

The Illinois Green Infrastructure Study: Findings and Policy Recommendations

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Issues

- Project examined seven issues set forth in Section 15 of P.A. 96-26, the 2009 Illinois Green Infrastructure for Clean Water Act
- Some issues emphasized over others:
 - Performance of green infrastructure practices
 - Economics of green infrastructure use
 - State and local models for successfully using and phasing-in green infrastructure practices in MS4
 - Local perceptions of barriers to adoption
 - ARRA's 20% set-aside for green projects in SRFs

Issues (con't)

- Want to briefly discuss why we focused on these research issues and what concerns (as generated by reviewer comments of drafts of the report posted on-line by IEPA) arose in doing so
- Want to also briefly highlight our specific recommendations and how they related to our examination of these issues and concerns

Green Infrastructure Performance

- UIC Science Team decided to see if the relative effectiveness of GI practices, compared to conventional detention, could be determined through a review of the peer-reviewed literature in the ISI database and in USEPA's Stormwater BMP Database
- Team focused on 5 GI practices (bio-infiltration, permeable paving, filtration, green roofs, and constructed wetlands), analyzing data on reduction of stormwater discharge volume and rates and on TSS and TN removal effectiveness by these practices

Performance (con't)

- Team found 490 peer-reviewed journal articles addressing Green Infrastructure practices
- Sample narrowed down to 236 articles with replicable data on GI effectiveness (e.g., pollutant concentration data)
- Literature further narrowed to 57 articles (covering 173 sites) that had enough information to be able to calculate GI effectiveness

Performance (con't)

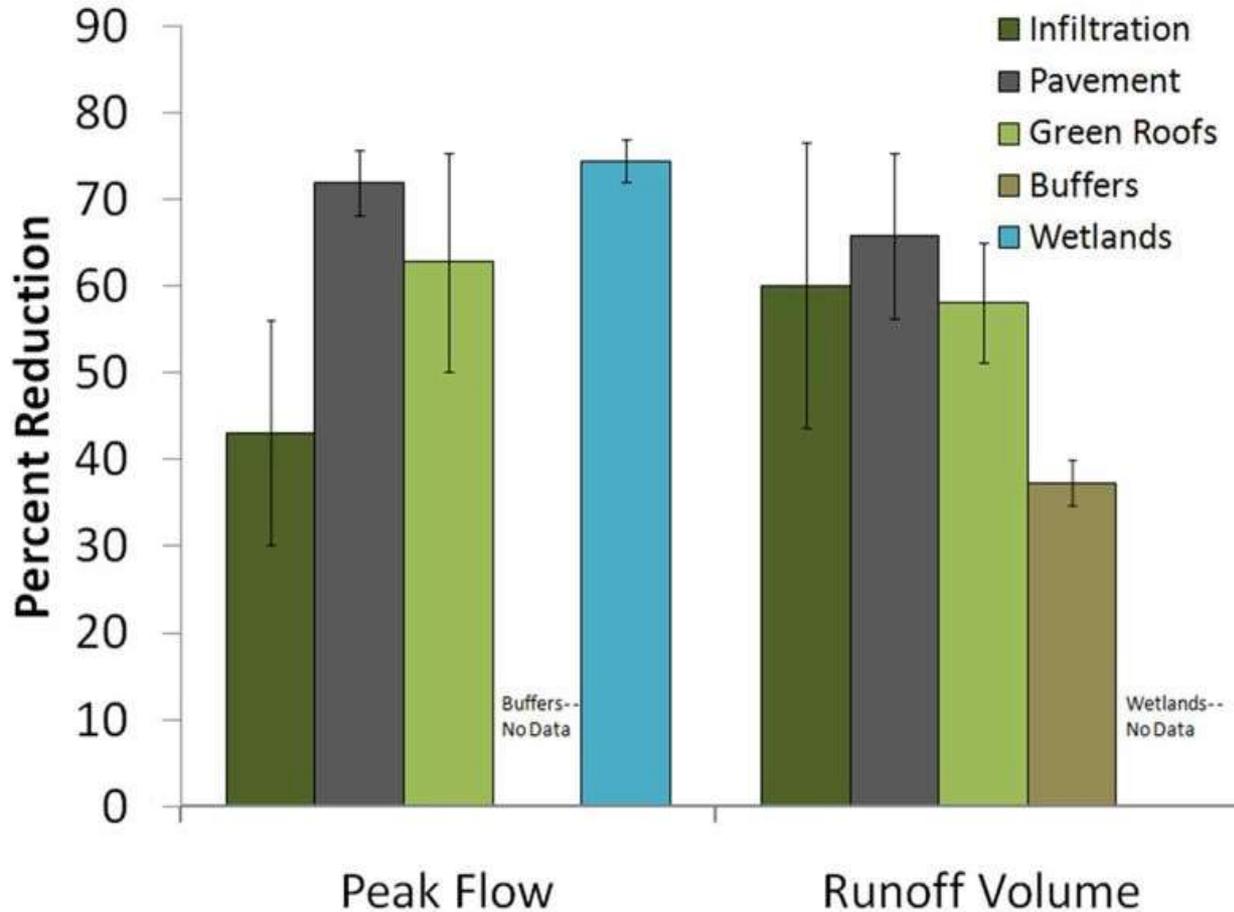
- Literature review found that, although possessing greater variability, GI BMPs worked, on average, about as well as conventional stormwater collection/detention systems in removing TSS and TN
- The GI practices were, also, generally effective in reducing runoff volume by 52-70% and peak flow rates by 57-85% for the storm events reported

