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**A natural solution for NJ's coastal storm  
protection? Think of Oyster Reefs**





*By JoAnne Castagna, Ed.D.*

Before the 20<sup>th</sup> century, when people thought of the Port of New York and New Jersey, they thought of oysters and eating these succulent shellfish. They were so abundant that the rich and poor ate them, two islands in the Port were named after them, and the streets were paved with their shells. Some biologists estimate that the harbor contained half of the world's oysters," according to the blog *History on the Half-Shell: The Story of New York City and Its Oysters* published by the New York Public Library.

This isn't the case anymore because of pollution and over harvesting, but people may think of the oyster again for an entirely different reason.

The U.S. Army Corps of Engineers, New York District with partnering agencies is creating an oyster reef in the Port, just off the coast of New Jersey that will help to revive the oyster population and most importantly help reduce coastal flooding that's been a major problem in recent years.

The Army Corps has incorporated natural and nature-based features in the past as a coastal risk management alternative, but due the increased interest in coastal resiliency and sustainability, features such as oyster reefs are becoming more popular.

On Earth Day in April 2022, U.S. President Joe Biden issued Executive Order 14072: *Strengthening the Nation's Forests, Communities, and Local Economies*, which directs to take multiple actions designed to tackle the climate crisis, make our nation more resilient to extreme weather, and strengthen local economies, including focusing considerable attention and federal effort on nature-based solutions.





The Army Corps is acting on this. In fact, it recently released a set of guidelines on how



The Army Corps is acting on this. In fact, it recently released a set of guidelines on how to do this. The award-winning guide called, “*International Guidelines on Natural and Nature-Based Features for Flood Risk Management*” involved 5 years of collaboration with scientist and engineers from around the world and is one of the first guidelines of its kind.

Dr. Todd Bridges, who worked on these guidelines and who is now retired, headed the U.S. Army Corps of Engineer’s Engineering With Nature initiative said, “Conventional and nature-based engineering features can be used together in projects to provide storm risk reduction, maintain wildlife habitats, provide recreational space, and maintain the natural resources cherished by so many.”

Natural and nature-based engineering features are landscape features used in combination with conventional engineering features. Natural features occur naturally in the landscape and Nature-based features are engineered, constructed, or restored to mimic natural conditions.

Examples of these features include beaches and dunes; vegetated environments, such as maritime forests, salt marshes, freshwater wetlands, fluvial flood plains, barrier islands, seagrass, and coral and oyster reefs.

Bridges added, “By combining something natural and nature-based with something conventional, we make the system better overall. This is nature supporting engineering and engineering supporting nature. He said for example, when a concrete flood wall is designed to include an expansive reef and marsh in front of it, the wall provides flood protection benefits during storms while the reef and marsh system reduce the power of waves, can grow with sea level rise, captures carbon, improves water quality, and provides recreational opportunity. The combination is better than either of them apart.

These International Guidelines are being used by engineers inside and outside the Army Corps including those with the Army Corp’s New York District that’s using them in its Hudson-Raritan Estuary New York and New Jersey Ecosystem Restoration Project.

The Hudson-Raritan Estuary is located within the boundaries of the Port District of New York and New Jersey and is situated within a 25-mile radius of the Statue of Liberty



National Monument.



Exposed oyster reefs in Virginia's Elizabeth River serve as a breakwater to prevent shoreline erosion.

An estuary is a partially enclosed, coastal water body where freshwater from rivers and streams mixes with salt water from the ocean. Estuaries can include a variety of



habitats including salt marshes, mangrove or maritime forests, mud flats, tidal streams, rocky intertidal shores, reefs, and barrier beaches.

The Hudson Raritan Estuary is a complex ecological system located within a highly urbanized region of 20 million people that includes the New York Harbor, rivers, wetlands, coastlines, and open waters.

Over the years, industrialization has degraded the estuary and hardened the coastlines resulting in the tremendous loss of habitat. The estuary has lost more than 85% of its tidal wetlands, 99% of its freshwater wetlands, and 100% of its oyster reefs.

Restoring the estuary is important because the ecosystem provides habitat for birds, fish, shellfish, and other wildlife, maintains water quality by filtering out contaminated sediments, provides recreational opportunities, boosts the region's economy, and acts as a buffer from flooding for coastal communities during destructive and powerful storms.

Lisa Baron, project manager, New York District, U.S. Army Corps of Engineers said, "The plan for the Hudson Estuary Program is to restore a mosaic of 621 acres of habitat at 20

individual project sites. These projects will restore estuarine and freshwater wetlands, shorelines, fish passage, oyster reefs, shallow water habitat, coastal forests and marsh islands while providing maximum ecological and societal benefits to the region.”

Work is starting up on several of these restoration sites and one of them is using oyster reefs to serve as a natural and nature-based feature for coastal resilience.

According to the International Guidelines, coral and shellfish reefs can act as the first line of defense against flooding, storm damage, and erosion in coastal areas. Reefs do this by buffering wave energy. Reefs also provide additional benefits, including fisheries production, habitat and biodiversity, recreation, and tourism and revenue.

Unfortunately, in the Hudson-Raritan Estuary, oyster populations are practically extinct. Up until the late 1800s, the bottom of the estuary was blanketed with oysters. The eastern oyster populated 200,000 acres of the estuary and today it’s considered ecologically extinct, primarily caused by water pollution, dredging, poor land management, and overharvesting.

The Army Corps in collaboration with the U.S. Navy, New Jersey Department of Environmental Protection and the NY/NJ Baykeeper is aiming to reintroduce the oyster back with the Oyster Restoration at Naval Weapons Station Earle Project in New Jersey.

Naval Weapons Station Earle is a secluded Naval location on the coast of New Jersey, on the Raritan Bay. The plan is to expand a .25-acre oyster reef constructed by the NY/NJ Baykeeper to create a 10-acre oyster reef habitat under the station's 2.9-mile pier that is close to the land and away from naval ship activity.

Stacey MacEwan, project manager, New Jersey Department of Environmental Protection, Office of Natural Resource Restoration said, "Oysters bring a range of benefits to the estuary. Oysters improve water quality through filtration processes, but the reef itself provides a vertical structure that supports a diverse community of fish and invertebrate species, and the reef structure can also help to protect the shoreline from erosion. This type of project can provide large-scale benefits in a relatively small footprint."

Meredith Comi, coastal restoration program director with the NY/NJ Baykeeper agreed,



Meredith Comi, coastal restoration program director with the NY/NJ Baykeeper agreed, “Knowing that protecting our shorelines is leading to an increase in species diversity is very cool and is even more of a reason to use natural and nature-based features in resilience projects.”

With increased use of natural and nature-based engineering features in the future, people will again think of the oyster when they think of the Port of New York and New Jersey, not only as a culinary delight, but a tool for improving the port’s habitat, water quality, economy, and most importantly reducing coastal flooding in New Jersey.

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