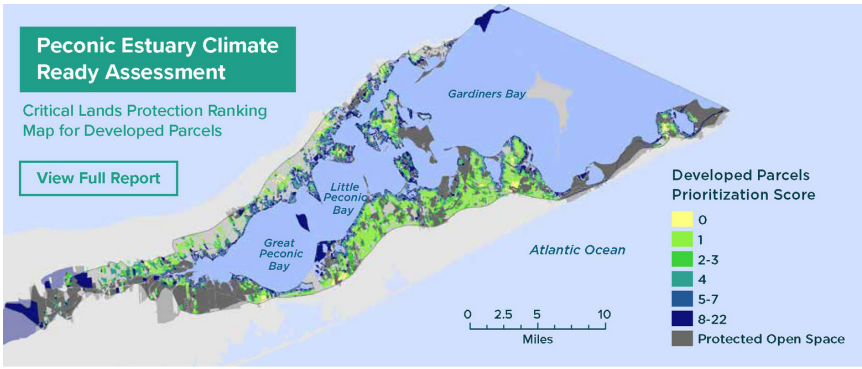
Sea Level Rise (SLR): Globally sea levels are rising in part due to expansion of oceanic waters as average temperatures increase and in part due to increased amounts of available freshwater from melting glaciers and land-based ice. Locally, sea level is expected to increase up to 8 inches by the 2020s, and up to 30 inches by the 2050s. Rising seas are likely to causes stresses on habitat, human populations, and natural resources.

Ocean Acidification: As an increasing amount of carbon dioxide (CO_2) accumulates in the atmosphere, there is a similar increase in the amount of CO_2 that is transmitted to the oceans. When CO_2 dissolves in salt water a series of chemical reactions take place that result in a decrease in the overall pH of the water, meaning that the water becomes more acidic. The process is called ocean acidification. The ocean pH is now lower than any time in the last 420,000 years and if current trends continue, the average pH of the oceans could drop by as much as 0.5 pH units relative to preindustrial levels.

Marine Habitats: Climate change is linked to the loss of wetlands, eelgrass beds, and other important marine habitats. Wetlands can migrate inshore gradually with rising water levels. However, the rate at which the sea-level is rising is making it difficult for wetlands to migrate fast enough. Additionally, areas with significant coastal development and shoreline hardening prevent coastal habitats from migrating landwards as sea level rises. Because of their ability to absorb storm energy, wetlands are increasingly seen as a first line of defense against storm surge, adding to their value in land preservation.

Water Quality & Watershed: The Peconic Estuary's surface waters support valuable habitat, recreation, and fisheries. Groundwater is the primary source of drinking water for the surrounding communities and freshwater for the watershed's river, ponds, wetlands, and the Estuary itself. It also maintains the estuary's saline balance. The watershed's surface water and groundwater, which are monitored and protected closely, face numerous pressures. Nutrients in groundwater (primarily from septic systems); contaminated runoff from impervious surfaces, lawns, agricultural areas, and golf courses; and atmospheric deposition of nitrogen have affected the Peconic Estuary's water quality. Changes in precipitation patterns will likely lead to increased land based runoff of nutrients, herbicides, and pesticides and may also lead to increased atmospheric deposition. Additionally, increases in sea level will likely result in regular inundation of septic systems in coastal communities, either through regular tide cycles or elevation of groundwater level. This will lead to increases in the amount of nitrogen and pathogens transmitted directly to estuarine waters.

How is PEP Preparing for Climate Change?



Scientifically informed, proactive efforts can reduce the negative impacts of climate change in resource management and conservation. In 2016, PEP embarked on a **Climate Ready Assessment (CRA) Project** to incorporate climate change into an updated Critical Lands Protection Strategy (CLPS), to conduct a risk-based climate change vulnerability assessment, and to develop an adaptation action plan consistent with USEPA's Climate Ready Estuaries Program.

PEP's **Climate-Based Critical Lands Protection Strategy Criteria and Ranking Tool** was developed with assistance from Anchor QEA, LLC. to help decision makers not only determine which lands were highest priorities for acquisition, but also to evaluate which adaptation strategy is most appropriate by taking into consideration each region's vulnerability to future sea level rise, storm inundation, and erosion. Visit the PEP website to learn more about the Interactive CLPS Criteria and Ranking Tool and to use the tool to identify land priorities and next actions to take.

In 2019, a **Climate Ready Action Plan** was developed to guide municipalities and resource managers in the Peconic Estuary and the Shinnecock Indian Nation to adapt to the impacts of climate change through the prioritization of climate change risks and vulnerabilities. Final reports and updates are available on the PEP website and include the updated Critical Lands Protection Strategy (CLPS) and the assessment of climate change vulnerabilities for both the Peconic Estuary Partnership and Shinnecock Indian Nation.

