



Protecting Urban Forested Natural Areas

Strategies for Conservation in Cities

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Contents

Preface

- 04** The Forest in Cities Network
- 05** The Natural Areas Conservancy
- 06** Executive Summary

Introduction

- 08** What are Urban Forested Natural Areas?
- 12** Drivers of Forested Natural Area Loss
- 14** Common Barriers to Protecting Forested Natural Areas
- 16** The Importance of Defining and Assessing Natural Areas

Approaches to Preserving Land

- 19** Land Acquisition and Easements
- 20** Tree Ordinances
- 21** Natural Areas Laws and Programs
- 22** Zoning and Land Use Restrictions
- 23** Wetlands Protection
- 23** Biodiversity Protections

Case Studies

- 24** Atlanta: *Tree Fund Use for Land Acquisition*
- 26** Austin: *Protecting Natural Areas through Land Development Regulations*
- 28** Baltimore: *Updating Local Ordinances through Partnership*
- 30** Boston: *Protecting Urban WILDS through Legislation*
- 32** Houston: *Protecting Nature in Parks Through a Nature Preserve Ordinance*
- 34** Miami: *Protecting Endangered Ecosystems*
- 36** New York City: *Protection of Forever Wild Natural Areas*
- 38** Philadelphia: *Expanding Tree Ordinance and Wetlands*
- 39** Seattle: *Acquiring and Protecting Land*
- 40** Washington D.C.: *Protecting Forests by Protecting Heritage Trees*

Conclusion

- 41** Conclusion
- 44** Call to Action
- 45** Appendix: Links in Report

The Forests in Cities Network



The Natural Areas Conservancy's Forests in Cities network was launched in 2019 to promote and advance healthy forested natural areas in cities across America through science, management, partnerships, and communications. The network is composed of expert teams from 19 metro regions across the United States.

The teams include nonprofit, public, academic, and private sector professionals specializing in forested natural areas. The teams play a valuable role in the success of this program by sharing firsthand experiences, contributing data and participating in research initiatives, and developing a community of practice. This report is based on the input of the Forests in Cities membership.

The Natural Areas Conservancy

The Forests in Cities Network is an initiative of The Natural Areas Conservancy, which champions urban natural areas in New York City and across the nation through innovative research, partnerships, and advocacy. The Natural Areas Conservancy increases the health and resilience of urban forests and wetlands, catalyzes connections between people and nature, and strengthens the environmental workforce.

Below: Boston Natural Area



Executive Summary

The following report summarizes the main threats to one type of urban natural area – forests – and the strategies cities use to minimize or negate these threats.



Urban natural areas provide numerous ecosystem services and places for urban residents to recreate, interact with nature, and seek respite from the hustle of urban life. Due to the multitude of benefits natural spaces provide, protecting these areas should be a priority. The consequences of land development and clearing in cities are severe. Once a forest is cleared, it takes decades of active management and extensive resources to restore, and such efforts rarely result in an ecosystem that functions as highly as the original forest. A forest is a delicate ecosystem consisting of multiple age classes of trees, shrubs, herbaceous plants, soil organisms and wildlife. Enacting strategies to protect urban forested natural areas in perpetuity is the most effective means to ensure the vital benefits offered by forests are available for generations to come.

Within urban areas there is intense competition for space for housing, infrastructure, and even park amenities such as ballfields and public parking. This is largely due to increased urbanization and densification in the United States¹. Due to these competing priorities, urban forested natural areas—which are often referred to as ‘undeveloped land’—are under threat of being cleared and converted to other land uses. This report argues that this so-called ‘undeveloped land’ is a valuable resource worth protecting. In addition to full-scale destruction, forests are vulnerable to a “death by a thousand cuts” where the urban forest is damaged and diminished one small piece at a time leading to a cumulative loss. These trends can be especially problematic in growing cities that have a large amount of their forests on private property, making them more susceptible to development pressure. In more established, older cities where much of the forested land is held by local government, forested natural areas may still be cleared. Finally, high housing and

land prices make it difficult for government entities to offer competitive prices to acquire and protect urban forest patches.

Overall, this report shows that cities use various tactics such as ordinances, zoning, land acquisitions, and federal protections to preserve natural areas. The most successful approaches feature overlapping strategies protecting both individual trees and land from being cleared or developed. Based on these findings, this report proposes a toolbox approach, where each city tailors various strategies to craft a comprehensive protection strategy that works for their city, keeping in mind that not all protection strategies protect forests in totality. Using the case studies and methods outlined in this report, cities can evaluate, strengthen and add to their own toolboxes. This process begins with an assessment of the laws and policies currently in place protecting forested natural areas. We hope that this report is helpful for practitioners and decision makers, particularly those who influence local policy, to gather new ideas about how to protect forested natural areas in cities across the country.

¹ United States Census Bureau. Nation’s Urban and Rural Populations Shift Following 2020 Census. 2022. <https://www.census.gov/newsroom/press-releases/2022/urban-rural-populations.html>

