Case Studies:
Valuing Green Infrastructure Across the United States

Throughout the United States, there is a growing recognition of the benefits green infrastructure provides to communities. Many municipalities have begun to recognize the additional benefits green infrastructure and effectively incorporate these practices. The following case studies illustrate the process these municipalities have implemented and what some of the findings have been.

Aurora, Illinois

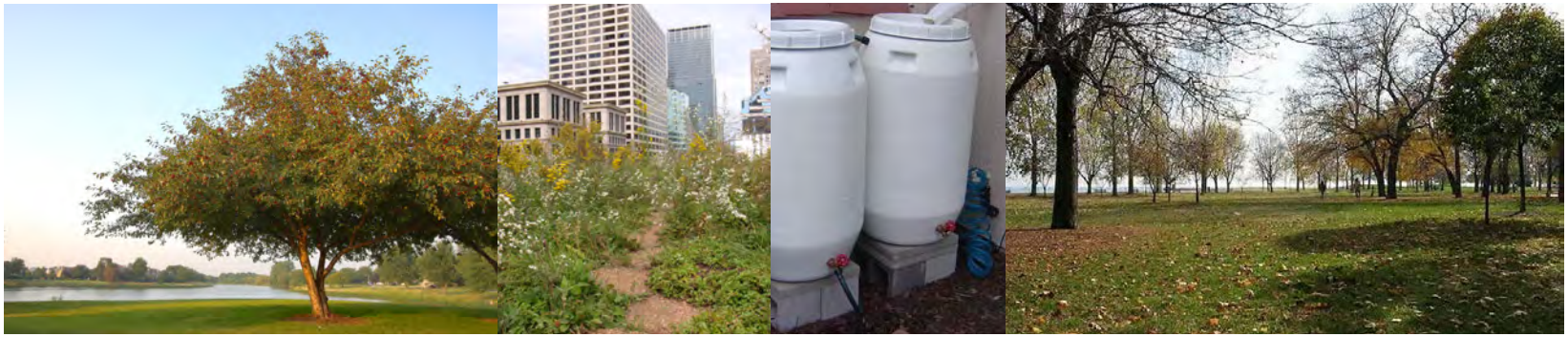
Faced with aging infrastructure, an already impaired local water way and projected population growth, Aurora wanted to strengthen its downtown economy while providing environmentally and economically sustainable solutions to its stormwater management issues.

The City's leaders recognized the potential value green infrastructure could provide in solving some of these issues and began to analyze where GI might be appropriate. The resulting plan, highlighted in Aurora's *Rooftops to Rivers* program, seeks to bring green infrastructure to scale and attain quantifiable, replicable results.

Early estimates conclude that current stormwater runoff issues within the city could be substantially reduced, with "nearly 141 million cubic feet of stormwater (about 1.05 billion gallons) [diverted] from the sewer" (NRDC 2009). These results would yield about $108,632 in annual savings and reduce energy use by 1.37 million kWh, or the equivalent of 990 metric tons (about 2.2 million pounds) of carbon dioxide.

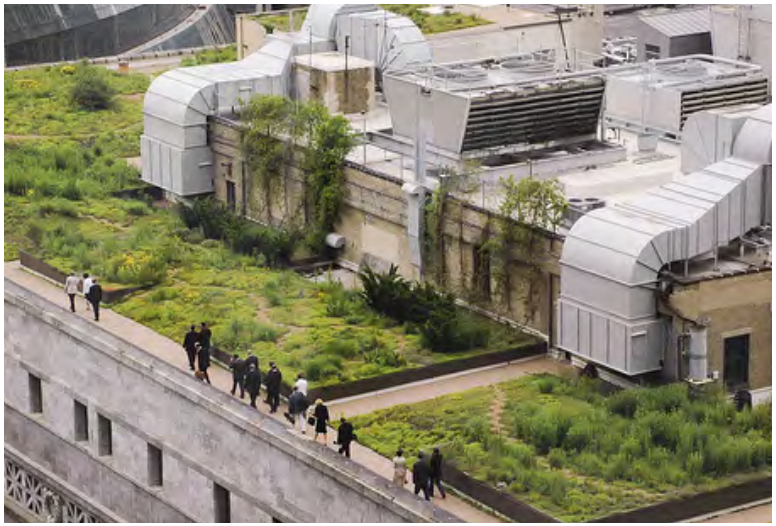
Chicago, Illinois

In an effort to address and plan for the future impacts of climate change, including increased flood risks and public health stresses, Chicago adopted and is currently implementing its *Chicago Climate Action Plan*. The plan emphasizes green infrastructure



(including green roofs, tree plantings and rainwater harvesting) as a strategy for adapting to the risks this region faces as climate change develops (Chicago 2008).

