Green Infrastructure

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Residents who live in Syracuse know one thing for sure: it rains and snows quite a lot. Most people joke about the weather in Syracuse being very unpredictable, and when weird stuff happens it is written off as normal atmospheric conditions. The city was even dubbed, “The Snowiest City in America,” by The Weather Channel for the lake effect snow we enjoy so much. (Coin, Glenn) For winter sports fanatics, the snow is great, and for kids the puddles are fun to splash in. But the reality is, the streams, rivers, and lakes in our city aren’t having as much fun!

When the snow melts and rain events occur, water must flow somewhere. The reality is we, as civilized human beings, have constructed our cities with materials that cause storm water to run across roads, sidewalks, roofs, parking lots, and other surfaces because they are not permeable. In a normal circumstance for mother earth, when it rains on undeveloped areas, the storm water particles soak into the ground back into the water table right on site where they fell. Unfortunately, when you build cities with asphalt and concrete, those water particles get diverted somewhere else.
Storm water is a magnet for whatever else may be on the ground in its path. Even if the rain is a small drizzle, or torrential downpour, the storm water runoff brings along with it a variety of goodies that aren’t so healthy for nearby water systems. One of the major problems associated with pollution as a result of run off are cars, because roadways are littered with their oil, grease, metals, coolants, etc. Other forms of pollution are: fertilizers, pesticides, and chemicals from gardens, farms, and sports fields; bacteria from your pets feces and septic systems; loose soil from construction sites and bare ground; accidental spills that leave contaminants on the ground; tobacco spit, and much more. (“Stormwater Runoff..”)

Polluted runoff entering Limestone Creek in Fayetteville, NY
All roadways and constructed spaces are designed with slopes that cause the storm water to flow into a drain, to the side of the road, and anywhere that will prevent big puddles and hazards for vehicles. However in Syracuse we have combined sewer overflows (CSO’s) that make our storm water issue even greater, and the pollution in our waterways to be far worse. A CSO carries both sanitary sewage from homes and business, as well as storm water from the roads. On a normal day, these CSO’s are more than capable of transporting the sewage to the Metropolitan Syracuse Wastewater Treatment Plant. The problem is during larger rain events, when the pipes are not large enough to handle the extra volume. The consequence is pipes overflow and kickback the contaminated sewage mixture on the surface, which finds its way into a local stream. For our city this is Onondaga Creek, Harbor Brook, and ultimately Onondaga Lake. ("Combined Sewer Overflow")

Combined Sewer Overflows (CSO’s)

Onondaga Lake was mistreated for years during industrial age, when highly contaminated waste was poured into its waters. In 1940, swimming was declared to be a dangerous activity, and in the 1970’s fishing was made illegal. Finally in the late 80’s and 90’s, Syracuse was being held accountable. In 1998, the city fell under a Federal Court order to “take steps to reduce and/or eliminate the frequency of CSO events.”

Among the clean-up efforts is an award-winning program called Save The Rain, which began in January 2008 to find alternatives to “gray” infrastructure such as impermeable asphalt roadways. The program targets contaminated runoff and CSO events, and strives to collectively improve the quality of the storm water that flows into Onondaga Lake. (“Onondaga Lake”)
So who cares: why are polluted streams, rivers, and lake a problem? The contaminated storm water collected from one home, or one business seems insignificant, but when you add up the total amount across an entire city the water bodies are threatened. Our drinking water is degraded and fisheries, plant and animal habitats are without clean water which is necessary for their survival. Algal blooms can occur as a result of high concentration of phosphorous and nitrogen that come from farming and other human activities, and cause reduced levels of oxygen for aquatic life. Those toxins are harmful especially for humans if we ingest contaminated fish and drink tainted water. (“The Problem”) 