Performance (con't)

- Variability in GI BMP effectiveness probably due to:
 - Differences in site and BMP design,
 - Scale and sizing of BMPs used,
 - Geographic variability of sites studied (e.g., cold weather) in literature and
 - BMP maintenance

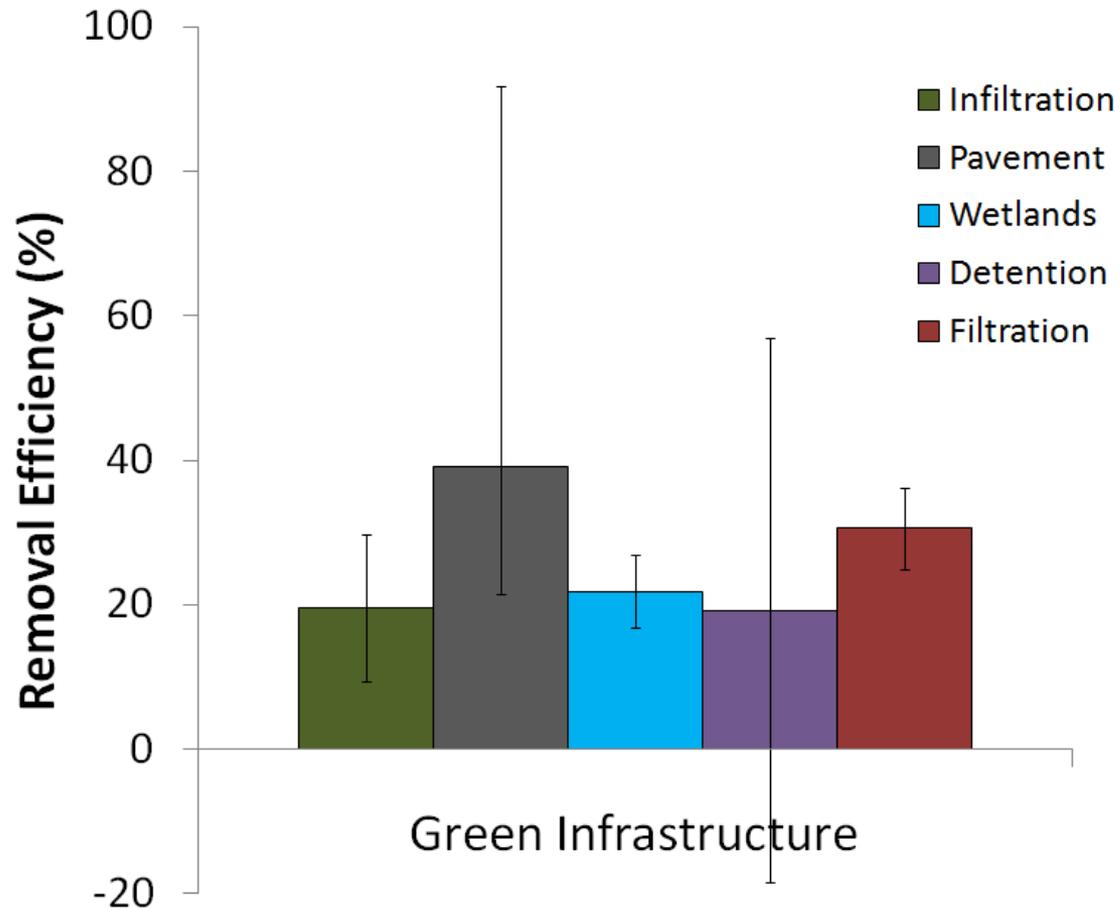
Preliminary Results

Peak Flow and Runoff Volume



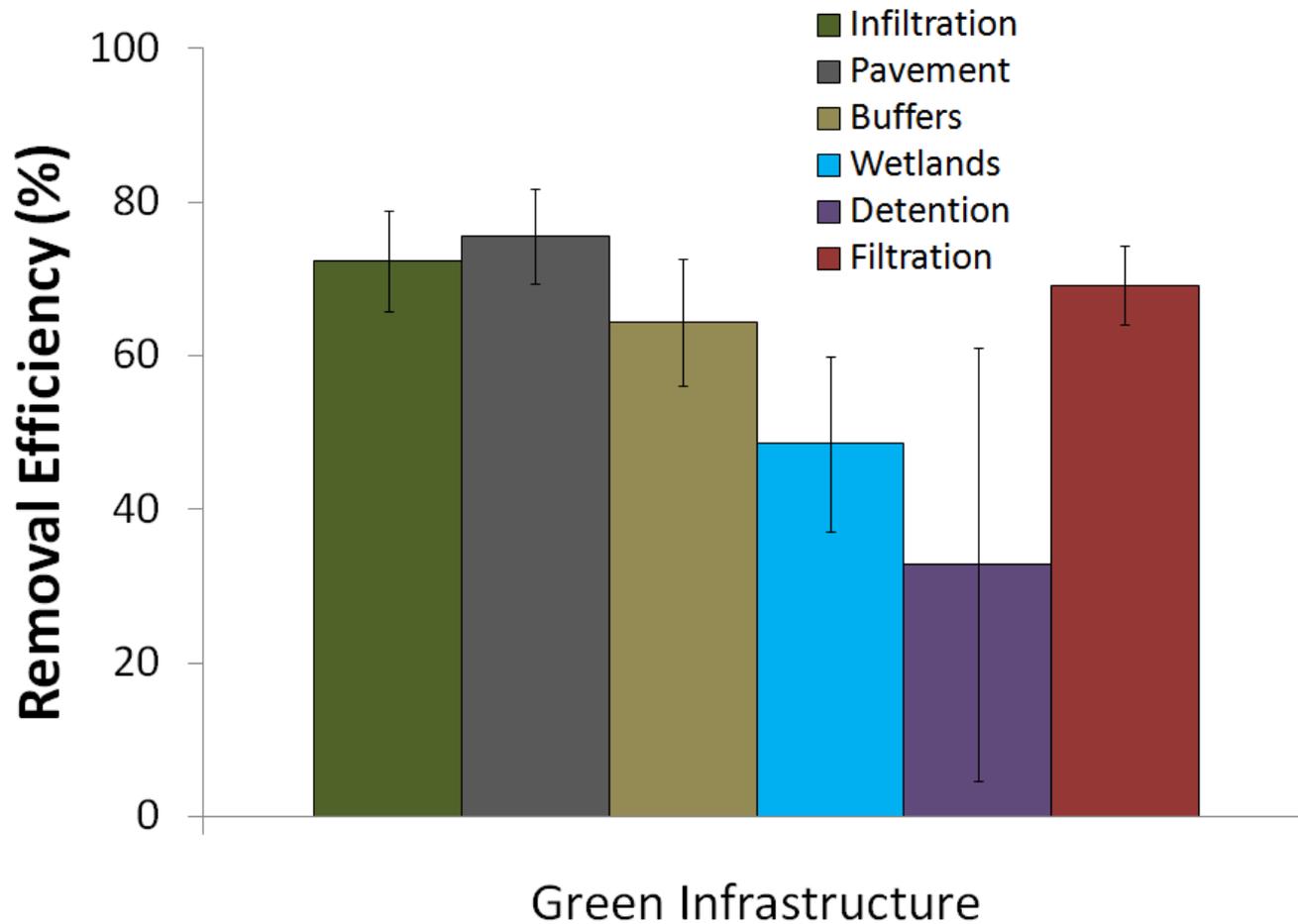
Preliminary Results

Total Nitrogen



Preliminary Results

Total Suspended Solids



Performance Issues

- The team's GI effectiveness calculations generated considerable comment from reviewers and our "expert advisory group" since pollutant load removal, not removal effectiveness, is the metric used in the USEPA's BMP Database
- Science Team referenced, but did not use, the BMP Database because:
 - Data needed to calculate weighted average removal effectiveness was missing for most Database sites
 - Over half of data points from 24 sites in only 20 states (half of which were in warm climates)