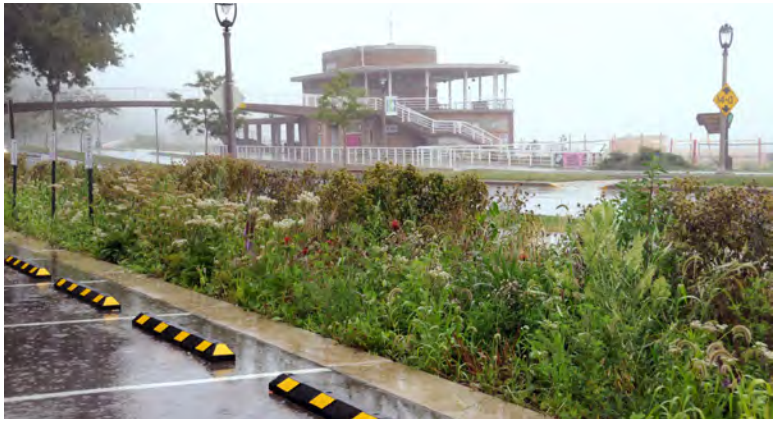
Chicago has also been a leader in promoting urban green roofs due to the combined sewer overflows problems within the region. The 20,000 square foot roof atop City Hall has helped decrease stormwater runoff and improve urban air quality by reducing the urban heat island effect around the site. Since its completion in 2001, the green roof has saved the city $5,000 a year in energy costs (Chicago Green Roofs 2006). Monitoring of local temperatures found that the "cooling effects during the garden's first summer showed a roof surface temperature reduction of 70 degrees and an air temperature reduction of 15 degrees" (ASLA 2003). To date, Chicago has over 400 green roof projects in various stages of development, with seven million square feet of green roofs constructed or underway.



Milwaukee, Wisconsin

In an effort to reduce the occurrence of combined sewer overflows and reduce stress on aging grey infrastructure, the Milwaukee Metropolitan Sewerage District (MMSD) created a program called GreenSeams, which purchases upstream land for infiltration and riparian services. The program makes voluntary purchases of undeveloped, privately owned properties in areas expected to have major growth in the next 20 years. It also purchases open space along streams, shorelines and wetlands.

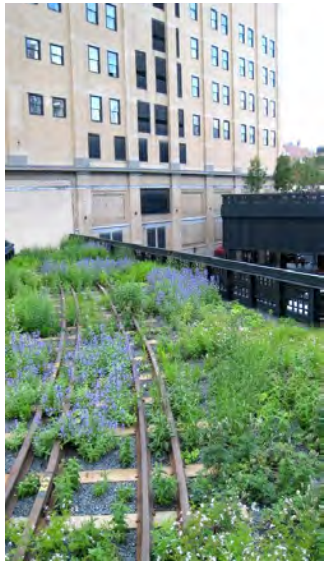
MMSD estimates that the total acreage holds over 1.3 billion gallons of stormwater at a cost of $0.017 per gallon. In contrast, one of its flood management facilities holds only 315 million gallons at a cost of $0.31 per gallon (MMSD 2010). While the comparison is not an apples-to-apples application, Milwaukee has found that, for managing stormwater and its potential flooding and overflow problems in urbanized areas, upstream conservation and the use of green infrastructure is cheaper than capital infrastructure build-out. This type of GI program works to save money for both the utility and its ratepayers.



New York, New York

Like most municipalities across the country, New York City (NYC) faces economic challenges. It must look at new strategies for getting the greatest amount of value out of every dollar invested in infrastructure. Due to its high percentage of impervious surfaces, the city generates a significant volume of stormwater runoff. In addition, NYC's aging infrastructure is under increasing pressure due to current and projected population growth. In an effort to address these issues while providing benefit to its residents, the city has adopted a Green Infrastructure Plan as part of its PlaNYC initiative. The plan presents "an alternative approach to improving water quality that integrates green infrastructure, such as swales and green roofs, with . . . smaller-scale grey or traditional infrastructure" (NYC 2010). One of its goals is to manage 10 percent of the runoff from impervious surfaces in combined sewer watersheds through these detention and infiltration approaches.

