

The Green Infrastructure Decision Support Tool

A tool that helps city decision makers understand the multiple benefits of green infrastructure



Wetlands, green roofs, rain gardens, and permeable pavement can help communities deal cost-effectively with the increased precipitation and storm water runoff that many anticipate as a consequence of climate change. These investments also bring potential benefits, from good jobs to healthier air and cooler summer temperatures. With options like green infrastructure, we can help our communities become healthier and more equitable places to live and work. But the complexity of options, trade-offs, costs and benefits makes it difficult for people to choose the best options for their

communities. We have designed the Green Infrastructure Decision Support Tool to help with this need.

The Green Infrastructure Decision Support Tool helps municipal officials, business owners, civic groups, residents, and county and regional government bodies explore the potential of green infrastructure to help cope with stormwater while generating social, economic and environmental co-benefits. For example, we are working in partnership with local groups such as the 16th Street Community Health Centers and 1000 Friends of Wisconsin to encourage collaboration and strategic thinking regarding green infrastructure in the watershed.



The Kinnickinnic River Watershed - 26 square miles, densely populated, high percentage impervious surface.

The Tool

The Green Infrastructure Decision Support Tool focuses on the Kinnickinnic River watershed, a 26 square mile section of greater Milwaukee that has experienced flooding, basement backups and combined sewer overflows. This watershed is one of the most densely populated and highly paved parts of the city.

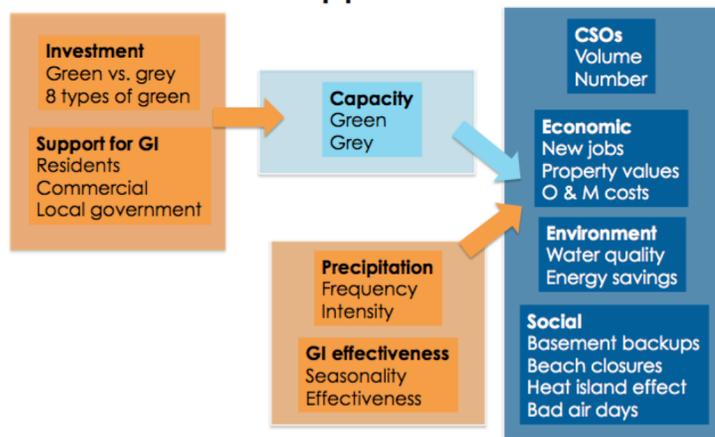
The simulation itself is a system dynamics simulation that tracks the stocks of green and grey infrastructure based on a user's decisions about allocation of investment. The user can also set different rainfall regimes and modify the assumptions about the effectiveness of different types of green infrastructure at capturing and retaining water.

A range of benefits beyond stormwater management are tracked and reported, including water quality improvements, jobs, air quality improvements and energy savings.

To support the thinking of this diverse group of stakeholders, the decision support tool performs the following:

- runs very quickly, simulating 10 to 20 years in less than 60 seconds;
- aims to provide a full picture, with economic, social, environmental and performance outputs;
- allows for creation of different investment scenarios – for 8 different classes of green infrastructure, as well as additional investment in grey infrastructure;

GI Decision Support Tool Structure



The structure of the simulation – user controlled inputs are in gold, outputs are dark blue.

- supports exploration of different possible future rainfall patterns, to see how different investments might play out under different future climate conditions; and
- allows users to vary key assumptions, such as costs or performance of different types of green infrastructure.

