

Calculating Carbon Storage and Sequestration in New York City's Natural Area Forests

Six Key Takeaways

About This Study

Forests can lessen the impacts of climate change by absorbing carbon dioxide and storing that carbon in their wood, leaves, and soil. The value of rural forests in mitigating climate change is well understood. However, in urban settings, the contribution of forests in capturing and storing carbon is not well quantified. Our findings represent the most comprehensive carbon accounting for New York City's forested natural areas.

In 2019, NAC's conservation scientists and researchers used extensive forest assessment data to calculate the amount of carbon sequestered and stored in New York City's forested natural areas. We completed this study to better understand the value of this resource in mitigating climate change and to evaluate the role of restoration and management in influencing carbon capture.

1.

NYC's natural areas are storing and sequestering carbon at a similar rate as rural forests.

2.

Forested natural areas make up a quarter of the total tree canopy in NYC but account for 69% of the carbon stored and 83% of carbon sequestered of trees across the city.

3.

Forested natural areas store almost 4x more carbon than all of NYC's street trees.

4.

Carbon sequestration in NYC's forested natural areas offset approximately 4,500 cars on the road annually.

5.

NYC's natural areas are dominated by native forests, which act as carbon sinks.

6.

The healthiest forests in NYC store and sequester significantly more carbon than degraded forests, which are dominated by vines and invasive plants.

Why This Matters

These findings allow us to further understand New York City's forested natural areas. More importantly, they illustrate the potential that natural areas have in mitigating climate change and why the management of our city's forested natural areas is so crucial.

The 7,300 acres of natural area forest under the jurisdiction of NYC Parks are not self-sustaining. They require long-term management, care, and funding as documented in the *Forest Management Framework for New York City*. In order to maintain and even increase the carbon storage and sequestration in New York City's forests, increased management of the city's forested natural areas is paramount.

Our results show that urban forested natural areas play an important role in localized, nature-based climate solutions and should be at the center of urban greening policies looking to mitigate climate change.

A Closer Look...

Terms Explained

Trees grow in many different places throughout a city. Where they grow can affect the ways they are cared for and the benefits they provide to city residents. You'll commonly find trees growing on public property, alongside streets or in parks, and on private property, like household yards.

When it comes to forested natural areas, they can be found on both private and publicly-owned property — often growing on city parkland but also in vacant lots or similar landscapes. Forested natural areas are places that look and feel like the woods, and they grow together as a stand of trees that are cared for differently than trees that grow on an individual basis, such as street trees. But regardless of location, all trees store and sequester carbon.

