The Green Infrastructure Decision Support Tool – Milwaukee Pilot Project

Helping city decision makers see what works to create resilient stormwater infrastructure

Green Infrastructure
Wetlands, green roofs, rain gardens and permeable pavement can all 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. Solutions like green infrastructure are a source of hope that by responding to climate change, we can also help our communities become healthier, more equitable, and more sustainable places to live and work.

Decision Support 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 in the past. This watershed is one of the most densely populated and highly paved parts of the city.

We have designed the tool to help decision makers in the watershed – 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 in the process.

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

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

**Inclusiveness in 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 selection of which costs and benefits would be most of interest to the citizens of Milwaukee, and many 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. For example, when the decision support tool is driven by historical Milwaukee rainfall, the pattern of combined sewer overflows generated by the tool (in blue in the graph to the right) matches the actual historical pattern (in black). We’ve conducted similar tests against historical data for separated sewer overflows, basement back-ups, and Kinnickinnic River Flooding.

**Supporting Whole-Thinking, Collaboration, and Innovation**

Green infrastructure is a systems intervention that touches on topics ranging from ecology to 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.

The Green Infrastructure Decision Support tool is highly interactive, allowing for rapid testing of scenarios, looking 20 years into the future.

Users explore the consequences of different amounts of investment in green infrastructure solutions (like porous pavement and rain barrel installation) versus investments in grey infrastructure (like pipes, storage capacity, and water treatment capacity).

The simulation makes it easier to understand how the city’s storm water system might perform in response to different future rainfall patterns, as well as the implications for both upfront and operational costs.

The simulation also shows simple indicators of some of the economic and environmental co-benefits of green infrastructure, as the above panel shows for Green Infrastructure related jobs, property values, and fuel/energy savings 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 percent).
Next Steps
Along with continued testing and validation of the Milwaukee Green Infrastructure Decision Support Tool, the project is moving in several directions:

• facilitating outreach and engagement in the Kinnickinnic River watershed in partnership with Sixteenth Street Community Health Centers and the Milwaukee Metropolitan Sewerage Department
• taking the approach to other US cities. Please contact us if your city might be a candidate for our next project. We are particularly interested in applying the approach in cities in different climate zones or with different mixes of green and grey infrastructure than what is found in Milwaukee.
• developing generalized insights and simple tools from the Milwaukee work. Not all cities will have the time and resources to develop customized decision support tools, but we are committed to making as much of the learning from the city-specific projects available as we can.

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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