

Ten Principles for Creating a Living Edge

- 1. Install surfaces that support estuarine life.** Use rough textured and porous surfaces to facilitate attachment of marine organisms, both plant and animal. Use differently-sized materials so that pore spaces vary in size and shape, providing habitat for different kinds of fish and invertebrates.
- 2. Living water filtration system.** Immature shellfish and other filter-feeding organisms float, seeking suitable surfaces to which they can attach permanently. Incorporating mussel, oyster and clam shell into shoreline structures will encourage the formation of a crust of filtering organisms. These will serve as a living water-filtration layer to reduce excessive nutrients and some pollutants.
- 3. Reduce wave energy.** Horizontal terraces and gently sloped banks result in shallow water zones with light penetration which is important for fish and many other kinds of aquatic life. Gently sloped structures also absorb wake energy (waves from boats) instead of reflecting it, as vertical structures do. The reduced turbulence lowers scour and stress on the shore, and making the nearshore safer for kayaks and rowboats. Porous surfaces also contribute to the reduction of wake energy by breaking up the wave. The water is redirected water in smaller streams going many directions, with has less erosive power.
- 4. Reduce stream velocity.** Channelizing urban rivers produces faster-flowing water, especially where it is pushed through constricted areas. Replacing straightened shorelines with irregular, staggered or curvilinear forms reduces flow velocity by producing a string of eddies. In combination with slopes or terraces, the shape of the shore can be designed to reduce scour. This



Historic engraving of Harlem River at McCombs Dam (145th St) illustrating its natural shore with shallows and porous, green floodplain.



Mussels grown on "sockline"
Photo: www.dfo-mpo.gc



Mussels densely attached to rocky substrate. photo: <http://oeirasdailyphoto.blogspot.com/2009/10/mussel-habitat.html>

allows sediment to settle out of the water, creating microconditions similar to those found in natural shores.



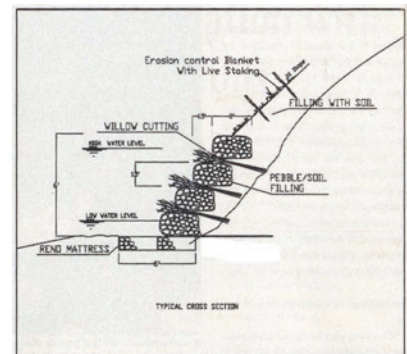
Irregular edges and terraced bank, Coney Is. aquarium

5. **Greenery.** Shoreline structures which can be planted create an urban variation of a stream buffer zone: much greener, sweeter smelling and better looking than their industrial-era counterparts. These can include porous walls with terraces for plants, greenwalls with voids that can hold soil and plants, and several other types of vegetated walls. Connecting fragmented habitat patches with a green corridor can greatly increase the ecological value of marginal and disturbed habitats. These linear green spaces support wildlife in many ways, including food and nesting materials, and cover that allows wildlife populations to move along the stream corridor and reach other types of ecosystems necessary at different points in their life cycle (for example marine turtles might seek a sandy patch for nesting). Varying heights of vegetation supports a larger variety of species, including those which seasonally use different canopy levels. Planted slopes resist erosion with a network of roots.



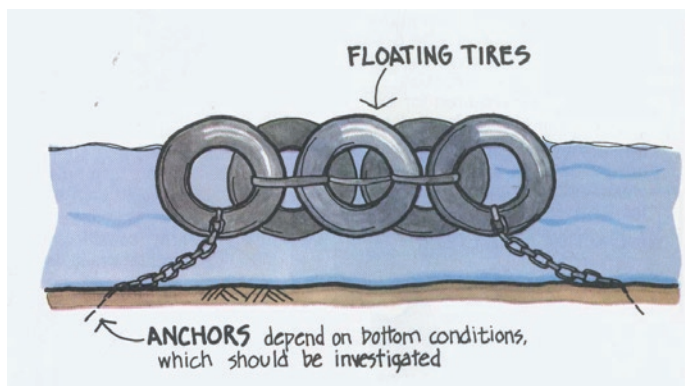
“Evergreen” Greenwall, near Athens, NY. Photo: LI Precast

6. **Bioremediation.** Non-point-source pollution, the everyday dust, litter, oil droplets, and other urban contaminants, runs off the pavement with every rainstorm and ends up in rivers and lakes. Earthen banks, along with vegetated space, allow this polluted runoff to percolate through layers of roots, soil and rock, where microorganism activity cleanses the water on its way into the river. Where possible, paved areas should be minimized and replaced with porous surfaces.



Gabion planted with willow stakes
Credit: Land and Water, Vol. 49
No.1, Jan, 2005

7. **Durable in urban tidal conditions:** Choose materials which are durable, especially against salt corrosion, vandalism, wake action, ice scour and freeze/thaw expansion and contact with boats. Marine-grade plastics, salt-resistant concrete, recycled rubber tires and stone are particularly long-lasting materials.



Breakwater of recycled tires.
Image credit: US Army Corps of Eng. Low Cost Shore Protection, 1981.



Harlem R. Park looking north from 140th St. after construction by EDC, 2009

8. **Hand-powered boats.** Accommodate kayaks and row-boats in some area of the shore without sharp rocks or steep walls.

9. **Visiting boats.** Accommodate larger boats for visiting programs and emergency evacuation in some area of the esplanade area, including cleats for docking.

10. **Safe Access.** Incorporate design solutions that safely allow people to touch the water.



Kayakers in Harlem River, photo: MWA



Flushing Meadows Park lakeside plaza



The Pegasus Marine History Vessel,
a reconditioned NYC tugboat with public programs
photo: Joe Myer, The PEGASUS Preservation Project
<http://www.tugpegasus.org/vhistory2.htm>



Harlem R. Park Tidepool

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