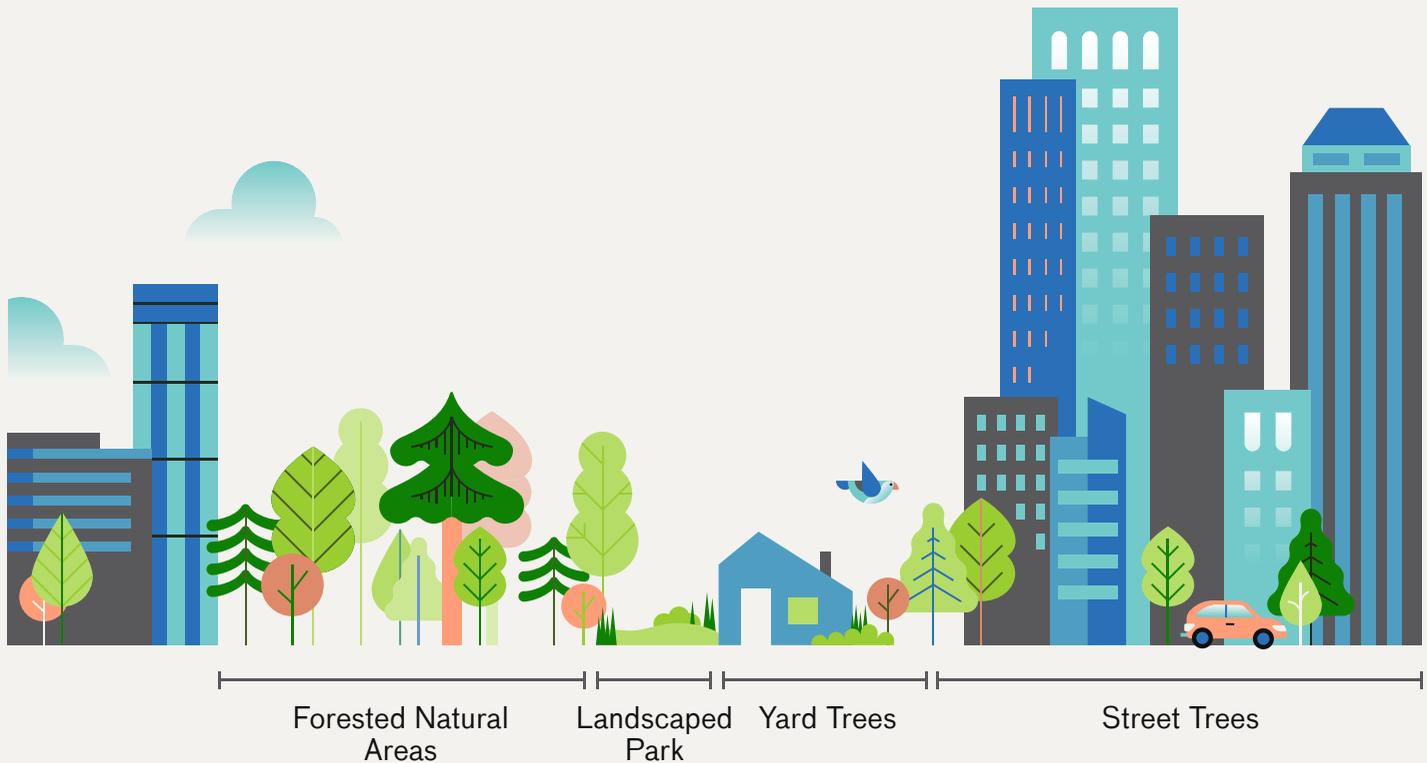
What are Urban Forested Natural Areas?

Right: This diagram shows how forested natural areas are distinct from other parts of the urban canopy.

Land Acknowledgement: when speaking about ownership of land, it is important to acknowledge the historical and contemporary use and presence of indigenous communities on the land which currently holds urban settlement in the United States along with the dispossession of these lands. Movements to give land back or support the cultural practices of indigenous communities are an important facet of land protections for forested natural areas throughout the United States.

Forested natural areas are distinct from other parts of the urban forest, like street trees and landscaped park trees in terms of size, biodiversity, species composition, and structural complexity. Where landscaped park and street trees are managed individually, forested natural areas are managed holistically — as systems — to ensure that multiple layers and age classes are present.

These considerations are important to ensure the current and future health of the forest, so these areas can persist and support other species into the future. Across the United States, 82% of urban parkland — 1.7 million acres — is natural areas².



All trees provide benefits, but forested natural areas provide some benefits at higher rates per area than landscaped greenspaces which is particularly important for marginalized communities which are expected to bear the brunt of climate change impacts. For example, forests do a better job at cooling and cleaning the air — including offsetting carbon emissions — and the bigger the forest, the greater the effect^{3,4,5}. Forested natural areas also provide critical habitat for native plants and animals, safeguarding and connecting local biodiversity in fragmented urban landscapes⁶.

Ecosystem services and protection of biodiversity are two commonly reported metrics in city sustainability goals, but the benefits of forested natural areas don't end there. These spaces may also contain networks of nature trails, which provide safe access to nature – a facet especially

important for people who may not have the resources, time or transportation to experience nature outside of cities. These areas function as critical infrastructure and contribute meaningful public health and environmental benefits to city residents.

² Trust for Public Land. 2023 City Park Facts. 2023. Available from: <https://www.tpl.org/2023-city-park-facts>

³ Jaganmohan, M., Knapp, S., Buchmann, C. M., & Schwarz, N. (2016). The bigger, the better? The influence of urban green space design on cooling effects for residential areas. *Journal of environmental quality*, 45(1), 134-145

⁴ Pregitzer, C.C., Hana, C., Charlop-Powers, S, M.A. Bradford. 2020. Carbon Accounting for New York City Natural Area Forests. *Natural Areas Conservancy Report*.

⁵ Crown, Crystal A., Clara C. Pregitzer, Jeffrey A. Clark, and Sophie Plitt. 2023. *Cooling Cities: Harnessing Natural Areas to Combat Urban Heat*. Natural Areas Conservancy, NY



Forested natural areas are more than a collection of trees. They support plant and animal communities from the soil underfoot to the leaves in the top of the forest canopy.

Maintaining forested natural areas in the urban environment is fraught with many challenges. Firstly, these areas face multiple and magnified stressors in the urban context such as climate change, dumping, fires, and invasive species.

