Members of the American Venice Civic Association, representing 1,300 homes on the border of Lindenhurst and Copiague, New York in the heart of Long Island's southern coast, approached AGU's Thriving Earth Exchange about mitigating storm-related and seasonal coastal vulnerabilities in the wake of 2012's Superstorm Sandy. Image via Google Maps.

Creating a living shoreline for community resilience

AGU's Thriving Earth Exchange helps American Venice preserve and persevere amid changing conditions

Coastal communities along the Atlantic seaboard have experienced a range of hardships in the last two decades connected to routine and evermore destructive major weather events. The eight million residents of Long Island, extending 118 miles due east of New York City's five boroughs, struggled after Superstorm Sandy destroyed upwards of 100,000 homes in 2012. In the aftermath, municipal authorities and property owners alike raised new and urgent questions about changing expectations for future events. How much higher could flood waters get? Could infrastructure be reliable for families fleeing inland or rescue crews pushing out towards the danger? Ultimately, what could it mean to live in a resilient coastal zone fated to increasingly more violent weather events but determined to thrive regardless?

In 2020, Michele Insigna, Kathy Gullo, and John Vogt—all members of the American Venice Civic Association, representing 1,300 homes on the border of Lindenhurst and Copiague, New York in the heart of Long Island's southern coast—approached AGU's Thriving Earth Exchange with the challenge of increasing vulnerability and finding a way to mitigate it. The devastation of Superstorm Sandy in 2012 remains a benchmark for what's possible, and more recent events remain annual precursors to the next "big one," such as Hurricane Ida, which famously forced the New York Subway to shut down in 2021, or Tropical Storm Isias, which left 2.5 million people without power on Long Island in 2020. Yet, what some call "sunny day flooding" also present annual threats to area residents especially during spring tide, and increasingly with normal high tides. As the project team points out, it's not just property damage and halted traffic that minor flooding spurs. It's also the movement of loose sediment like cobbles and sand up and down the coast, eroding one area and being deposited in other areas. Normally, this has been addressed with bulkheads, such as walls and piers, as well as dredging, but these remain proverbial bandages that provide no long-term mitigation.

The project team—which expanded to include Kathleen Fallon, a Marine Coastal Processes and Hazards

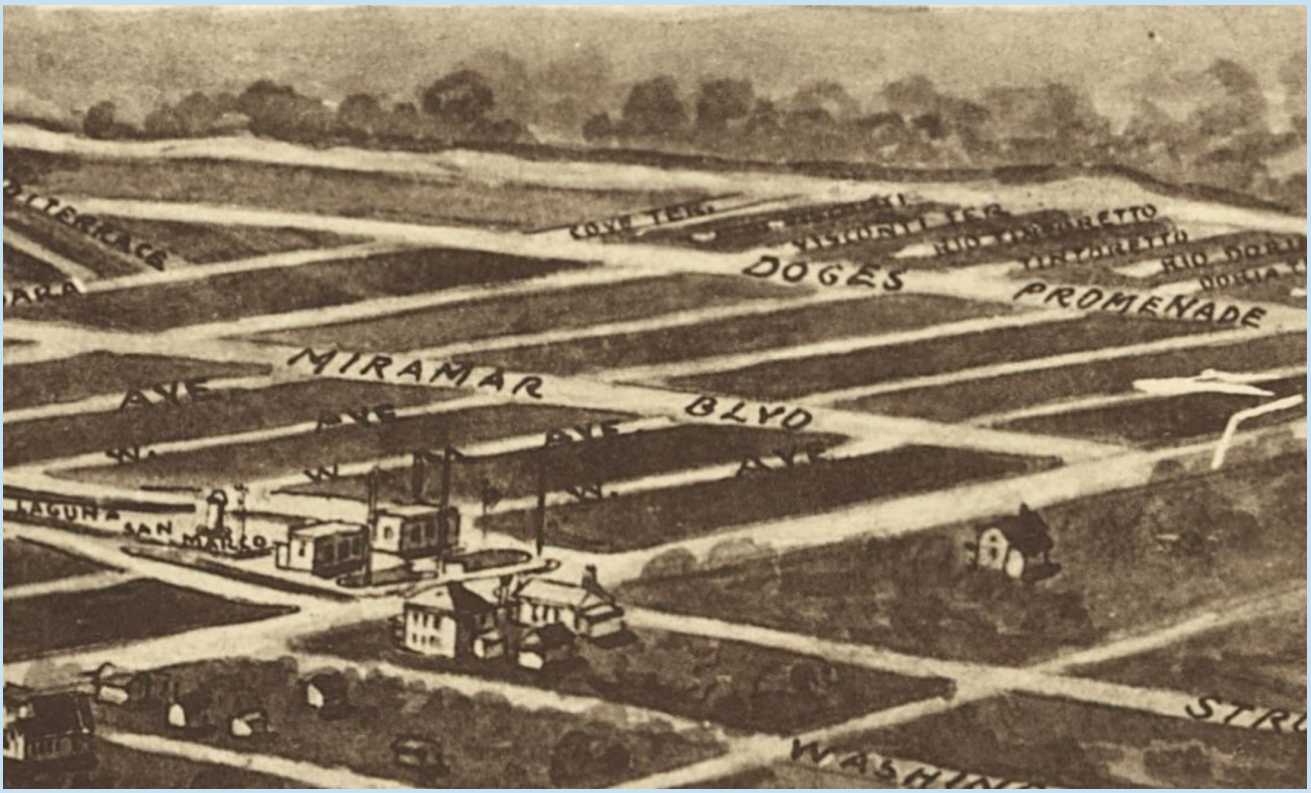
"American Venice" is the legacy of a 1926 real estate development project that, today, borders Lindenhurst and Copiague. The plan, which can be discerned in the upper register of famed panorama mapmaker Renê Cinquin's 1926 "Aero-View of Lindenhurst" called for multiple canals with public promenades and Italianate-style single family homes. Courtesy Library of Congress.