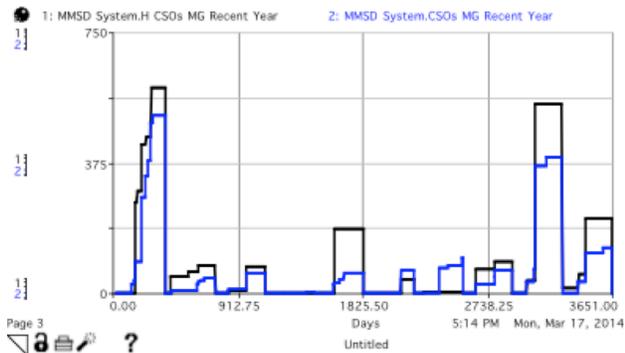
Tool Development and Validation

Because infrastructure choices impact the well being of many groups within a city, the process that is used to develop decision support tools like this one is very important.

Climate Interactive developed the Green Infrastructure Decision Support Tool in consultation with a broad group of partners and advisors in the Milwaukee region, including municipal leaders, civic groups, environmental groups, scientists and the

regional wastewater authority. These groups guided the selection of which costs and benefits would be most of interest to the citizens of Milwaukee, and they provided the datasets and analysis that underpin the Tool.

This approach of dedicated outreach, careful listening and iterative improvement of the tool has served to produce an underlying computer simulation that reproduces many of the historical patterns observed in the watershed.



When the simulation is driven by historical rainfall, the pattern of combined sewer overflows (blue) matches well with the observed historical pattern (black).

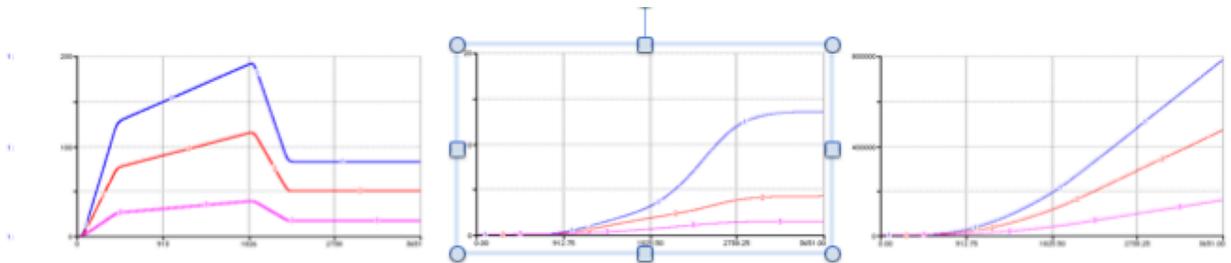
Supporting Whole-Thinking, Collaboration and Innovation

Green infrastructure is a systems intervention that touches on topics ranging from ecology and hydrology to economics, social justice and community wellbeing. The Decision Support approach helps people see what works for the whole system and supports decision makers as they discover the combinations of investments that best serve their goals – for affordability, resilience and community well-being.

In one mode, the tool provides an overview of the ‘whole system,’ helping people see at a glance a full suite of multiple benefits and compare those benefits between different investment options:



For each of the outputs in the Overview Mode, the simulation can also reveal more detailed information, including dynamics over time and differences between scenarios. The simulation makes it easier to understand how storm water systems might perform in response to different future rainfall patterns, as well as the implications for both upfront and operational costs and the non-stormwater benefits that accrue with each scenario.



Green Infrastructure-related jobs (left graph), property values (middle) and fuel/energy savings (right) for three different scenarios of Green Infrastructure Investment (with the blue line showing the highest level of investment in Green Infrastructure and the pink line the lowest).

About Climate Interactive

The biggest challenges facing our lives on Earth are made up of complex, interconnected parts. People need better ways to understand the full picture. Our team at Climate Interactive helps people see what works to address climate change and related issues like energy, water, food and disaster risk reduction. Overall, our easy-to-use, tangible, scientifically grounded tools help people see for themselves what options exist today to create the future they want to see.

Climate Interactive is collaborating with Chris Soderquist of Pontifex Consulting to create the Green Infrastructure Decision Support Tool. Chris is a leadership and system dynamics consultant with extensive experience modeling water system issues. He was lead developer for the UVA Bay Game, as well as co-developer of the Everglades Game.

Contact Information

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