Additionally, since 1991, New York City has committed upwards of $1.5 billion toward maintaining and preserving its source waters in the Catskill and Delaware Watersheds (NYC DEP 2006). This initiative has thus far eliminated the need for a filtration plant that could cost as much as $10 billion. The city has not only improved its water quality, it has reduced the potential cost of water supply service to its ratepayers and reduced downstream flooding concerns. It has at the same time increased habitat and recreational opportunities for surrounding communities.



Philadelphia, Pennsylvania

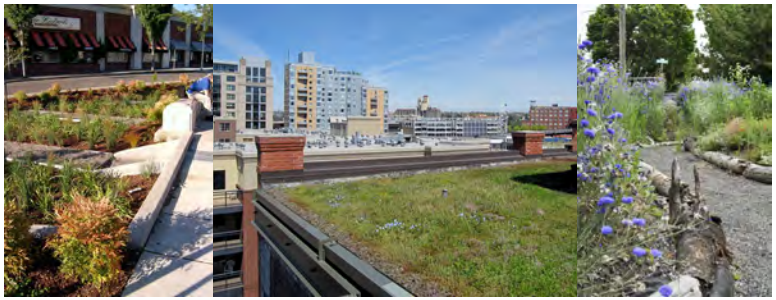
Philadelphia faced the fact that conventional grey infrastructure approaches to managing the region's growing stormwater management issues would be cost prohibitive and would not adequately enable the City to meet its water quality standards. So, it turned to green infrastructure for possible solutions. The City hired Stratus Consulting to do a triple bottom-line assessment comparing traditional and green infrastructure. The final report's analysis shows that the net present-value of the benefits from green infrastructure greatly outweigh those of traditional grey infrastructure. For example, the city-wide implementation of green infrastructure at a 50 percent LID level—an option that would manage runoff from 50 percent of impervious surfaces in Philadelphia through green infrastructure—would provide a net benefit of $2,846.4 million. A 30-foot tunnel—the grey infrastructure option—would provide a net benefit of only $122 million (Stratus 2009).

In seeing the additional value that green infrastructure would provide its residents, Philadelphia has gone on to create a long-term combined sewer overflow control plan that invests heavily in GI initiatives. The program, titled *Green City Clean Waters*, is designed "to provide many benefits beyond the reduction of combined sewer overflows, so that every dollar spent provides a maximum return in benefits to the public and the environment" (PWD 2009).

Portland, Oregon

As in most urbanizing areas, Portland's increasing development has led to greater volumes and velocities of stormwater runoff, which has threatened critical waterways. Combined sewer overflows have also decreased water quality in the region. In search of methods to alleviate these environmental strains, the City of Portland Bureau of Environmental Services analyzed the key ecosystem benefits of replacing traditional grey infrastructure with green infrastructure in their ten year "Grey to Green" program, which encourages innovative stormwater management.

In addition to ecosystem benefits, the city has begun to research the many additional social and economic benefits that GI can provide. For example, in its "Energy and Greenhouse Gases" section, the report calculates the energy savings from the Grey to Green's proposed 43 acres of green roofs. The calculations estimate an annual savings of 63,400 kWh (ENTRIX 2010). The next step would be to translate this energy-savings benefit into a monetary value by multiplying by a price per kilowatt-hour. While as yet no monetary value has been assigned for these benefits, the city is working toward a better understanding of the underlying additional value green infrastructure can provide its communities.



Seattle, Washington

Since the late 1990s, the Seattle Public Utilities (SPU) agency has undertaken a variety of green infrastructure pilot programs including the well-known Street Edge Alternative (SEA) project. This and similar programs aim to reduce and treat runoff impacting water quality and aquatic habitat in the Puget Sound watershed by managing stormwater more effectively at a localized level. With this and other pilot programs, Seattle has collected performance data and made the case for substituting green infrastructure practices for traditional grey infrastructure in urban and suburban areas. For example, SPU estimates that a local street converted to the SEAStreet design saves $100,000 per block (330 linear feet) compared to a traditional street design, while achieving the same level of porosity (35 percent impervious area). In addition to these avoided-cost savings, the program claims these designs have provided additional community benefits such as traffic calming, improved neighborhood aesthetic and bioremediation (SPU 2010).

For more examples of communities implementing green infrastructure practices, please check-out The Conservation Fund's Green Infrastructure Leadership Program, which has assembled an online database of green infrastructure projects being planned and implemented across the country.
http://www.greeninfrastructure.net/content/projects