Watershed 263 Stormwater Demonstration Project

The Challenge

Baltimore City is divided into 355 man-made watersheds that collect stormwater runoff and flow untreated into the city's remaining open streams or directly into the Harbor and eventually the Chesapeake Bay. As one of these stormsheds, Watershed 263 is a 930-acre stormwater drainage area in west and southwest Baltimore composed of 12 neighborhoods with industrial, institutional, and residential land uses. About 74 percent of the area is covered with impervious surfaces. Open space within Watershed 263 is fragmented and unevenly distributed. The area does not support an urban forest ecosystem and has a tree canopy cover of just 5.9 percent compared to a citywide average of 27 percent.

Watershed 263 stormwater, carrying trash, bacteria, heavy metal, and other pollutants converges into a 25 foot outflow pipe near the mouth of Gwynns Falls in the Middle Branch of the Patapsco River. This is an area that Baltimore City is interested in redeveloping as a mixed use land use development requiring improved water quality.

The Opportunity

The Watershed 263 Pilot Demonstration Project focuses on revitalizing urban communities by using urban forestry watershed projects to measurably improve both water quality and quality of life. The project is a partnership between the Parks & People Foundation, Baltimore City Department of Public Works, Baltimore Ecosystem Study, and U.S. Forest Service. A Water Quality Management Plan and Community Greening Framework have been developed and includes reducing impervious surfaces, growing the trees canopy; creating bio-filtration site by cleaning and landscaping vacant lots; reducing litter; cleaning streets and alleys; creating community gardens, improving city parks, and landscaping schoolyards where asphalt has been removed; increasing recycling; and supporting community stewardship and involvement.

Small, low-impact watershed restoration projects that support water infiltration, such as rain gardens and tree plantings, improve environmental quality, create healthier communities, support economic development, and offer educational and recreational opportunities. To demonstrate the effectiveness of these techniques, a special project is underway in one of the watershed's 36 sub-drainage areas that include innovative designs prepared by the Center for Watershed Protection and in the near future a virtual tour web site. Baltimore City Department of Public Works and the Baltimore Ecosystem Study with U.S. Forest Service assistance are monitoring selected storm drains in the Watershed 263 to measure water quality change over time resulting from the greening projects.

Water Quality Monitoring Results

Stormwater measured at both sub-drainage monitoring sites (about 40 acres each in size) have very high, levels of bacteria, heavy metals and nutrients that exceed national urban watersheds norms including:

• Heavy metal pollutant including copper, lead and zinc besides having high concentrations in both baseflow and stormwater runoff flows. Significant dissolved metals are found during baseflow (and may indicate groundwater contamination or illicit discharges), but the highest levels are in stormwater runoff, with many of the storm samples exceeding Maryland freshwater chronic toxic criteria levels.

• Bacteria contamination for baseflow are high, but extremely high for stormwater runoff, often approaching levels similar to that of dilute raw sewage; these levels are far in excess of State water quality criteria.

• Fluoride levels are well above background, especially at Baltimore Street, possibly indicating significant water supply pipe leakage. Fluoride is not harmful in this setting, but since it is added to drinking water, it is a useful indicator of water line or sewage line leakage.

• BOD (biological oxygen demand) levels suggest very high organic material loading, possibly from sewage or accumulated pools within the storm drainage system that would result in oxygen deficits in receiving waters.

• Nutrient levels (phosphorus and nitrogen) are far above natural background levels and are capable of causing highly eutrophic conditions in receiving waters (i.e., excessive algal growth and resultant oxygen deficits and turbidity, etc.). In particular, the Baltimore Street nitrate levels during baseflow suggest illicit inputs, either from sewage contaminated groundwater or illicit discharges or the horse care facility.

Significant declines in Total Nitrogen (and other pollutants) occurred in the sub-drainage area targeted for intervention but it exceeded the potential results of the six green infrastructure projects installed here. Thus, hydrologic complexity arises from aging and failing gray infrastructure complicating the monitoring of green infrastructure benefits.

Outcomes and Benefits

- Implemented 11 green infrastructure projects and 30 community greening projects; 22 additional green infrastructure project are currently being implemented with funding support from the Atlantic and Chesapeake Bays Trust Fund administered by the Maryland Department of Natural Resources.
- Four acres of obsolete schoolyard asphalt has been removed and the area landscaped with trees and gardens.
- 1000 new street, park, and schoolyard trees have been planted so far beginning to grow the watershed tree canopy. Many more trees have been mulched and cared for by Parks & People community volunteers and BRANCHES youth crews along the proposed neighborhood “trail” connecting to the Gwynns Falls Trail in the lower industrial portion of the watershed.
- Cleaned and greened over 200 vacant lots.
- Restored a 1.5 mile green median on Fulton Avenue and installed new street trees along Baltimore and Monroe Streets.

- Sixty public education and training workshops have been conducted and a Watershed Community Stakeholder Council has been established to measure project progress and set priorities using an indicator monitoring system.
- Education and outreach campaigns and restoration projects have been conducted so far at 11schools and with 10 neighborhood associations and 5 businesses.
- Supported the West Baltimore Park Squares programing and marketing campaign.
- City is proceeding with implementation of a community proposal for creating a 6-mile neighborhood bicycle and pedestrian "trail" connecting all historic parks and school facilities to the existing 15-mile Gwynns Falls Trail and landscaping major streets with water quality projects.
- The monitoring of storm drains in the Watershed 263 to measure water quality change over time resulting from the greening projects has produced unique data that has not previously been available to policy makers and the general public.

Sharing Success

Our results suggest that green infrastructure implementation solidly rooted in a socialecological framework that includes community education resulting in positive engagement and action can be an effective vehicle for transforming urban neighborhoods and improving both water quality and quality of life.

7/18/2013