

GIS-based prioritization system for small municipality MS4 compliance projects

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BACKGROUND

- The Clean Water Act requires municipalities to manage point source discharges of pollutants, including stormwater systems (i.e., Municipal Separate Storm Sewer System; MS4)
- Approaches for complying with federal regulations can be difficult for small municipalities
- Determining what Best Management Practices (BMPs) to implement can be costly and difficult
- A system for identifying and prioritizing locations for solutions can save municipalities money and resources



METHODS

Conceptual development (based on)

- MS4 program requirements
- Discussions with local municipalities
- Case studies and empirical evidence on project effectiveness

Data sources

- Publicly available remote sensing data
- County/local government data on land parcels
- New GIS data by processing existing spatial data as needed

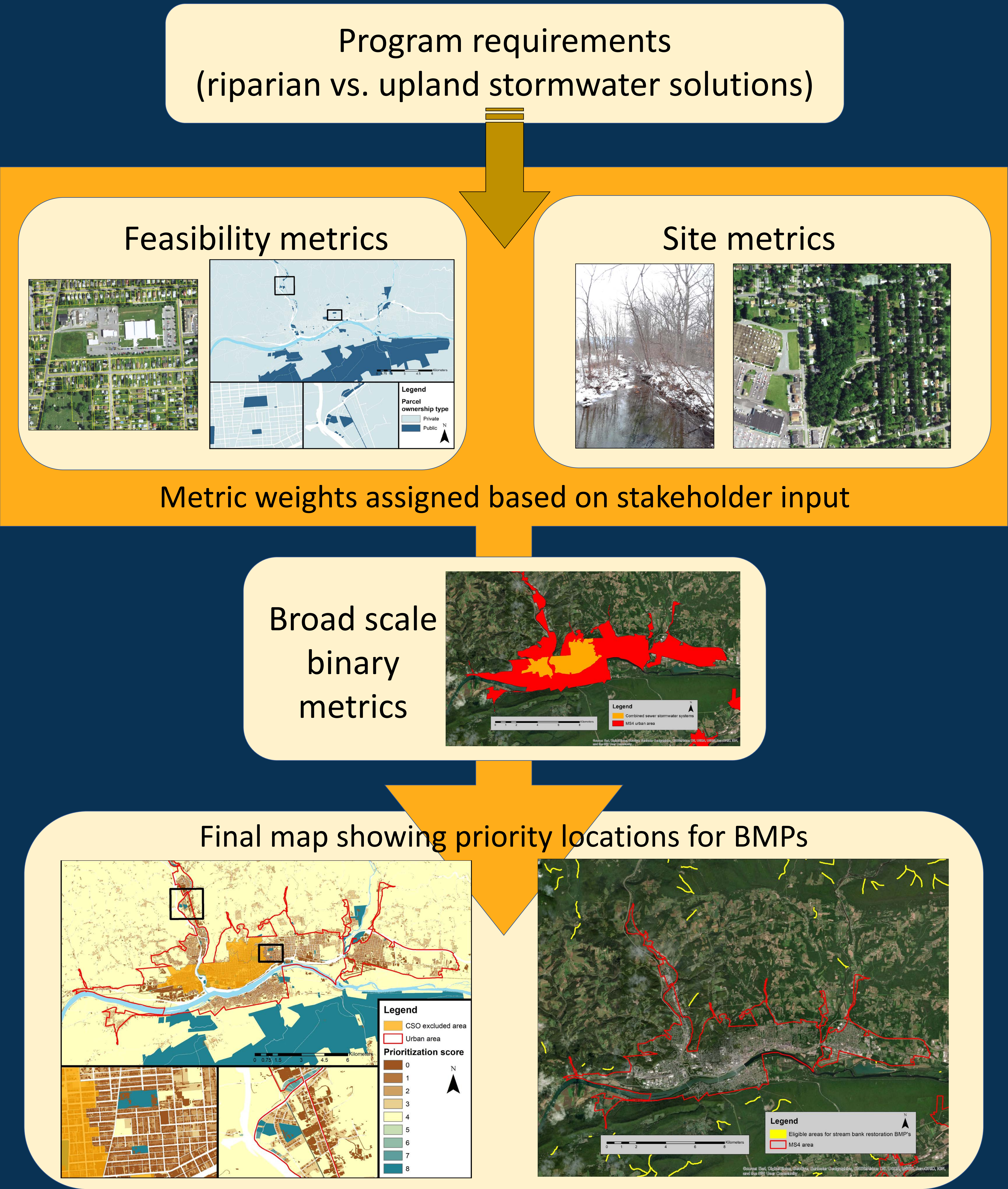
Model development

- Model calibration:
 - Calculate metrics
 - Determine metric weights (through stakeholder input)
 - Ground truth results (with stakeholders)
- Revise model and repeat calibration
- Provide map of locations and analysis of management approaches employed (e.g., parsed areas, specific barriers, etc.)

RESULTS

- Appropriate locations of stream bank restoration were rare (none in our MS4 regulated areas)
- Majority of land in the urban area had low suitability for upland stormwater BMPs
- Private ownership and small size of parcels were important limitations
- Parsing out areas to reduce load calculations limited available locations for BMPs
- Small BMPs are more feasible than large BMPs
- Stakeholder input and iterative model calibration is key
- Ecological improvement is often not an important metric to local municipalities
- Manager expectations don't match reality of most feasible and effective options

Small municipalities needing to comply with federal stormwater mitigation requirements need help identifying and prioritizing locations for potential solutions (BMPs)



METRIC DESCRIPTIONS

Program requirements

Metrics based on the general approach to MS4 compliance (i.e., type of approach desired); this sets the structure of the model

1. Project intended for riparian zone?
2. Project intended for upland stormwater?

Feasibility metrics

Metrics based on the feasibility of the site to perform the project given management requirements and financial constraints

1. Parcel size (larger better)
2. Linear feet available (larger better)
3. Infrastructure present (absent better)
4. Ownership (public better)

Site metrics

These metrics describe the general condition at the site that relate to overall project success and longevity (will be dependent, in part, on BMP type)

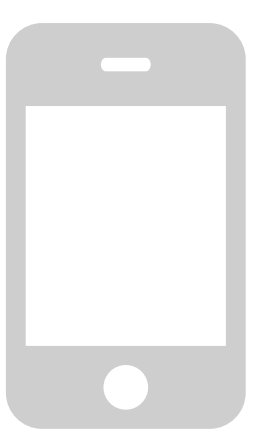
1. Land use/cover
2. Slope
3. Proximity to surface runoff
4. Proximity to existing issues
5. Impaired stream
6. Location in catchment / drainage area
7. Soils

Broad scale binary metrics

Program constraints dictate where projects can and cannot happen due to program rules; these metrics are not weighted (informative for project potential if different decisions made)

1. In/out of urban area
2. In/out of municipality or MS4 coalition
3. Parsed out of sediment and nutrient load calculation; e.g.,
 - Combined sewer system
 - Federal, state, or industry owned land and/or infrastructure
 - Floodplain

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Take a picture to see more information about the project

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