

Jamaica Bay Watershed Plan; The Problem to Solve: Integrating and Optimizing Management Practices

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Best Measures of Efficacy of BMP's/EMP's/HMP's

- Water Capture
 - Per unit area or length of infrastructure (roadway, parking lot, etc.)
 - Per unit area of land-use coverage (industrial, commercial, or residential structure)
 - CSO frequency and volume of discharge
- Ecological Features
 - Biodiversity per unit area
 - Ecological productivity per unit area
- Local Thermal Regulation
 - Urban heat island reversal

The Challenge: 100 Square Miles of Urbanized Watershed



Glacial History

Parks & highways on the moraine

City streets, residences, and commercial development on the outwash plain

Thousands of acres of fill over historic marsh



Hard edge (linear bulkheads)



Soft edge (in purple)

Historic Marshes and Fill in Jamaica Bay: Learning the History of the Place



The entire edge of Jamaica Bay is landfill.

Much of the bay bottom has been dredged, filled, or otherwise greatly changed.

The Park can focus on a primary educational and scientific question: How can human-built structures enhance biodiversity and ecological productivity?



The Belt Parkway has, since its construction began seven decades ago, aimed to provide transportation around Jamaica Bay. At the same time, the roadway has cut off ready public access to the Bay itself. Both education and infrastructure are likely to be necessary to lead the public around it.

A National and Historical Perspective: Marsh & Habitat Loss in Louisiana

FOR 7,000 YEARS, THE MISSISSIPPI RIVER flooded Louisiana's coast with land-building sediment. The amount of new land this sediment created exceeded the amount of land lost to natural processes of subsidence, erosion and sea-level rise.

In the 20th century, levees erected along the banks prevented river sediment from reaching coastal marshes, upsetting the balance between land lost and land gained, initiating the now catastrophic retreat of Louisiana's wetlands.

SEA Streets: Seattle's Response to Non-point impact on the Salmon Fishery in an Inland Waterway



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SEA Streets: Seattle's Response to Non-point impact on Puget Sound



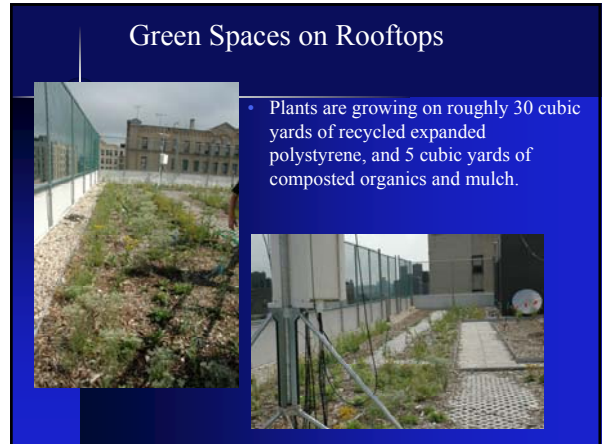
SEA Streets: Seattle's Response to Non-point impact on Puget Sound



Green Spaces on Rooftops



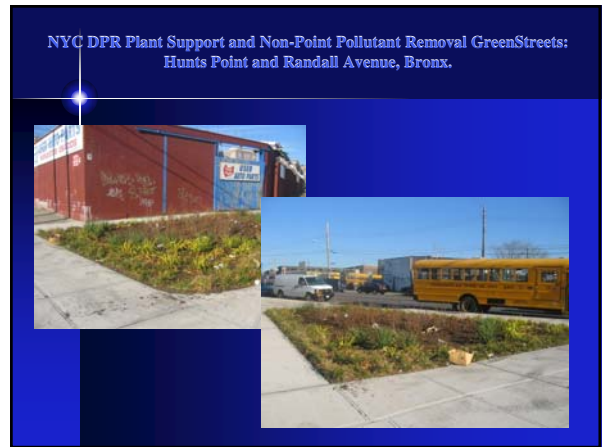
Image from earthpledge.org



Material Flows:

New York City Garbage:

- 2,500 tons of organic waste each day;
- Between 600 and 1,200 cubic yards per day of waste styrofoam;
- About 2,000 tons of waste glass each day
- About 1,200 tons per day of biosolids
- Tons per day of waste drinking water treatment plant



Two Stormwater Strategies

- Distributed
- Potentially Cost Effective
- Centralized
- Potentially Capital Intensive





Marsh Loss in Jamaica Bay

1974 Tidal Marshes (shown in pink)
Elders Point
97 Acres

1999 Tidal Marshes (shown in pink)
Elders Point
21 Acres

The New York State Department of Environmental Conservation has documented similar patterns of marsh loss in Jamaica Bay by comparing aerial photographs from the past several decades. The watershed plan will probably have no impact on this sediment budget problem

Salt Marsh Nitrogen Removal in Jamaica Bay:

Spartina alterniflora- marsh grass

Filters, stores, and removes excess nitrogen from water column

- ❖ Four wastewater treatment plants discharge into Jamaica Bay
- ❖ About a part per million of total stormwater input is NOx
- ❖ Saltmarsh removes between 40-200 lbs of nitrogen/acre/yr
- ❖ Removal mechanisms include denitrification and sediment burial

Learning about Problems in the Bay and the Technologies and Natural Systems that Treat Them: Nitrogen Budget of Area Surrounding Penn & Fountain

- 26th Ward Treatment Plant discharges approximately 14,000 lbs of Nitrogen per day
- Between 13,000 and 64,000 acres (20-80 sq. miles) of marsh would be required to treat one-half of these inputs

Wetland Treatment of 26th Ward Discharge

- If 50 acres of marsh were restored near Fountain Avenue, it could only remove less than 1% of 26th Ward Nitrogen
- One square foot of mussels can filter approximately 2000 gallons of water per day
- About an acre of mussels would filter *all of the daily discharge* (65 MGD) from the 26th Ward Plant
- ≈ A one acre oyster reef, 3,000,000 oysters, could filter approximately 65 MGD

Oyster Reef and Eelgrass Function

- Oyster reef restoration can make significant contributions to water quality
- Oysters and other filter feeders remove suspended particulates and deposit nutrients in sediments, decreasing turbidity

- Increased water clarity allows for eelgrass population development, increasing primary productivity
- Eel grass provides habitat for fish and other aquatic organisms

Penn & Fountain Ave Landfills



- 100 acres intertidal marsh could be built around the Penn & Fountain Avenue Landfills, with 1,500,000 cubic yards of dredge sediments, cement lock or other treated dredged material, and/or rock blasted from harbor deepening.
- 100 acres of marsh could denitrify 2 tons of nitrate-nitrogen per year from Jamaica Bay.

Penn & Fountain Ave Landfills



Add aerial of present Landfill configuration

Educational and Scientific Questions and Opportunities

- Will more habitat types increase species diversity?
- Can restored habitat increase ecological productivity?
- Would more productive ecological systems decrease pollutants?

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Biogeochemical Cap

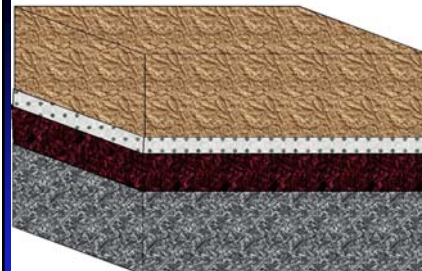
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Jardin del Paraiso Soil Remediation Program



One foot compost from DOS and/or Green Thumb.

One to several inches clean sand or ground up brick, concrete, & rock

Several inches of composted NYCDEP biosolids

Fill presently on Site, Left in Place, unmodified