These stressors decrease both the quality of visitor experience and the health of the forests themselves, leading to degradation. In addition, forested natural areas have limited formal protection, putting them at risk from development and encroachment, and the losses are staggering. During the five year period from 2014-2019, 4% of natural area parkland (15,264 hectares) was lost in 96 of the most populous cities in the United States⁷.

A survey of 19 cities in the Forests in Cities Network, found that 74% of cities reported loss of forested natural areas in the last 5 years. Forested natural areas need management and continued investment. In this report we focus on strategies that cities are using to protect these highly valuable lands from destruction.

⁶ Ives, C. D., & Kelly, A. H. (2016). The coexistence of amenity and biodiversity in urban landscapes. *Landscape Research*, 41(5), 495-509.

⁷ Pregitzer, C. C., Charlop-Powers, S., & Bradford, M. A. (2021). Natural Area Forests in US Cities: Opportunities and Challenges. *Journal of Forestry*, 119(2), 141-151

Methods

The information in this report was compiled from a literature review of existing tree protection methods, as well as 15 semi-structured interviews conducted by the Natural Areas Conservancy with urban forestry practitioners who manage land protection strategies from across the Forests in Cities Network.

Drivers of Forested Natural Area Loss

Right: Infrastructure work in Baltimore
Photo Credit: Ashley Bower

Our research found that the main drivers of forested natural area loss fall into the following four categories:

Development

The main driver of forested natural area loss is direct land development. Due to the high cost and limited availability of land in cities, any “open” land can be seen as a potential site for development, particularly for housing. The high cost of land in cities makes it more difficult for entities to acquire it to protect forested natural areas. Competing priorities should not be pitted against each other—communities deserve housing, economic security, and access to nature.

Land Use Conversion

Besides development, the risk of conversion of publicly owned land is high, as forested natural areas may be seen as a potential site for other uses. In particular, siting of public facilities and park amenities such as ballfields, parking lots, and picnic areas can cause cities to cut down forests. This includes a recent high-profile case of a city cutting down trees to site facilities for public safety agencies that has garnered national attention⁹. Therefore, putting land in the public domain may not be sufficient to protect it as a natural area.



Infrastructure

Installation and management of infrastructure such as sewer lines, electric lines, and water mains, often located underground in forested areas, can result in collateral damage to the forest, whereby large linear areas of forest are cleared as technicians dig to access the ground below. Forests susceptible to these uses are often exempt from protections because the services provided by this infrastructure are considered vital. As climate change mitigation measures increase, siting of renewable energy projects along with flood and sea level rise mitigation also pose a threat to forested natural areas.

Degradation

Threats such as extreme weather, invasive species, pests, illegal dumping or other illegal activities may not directly affect the legal status of forests, but they do make these spaces less appealing and valued and therefore harder to protect. In addition, when forests become degraded they provide reduced ecological services and the costs of restoring them are higher.

⁸ Maxouris, Christina. CNN. Atlanta wants to build a massive police training facility in a forest. Neighbors are fighting to stop it. Available from: <https://www.cnn.com/2022/09/24/us/atlanta-public-safety-training-center-plans-community/index.html>

Common Barriers to Protecting Forested Natural Areas

We found that the following barriers must be addressed to conserve forested natural areas:

Public Opinion

There may be resistance from the public to new laws and regulations that protect forests. This may be due to perceptions that forested natural areas are unsafe or undesirable, preference for other land uses, or fears of government overreach.

Private Interest

The private sector, particularly builders and developers, may oppose new regulations that prevent clearing land or place restrictions on development.

Lack of Enforcement

Though cities may have laws that prevent the destruction of forested natural areas, those laws are only as effective as they are enforced. Limited resources or political will for enforcement agencies may stymie efforts.

Lack of Political Will

Though there may be strong public interest in protecting forested natural areas, there may be limited political will to protect them. There may be bureaucratic barriers, lack of funding or other governance challenges that prevent action to protect forested natural areas.



Housing Affordability

Efforts to preserve open space may run counter to efforts to develop land for affordable housing. This is a common example of how city priorities may conflict with preserving forested natural areas

Lack of Information

If people don't know the value of natural areas, or do not know the extent or location of natural areas near them, they may not advocate for their protection.

Loss of Local Control

Some state legislatures may be hostile to local efforts to preserve land or protect trees, and may preempt municipal conservation measures.

Economic Arguments

Land is often cleared for commercial uses with the argument that it is necessary for economic development. Often economic development offices in cities facilitate these types of uses. Additionally, cities may not have funding to acquire land.

Maintenance Costs

The cost of maintaining forested natural areas may be a barrier to efforts to protect land, particularly through acquisition. Cities are reluctant to purchase land, or parks departments may choose not to acquire land, due to potential maintenance costs.