Economics

- Center for Neighborhood Technology (CNT) examined economic literature on GI costs and benefits
- When preliminary BMP effectiveness data became available from Science Team, we decided to stress **cost-effectiveness** of GI, rather than undertake a benefit-cost analysis of Green Infrastructure practices (though CNT had also done a preliminary BCA on green infrastructure)

Economics (con't)

- CNT examined BMP life cycle cost data from published studies, from data in its own Green Values Stormwater Calculator[®] and from GI programs used elsewhere in the nation
- Analyzing three scenarios in its Calculator, CNT found:
 - **GI construction costs** were 4% less for an urban commercial building, 23% less for an urban townhouse project and 31% less for a suburban residential development
 - **GI life-cycle savings** were 20% for the retail, 29% less for the townhouse and 24% for the suburban project

Economics (con't)

- Our position is that, if GI BMPs offer comparable pollutant removal and hydrologic performance with and are cheaper (in both their construction and life-cycle costs) than conventional collection/detention practices, GI BMPs ought to be the preferred urban stormwater management option for municipalities and landowners
- You might not need the cost and complexity of undertaking a sophisticated BCA if the use of GI BMPs can be justified on the basis of their cost-effectiveness alone

Implementation Models

- CMAP staff examined use of GI BMPs in existing urban stormwater management programs in Illinois:
 - Cook, DuPage, Kane, Kendall, Lake, McHenry, and Will Counties
 - Cities of Aurora, Chicago and Crystal Lake, and Village of Homer Glen
 - Downstate communities also examined (Peoria, Decatur, Bloomington, Moline, and Rantoul)

Implementation (con't)

- CNT staff examined GI BMPs standards adopted by other states: Maine, Maryland, Minnesota, New Jersey and Wisconsin
- Also looked at whether state Energy Portfolio Standard programs (where an increasing percentage of state energy needs are met by alternative sources over time) can be used as model to phase-in GI BMPs in MS4 permits

Implementation (con't)

- Issues identified by CMAP in local interviews:
 - Most counties in Illinois are not legislatively authorized nor funded sufficiently to establish their own stormwater management commissions or agencies (as is case in Chicago metro area)
 - Lack of long-term GI BMP performance data in Illinois' diverse soils and during winter months
 - More specific guidance on BMP maintenance practices and costs needed
 - Concern with groundwater contamination by stormwater infiltration and aesthetics of native plants

Green Project Reserve

- ARRA set aside 20% of funds to SRFs for “green projects” – energy and water conservation, green infrastructure and “innovative projects” – with some state expenditures in form of grants and not loans
- Green Infrastructure Study researchers from CMAP and CNT worked with other stakeholders to advise IEPA on how these funds should be prioritized.

Recommendations: Performance Standards

- IEPA should adopt a set of flexible stormwater volume retention performance standards (e.g., requiring that the first inch or half-inch of stormwater be retained on-site) that varies according to conditions at a particular site
- Standards should be phased in using a Green Infrastructure portfolio strategy (maybe linked to IEPA's 5-year MS4 permit cycle)

Recommendations: Administration

- Counties should work with MS4 municipal permit holders to promote GI BMPs in Illinois
 - Counties are the government unit most consistent with watershed and sub-watershed scales (that NRC says should be the optimal management scale)
 - State should provide resources to counties to help them with these activities
 - Counties can also turn to local expertise – e.g., soil and water conservation districts – to help them

Recommendations:

Applicability

- Proposed new performance standards should initially be phase-in within current areas subject to MS4 permit (then expanded into developing areas later to limit impervious surface ratios)
- Standards should apply to public as well as private development
 - Should use GI BMPs for new public improvements as well as for major maintenance projects
 - State should develop guidance on infrastructure BMPs

Recommendations: Funding

- IEPA should develop guidance for prioritizing and funding GI projects using the Green Project Reserve set-aside funds in its SRFs
- Costs of constructing GI BMPs should be borne by private landowners (same as with conventional collection and detention systems)
- Residual runoff should be managed by local governments using a fee system (with GI BMPs credited against the fees)

Recommendations:

Maintenance, Research and Training

- If fee system used, landowners using GI BMPs to earn credits should annually report on BMP maintenance to retain their GI credits
- Need more research on GI effectiveness, especially in Illinois soils and conditions, and to explore the use of GI treatment trains
- If counties are to assist MS4 permittees, need to train county staff to provide such assistance