CASE STUDY: HARLEM RIVER PARK

OVERVIEW

Side by side with traditional steel sheeting, concrete walls and riprap, this narrow 20-acre park sandwiched between Harlem River Parkway and the Harlem River features porous alternatives to standard hard waterfront infrastructure. Porous seawalls are composed of stacked greenwalls and flexible gabions, and tide pools and native vegetation are integrated within the parks infrastructure. In addition to providing a more functional, absorbent floodplain, the project also improves public access, nearshore and upland habitat and provides a vehicle for community-based arts and cultural expression.

LOCATION & ACCESS

Manhattan, New York City, New York, located along the Harlem River between 132nd and 145th Streets. This site is publicly accessible.

PARTICIPANTS

Owner: New York City Department of Parks & Recreation
Manager: New York City Department of Parks & Recreation
Capital Funding: New York City Department of Parks & Recreation, New York City Economic Development Corporation, NYC Mayoral Budget, and New York State Department of State (DOS).
Design: New York City Department of Parks & Recreation (landscape architects Emmanuel Thingue, Ricardo Hinkle and Marcha Johnson, Dewberry Engineers); and NYC Economic Development Corporation (landscape architect Greg Hoer with Parsons Brinkerhoff).

HUDSON RIVER SUSTAINABLE SHORELINES

The Hudson River Sustainable Shorelines Project is a multi-year effort lead by the New York State Department of Environmental Conservation Hudson River National Estuarine Research Reserve, in cooperation with the Greenway Conservancy for the Hudson River Valley.

The Project is supported by NOAA through the National Estuarine Research Reserve System Science Collaborative.

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Community/Brainstorm Partners: Carter Craft of Metropolitan Waterfront Alliance, Richard Toussaint of Harlem River Park Task Force, Environmental artists Jackie Brookner, Terry Boddie and Michael Lee Poy, Marine Engineer Tom Herrington and colleagues from Stevens Institute, Marine Biologist and Michael Judge Architect Michael Fishman.

Contractor(s): Phoenix Marine Company

Cost: 14.3 billion (Phases 2 &3)

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Website: http://www.harlemriverpark.com/ http://www.nycgovparks.org/parks/harlem-river-park-bikeway/

Figure 1: Typical degraded site conditions prior to project. (Hinkle/Johnson)

BACKGROUND

Since the 1980's, many post-industrial urban waterfronts have been rebuilt as public esplanades. Typically these feature a paved walkway separated from water by vertical, hard walls topped with steel railings to prevent any contact with the water. This approach improved access to the waterfront and great visual resources but little ability to use the water recreationally and limited ecological value for shore zone species.

Increased public demand for activities like urban kayaking and the need to rebuild aging infrastructure presents the opportunity to encourage ecologically enhanced alternatives to the hard seawalls.

Harlem River Park is a multi- phase project, with initial discussions beginning in 2001, initiated by Richard Toussaint and other residents who formed Harlem River Task Force. The first phase, from 132nd to 138th Streets finished in 2002, provided the first recreational amenities on the site and access from the E. Harlem neighborhood previously cut off from the waterfront. At the water's edge, the rusted industrial steel sheetwall was replaced with a new similar wall. Phases 2 (from 138 to 142nd) and 3 (from 142nd to 145th) were supported by the $40,000 NY State "Designing the edge" grant to research and include habitat-friendly alternatives with water access. The three phases together present an opportunity to compare the durability, habitat value, appearance and floodplain functions of different approaches within the same river conditions.

ASSESSMENT, PLANNING & DESIGN

The site assessment identified numerous different types of degraded hard shorelines, including rip-rap, bulkhead and revetment, along the shipping channel of the Harlem River and bound by a major highway on the inland side. The narrow site, and the need to keep Harlem River Drive open to traffic, forced the city to construct portions of the park from the water side. On-site discoveries of a failing bulkhead, old landfill and homeless encampments proved to be a few of the many challenges.