Specialist (with New York Sea Grant and resident of Lindenhurst), who served as a community sci-entist for the group—identified what they call a "nature-based" solution to build community resilience. They intend to create a
"living" shoreline, which would consist of a wetland habitat that could absorb and slow surges caused by storms and hurricanes. The scheme would also preserve local Indian Island as a nursery and sanc-tuary and, as an effect of its implementation, remove shoreline bulkheads that redirect surging tides rather than absorbing them.

"The community leaders had a vision, but they were also open to new ideas and very environmentally focused" says Fallon, who provided technical expertise for the living shoreline scheme. "I always applauded them for thinking about shoreline management techniques as pro-gressively as they did."

Living shorelines are hybrid shoreline management techniques which utilize natural and nature-based features to stabilize the shoreline. They extend dozens of feet or even hundreds of feet into the ocean. Marshes trap sediment from tidal waters and, along with oyster reefs, act as nat-ural barriers to waves, according to the National Oceanic and Atmospheric Administration (NOAA), which says that a mere 15 feet of marsh extending out to sea can absorb up to 50% of incoming wave energy. Additionally, living shorelines increase biodiversity, purify its waters, and sequester carbon dioxide in the atmosphere. Referencing materials produced by the US Army Corps of Engineers, NOAA reckons it can cost as little as $1,000 per linear foot to create a living shoreline and as little as $100 per linear foot to maintain it each year.

"We're still learning about what works and what doesn't here on Long Island, but a living shoreline doesn't look like one thing—there can be lots of types," says Fallon, who cites communities along Maryland's Chesapeake Bay that have been working on implementing living shore-lines for several years now. "I think we need to explore the definition of living shoreline as it pertains to each of



Although the Great Depression effectively killed the scheme for a unified "Venice," infill by the 1950s and 1960s created an eclectic community that maintains the place-names like Doges, Miramar, and San Marco (seen in this detail from Cinquin's panorama), as well as the urban plan of the original development. Courtesy Library of Congress.

Coastal communities along the Atlantic seaboard have experienced a range of hardships in the last two decades connected to routine and evermore destructive major weather events. The eight million residents of Long Island extending 118 miles end to end, including Babylon, New York, struggled after Superstorm Sandy destroyed upwards of 100,000 homes in 2012.

our communities, which we were able to do through this Thriving Earth Exchange project."

At Lindenhurst and in dozens of communities around the country, AGU's Thriving Earth Exchange serves as a connector and facilitator to bring together communities who have self-identified concerns, fellows who organize and administer community-based projects that address those concerns, and experts who can address the specific scientific issues that come to bear on the projects. The Thriving Earth Exchange trains and convenes fellows during the course of their projects, offers limited monetary support, and provides opportunities for fellows to create awareness of the scientific challenges that projects raise and, ideally, help solve, as well as opportunities for fellows to share their work.

Creating a New Venice

Although cities named Venice in California and Florida are arguably the best known tributes to their Italian progenitor, the southern shore of Long Island boasts a version that might hold the key to understanding how communities implement local coastal resilience initiatives. Situated 36 miles east of Manhattan, the Town of Babylon is well positioned on both a rail line and Montauk Highway, one of the original east-west roads of Long Island bisecting Suffolk County, making it among the oldest satellite

The draw for prospective buyers in 1926 included an ersatz Piazzetta di San Marco, complete with a replica of St. Mark's lions that, in their original context 4,100 miles away, guard the Doge's Palace and Sansovino's Biblioteca. The sentinel lions remain today as vestiges in an alien marina landscape and beloved symbols of the community's identity. Courtesy Preservation Long Island.

communities of the metropolitan area—not to mention one of the most popular resort areas of the 19th century. Suffolk County's growth overall has not abated since the first census in 1790, and although some decades have seen greater growth than others, train and auto travel drove an 83% increase in residents in the years between World War I and World War II.