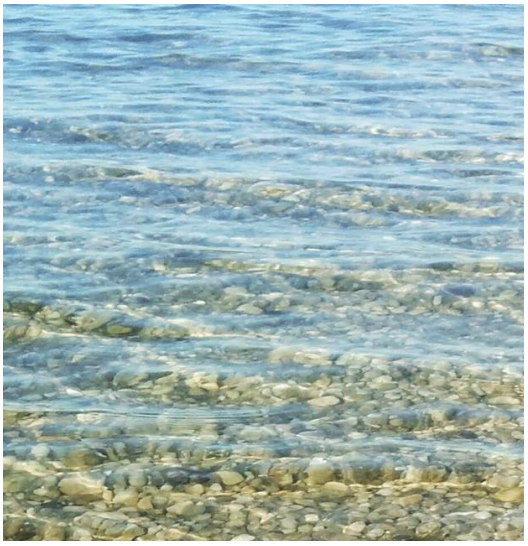
The Town of Southold Living Shoreline Demonstration Project: Faced with projected rising sea levels and heightened storm activity due to climate change, the Town of Southold wanted to provide its residents with an example of an environmentally-conscious alternative to shoreline hardening for residential property protection. PEP has been hard at work towards this effort in collaboration with the Town of Southold, Suffolk County, and Cornell Cooperative Extension (CCE), with funding from the USEPA, The Suffolk County Water Quality Protection and Restoration Program, and the Town of Southold, to create a living shoreline demonstration at The Suffolk County Marine Environmental Learning Center (SCMELC) in Southold, New York

This project incorporates Spartina alterniflora and ribbed mussels to create a living buffer against waves and storm damage while also providing important marsh habitat and pathogen and nitrogen mitigation. This shoreline is currently being evaluated for its ability to not only provide storm resilience and coastal habitat, but also for the shoreline's effectiveness in reducing nitrogen and pathogen inputs to the Peconic Estuary. To read more about the Town of Southold Living Shoreline Demonstration Project, visit the PEP website.

Photo Credit: Kaitlin Morris

Harmful Algal Blooms In the Peconics

Harmful algal blooms (HABs) have plagued the Peconic Estuary since at least the mid 1980's, and the brown tide that occurred then was a primary reason for the creation of the Peconic Estuary Partnership. Although the brown tides of decades past were once dominant, other HABs have become increasingly prevalent in recent years. The Peconic Estuary experiences numerous HABs annually, sometimes reaching record concentrations.



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Some HABs produce toxins that can cause severe illness or death in humans, wildlife, or fish, limiting recreational activities and making seafood from the area unsafe for human consumption. Other HABs do not pose a direct threat to human or animal health, but do lead to poor water quality, low dissolved oxygen levels, and foul odors.

For many HABs, the driver is related to nutrient pollution. For that reason, efforts to reduce HABs are intertwined with efforts to lower nutrients in our waterways. Other HABs are driven, in part, by warming waters as a result of climate change, and some are brought by offshore currents. Extensive work has been carried out by Stony Brook University in the Peconic watershed to understand these variations. Researchers at Stony Brook University, in conjunction with The Nature Conservancy, track HABs in the Peconic Estuary on a yearly basis.

In New York State, nitrogen has been established as the leading nutrient pollutant in coastal waters by both NYSDEC's Long Island Nitrogen Action Plan (LINAP) and Suffolk County's Subwatersheds Wastewater Plan. Groundwater that seeps into the Peconic Estuary can carry high loads of nitrogen arising from insufficient wastewater treatment and/or excess fertilizer, and wastewater has been established as the most significant land-based contributor of nutrients to the Peconic Estuary. Much of the nitrogen pollution has been linked to unsewered areas, specifically properties that use outdated septic systems, also known as Onsite Wastewater Treatment Systems (OWTS), which have limited ability to reduce the amount of nitrogen in wastewater.

Unlike most of the country, many homes on Long Island still use cesspools to handle waste. This is a cesspool at a home in Mattituck, NY that was originally built in 1940. At the time this picture was taken it was still being used by the homeowner although, like all the other cesspools, it did not treat the waste to prevent high levels of nitrogen from entering the groundwater.

The **Suffolk County Reclaim Our Water Initiative** provides increased protection of water resources. Suffolk County has taken action to protect water resources by making changes to the Suffolk County Sanitary Code to allow for the use of Innovative Alternative Onsite Wastewater Treatment Systems (I/A OWTS) to effectively treat wastewater. A number of I/A OWTS technologies are being evaluated to determine which ones will be most effective in areas throughout the county. Suffolk County is providing grants and low-interest financing to make the installation of new nitrogen reducing septic systems affordable for homeowners through the **Septic Improvement Program.** Learn more about HABs and PEP's efforts to protect our water quality in the CCMP 2020.

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PEP's Recent Nitrogen-Reduction Projects

Peconic Estuary Solute Transport Model

In 2017, Suffolk County launched their ambitious Subwatersheds Wastewater Plan to combat nitrogen loading. A comprehensive understanding of past nutrient loads within the estuary is essential, and the USGS, with PEP-designated NYS funding, is developing a solute transport model in the watershed. Understanding groundwater pathways and travel times is key to highlighting priority areas and creating strategies for the reduction of historical loads.

