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It's Not Easy Being Green: Green Infrastructure Measures

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Stormwater runoff is a major cause of water pollution in urban and suburban areas. When rain falls on undeveloped areas, the water is absorbed into the ground and filtered by soil and plants. In developed areas, when rain falls, it hits rooftops, streets and parking lots, and is funneled directly into an underground collection system to the nearest body of water. Because the stormwater is not allowed to infiltrate into the ground and because it travels so quickly through the piped collection systems, it carries trash, bacteria, heavy metals, and other pollutants, degrading the quality of the receiving waters. Additionally, during storm events, the receiving waters will increase both in water volume and velocity of flow, which increases erosion and flooding, damaging habitat, property and infrastructure.

In 2010, New York State revised the Stormwater Management Design Manual to include requirements for Green Infrastructure stormwater management practices for the first time. The EPA defines Green Infrastructure as “us(ing) vegetation, soils, and natural processes to manage water and create healthier urban environments. . . . At the scale of a neighborhood or site, green infrastructure refers to stormwater management systems that mimic nature by soaking up and storing water.”

There are a number of measures that can be taken to ensure that stormwater which falls on a particular site remains on that site until it infiltrates into the groundwater, including but not limited to: downspout disconnection, rainwater harvesting/ rain barrels, rain gardens, bioswales, permeable pavement, green alleys and streets, green parking, green roofs, urban tree canopy, and land conservation.

Downspout disconnection is the removal of the connection between the downspout on a typical residential home and the pipe that brings its runoff to the nearest storm drain. This allows the homeowner to manage the roof runoff onsite, instead of increasing volume in the storm sewer system unnecessarily, and allows the residents to use the water for landscaping if desired.



Rain barrels are a tank for temporary storage of rainwater. Stormwater runoff from the roof of a building is diverted through the downspout into a barrel and stored for later use, such as landscaping or cleaning outbuildings.

Rain gardens such as the one installed at SUNY Orange Middletown are shallow vegetated basins that collect and absorb runoff from rooftops, sidewalks, streets, lawns, and parking lots. Rain gardens mimic natural hydrology by allowing infiltration and evapotranspiration of runoff, and can be installed in almost any unpaved area.



Bioswales are vegetated, mulched, or xeriscaped channels that provide treatment and retention as they move stormwater from one place to another. Vegetated swales slow, infiltrate, and filter stormwater flows. As linear features, vegetated swales are particularly suitable along streets and parking lots.

Green streets, alleys, and parking are simply streets, alleys, and parking areas that incorporate green infrastructure measures to store, infiltrate, and evapotranspire stormwater. A green street, for instance, could include permeable pavement, a rain garden in the median, and bioswales at either curb instead of gutters.



Urban tree canopies are goals set by municipalities to ensure that denser areas retain the benefits of tree cover. Trees reduce and slow stormwater by intercepting precipitation in their leaves and branches. Of course trees provide other benefits, such as natural cooling through shade, and can increase effectiveness of permeable pavement options through slowing the rate at which stormwater hits the ground.

Green roofs such as this one are covered with growing media and vegetation that enable rainfall infiltration and evapotranspiration of stored water. They work particularly well in denser areas where the land area may not exist at ground level to allow for effective infiltration.

Land conservation naturally decreases the potential amount of stormwater runoff by removing land from the development inventory. By providing conservation areas and limiting the land both on a particular parcel and within a municipality that may be developed, the conservators are reducing the amount of impermeable surfacing that will cause the negative impacts of stormwater runoff, such as erosion and flooding.