Follow-up: Addressing Stormwater Management through Community-Driven Green Infrastructure Design

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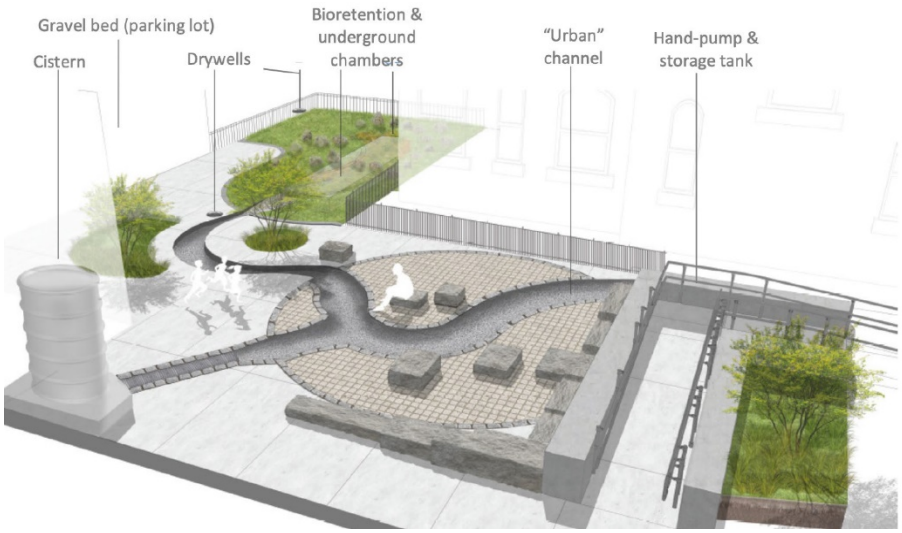
On Wednesday, April 28th, 2021 SNEP hosted a webinar on "Addressing Stormwater Management through Community-Driven Green Infrastructure Design". Presenters included Mark Voorhees with EPA Region 1, Stacey Eriksen with EPA Region 8, Kelly Boling with the Trust for Public Land, and Kate England with the MA Department of Conservation and Recreation. This article provides a recap and continuation of that discussion.

Stormwater infrastructure is a necessary service that most urban and suburban cities and towns provide to prevent flooding from overland runoff. Traditional stormwater systems include "grey" infrastructure that directs rainfall and snowmelt off streets toward a low point along paved surfaces where it is collected, piped, and released into a nearby lake, river, estuary, coastal water, or ground water. As storm runoff moves across these paved surfaces it picks up natural and man-made pollutants like trash and debris, oil, gasoline, pet waste and lawn fertilizer. If left untreated, this runoff can have harmful impacts on local water quality including drinking water and aquatic life; increase community health risks from water-based recreation; and lead to unsightly conditions that may diminish property values.

As more land becomes developed and paved, leaving fewer avenues for stormwater to enter the ground, stormwater systems can struggle to handle this influx of water, which causes stormwater runoff to back up into streets during heavy storms. Lack of maintenance can also contribute to clogged storm drains exacerbating stormwater runoff problems. As climate change leads to more extreme weather events, the potential for flooding and impacts to water quality are expected to increase. Traditional grey infrastructure is widely prevalent throughout the nation and has served many communities well since its inception.

However, for those communities with systems ready to be replaced or under new development, green infrastructure (GI) offers an opportunity to prevent flooding and even provide additional local benefits. As our panelists discussed in detail during our most recent webinar, while grey infrastructure has been our history, green infrastructure can be our future; especially when designed with input from the communities they serve.

The goal of traditional grey infrastructure is straightforward: move water off surfaces as quickly as possible. While this is immediately successful in the prevention of community flooding, these systems miss out on the opportunity of replenishing local groundwater storage by shuttling rainwater away from where it initially fell, which can have ecological impacts over time. Green infrastructure designs are now being used across the SNEP region country to divert runoff to land areas where it is afforded time to infiltrate into the ground and replenish groundwater where it fell. These structures



Mockup of the GI project at the BPS Rafael Hernandez K-8 school presented by Kate England

vary in size and design and are adapted to fit the system requirements of the space.

GI practices can take the form of planted and landscaped vegetation like raingardens planted with trees, shrubs, and perennials, or swales and infiltration basins through which stormwater can easily penetrate; and have the benefit of being entirely modular. Like grey infrastructure, GI systems are capable of channeling stormwater; but by providing local storage and time for stormwater to slowly pass through layers of vegetation and recharging groundwater, GI provides the additional benefit of naturally removing pollutants and keeping water local.

