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Catalyzing a Business Response to Michigan's Deficient Green Stormwater Infrastructure

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When it rains on impervious surfaces, such as roads, parking lots, and roofs, stormwater runs off and flows overland into storm drains and directly into local waterways. The storm drains connect to an underground storm sewer network, referred to as gray infrastructure as a reference to the color of concrete of which much of this infrastructure is comprised. Stormwater runoff is a major source of water pollution in urban areas since it carries trash, bacteria, nutrients, heavy metals, hydrocarbons, and other pollutants that it picks up along the way and deposits into local waterways.

As an alternative to gray infrastructure, communities are starting to implement green stormwater infrastructure (GSI) as a mechanism to manage stormwater and bolster the capacity of their gray infrastructure to manage increasingly intense rainfall events. GSI uses vegetation, soils, and natural processes to manage stormwater runoff closer to where it falls (EPA, n.d.). In other words, GSI mimics the natural water cycle by promoting infiltration, evapotranspiration, and rainwater storage as shown in Figure 1. This creates healthier urban environments by providing flood protection, cleaner air, cleaner water, and diverse habitats in an otherwise ecologically sterile area.

FIGURE 1 - GSI MIMICKING THE NATURAL WATER CYCLE BY PROMOTING INFILTRATION, EVAPOTRANSPIRATION, AND RAIN WATER STORAGE.

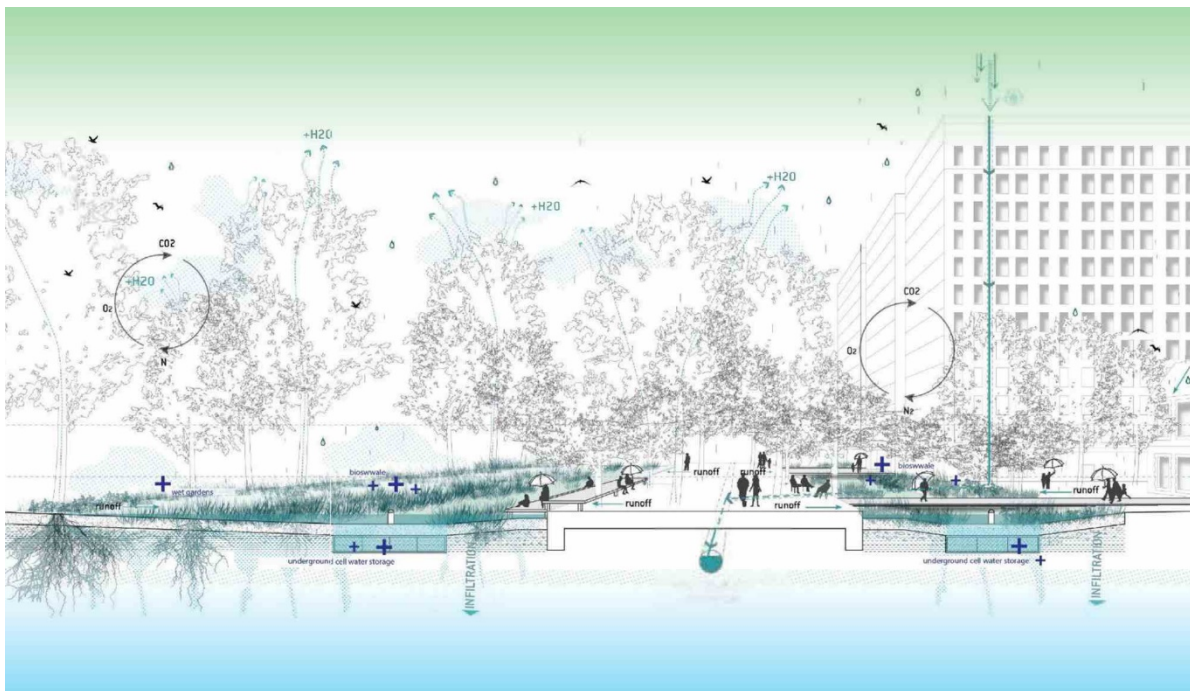


Illustration by Agence Ter - Akoaki, LLC.