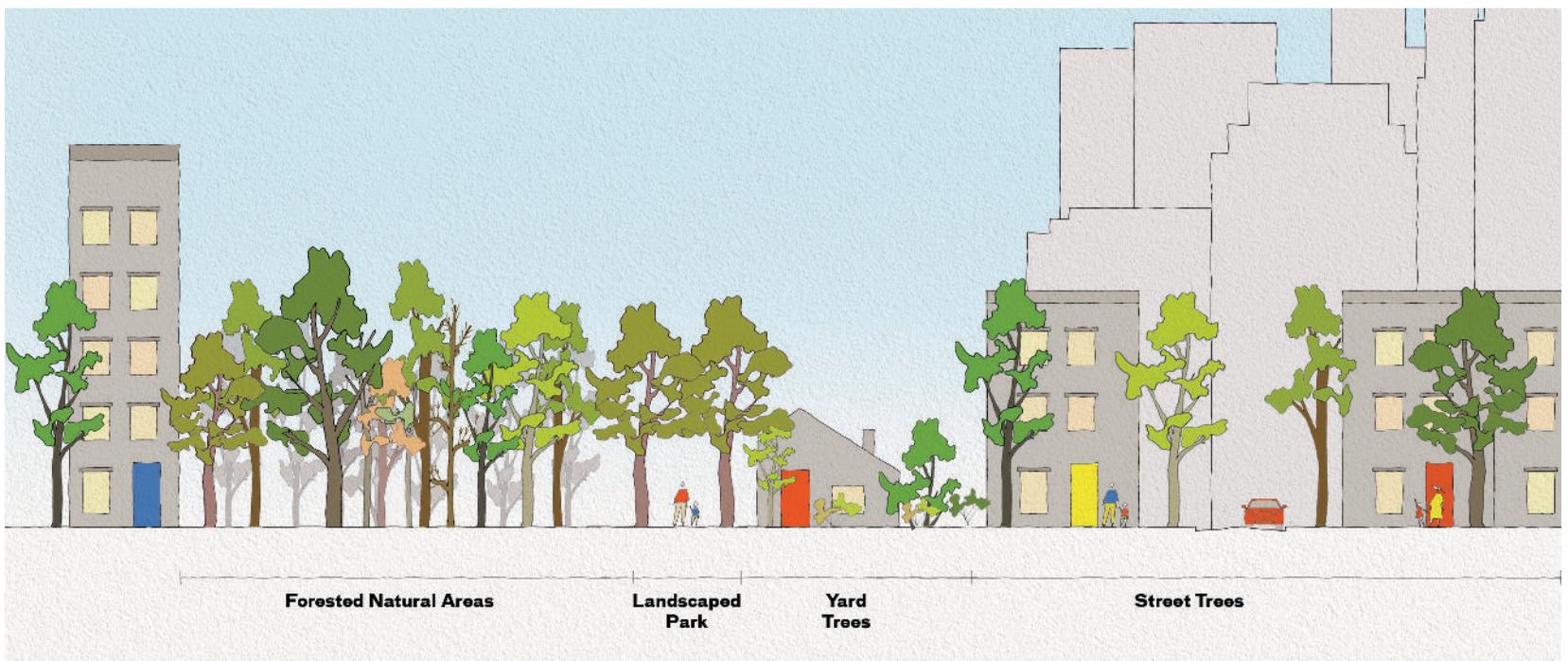


Figure 1: Trees can be found in many of New York City's varied landscapes including: forested natural areas, parks, yards, and streets.

Carbon sequestration is the process of removing carbon dioxide (CO₂) from the atmosphere. And **carbon storage** refers to the quantity of carbon stored in a given "pool" or "stock," such as trees or soil.

Carbon comprises roughly 50% of the material in trees, soil, and other forest components. Carbon can be stored and sequestered in different "pools" or "stocks" within a forest such as living trees and shrubs, standing dead trees, smaller plants and saplings, dead wood on the ground, fallen leaves and twigs, and soil.

You could compare the amount of carbon stored in a forest to a savings account — a more fixed amount that's stored over many years — and the amount of carbon sequestered to a checking account. Each year as the forest grows, the balance between carbon sequestration and carbon emissions from dead and decaying material will add or subtract from the overall carbon storage stock. If there is an annual net sequestration (like depositing money into the checking account), the overall carbon storage stock will grow.

Carbon Stocks in a Forest

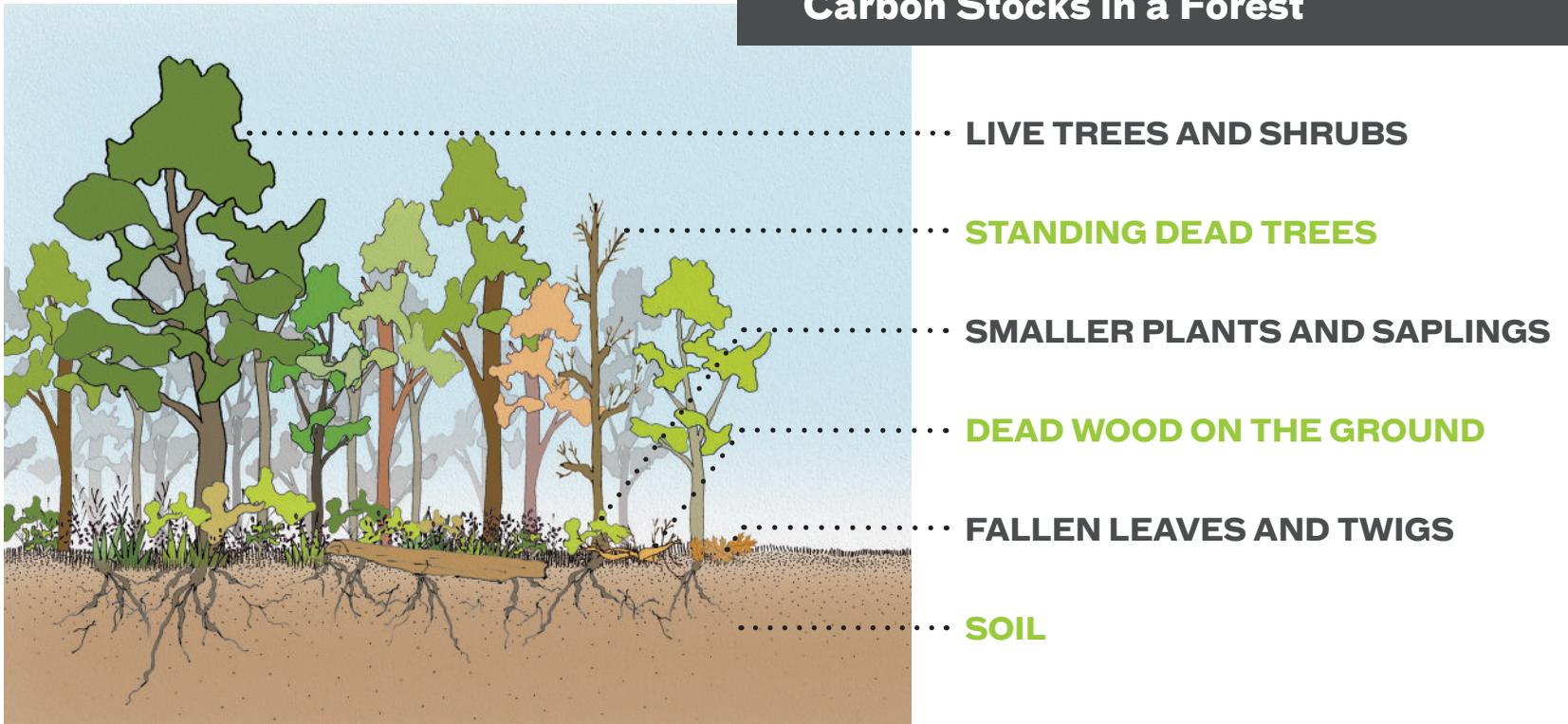
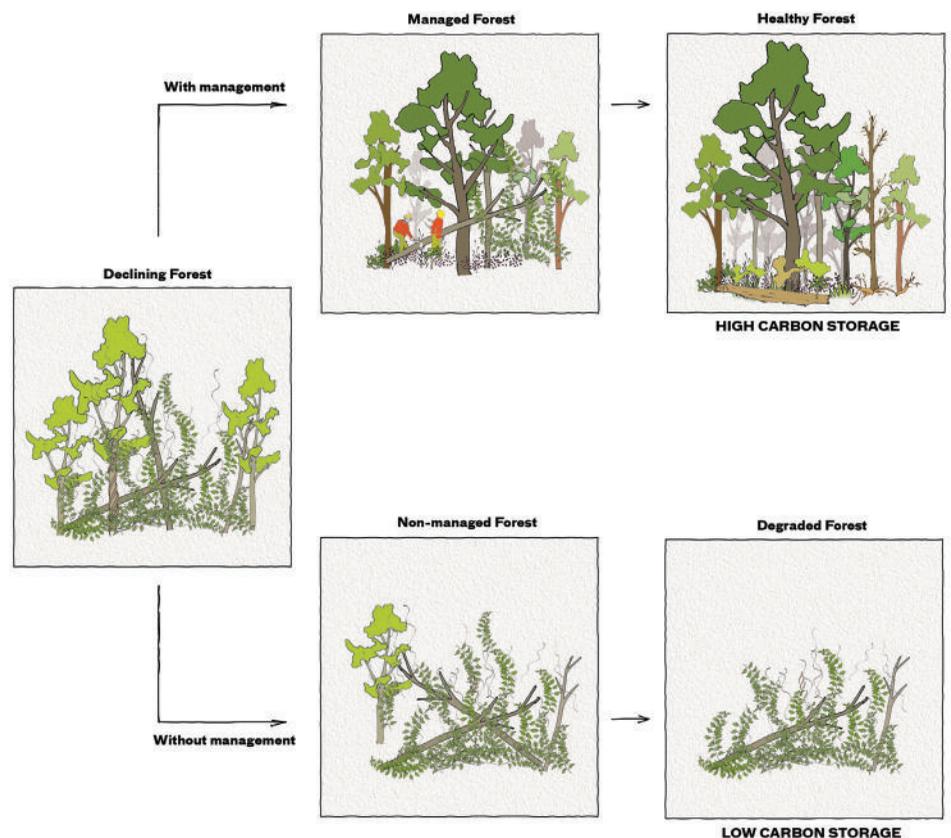


