

Community-Science Partnership to Enhance Stormwater Management and Equity





Stormwater Risks and the DFW Metroplex

- Rapid urbanization compounded by climate change accelerates **stormwater flooding**, often beyond the capacity of communities to respond with traditional infrastructure
- Our project seeks to address this challenge by through innovative **community partnerships and technical tools developed to support adaptive stormwater infrastructure and management**

Blue-Green Infrastructure: Opportunities

- Blue-green infrastructure (BGI) is a globally recognized **“nature-based” alternative to traditional stormwater infrastructure**
- BGI includes ecological urban landscapes and engineered systems that span urban forests to retention ponds, bioswales, blue-green roofs, and rain gardens
- BGI supports urban resilience through better management of naturalized water-flows and localized stormwater funding
- Co-benefits include **on-site pollutant and nutrient uptake** from stormwater, **biodiversity protection**, **urban heat island mitigation**, and **air quality improvement**

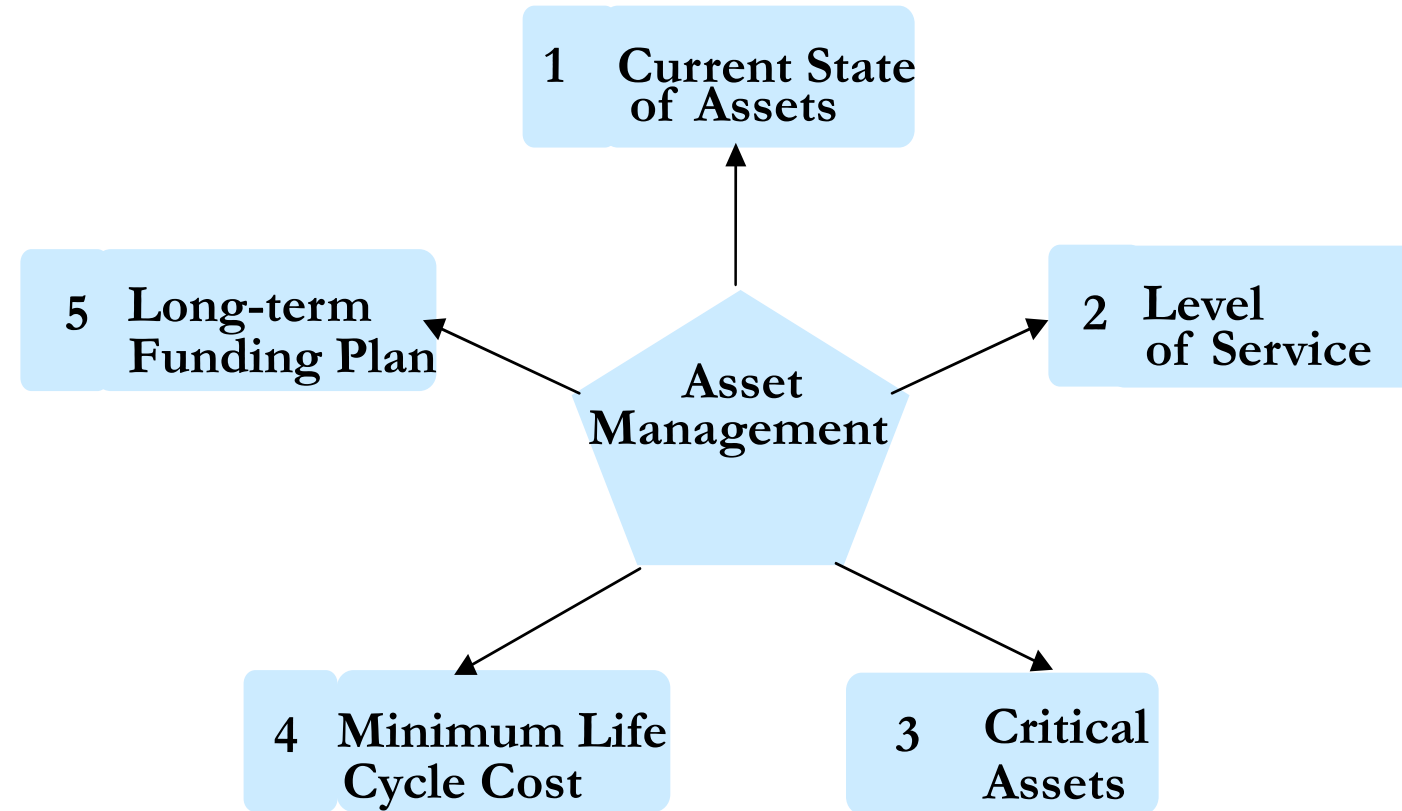


Blue-Green Infrastructure: Challenges

- Research shows that the **challenges of funding, expertise, and equity** can undermine efforts to sustain BGI investments over time
- Financing and mobilizing long-term BGI maintenance labor has proved difficult in many contexts, sometimes creating conflicts with local communities



What is Asset Management



GAM and CGAM Evaluation forms

Regular Inspection and Maintenance Guidance for Bioretention Systems	
Maintenance of bioretention systems and tree filters can typically be performed as part of standard landscaping. Regular inspection and maintenance is critical to the effective operation of bioretention systems to insure they remain clear of leaves and debris and allow free draining. This page provides guidance on maintenance activities that are typically required for these systems, along with the suggested frequency for each activity. Individual systems may have more, or less, frequent maintenance needs, depending on a variety of factors including the occurrence of large storm events, overly wet or dry conditions (I.E., drought), regional hydrologic conditions, and the upstream land use.	
Score, description 0, Continue routine maintenance/NA 1, Minor Issues observed, needs attention 2, Major Issues observed, requires immediate attention 3, Failure	