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There are numerous examples of planted and engineered GSI including rain gardens, bioswales, native landscaping, planter boxes, street trees, infiltration trenches, vegetated roofs, porous pavement, and stormwater treatment wetlands. Each of these can play an important role in stormwater management and community implementation based on numerous factors including regulations, existing infrastructure constraints, cost, maintenance concerns, community acceptance, pollutant loads, and stormwater volume. For example, a rain garden is a shallow depressional area in the landscape that uses an amended planting soil mix and native plants to capture and treat stormwater runoff. The planting soil mix provides open pore spaces for stormwater storage and pollutant capture; and native plants are important because of their deep root structure, hardiness, adaptability to changing conditions, and the ability to provide habitat for native fauna. Rain gardens are a very economical way to treat stormwater, but they require significant ongoing landscaping maintenance to remain aesthetically pleasing.

Watershed organizations throughout Michigan include programming for education on and implementation of GSI practices. A watershed is the area of land that drains into a waterbody, such as a river, lake, or stream. Groups organize around the management of that watershed land area, because what happens on land flows into and affects nearby waterbodies. In West Michigan, there are groups that focus on the Grand River ([Lower Grand River Organization of Watersheds](#)), Plaster Creek ([Plaster Creek Stewards](#)), and the Rogue River ([Trout Unlimited](#)), for example.

In Southeast Michigan, four watershed-focused groups have formed a collaborative to develop an earned-income model for programming around GSI products and services. Led by the [Friends of the Rouge](#), the Southeast Michigan Green Stormwater Infrastructure Collaborative (Collaborative) also includes the [Huron River Watershed Council](#), [Friends of the Detroit River](#), and the [Clinton River Watershed Council](#). The Collaborative's goal is to develop joint, coordinated programming that will reduce redundancies and increase efficiencies in program and service delivery. A team of experts from [West Michigan Environmental Action Council \(WMEAC\)](#), [Grand Valley State University \(GVSU\)](#), and [Drummond Carpenter](#) is working with the Collaborative on a marketing analysis and business plan. While specific contractors and suppliers are focused on GSI implementation and construction, there remains a significant gap in the business response to GSI production. The Collaborative is aimed at exploring how a group of nonprofit organizations can collectively fill these gaps as the business community transitions from a focus on gray infrastructure to GSI. Since pollution and stormwater's role in dispersing it are systemic issues that can impact all communities and stakeholders, the issues discussed in this research are widely applicable in many geographic areas.

GSI is essentially aimed at preserving a public amenity (waterways), and the Collaborative's initial focus was to identify gaps in the private business response to a need for GSI. Next, GSI related products and services were identified that are both in demand and could be delivered or facilitated by the nonprofit Collaborative. To accomplish this, the Collaborative hosted an exploratory listening session on September 17, 2021. Each Collaborative organization sent representatives to this session, and the listening session also included government officials (i.e. Water Resources Commissioner staff), regional planning staff, consultants, and GSI contractors who work in a five-county region of Southeast Michigan.

Findings

The diverse groups engaged in this listening session raised several issues that are potentially applicable to GSI facilitation. Perhaps the most obvious was that knowledge of GSI amongst the public is deficient. As an example, one participant commented that Detroit recently mandated disconnecting downspouts from storm sewer systems, but there is no auditing or tracking of compliance. Just as importantly, disconnection of downspouts may cause water issues that require the addition of GSI. Several participants commented that many landscape contractors focus primarily on turf grass, and they don't understand GSI methods or the fundamentals of GSI function. One participant related tales of GSI infrastructure being destroyed or mowed down because the landscape contractor didn't understand its purpose or perhaps even know of its location. This raised significant discussion on the need to clearly mark GSI installations along with the need for maintenance and protection of existing GSI.

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This discussion organically flowed to explore issues associated with maintaining existing GSI installations. While the contractors involved in the discussion would undertake maintenance of GSI, construction demand makes them reluctant to engage in maintenance as they are busy with more professionally attractive and lucrative activities. This issue is expected to become more significant as the labor shortage is limiting to many small businesses. The discussion of maintenance also brought back the idea that there is little to no monitoring of GSI locations and performance, and GSI practices can exist outside of the knowledge of property owners, governing authorities, or individuals who maintain the property. Finally, significant agreement was voiced that as existing GSI installations age, the importance of maintenance will increase dramatically.

