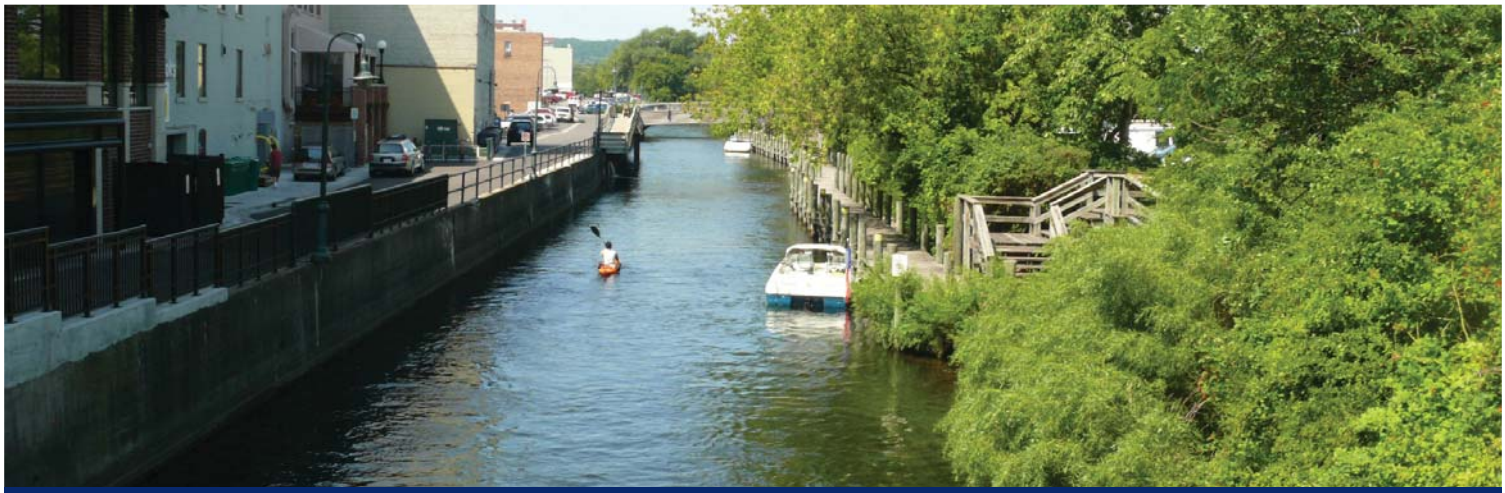

Blue Green Infrastructure

MICHIGAN ECONOMIC DEVELOPMENT CORPORATION

What you will learn:

The different types of infrastructure

How stormwater infrastructure works

Benefits of blue green infrastructure

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Stormwater management attempts to control the amount, quality and timing of runoff in a watershed system. Generally, stormwater systems are designed to move urban stormwater away from the built environment, preventing flooding and damage to buildings.

In a natural watershed, green infrastructure manages stormwater. Groundcover protects the land from erosion. Vegetation moderates the effects of rain and wind by interrupting ground surface flow. The runoff rate is slowed and soaks slowly into the soil. This natural infiltration helps remove impurities allowing stormwater to be relatively clean and clear before it reaches lakes and rivers. Traditionally in urban or urbanizing areas, gray infrastructure alone

TERMS:

Watershed refers to a natural, geographic area of land that drains into a particular water body.

Gray infrastructure refers to constructed structures such as treatment facilities, sewer and water pipes, stormwater systems, or storage basins. The term "gray" refers to the fact that such structures are often made of concrete.

Blue infrastructure refers to water elements, like rivers, canals, ponds, wetlands, floodplains, water treatment facilities, etc.

Green Infrastructure refers to ecological systems, both natural and engineered, that act as living infrastructure. Elements include bioswales, rain gardens, and constructed wetlands to manage wet weather impacts.

State laws that may also apply:

Michigan Natural Resources and Environmental Protection Act, 1994

Michigan Zoning Enabling Act, 2006

Michigan Drain Code Act, 1956

managed stormwater. Rainwater falling onto a street or parking lot is channeled into a catch basin where the stormwater runs through a series of pipes and is then directed to a water treatment plant.

In many Michigan cities, these sewer systems were designed 100 years ago, based on critical 'design storms' defined through analysis of historical precipitation data at the time. According to the American Society of Civil Engineers (ASCE), Michigan lacks a systematic approach to inventorying, operating and maintaining its stormwater infrastructure, and few communities have dedicated funding sources for stormwater systems. In 2018, the ASCE gave Michigan's stormwater infrastructure a grade of D-.