Inspection Activities: common maintenance activity is the removal of leaves from the system and bypass structure. Visual inspections are routine for system maintenance. This includes looking for standing water, accumulated leaves, holes in the soil media, signs of plant distress, and debris and sediment accumulation in the system. Mulch and/or vegetation coverage is integral to the performance of the system, including infiltration rate and nutrient uptake. Vegetation care is important to system productivity and health.	
ACTIVITY	FREQUENCY
Check to ensure the filter surface remains well draining after storm events. Remedy: If filter bed is clogged, draining poorly, or standing water covers more than 15% of the surface, then remove top few inches of discolored material. Till or rake remaining material as needed. A record should be kept of the time to drain for the system completely after a storm event. The system should drain completely within 72 hours.	After every major storm in the first few months, then annually.
Check inlets and outlets for leaves and debris. Remedy: Rake in and around the system to clear it of debris. Also, clear the inlet and overflow if obstructed.	Quarterly initially, then annually.
Inspect inlets and outlets to ensure good condition and no evidence of deterioration. Check to see if high-flow bypass is functioning. Remedy: Repair or replace any damaged structural parts, inlets, outlets, or sidewalls.	
Check for animal burrows and short circuiting in the system. Remedy: Soil erosion from short circuiting or animal burrows should be repaired when they occur. The holes should be filled and lightly compacted	
Check to insure the filter bed does not contain more than 2 inches accumulated material Remedy: Remove sediment as necessary. If 2 inches or more of filter bed has been removed, replace media with either mulch or a 50% sand, 20% woodchips, 20%	

Community Green Asset Management Tool – 1.0 Beta Testing and Feedback 25 Feb 2023

Scoring

1	Strongly Agree
2	Agree
3	Neutral
4	Disagree
5	Strongly Disagree
-	Not Applicable

	Date of Inspection:			
	Location:			
	Asset type (drop down menu) or location (based on ArcGIS)			
		Score (1-5)	Weighted Score*	CGAM
Code	A. Level of Service			
	Education and Learning			
A1	- Clear and accessible signage supports community understanding of the site's ecological benefits.			
A2	- Site is designed to provide opportunities for community environmental education.			
A3	- Accessibility to the site (trails, walkways, access points, etc) are operational and accessible.			
A4	- Access points are visible and clearly marked.			
	B. Current State of BGI Asset - Summarizes and identifies the current condition of the asset			
	Plant selection			
B1	- Annual plant selection appropriate for local conditions			
B2	- Perennial plant selection is appropriate for the local conditions			
B3	- Seasonal plant diversity is appropriate for the local environment and			