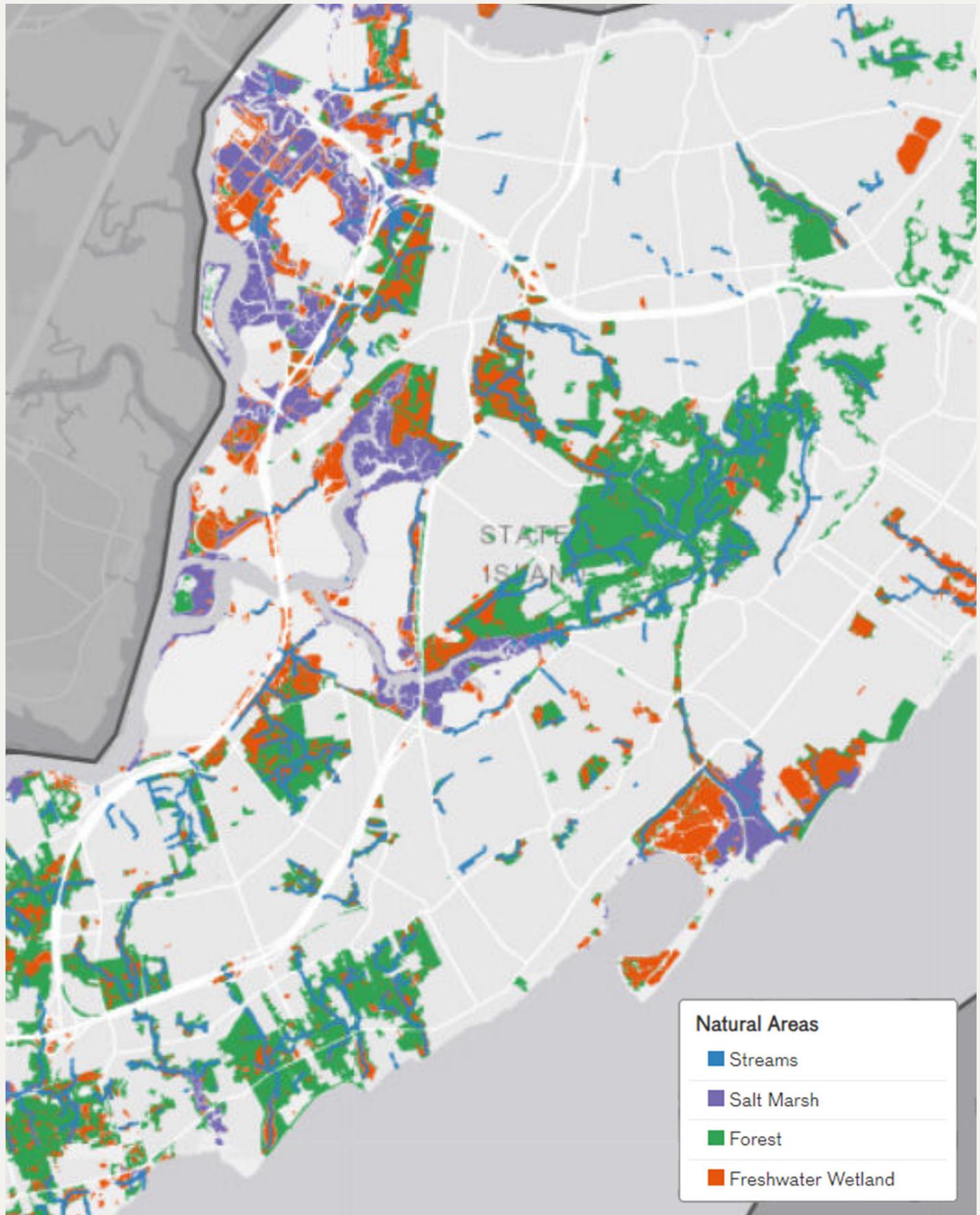
Top: Vines smothering trees are an example of degradation.

The Importance of Defining and Assessing Natural Areas

A key first step to protecting natural areas is defining what constitutes a natural area. Within a legal context, natural areas must be distinguished from other greenspace or parkland in order to receive special protection and conservation. Cities use different terminology to describe natural areas rooted in their unique ecological differences, as well as the diversity of governance characteristics we find across the country. For example, Houston's [Nature Preserve Ordinance](#) defines natural areas as "all city-owned lands containing native ecosystems that are under the control of or assigned to the department, Harris County, or other county for management, maintenance, and operation;" whereas for land to be included in New York City's Forever Wild Program it must be owned by the parks department, be greater than two acres and have a dominance of natural vegetation⁹. Developing a precise definition of these spaces particular to each city helps to protect them. Determining what counts as a natural area may be an initial step to protecting it.

Knowing what you have is essential for protecting it. Once there is a definition of a natural area, delineating the boundaries and ownership of the natural areas, through mapping, can be conducted. Once an assessment exists, it allows for more informed decision making and protection and management prioritization (e.g. larger, higher quality forest patches are prioritized for acquisition first). Zoning is informed by assessment, and ordinances are easier to advocate for when an assessment is done.