During wet weather events, heavier storms result in increased amounts of water and wastewater in combined sewer systems for short periods of time. Hotter summers, increased pollutant concentrations, longer retention times, and sedimentation of solids may lead to corrosion of sewers, shorter asset lifetimes, and more drinking water pollution. All of these factors lead to higher costs for governments.

In short, government funding continues to shrink and extreme weather events continue to batter existing infrastructure. These challenges necessitate officials, engineers, and planners being smarter and more creative when replacing or extending infrastructure. This is where blue-green infrastructure (BGI) comes in.

In contrast to gray infrastructure, blue-green infrastructure aims to recreate a naturally-occurring water cycle while contributing to natural amenities that can be enjoyed by the public. This is accomplished by combining and protecting the hydrological (water features) and ecological (open spaces or natural features) values of the urban landscape while providing resilient and adaptive measures to deal with flood events. Instead of underground pipe or roadside swales, blue green infrastructure is a strategically planned network of "…natural and semi-natural areas, ranging in size from rain gardens right up to green streets, that are designed and managed to deliver a wide range of environmental, economic, and social benefits including improved water quality".

A key aspect of BGI is its ability to perform several functions and provide several benefits within the same area. For example, a drainage ditch at the side of the road is useful for storing water, but isn't used for recreation and isn't particularly scenic. In contrast, a bioswale with native plantings at the side of the road is also useful for storing water, but is now scenic and a better habitat for wildlife.

Likewise, a green roof can reduce stormwater runoff and the pollution load of the water, while also decreasing the urban heat island effect, improving the insulation of the

Resources:

The Role of Blue-Green Infrastructure in Managing Urban Water Resources by Robert Brears

Blue Green Cities Research Project

2018 ASCE Report Card of Michigan's Infrastructure

Green Infrastructure Vision for Southeast Michigan by SEMCOG, May 2014

Planning for Infrastructure Resilience by the American Planning Association, Planning Advisory Service (PAS)

WHAT COMMUNITIES ARE DOING THIS?

In 2017 **Melbourne, Austrailia** embarked on four pilot projects to "green your laneway," a natural makeover for the city's central laneways that lacked green space.

Rain City Strategy in **Vancouver, British Columbia** has an ambitious target to capture, clean and manage at least 90 per cent of their annual rainfall volume. Projects include rainwater tree trenches on roadways to absorb rainfall, green roofs, absorbent parks and wetlands as well as permeable sidewalks.

The Emerald Necklace in **Boston, Massachusetts** is a park system that has been a continuously evolving example of blue-green infrastructure over the past 130+ years.

building, providing a habitat for species, and creating a cooling effect during hot weather.

Since watersheds and stormwater do not hew to corporate boundaries (city, township, village or county), intergovernmental, or regional, efforts will yield more significant impacts. Reach out to your neighbors to coordinate efforts.

Benefits of BGI include:

- Improved water quality: BGI captures and cleans stormwater, ensuring waterways are healthier
- Reduced potential for flooding: BGI slows down and holds stormwater allowing it to soak into the ground
- Enhanced resilience to climate change: BGI can use water as a resource for communities and natural habitats
- Reduced infrastructure costs: BGI reduces the volume of water entering the sewer system, increasing the lifespan of the sewers and reducing infrastructure maintenance costs
- Increased space for communities and wildlife: BGI provides multiple mental and physical health benefits to communities as well as a sanctuary for urban wildlife and pollinators

Next Steps

Communities with water features, such as lakes, rivers or ponds, are probably already doing some aspect of BGI. Additional, important enhancements may allow those existing water features to yield even greater benefits. Consult with your community's engineer to find out more.

Communities without water features can take advantage of stormwater by incorporating planter boxes, bioswales, and raingardens into parking lot, parks, and easement designs

Check out ***MEDC's Green Infrastructure and Stormwater Management*** for additional ideas.

This tear sheet was developed by the Michigan Associaion of Planning (MAP) for the Michigan Economic Development Corporation (MEDC). The Michigan Association of Planning is a 501 c 3 organization, dedicated to promoting sound community planning that benefits the residents of Michigan. MAP was established in 1945 to achieve a desired quality of life through comprehensive community planning that includes opportunities for a variety of lifestyles and housing, employment, commercial activities, and cultural and recreational amenities.