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When multiple systems are incorporated throughout a given area through deliberate urban landscape planning, green infrastructure can provide additional tangible and even intangible benefits to local communities by providing access to more natural settings – especially in areas where green space is severely lacking, or where increased ambient heat is a persistent problem. GI can provide a natural cooling effect when street trees are used to capture runoff and also provide shade to hot summer streets, reducing their ability to trap heat from the sun and radiate it back out to the surrounding environment (known as the Urban Heat Island effect).

During SNEP’s recent webinar, several speakers discussed the importance of maximizing the knock-on benefits of GI by involving residents in the design of local green infrastructure projects at the outset; and the available tools to support these efforts. As Mark Voorhees presented during the webinar, SNEP, the SNEP Network, and EPA Region 1 are working with the UNH Stormwater Center to update existing tools to assist municipalities in determining the best type of GI applications for their sites. Current tools include the UNH BMP Performance Calculator, the BMP Crosswalk, and the SNEP Network Stormwater Retrofit Manual, which is in the final stages of development.

While GI holds many benefits for restoring our waterways, some municipalities are using GI to realize additional benefits by bringing residents into their design process to get their input at the outset. Stacey Eriksen of EPA Region 8 based in Denver described their efforts to gain input in GI projects, and depending on the make-up of the community, the importance of providing additional services for non-English speakers. Additional accommodations included public meetings that provided translators, visual aids, large photographs, and design mock-ups to clearly depict the proposed project. With respect to the Westerly Creek project in Denver, CO (which also included the Trust for Public Land (TPL)), even children were given the chance to describe what they would like most out of a given space.

In fact, children proved to be an enormous asset to several of the projects described during the webinar. Kelly Boling of TPL described the process that his team underwent to work with schoolchildren at the Chittick School in Hyde Park, MA to redesign their paved parking lot into a fun, useable space. The kids understood the task and were able to contribute to the design of a functional space that was fun and allowed them to interact with their landscape. “They really were the experts,” said Boling of the

schoolchildren, "they had a very elaborate understanding of the site that we never could have had, had we gone in and started making decisions without them."

Community Process with Public Meetings

1st Meeting: Vision Boards and Large Comment Boards with Markers

- Design team presents vision boards: images of past projects, demonstrating what's possible, and allows community members to draw/write on these posters to give their feedback of what they like and what they don't.
- Synthesized feedback into several options

2nd Meeting: Summary of Meeting #1 and Sticker/Sticky Note Activity

- Those options were commented on further and community members voted for their favorite concepts and provide further feedback.
- Previous comments synthesized and three conceptual designs were prepared.

3rd Meeting: Present Results to the Community

- Conceptual designs were presented and voted on by community members

Community meeting process that Kate England outlined during her webinar presentation. Communities were involved in the design process from start to finish – from conceptualization through initial design.

Kate England of the MA Department of Conservation and Recreation described a similar experience at the Rafael Hernandez K-8 School project that she was involved during her time at the Boston Water and Sewer Commission. The Boston Public School System worked with Kate's team to redesign the paved play area at the Hernandez school. Kate's team took advantage of this opportunity by creating a stormwater curriculum that teachers could use to educate their students about the new space and how stormwater moves through it. One such feature to come out of this redesign is a water cistern with a hand pump that releases previously captured stormwater through the system (shown right). Water flows through channels designed to mimic paved, impervious surfaces common in urban spaces, and to "greener" spaces to demonstrate how GI design can better facilitate stormwater management in a manner that's more beneficial to the environment. Kate mentioned that the students' favorite thing to do after a rainstorm was to run outside and pump the water through the space that they helped design. "Get the kids involved" said Kate during her presentation, "they have great ideas, they have lots of energy -- lots of passion, and they're going to tell you [when you're not doing something right]."

Together these presenters described the positive outcomes of involving local community members from the outset. Opportunities abound; and their full potential can be realized through a community-centered approach. EPA's SNEP Network provides no-cost technical assistance to municipalities, tribal nations, and local organizations to address a variety of needs, including green infrastructure. To learn more about their services and the many benefits green infrastructure can provide contact Martha Sheils, the SNEP Network Director, or visit the SNEP Network website.

For more information on community-driven green infrastructure design, please refer to our recorded webinar on the SNEP website or reference the contact information and slides from our presenters here.