A closely related discussion revolved around the importance of understanding GSI and stormwater management holistically. Stormwater isn't an individual property owner's concern; it impacts entire communities. One property owner's stormwater management action, or lack thereof, impacts neighboring stormwater remediation needs. While certain entities within the five-county area have made initial efforts to catalog and track GSI installations, there is no complete, common, or official database showing the locations and types of extant GSI to provide a holistic portrait of green stormwater management.

Perhaps the most actionable concept involved the need for a local source of native plants. All three types of stakeholders (contractors, government staff, and collaborative employees) seemed to agree that there is a need for a local source of native plants in Southeast Michigan. While some of the collaborative organizations do offer native plants as a product, these are provided on a very restricted schedule and they are sourced from a distant provider. The contractors specifically lamented the lack of a local source for native plants, stating that most are ordered from Illinois or Wisconsin. Local nurseries and retailers don't seem to understand or see the benefits of native plants, but most participants have noted an increased interest in native plants amongst the public. A local source would better fit the spirit of what is driving the Collaborative to explore GSI projects.

The final, and perhaps most important insight originated with the government employees in attendance. These individuals agreed that the demand for GSI infrastructure and construction will likely increase dramatically in the near future. Regional standards began requiring a volumetric reduction in stormwater beginning in 2018, and GSI represents an attractive means to meet these goals. As these practices become more standardized and understood by both the public and developers, the testing, implementation, tracking, and maintenance of GSI's will all become more important.

Implications and Opportunities

While our focus was on Southeast Michigan, there are several results that may be equally applicable to West Michigan. The government participants indicated that regulation is driving demand for GSI, and they suggest that this will increase dramatically in the near future. While local stormwater regulations in West Michigan may differ, these regions share many similarities. The fact that both regions contain multiple watersheds that drain urban areas into a Great Lake is significant, and information sharing between regulators is common. Preemptively thinking about potential GSI regulation may facilitate faster or better uptake of GSI in West Michigan.

The lack of a local supplier in Southeast Michigan for native plants also has ramifications for West Michigan. While a West Michigan nursery specializing in these plants wouldn't be local from Detroit's perspective, it would be much closer than Illinois or Wisconsin. A plan to grow and market native plants in Southeast Michigan can potentially be used as a template for opening a similar operation in West Michigan. There are numerous watershed and water-focused environmental groups in West Michigan who might collaborate in a manner similar to those in the east for the same purpose.

The tracking and cataloging of GSI installations are issues where West Michigan might learn from the five-county focus of the study. The government employees in our sessions raised this as a significant issue as "we just don't know what is out there." As these systems get older this is likely to become an increasingly important issue. If no one knows where these systems are located, it is difficult to inspect or maintain them. If a system fails, it may require several significant

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weather events before stakeholders realize the cause of the issue. In this particular area, West Michigan is actually ahead of our colleagues across the state as the City of Grand Rapids and LGROW are actively working to populate a database of these installations. From a policy perspective, it is important that this database is both complete and easily accessible as it may be influential in maintaining a consistent level of green stormwater performance over time. As funding will likely become scarcer, maintaining focus and the dollars devoted to this project are important considerations. Second, developing a proactive plan for how this database will be used is important. When will each type of installation be inspected? What are the expected levels of performance for each type of installation? What is the process for remedying a non-performing installation? These are all questions that can and should be answered in conjunction with the completion of the database.

Conclusion

There is already substantial collaboration between municipalities, watershed organizations, and water quality advocates in West Michigan on GSI education and implementation, and GVSU and WMEAC have been working on making the business case for environmental assets and GSI for more than a decade (Isely et al, 2010; Isely et al, 2018; Nordman et al, 2018). Stormwater runoff is the largest source of pollution in our local waterways (McMahon, 2016). With our changing climate, we can anticipate more rain, more often. We will all need to take a larger role in managing stormwater, and the Collaborative's efforts to catalyze a business response that facilitates GSI in Southeast Michigan can have significant benefits statewide.

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