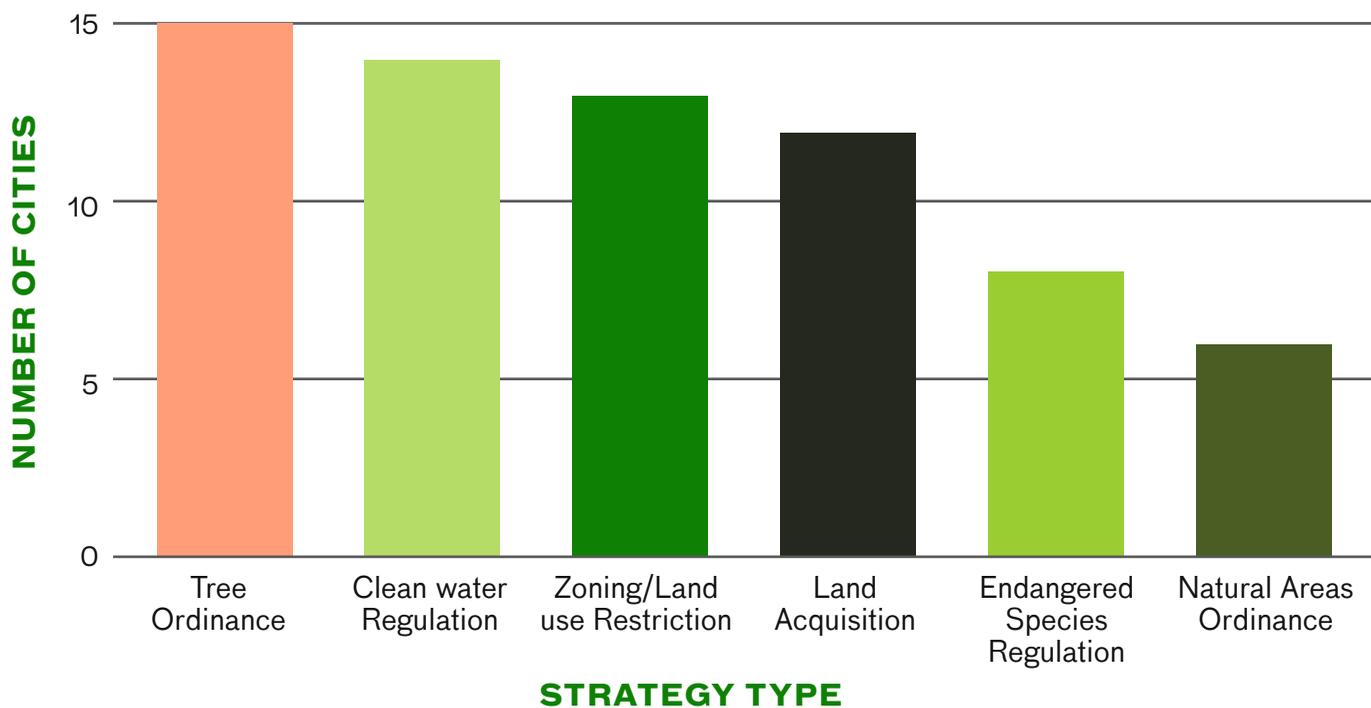
⁹ Cullman, G., D.N. Auyeung, J. Greenfeld, K. King, and M. Larson. 2022. Preserving Nature in New York City: NYC Parks' Forever Wild Program. Cities and the Environment.



Approaches to Preserving Land

Below is a summary of our findings for how forested natural areas are protected. This list includes six examples of strategies and how they were implemented.

Most Common Strategies for Land Protection



Above: This data is based on a survey that was distributed to 19 metro regions in the Forests in Cities network where they were asked to list which land protection strategies were used in their cities.

Land Acquisition and Easements

Land acquisition and easements are ways that government and private entities purchase land or the rights to develop land.

Public ownership of forested land is an essential component of whether or not land is protected. Privately held land is much more politically difficult to regulate and therefore more likely to be converted from forest or developed. Therefore, one strategy that many cities use is acquisition with the intent to preserve the land as a natural area. The way this is carried out varies greatly from city-to-city, including purchasing from willing sellers, eminent domain or foreclosure, as does the size and cost of available land. In older, denser cities, there is often less forested land to acquire and much of the open space is already held by the government. Unused public land can be transferred to other departments for protection. In less dense or growing cities, much of the forested natural areas are on private property. In addition to the cost of acquiring land, cities must also consider maintenance costs once land is acquired.

Purchasing authority by cities varies and is often green-lighted by legislation that sets parameters for which land can be acquired. Often, each potential acquisition must be approved by a legislative body, though this is not always the case. Another strategy many cities use is to partner with a nonprofit organization which acts as a broker for the land, including purchasing the land and then selling it or giving it to the government. This arrangement benefits cities because private organizations can be more nimble and flexible in brokering fast-paced real estate deals.

Other ways that governments acquire land is through conservation easements. Conservation easements are legally binding agreements that private land will not be developed and/or that land will be stewarded in a certain way in exchange for tax breaks.

Private organizations, especially land trusts, can also use acquisitions and conservation easements to protect land in cities.

Case studies: Atlanta, Houston, Miami, Seattle, and Washington D.C.

Tree Ordinances

Tree ordinances are local laws that determine if trees may be cut down. These laws determine mitigation measures along with fines for infractions. They vary widely across cities.

Tree ordinances are an extremely common type of law in cities that regulates the urban forest. Whether or not these laws protect forested natural areas by preventing the removal of trees depends on which trees are subject to the ordinance. The most common form of tree ordinance is one that protects right-of-way trees (commonly referred to as ‘street trees’); however this type of ordinance does not extend to trees in forested natural areas. Some cities only protect trees on public property, including parks and natural areas. Some cities exclude public land and only regulate private property. The most protective tree ordinances apply to both public and private property. When large trees in forested natural areas are protected by a tree ordinance it can create an “umbrella effect” as any damage or removal of smaller neighboring trees may risk damaging the protected tree and thus the entire forest gains protection.

Tree ordinances often have exclusions for certain types of utility work which can weaken them. Some tree ordinances define which sizes and/or species of trees the law applies, or have exceptions for certain invasive species that can be removed.

Tree ordinances require that when trees subject to the law are cut down, that they be either replaced or a fee-in-lieu must be paid. Tree funds are commonly set up by cities as a repository for fee-in-lieu for removing trees or fines from infractions of the tree ordinance. Often this funding is used to plant new trees, but each tree fund has different restrictions on what the money can be spent. In some cities natural areas maintenance and land acquisition are eligible for tree fund monies.

Case studies: Atlanta, Austin, Baltimore, Philadelphia, Seattle, and Washington D.C.