Aside from the environmental affects, dirty water makes it unsafe for recreational activities such as swimming, boating, fishing, and wading, and takes away from the beauty of water bodies. (“Stormwater”)
“Green Infrastructure,” (GI) is the buzz phrase for the revolution of new building techniques being implemented to hopefully change the trajectory of Onondaga Lake, and other contaminated waterways across the country. Instead of the one-dimensional system of building we used in the past considered “gray infrastructure,” green infrastructure weaves “natural processes” into the urban fabric, and has multiple environmental, social, and economic benefits. As Communities are needing to replace deteriorated infrastructures, they are turning to these sustainable methods as resilient and cost effective solutions. (“Green Infrastructure”)

Currently, Save The Rain focuses on seven forms of GI, helping provide funding for projects around the City of Syracuse and the surrounding suburbs. These seven include: rain barrels, green roofs, rain gardens, porous pavement, bio-swales, cisterns, and tree plantings.

Typical drain inlet that collects roadway pollutants, and sends it to the nearby creek.

Greening the Gray
Save The Rain | Project Examples

Project #1: Fayetteville Lower Village Streetscape Enhancements
- Porous Pavement
- Pavement Reduction
- Rain Gardens
- Tree Planting

Project #2: East Washington Street Green Corridor
- Porous Interlocking Pavers
- Bioswales

Project #3: Westcott Community Center Project
- Porous Pavers
- Rain Barrels

Project #4: SUNY-ESF Centennial Hall
- Infiltration Trench
- Cisterns
- Bioswales
Fayetteville, New York: Lower Village Streetscape

The Fayetteville Lower Village street enhancements project was a multi-faceted project geared towards pedestrian improvements and storm water management. A handful of “green” technologies were implemented in an effort to reduce the amount of water flowing into limestone creek. Along with rain gardens, porous pavement in the parking areas, tree plantings, and flexi-pave (porous material made from recycled rubber tires), the project included table topped intersections and sidewalk bump-outs, to slow vehicular traffic. The goal was to make the area more pedestrian friendly, and environmentally conscious. There are future plans to implement nine rain barrels to the businesses located along this corridor.
Capture Area: 76,900 sq. ft.
Runoff Reduction: 933,000 gallyr

This project along East Washington Street near the Center of Excellence showcases a number of green infrastructure technologies to improve the storm water capture, and raise the aesthetic of the surrounding landscape. An underground infiltration trench was dug out, parking lanes with porous pavers were implemented, and bioswales were placed along both sides of the road to capture runoff and hold it on site. The project is still being completed, and includes new sidewalks and pedestrian crossings.
The Wescott Community Center project was part of a larger effort by Save The Rain in 2012 that encompassed parks within the combined “sewershed.” The patio with impervious pavers and compacted soils was replaced by new porous pavers. The space was designed to handle runoff from the Center’s roof, as well as runoff from Wescott Street. The rear of the building showcases rain barrels which also collect runoff from parts of the roof, which will be used to water the properties gardens and lawn.
The first dorm to be built for this environmentally conscious college of course included several green infrastructure technologies to ensure the motto, “We Practice What We Teach.” An infiltration trench was dug out, a system of cisterns was provided, and bioswales were put in to reduce the storm water runoff generated by the new building. The back parking lot area was also part of a bio-retention plan, but is being replaced by an addition to the dorm.
Issues, Concerns & The Future of Green Infrastructure

As a result of these green infrastructure techniques being quite new, there is much to be learned and improved upon. There are still major questions whether or not they work to their contracted capacity. Many people are still hesitant to implement them because of how unfamiliar they are with how to maintain them, which is currently one of the biggest concerns.

How does porous paving stand up to freezing and thawing during winter months? How do you prevent the pores from clogging up? How do you ensure that rain gardens, bioswales, etc., are functioning to their greatest potential? These are just a few of many questions that will be slowly answered with time. Hopefully these technologies will eventually become mainstream building methods at a level where everyone involved is comfortable with their use.

http://therapidian.org/watershed-moment-stormwater-management-grand-rapids

Works Cited


*For all other information on Save The Rain and the project examples discussed here, please refer to their website: http://savetherain.us