

EPA's Green Infrastructure R&D

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Green Infrastructure Research



Agency Agenda

- April 2011 Green Infrastructure (GI) Agenda announced, EPA activities to encourage communities to adopt GI solutions for stormwater management:
 - Community partnerships;
 - Clarifying green infrastructure within the regulatory and enforcement contexts;
 - Outreach and information exchange;
 - Financing; and
 - Tool development and capacity building.
- April 2011 OW-OECA Joint Memo supporting and encouraging use of GI for wet-weather control and provided MS4 and Enforcement Action GI examples





EPA's ORD research to further EPA's Green Infrastructure Agenda

1. Modeling Tools for GI and Stormwater Planning
2. Technical Guidance in Adaptive Management for GI in enforcement
3. Generating and Collecting Data on GI Performance, O&M, Costs, Socio-Economic benefits

These research activities, explicitly designed to support the GI Agenda, are housed within ORD's Safe and Sustainable Water Resources research program

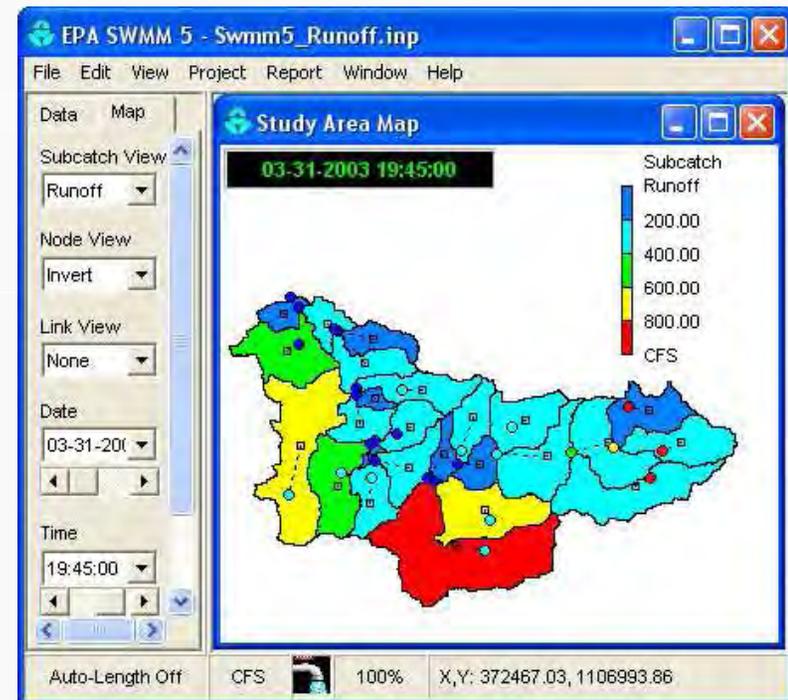


1. Modeling Tools

Storm Water Management Model (SWMM)

v.5 with Low Impact Development:

Planning, analysis and design related to stormwater runoff, combined sewers, sanitary sewers, and other drainage systems in urban areas



How would GI BMPs in an urban environment impact stormwater and contaminant runoff and reduce CSO events?



1. Modeling Tools

Stormwater Calculator

(note: SWMM v5 engine)

The screenshot shows the National Stormwater Calculator interface. The 'Runoff Results' window is active, displaying 'Capture Frequency' results. A bar chart shows the 'Fraction of Rainfall Captured' for various 'Percentile of Daily Rainfall Events'. The x-axis ranges from 10 to 99 percentiles, and the y-axis ranges from 0.0 to 1.0. The chart shows that as the percentile increases, the fraction of rainfall captured decreases. A vertical dashed line is drawn at the 85th percentile, corresponding to a capture frequency of 81.37%.

Percentile of Daily Rainfall Events	Fraction of Rainfall Captured
10	0.95
20	0.85
30	0.78
40	0.75
50	0.72
60	0.70
70	0.68
80	0.65
85	0.63
90	0.61
95	0.59
99	0.55

- Package modeling solutions (e.g., SWMM-LID) into usable tools for engineers and planners
- Collaboration between ORD and OW – potential technical support tool for Stormwater Rule



2. Technical Guidance for Integrating GI into Enforcement

Adaptive Management

GI Agenda (2a) *“Demonstrate how green infrastructure can be incorporated into combined sewer overflow (CSO) control plans.”*

GI Agenda (4d) *“Address the green infrastructure implementation obstacle of real or perceived risk, and investigate ways to help insulate communities from perceived risk related to choosing green infrastructure technologies.”*

- Cleveland case study: ORD and Region 5 “Green Team” proposal (adopted) for an integrated green-gray approach for Cleveland consent decree
- “Green Team” Proposal designed an approach to integrate GI that would share risk and employs adaptive management for green-gray solution that evolves based on actual conditions and outcomes
- Performance measurement offers opportunity to adapt green-gray approach and take advantage of additional GI opportunities or co-benefits



ORD products coming from Cleveland Case Study

Developed R&D in Cleveland to address GI part of CD process:

- *Developed protocol for assessing soils potential for stormwater detention in vacant lots*
- *Characterized impact of residential demolition on future land use options*
- *Design an experiment to study an adaptive management approach for GI in Slavic Village neighborhood, evaluate social capital via public participation and hydrologic, ecosystem service benefits*
- *Develop and beta-test vacant land re-use decision support tool*
- *Evaluate and assess utility of a candidate environmental justice metric*
- *Site-scale monitoring and assessment of effectiveness and performance (water volume, water quality) for GI practices*



3. Data on GI Performance, O&M, Costs, Socio-Economic benefits

- Monitoring of GI BMPs such as permeable parking lots and rain gardens (O&M, long term performance)
- Monitoring stream restoration and riparian buffer zones (ecosystem services for nutrient management)
- Economic valuation assessment of green infrastructure implementation (e.g., property value changes)
- Next slides will share more detail on monitoring of GI BMPs: Approaches and lessons learned