Right: New York City Natural Area
Natural Areas Conservancy

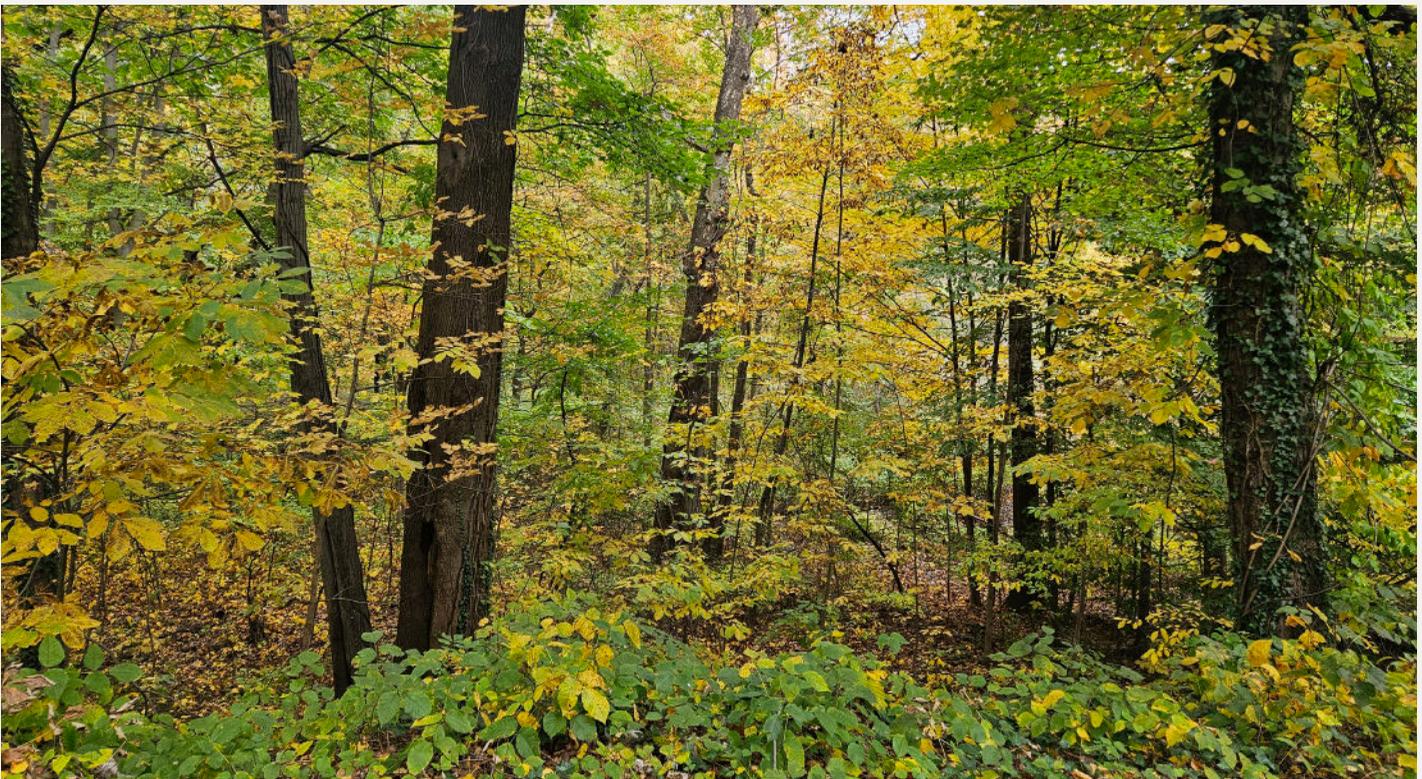
Natural Areas Laws and Programs

Natural areas laws and programs are those that identify natural areas and often offer protections for them. These laws and programs have names unique to each city, though commonly they are referred to as nature preserves.

Natural area laws that specifically define and protect natural areas by preventing development and conversion to other uses are a more recent development in the protection of urban forested natural areas. Local programs, such as nature preserve systems in cities such as Houston and Austin, and state laws, such as the Illinois Nature Preserve Program, are forms of natural areas programs in urban areas that are backed by preservation law. These programs must define the natural areas that they protect, and create pathways to add lands into this special designation in the future.

In addition to or instead of legal protections, some programs advocate for natural areas through formalizing where natural areas are and promoting them. Advocating for and raising awareness about natural areas is one way of protecting them. Some cities have established formalized public outreach programs about the natural areas in their cities.

Case studies: Boston, Houston and New York





Left: Shagbark Hickory in Atlanta
Photo credit: Kathryn Kolb

Zoning and Land Use Restrictions

Zoning and other land use restrictions are a system of laws present in most cities which determine what can be built where. Often these restrictions have specific parameters for vegetation including trees.

Many cities have zoning laws regarding tree replacement or restitution on land that is being developed. Another common way that zoning is used is regulating the development of impervious surfaces (i.e. if a parcel is developed x% must remain pervious). Some cities define a forest as a specific land use type in zoning codes and require a certain percentage of that forest to be preserved in the case of development.

Land Swaps are another type of development mitigation that can be used. In these scenarios, if forested land is to be developed or trees are to be cut down such as in utility work, the developer is able to provide an alternative piece of forested land or the development rights to such land as a form of recompense.

Case studies: Atlanta, Austin, Baltimore, and Philadelphia

Wetlands Protection

Wetlands protections are laws that determine the use of waterways and the adjacent land. The federal government has jurisdiction over wetlands protections, and states and local governments may have stricter protections.

Wetlands are often included in or are adjacent to forested natural areas and have more legal protections that can often extend to protecting forests. The federal [Clean Water Act](#) applies to all cities in the United States. Many cities and states have further restrictions on development on wetlands or within a buffer of them.

Forests are also being recognized for their ability to keep local drinking water sources clean. In some cities, the Environmental Protection Agency has allowed forest preservation within the basin of waterways that supply drinking water to be a strategy for cities to comply with the Clean Water Act.

Case studies: Boston and Philadelphia

Biodiversity Protections

Biodiversity protections are laws and programs, especially endangered species regulations, that specifically address the biodiversity of plant and animal life and the habitat of those species.

The [Endangered Species Act](#) and similar state and local laws can be used to protect forested natural areas if there are endangered or threatened species present. These protected habitats, called critical habitats, have strict restrictions on what can be done in them to protect endangered species.

