A rain garden at Austin's Reilly Elementary School filled with stormwater after a winter rainfall.

Catching the Rain

Nature-Based Infrastructure Can Reduce Flooding and Improve Water Quality in Texas

Flooding and stormwater pollution have been persistent threats throughout Texas in recent years. Nature-based infrastructure – which mimics the natural environment to absorb rainfall – has the potential to help reduce flooding, improve water quality and add beauty to local communities.

What Is Nature-Based Infrastructure

Nature-based infrastructure imitates nature by allowing rainwater to slow down, and soak in to local soil. This prevents water pollution while mitigating floods, combating drought, and reducing urban heat. Common examples include:

- **Rain gardens** - Planted depressions that collect rainwater
- **Bioswales** - Shallow, vegetation-lined drainage channels
- **Conservation and restoration** of streams, rivers, and wetlands
- **Green roofs** - Vegetated roofs or walls that capture rainfall on the building itself
- **Permeable surfaces** - Concrete, asphalt, or paving stones that allow water to seep through
- **Rainwater harvesting** - Storage containers that collect rainwater from roofs

Benefits of Nature-Based Infrastructure

- **Improving water quality** - Stormwater systems can trap between 45 and 99 percent of solid pollutants.
- **Mitigating flooding** - Nature-based systems can absorb between 50 and 90 percent of rainfall and have the potential to fully prevent flooding from less severe storms.
- **Preventing drought** - Allowing rainfall to soak into local soils replenishes aquifers easing droughts later on.
- **Reducing urban heat** - Green areas of cities absorb more heat reducing summer temperatures by 10-15 degrees.
- **Removing greenhouse gases from the atmosphere** - Trees and green roofs can capture hundreds of pounds of carbon dioxide over their lifetimes.
- **Beautifying the landscape** - Projects add greenspace to our communities, improving the quality of life.

El Paso's Cielo Vista Library features a beautiful desert rain garden that helps filter runoff pollution from the library parking lot.

Texas is at Risk from Flooding

The Texas Water Development Board has estimated that one in every ten Texans faces moderate or high risk from riverine floods, and that flooding affects the "lives and livelihoods of all Texans." In 2018, 12 people and thousands of animals across the state were killed by floods, and damages from flooding totaled more than $3 billion in Texas in 2015. These numbers will get worse as climate change makes storms even stronger, however, we can help mitigate flooding by incorporating nature-based features into our communities making them more resilient when the storms come.

Stormwater Pollution Makes Our Waterways Unsafe

Stormwater carries toxic chemicals, oil, excess fertilizer, litter and other pollution from roads, construction sites and parking lots into our waterways. According to the Texas Commission on Environmental Quality (TCEQ), more than 780 miles of rivers and streams across the state are impaired due to stormwater runoff in 2017. The same year, Environment Texas research showed 63% of Texas beach locations and 49% of freshwater sites were unsafe for swimming on at least one water quality testing day. Nature-based infrastructure can help by filtering out pollutants before they reach our waterways.

Houston's Buffalo Bayou flooded during Hurricane Imelda in September of 2019.

Confluence Park in San Antonio uses native grassland habitat to filter runoff and protect the San Antonio River.

Nature-Based Infrastructure Is Growing Across Texas

Local governments across our state are incorporating nature-based features and policies into their jurisdiction.

- San Antonio requires nature-based features to protect water quality along the San Antonio River.
- Both the cities of Austin and Dallas have proposed city-wide mandates that would require developers to incorporate nature-based features into developments.
- The mayor of Houston has proposed a set of incentives to encourage developers to adopt nature-based infrastructure practices.

Texas Should Expand Nature-Based Infrastructure

Local governments across Texas should make use of every opportunity to incorporate nature-based infrastructure into their stormwater management, flood planning, landscaping, and water quality protection plans. Specific steps that local governments can take include:

- Requiring all new developments to incorporate nature-based infrastructure elements such as permeable paving, rain gardens and green roofs to protect water quality.
- Identifying and removing obstacles to the expansion of nature-based infrastructure by reviewing, revising and updating its building codes and zoning ordinances.
- Adopting a citywide nature-based infrastructure plan that would measure the amount of stormwater handled by existing infrastructure, set a target for increasing this amount, and implement policies to achieve this target.

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Photos: front-top: Staryn Wagner. rear-top: Francisco Perez; all others: Anna Farrell-Sherman