Developing a Community Green Asset Management Tool

- We seek to address these challenges by incorporating community priorities into an **asset management framework for BGI**
- This approach manages infrastructure assets by minimizing costs of owning, operating, and maintaining them
- Recognizing the value of this approach for for BGI, our community of practice will conduct a series of stakeholder workshops to develop and pilot a **Community Green Asset Management (CGAM) Tool** that reflects local concerns, priorities, and values associated with BGI maintenance



Piloting a Regional Vision

- Our project's initial phase, from October 2022 through April 2023, will pilot this work in the City of Denton. Our research team will convene a **Community Science Working Group**, which will include representatives from the City of Denton and key environmental and community groups, to guide the work
- This group will plan and execute a series of **workshops for local stakeholders** to develop, refine, and evaluate the CGAM Tool for the city
- The project aims to reduce local stormwater flooding, establish new community connections, and launch the tailored CGAM tool for the City of Denton

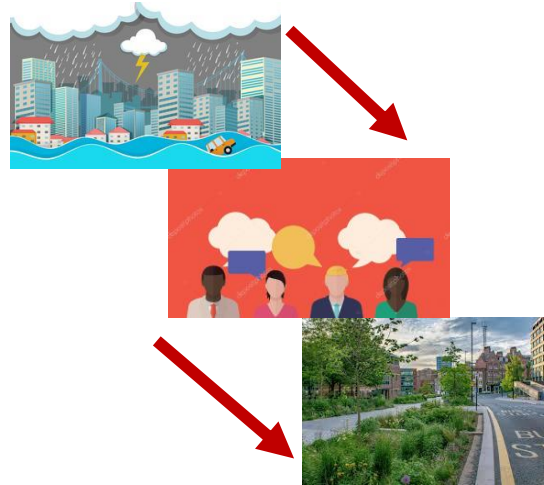




Community-Science Partnership to Enhance Stormwater Adaptation under Climate Change

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Research disciplines: Urban Planning, Public Administration, Geography, Civil & Environmental Engineering; Biological & Agricultural Engineering

Project Challenge: How to *overcome institutional barriers* that limit large-scale and equitable implementation of blue-green infrastructure (BGI) to enhance stormwater adaptation under climate change

- Municipalities leave BGI out of planning, budgets and maintenance plans because they are considered landscapes not assets
- Communities benefit unequally and have diverse priorities and values that are **commonly left out of BGI planning and implementation.**

Vision for a Stage 2: *Small institutional innovation can lead to big change*

We seek to develop a set of innovative tools for **communities to engage in collaborative urban governance** to increase public acceptance of nature-based solutions and public investment.

- Monitor and analyze effectiveness of the tool developed during the Stage 1 pilot
- Advance other needed tools for community-based BGI siting, priority setting, and planning (depending on CWSG)

Stage 1 Activities: Institutional innovation to increase public acceptance and public investment & maintenance in BGI

- Co-design, execute and assess a **pilot community-based green infrastructure asset management (C-GAM) tool**, which is modeled after other municipal asset management frameworks, to open new pathways for communities to directly participate in decision-making related to BGI installations across municipalities.
- **Community-Science Working Group** of research team and community BGI champions for change to guide C-GAM development and co-create Stage 2 Proposal

Developing a Community Green Asset Management Tool: Pilot Project

- We seek to address these challenges by incorporating community priorities into an **asset management framework for BGI**
- This approach manages **infrastructure assets** by minimizing costs of owning, operating, and maintaining them
- We will develop and pilot a **Community Green Asset Management (CGAM) Tool** that reflects local concerns, priorities, and values associated with BGI maintenance