Another way that cities can protect natural areas is through biodiversity programs. Policy that specifically seeks to protect and increase biodiversity in cities such as Los Angeles, San Diego and Austin may protect natural areas by necessarily protecting wildlife habitat. When protecting ecosystems becomes a priority for local governments, protecting natural areas necessarily also becomes a priority.

Case studies: Miami

Case Studies

The following case studies demonstrate how urban forest preservation strategies are implemented on the ground. These case studies were developed based on semi-structured interviews with Forests in Cities network members and provide context and strategies that could be adopted in other jurisdictions.

ATLANTA

Tree Fund Use for Land Acquisition

The following case demonstrates how the city of Atlanta uses tree ordinances and land acquisition as complementary strategies for protecting forested natural areas.

Atlanta is a sprawling city with thousands of acres of healthy, native forest and almost 50% canopy cover as of 2018; however, the vast majority of the canopy is on private property with only 4.9% of the canopy on protected, public land. Atlanta's population has skyrocketed in the past decades and demand for housing and development are creating imminent threats to Atlanta's forests.

Atlanta's tree ordinance applies to both public and private property. If trees over six inches at 4.5 feet height size are removed within the city limits they either must be replanted or money must be paid into the tree fund, or a combination of both. Though the cost is low relative to the cost of replacing trees, the funds from tree compensation can be used to protect existing trees through land acquisition.



Above: The green forest at Lake Charlotte.
Photo credit: Stacy Funderburke

In 2016, after property assessment and lobbying from within city government, the Atlanta City Council approved use of its Tree Trust Fund for land-acquisition and established criteria for selecting which parcels to purchase. The ordinance specifically restricts conversion to other uses and ensures that land is open to the public. The law requires that tracts contain 50 mature trees per acre and contain 80% canopy cover among other criteria. Like other acquisition programs, before land is purchased, the city council must dedicate and preserve the land, including protection from conversion to other uses and a plan for maintenance costs. Though this measure has been popular, it required champions within city government to draft, sponsor and pass.

Canopy coverage analysis has been an important tool in Atlanta's approach to conservation of the urban forest. Through a baseline tree canopy analysis, all undeveloped land throughout the city with 80% or more of canopy coverage has been identified. In Atlanta, The Conservation Fund, a nonprofit partner, often purchases the land with grant funds from private foundations which allows for faster acquisition and keeps down costs as nonprofits are able to make offers and execute real estate deals more quickly.

To learn more visit their case study:

Evans, Kathryn A.; Giarrusso, Anthony J.; and Zapanick, David (2023) "Perpetual Protection for Atlanta's High-Quality Forested Land in the City," *Cities and the Environment (CATE)*: Vol. 13: Iss. 1, Article 29. DOI: [10.15365/cate.2023.130129](https://doi.org/10.15365/cate.2023.130129)

AUSTIN

Protecting Natural Areas through Land Development Regulations

The city has been able to protect its tree canopy, including forested natural areas, through both a strict tree preservation ordinance that applies to both public and private land and development restrictions.

Austin, Texas is a fast-growing city with a booming population and high demand for housing. The city has been able to protect its tree canopy, including forested natural areas, through both a strict tree preservation ordinance that applies to both public and private land and development restrictions.

Austin's tree preservation ordinance, updated in 2010, requires a public hearing for the removal of any tree over 30" diameter at 4.5 feet height. This ordinance has led to a dramatic decrease in individual tree removal and it has served to protect forested natural areas where restrictions on removing large trees results in protecting the forested ecosystem as a whole.





As in many cities, zoning restrictions on development are an important tool used to preserve forested natural areas on private property. This means that when forested land is to be developed, developers must adhere to certain regulations, for example by retaining trees. In Austin, conservation easements also count as mitigation for tree removals. This means that developers can purchase the development rights for another property to protect existing forest in exchange for removing trees on the developed property. Other development restrictions for maintaining pervious surfaces, endangered species habitat, and other regulations also protect forested natural areas.

Left: Austin Natural Area

Top: Photo credit: Austin Parks and Recreation.

While many cities have passed ordinances to protect trees, they often lack resources to enforce regulations. Austin has invested in the enforcement of these ordinances by funding the City Arborist, responsible for enforcement, leading to the ordinances' success. While these measures have been incredibly successful, they are not set in stone. However, the measures used to protect trees from development are vulnerable to legislation from the state legislature which has historically had a strong interest in protecting the rights of developers.

To learn more visit their case study:

Mars, Keith W. (2020) "Outcome Oriented Policy: Protecting the Urban Forest Through Tree Preservation and Complementary Land Development Regulations in Austin, Texas," *Cities and the Environment (CATE)*: Vol. 13: Iss. 1, Article 21. DOI: 10.15365/cate.2020.130121



Above & Right: Baltimore Natural Areas

BALTIMORE

Updating Local Ordinances through Partnership

This case study examines the process of updating laws that protect forested natural areas.

In 2013, Baltimore Green Space, a nonprofit, published a paper on forest patches in Baltimore establishing several vulnerabilities in forest protection. One of these was the triggers for the forest conservation law in the city being too high. The Baltimore Office of Sustainability, a municipal agency, had committed to addressing some of these issues but did not have the necessary support to do so despite this being part of their sustainability plan. In 2017, Baltimore Green Space's program manager Katie Lautar joined the Baltimore City Forestry Board and collaborated with them to start the tree ordinance committee made up of a subset of its members. The committee was responding to direct threats and loss of forested land. The process began with an assessment of tree ordinances from cities across the U.S. that Baltimore could adapt.