Contracting with United States Geological Survey, this Solute Transport Model will be a tool to estimate time-varying nitrogen loading rates to the Peconic Estuary resulting from wastewater and fertilizer inputs to the groundwater. The Model will be used to simulate the response of loading rates to the estuary due to possible wastewater and fertilizer-management actions. Currently the project is in the final model development phase and scenario finalization stage. Anticipated completion is for late 2021. Learn more about the Peconic Estuary Solute Transport Model on the PEP website.

The Long Island Nitrogen Action Plan

The Long Island Nitrogen Action Plan (LINAP) is a collaborative multiyear initiative to reduce nitrogen in Long Island's surface and ground waters by DEC, the Long Island Regional Planning Council (LIRPC), and Suffolk and Nassau counties, with input from multiple partners and stakeholders.

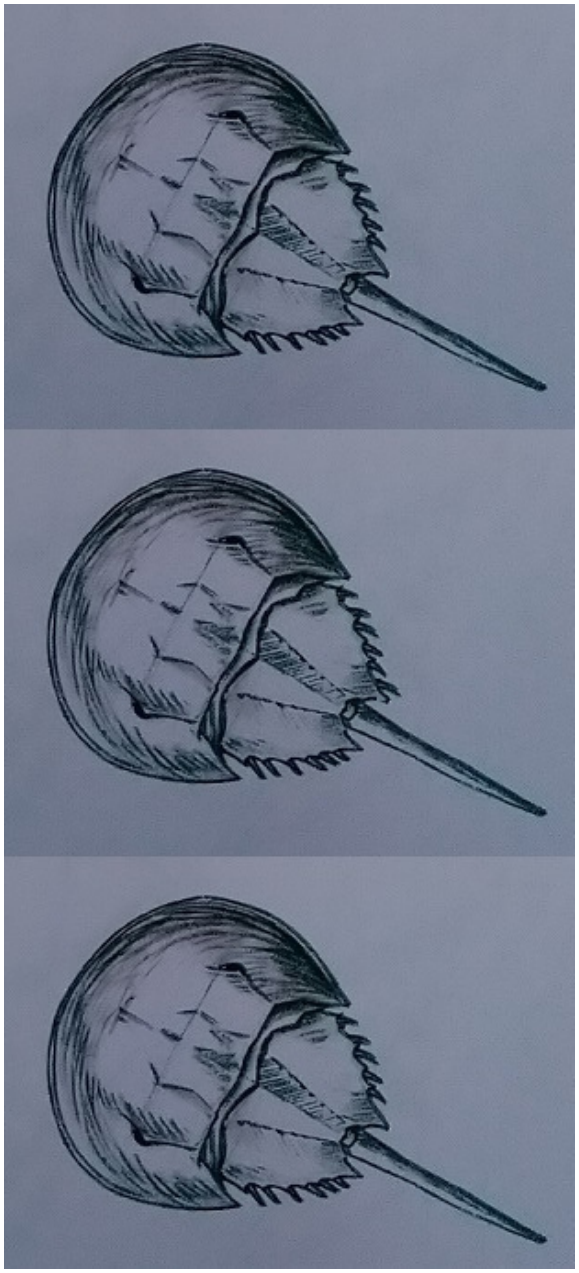
PEP is committed to working with our partners to achieve the goals of LINAP through our nitrogen-reduction reduction and by educating the public and our stakeholders on the importance and relevance of LINAP to the health of the estuary. Learn more about LINAP here.

To learn more about these and PEP's other water quality improvement projects, visit our website and read about our latest efforts in PEP's CCMP 2020.

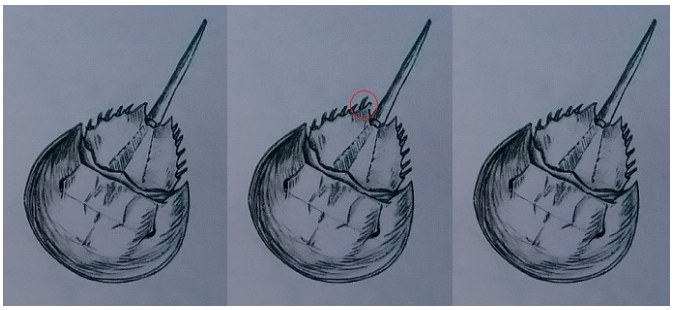
How You Can Help

- Upgrade your septic system! Visit Suffolk County Reclaim Our Water Initiative's website for details and for grant eligibility requirements.
- Participate in the Citizens Advisory Committee (CAC) to learn more about nitrogen inputs and other issues facing the Peconic Estuary and to participate in upcoming discussions about PEP's projects. Visit our website for more information!
- Start a native plant rain garden, install a rain barrel, or use the guides on our website to design a Peconic-friendly yard! Our Homeowners Rewards Program offer participants reimbursement for eligible projects. Visit our website for details!

One of these Horseshoe Crabs is Not Like the Others! Can you Spot the Difference?



Answer Key



For more activities and resources for educators, go to our website here: https://www.peconicestuary.org/what-you-can-do/education-and-outreach-programs/resources-for-educators/

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