Community Green Asset Management Tool

Project Challenge: How to *overcome two institutional barriers* that limit large-scale and equitable implementation of blue-green infrastructure (BGI) to enhance stormwater adaptation under climate change:

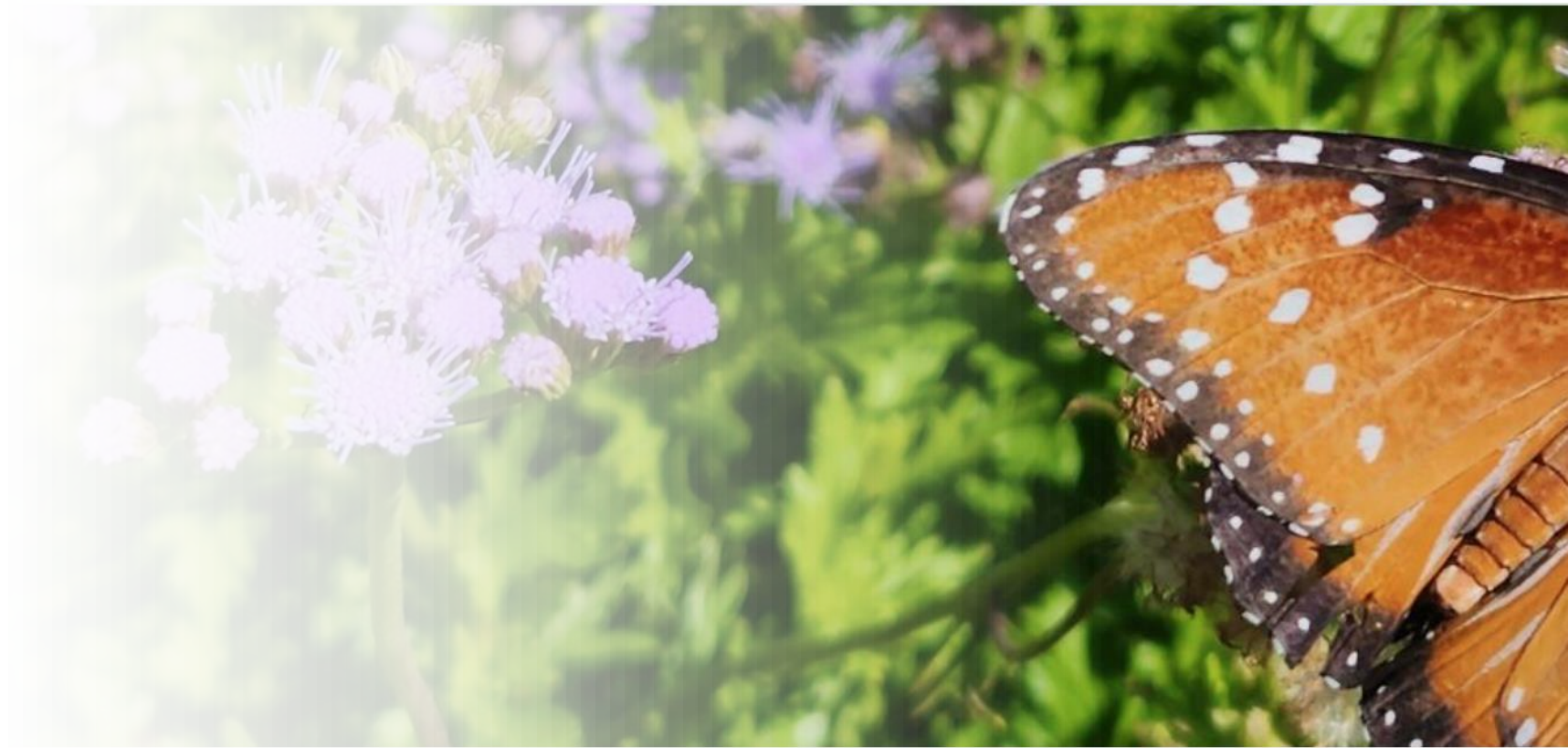
- 1) Municipalities leave BGI **out of planning, budgets, and maintenance** because they are considered amenities not infrastructure assets.
- 2) Communities benefit unequally and have diverse priorities and values that are **commonly left out of BGI planning and implementation**

