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Planning for Climate Change Through Riparian Restoration in Houston, Texas

The City of Houston faces a unique set of natural and developmental resiliency challenges that make it especially vulnerable to the impacts of climate change. As part of a comprehensive Climate Action Plan, the City is incorporating a suite of forestry practices. The City's Riparian Restoration Initiative, which increases natural forest cover in riparian zones, helps address climate change, but also benefits other issues like flooding, water quality, air quality, and maintenance of natural areas. This approach provides a model for future integration of forestry practices into the City's climate approach and other regional efforts.

Keywords

urban forest management, climate change adaptation, riparian, flooding, restoration

INTRODUCTION

The City of Houston faces a unique set of natural and developmental resiliency challenges that make it especially vulnerable to the impacts of climate change. As part of a comprehensive Climate Action Plan, the City is incorporating a suite of forestry practices. The City's Riparian Restoration Initiative, which increases natural forest cover in riparian zones, helps address climate change, but also benefits other issues like flooding, water quality, air quality, and maintenance of natural areas. This approach provides a model for future integration of forestry practices into the City's climate approach and other regional efforts.

CONTEXT

The City of Houston has experienced rapid development, population growth, and transitioning land cover in an area already at low elevation, with dense networks of urban bayous and high impervious cover. At the same time, extreme weather events (like the record-setting drought in 2011 and high-profile flooding events) have increased in frequency and intensity. In the aftermath of Hurricane Harvey, Mayor Sylvester Turner launched a citywide Climate Action Plan to highlight the city's recovery and resiliency progress. Houston's Climate Action Plan focuses on how communities can mitigate climate risk through greenhouse gas reductions. City departments and regional partners are collaborating on shared goals. Houston Parks & Recreation Department's role in this combined effort is to develop cost-effective and practical nature-based solutions to utilize Houston's abundant greenspace to capture and store carbon. The City's forested natural areas, even with their component of invasive species, are an appreciable resiliency asset. Based on a 2015 assessment produced by the US Forest Service, natural areas comprise about 35% of the City's total acreage, but these areas represent 77% of the city's 33.27 million trees. The ecosystem services provided by these trees are a bulwark against climate change, including 916,000 tons of carbon storage, \$7.49 million in annual energy savings due to shade, 1340 tons of air quality pollutant reduction, and over 96 million cubic feet of retained/infiltrated stormwater runoff. These benefits create additional nuance to consideration of related challenges like invasives removal. The challenge to meaningfully consider forestry benefits as part of comprehensive city policy to address climate change echoes a broader regional attempt to integrate forestry practices into planning efforts.

GOALS

One of the highlights of the City of Houston's comprehensive set of solutions to address climate change, is the goal to promote policies that protect existing forested land and increase tree canopy throughout the city. Example policy initiatives include the proposed targeted protection of 20% of park land in nature preserves by 2020; the creation of an all native tree list for mitigation purposes; more stringent regulations on tree removal and replacement; the establishment of a tree nursery to propagate locally collected, healthy, native species; and the establishment of a linear forests program to create small patches of habitat throughout medians. Restoration of habitat in parks and natural areas to increase the abundance and diversity of native species is a specific extension of this goal, and the City's Riparian Restoration Initiative is a

prime example of how the City is integrating forestry practices into approaches to meet broader planning challenges.

APPROACH

One specific approach that Houston has implemented to increase canopy cover, create and improve habitat, and provide a variety of ecosystem services throughout the city is the Houston Parks & Recreation Department's Riparian Restoration Initiative. The department is targeting all parks adjacent to bayous and tributaries for the restoration of forested riparian buffers. Historically, much of the Houston area was coastal prairie habitat with forested riparian habitat lining the bayous. Many of the riparian buffers have been removed or degraded due to development or stream channelization. Riparian zones that have not been developed are heavily impacted by invasive species. The restoration involves enhancing currently forested sites through the removal of invasive species and installation of a diverse mix of native trees and shrubs. Additionally, creation of riparian habitat is underway in parks where the entire forested zone has been cleared. A total of 70 parks have been identified as having an area adjacent to a bayou or tributary where a riparian buffer could be enhanced or created. This will ultimately result in the restoration of over 1,000 acres of habitat in city parks, including the installation of 200,000 native trees.

RESOURCES

The Riparian Restoration Initiative is predominantly funded through grants. The city's tree fund, collected through deposits from tree mitigation, also provides trees for some of the projects. Local partners and volunteers provide needed support in the form of plant propagation, tree plantings, and invasive species removal events.

KEY RESULTS

One of the primary key results was overcoming the logistical challenge of getting this program included in the City's broader approach to climate change. The integration of forestry initiatives, including the Riparian Restoration Program, into the Climate Action Plan was an important first strategic step in highlighting the benefits. The establishment of the Program itself as a comprehensive approach with political will behind it was a significant milestone and change for traditional approaches.

In less than two years, the City restored forested riparian buffers in four parks adjacent to three bayous and one tributary. A total of 20 acres has been restored, with 10 of those acres being newly created forested habitat that was once mowed park land. Six thousand native trees have been installed throughout these areas by community volunteers and staff. An additional 5 sites have been funded for restoration in 2020 with targeted acreage and number of trees to double the previous projects.

The program also provides a vehicle for coordinating with regional efforts and attracting external funding and partnerships. While it is not a panacea for the challenges facing the City of Houston, the Riparian Restoration Program is an important element in connecting forestry practices and the value of native areas to other planning disciplines addressing shared challenges like climate change, flooding, water quality, etc.

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