The working team of New York City Department of Parks & Recreation, New York City Economic Development Corporation, Metropolitan Waterfront Alliance and Harlem River Park Task Force and others held a community workshop in 2004 to explore ideas for the water's edge. The Designing the Edge objectives were:

- accommodate safe public access to the water's edge, which is 24' deep in places along the wall;
- provide access to the park for people arriving by hand-powered boats, including docking space for visiting boats such as those with educational programs or evacuation via boat in case of an emergency;
- use structures that absorb and dissipate wake energy, such as porous, sloped or terraced embankments;
- use porous ground surfaces and plantings to filter surface runoff and hold flood water;
- make use of healthy soil bacteria to improve groundwater (bioremediation);
- create a porous shoreline structure that provides habitat for filtering marine organisms within the crevices; and
- include cultural/historical references and public art.

Participating residents, elected officials and organizations considered many ideas, with consensus on:

- Steps and terraces to get down to the water in a safe manner;
- Commemorating the history and culture of E. Harlem;
- Encouraging environmental awareness and advising people about the danger of eating fish from polluted water.

A review of available materials and technology identified nearly a dozen different built shoreline techniques to be considered for the Harlem River Park location. Each technique was evaluated regarding its ability to provide habitat, protect from erosion, withstand consistent use, incorporate various uses and improve the park aesthetics.

Figure 2: View of a tide pool created to encourage awareness of tidal cycles. The public can safely touch the Harlem River here, and see some of the life within it. (Hinkle/Johnson)

Three shoreline techniques which seemed particularly suitable were compared by testing physical models in The Webb Institute wave tank: rectilinear gabion terraces with tidal pool, sloped serpentine round gabions and stacked staggered greenwalls. The results influenced the final design.

Figure 3: A before and after comparison of the park shoreline, near 135th street. (Hinkle/Johnson)

A tiered rock gabion wall was built between 139th and 142nd Streets, and a greenwall between 142nd and 145th Streets. Two tide pools (see photo) let people safely touch the river water and see some of its life forms; shallow sloped areas slow movement of the water; porous surfaces and gabions provide flood storage; and incorporating shells and different sizes of rock in the gabion, greenwalls and riprap create niches and substrates for a variety of near shore organisms. Native vegetation of marsh grasses reintroduced many floodplain species along the Harlem River.

The paved bike trail is planned to eventually link to a route around the entire island of Manhattan.

The use of complex and varying shoreline edges in this waterfront park increase both the ecological effectiveness, adaptation to changing sea levels and illustrate a series of cost effective techniques in a tight space.

PLAN IMPLEMENTATION

After construction of Phases 2 and 3 in 2009, it was hoped that ecological monitoring would be done along the water's edge to see how the different features attract algae, shell fish, and other river organisms. So far, no organized monitoring has occurred. The novel infrastructure elements have held up well, with the exception of recycled plastic fenders attached to the gabions in order to prevent the wires being damaged by boats coming close to the wall; The attachment method, with bolts, was not strong enough to withstand the constant stress of pulling and pushing in moving water.

The marsh plants set into the gabions have done very well, holding their own and expanding. Most of the coastal shrubs and grasses have also done very well. Many of the larger trees planted in the upland areas were replaced after the first summer's drought.

Bounded by a busy highway, the park's long distance from regular urban pedestrian traffic makes it attractive for some kinds of activities which thrive in isolated areas, such as some recent reports of homeless camping and prostitution. However, the park is also increasingly popular with visitors of many ages strolling, biking and skating the esplanade, picnicking and fishing. At the request of the community, a portion of the park is being organized as a small community garden, furthering the enjoyment of this important local recreation spot.

LESSONS LEARNED

- The cost of porous shores can be about the same as for traditional seawalls
- Porous waterside infrastructure can reduce negative impacts of urbanized shorelines on rivers;
- Sloped, porous infrastructure can slow the velocity of water, allow more infiltration and absorb flood water.
- Native vegetation supports species that use different zones along the river and floodplain ;
- Providing safe access to the water's edge lets people see and touch the river;
- Different activities such as a multiple purpose bicycle path, kayaking, relaxing, education, history and cultures of the community; the arts can be accommodated in the same space; and
- Ecological and community improvements are mutually attainable and beneficial.

ADDITIONAL INFORMATION

Designing the Edge Report (pdf)