Figure 2: Carbon stocks or pools that can be found in a forest.

Forests need management to reach desired conditions. Our goals for forests in New York City include forests that are dominated by a variety of native species, and have trees of many sizes. These conditions are ideal because they provide multiple benefits, including providing habitat for plants and animals and they naturally regenerate (for instance, when acorns grow into oak trees), making them more sustainable.

Without management, urban forested natural areas could decline, and invasive non-native plants could take hold. This would result in trees dying and releasing carbon into the atmosphere as they rot, and a loss of carbon storage and sequestration. Employing management practices such as tree plantings and invasive and non-native plant removal will help ensure that our forests are healthy and can offer maximum carbon storage and sequestration benefits.

Figure 3: Many of New York City's forests are at a tipping point. If they are not actively managed, these forests will experience a net loss in carbon storage.



How the Natural Areas Conservancy is Making a Difference

About Our Work

The Natural Areas Conservancy (NAC) is actively invested in the protection and management of New York City's 20,000 acres of natural areas. We preserve and promote ecological diversity and resilience across the five boroughs in close partnership with the New York City Department of Parks & Recreation (NYC Parks). The NAC is the first park conservancy dedicated exclusively to New York City's forests and wetlands — our research and resources have improved the management of more than 50 parks.

Improving Urban Forest Management through Science

In 2018, the NAC released a *Forest Management Framework for New York City* — a 25-year plan to guide restoration, management, and community engagement for the city's 7,300 acres of native forests. Informed by extensive research, the Framework's robust metrics will allow New York City to enhance biodiversity, adapt its forests to climate change, and expand its trails system. This Framework has been adopted by NYC Parks and is informing the agency's forest management efforts. We are using this Framework to advocate for increased investment in our city's natural resources and to promote best practices for land management. If fully funded, the framework will ensure that 100% of the city's forests are under active management, are healthy, and provide essential benefits for New York City's diverse communities.

To view the full *Carbon Accounting for New York City's Forested Natural Areas* report visit naturalareasnyc.org/forests

To learn more about the work of the Natural Areas Conservancy visit naturalareasnyc.org