Sensing an opportunity, real estate developers Victor Pisani and Isaac Meister purchased land in 1926 in a newly incorporated section of Babylon called Lindenhurst to create what would be known as "American Venice." The draw for prospective buyers? Glistening canals lined by new homes, stately bridges, and an ersatz Piazzetta di San Marco, complete with a replica of St. Mark's lions that, in their original context 4,100 miles away, guard the Doge's Palace and Sansovino's Biblioteca. In 1988, *The New York Times* interviewed long-time resident Louis Steinbrecher, whose parents bought property from Meister Builders in 1926 and reported that Pisani and Meister's agents distributed railroad tickets all over Brooklyn and Queens to prospective buyers, inviting them out for a weekend visit. "On the corner next to where the Venice Marina is today,'' Steinbrecher told the *Times*, ''they had a really big tent and all the kids got sandwiches, soda and ice cream while their parents were being shown around," adding, "And, they had gondolas here. I think they even imported some guy from Italy to take prospective property owners for a ride."

The Great Depression bankrupted Pisani and Meister a few years later, who never managed to construct more than a few scattered houses in the Italianate style. Their departure also meant an abandonment of the original development scheme that included dozens more canals than the few that were realized, as well as dedicated waterfront promenades eventually forsaken by waterfront property development. It wasn't until nearly 25 years later that the area began to fill in, tracking with a post-war population boom in Suffolk County between 1950 and 1960 that increased the number of new residents by 141%. Although the housing stock built after the 1950s was an eclectic mix of styles, "American Venice" survives as a series of canals, two restored bridges, street names like Lido, Miramar, and Doges, and the sentinel lions that graced nearly all 1920s-vintage postcards—now officially bordering the census designated place Copiague and the Village of Lindenhurst.

When Superstorm Sandy swept through the area in 2012, the charm of a themed real estate development and the resilience of an accretive community that had grown around it was tested like other coastal towns along Long Island's southern shores. But, American Venice could be a pioneer on Long Island at the intersection of shoreline resilience and historic preservation. By pushing out beyond the shoreline, the project team reckons they can create a layered and absorbent barrier mostly centered on the existing 87-acre Indian Island, owned by Suffolk County and composed of material dredged from American Venice's canals. Native plantings (and a kayak launch) would define the inner ring of protection, followed by rocks, followed by deep oyster beds—all cosseted by rock jetties on either side. A gentle slope from land to water means waterfowl can also easily access vital feeding grounds as part of the existing 40-acre bird sanctuary on the artificial island.

The irony of a community's salvation because of a marshland's initial destruction wasn't lost on Mary Cascone, the Town Historian of Babylon. "[Indian Island] is adjacent to an area nationally famous for the flamboyant speculation which brought about its development," she told the *Copiague News* in 2017. "Old time residents recall…when prospective clients were taken by salesmen in gondolas to see the marshland."

Still, it's not the irony that matters. It's the future fortunes of an established community and its vibrant coastal habitat that's at stake—and the next "big one" is not just their concern, but the concern of millions of Americans who live along the broader regional coastline from Cape May, New Jersey, to Watch Hill, Rhode Island.

To that end, the potential audience for this Thriving Earth Exchange project is much broader than shoreline managers (or even public officials), says its community scientist Kathleen Fallon, citing how much of the coast of Long Island is privatized, meaning there a lot of property owners who might want to learn more about resilience and environmentally sensitive ways of mitigating the effects of sea level rise and increasingly intense weather events.

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"When you're thinking of building on the shoreline, there are lots of people involved—not just the people with the good ideas," says Fallon. "Who owns the property? Who will maintain the living shoreline? What's allowable to build? What permits do you need from federal, state, and local jurisdictions? We had to wade through all of those issues on the project team—and we know it will eventually pay off when we start implementing these changes to improve the resilience of this particular community."

"Designing a living shoreline to mitigate flooding and increase community resilience," is a project of AGU's Thriving Earth Exchange, which advances community solutions to some of the most vexing environmental challenges. Thriving Earth Exchange helps scientists, community leads and sponsors work together to conserve natural resources, mitigate climate change and create awareness of natural hazards and their impacts on communities.

Learn more at thrivingearthexchange.

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Lindenhurst, NY