Co-design, execute and assess a **pilot community-based green infrastructure asset management (C-GAM) tool**, which is modeled after other municipal asset management frameworks, to open new pathways for communities to directly participate in decision-making related to BGI installations across municipalities.





Online Interactive Platform (Hub)



Current Storymap Example:
<https://arcg.is/1ePDLm0>

CIVIC Innovation: Dent

Nature-based solutions to flooding and water quality
in North Texas

Hub Platform:

Interactive tools for co-development of data with local communities

- Community Citizen Science Projects
- Educational Modules
- Training Workshops
- Interactive Signage
- K-12 and Undergraduate classroom materials



Blue-green Infrastructure (BGI) site in downtown Denton, TX

Flooding is a concern in cities all over the country, especially in areas with rapid growth. Some of these cities, like Denton, are using nature-based solutions to help solve the problem.

By installing green spaces - like strips between roads full of native plants or trees, or driveways with porous pavements, or low-lying areas with rock channels or mulch - instead of concrete to slow down water, these sites can greatly reduce flooding. Creating places to allow water to sink into the soil limits flood damage to nearby homes and businesses, and helps that water to go back into our rivers and lakes, improving water quality in the process.

Sounds like a win-win, right? Not everyone agrees. Despite growing evidence of success for flood control and water filtration, getting support to build these sites can be challenging. To explore these challenges, we're putting together a team of community stakeholders to share their perspectives about existing and future sites for Denton.

C-GAM Tool for BGI - Pilot Testing

C-GAM Survey Tool 1.0

Prototype of the C-GAM survey evaluation tool for pilot testing by CIVIC Volunteers.

<https://survey123.arcgis.com>



This project is funded by the National Science Foundation

For more information about the CIVIC Innovation project in Denton, fill out the interest form below to join our mailing list

CIVIC Innovation Denton BGI Project Interest Form

Sign up here to receive additional information and project updates.

<https://survey123.arcgis.com>



Have data to contribute to the project? Fill out the survey below and it will appear on our community map!

Denton BGI Site Survey - CIVIC Project

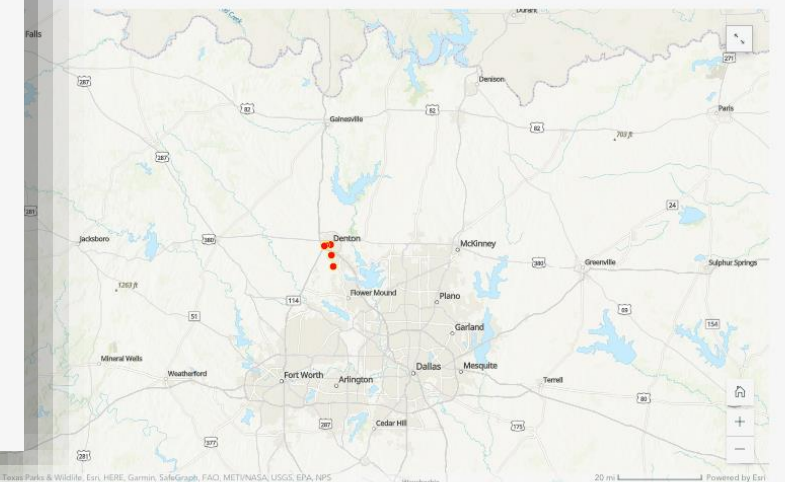
Description content for the survey

First Name*

Last Name*

Date (of site visit)*

Denton Area BGI Site Survey



Want to learn more about Blue-Green Infrastructure?

Click on the Resource Library below to find online resources