This information was shared with the Baltimore Office of Sustainability, giving them additional motivation to address this by establishing a formal Tree Ordinance Committee composed of members of Baltimore Green Space, The Baltimore City Forestry Board, City Forestry, Blue Water Baltimore, Baltimore Tree Trust, Baltimore City Forestry, Baltimore City Department of Public Works, and the Baltimore City Office of Sustainability.

This team built on the work of the Baltimore City Forestry Board by conducting a gap analysis of current Baltimore regulations. This second committee established a 3-pronged approach based on the current legislation:

1. To update the forest conservation regulation and the manual that governs this work.
2. To create a public property tree bill codifying the tree mitigation policy on public land.
3. To create a private property heritage tree rule.

The first bill they passed is the ordinance that strengthened the forest conservation code by lowering the land area for development to trigger the tree code from 20,000 square feet to 5,000 square feet, and increased mitigation fee-in-lieu rates and fines.

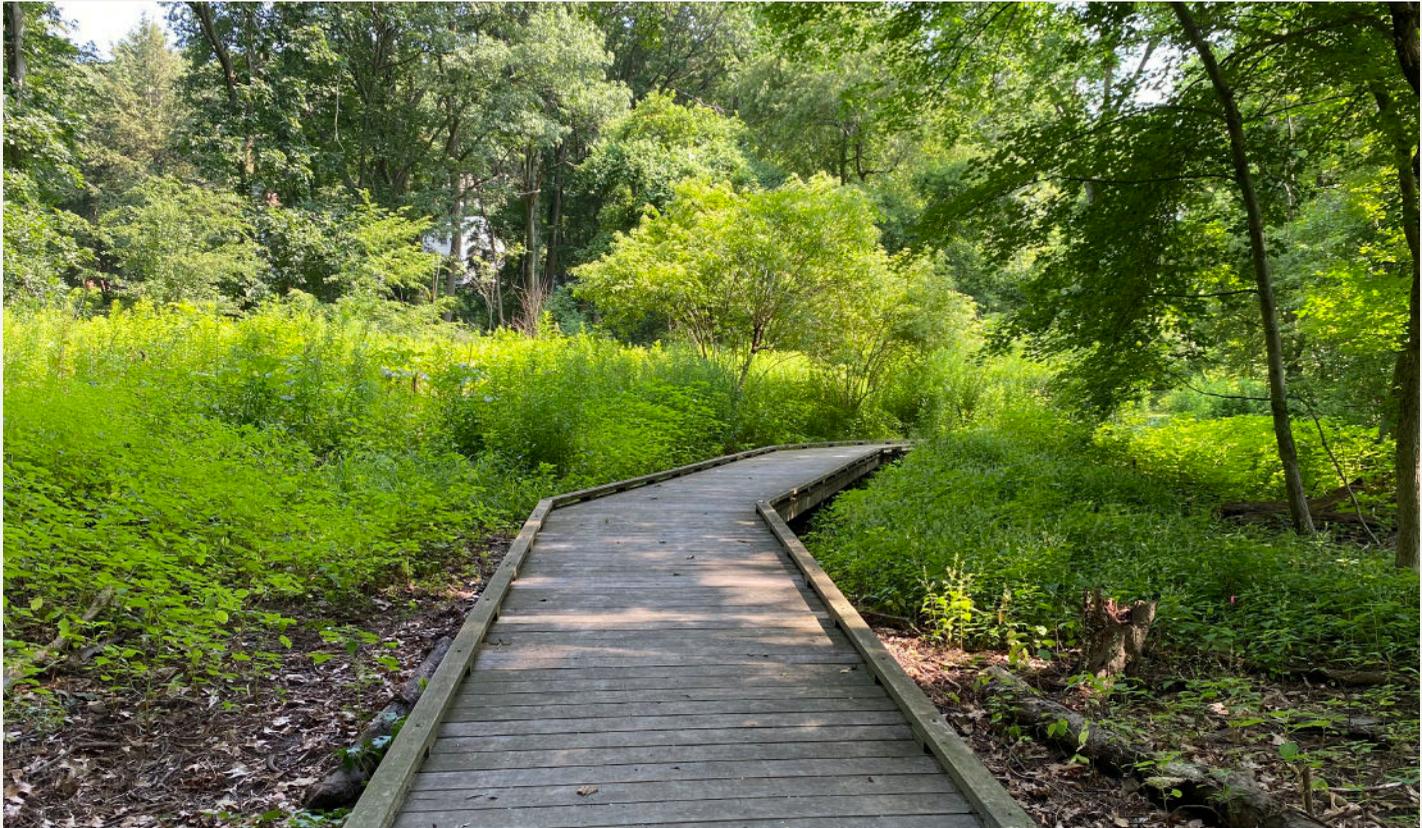
Additionally, the City of Baltimore currently has a policy that trees above 8” at 4.5 feet height on city land must be replaced. Because these codes updated existing legislation rather than passing something new, the process of gaining political support and enacting the updates was fairly quick and painless.

With the help of GIS data (information that is geographically referenced), and the first inventories done of Baltimore’s forested natural areas, it is easier to advocate for these spaces. Additionally, Maryland has one of the strongest forest preservation laws in the country which each jurisdiction is able to build upon. The remaining bills that were established as necessary were drafted and will be released in 2023 and 2024.

To learn more visit their case study:

[Bowers, Ashley A.; Gilder-Busatti, Amy L.; and Lautar, Katherine J. \(2020\) “Preservation, Regulations, and Policy to Protect and Grow Baltimore’s Forests,” *Cities and the Environment \(CATE\)*: Vol. 13: Iss. 1, Article 22. DOI: 10.15365/cate.2020.130122](#)





BOSTON

Protecting Urban Wilds through Legislation

Boston, Massachusetts has a comparatively long history of protections for forested natural areas and a comprehensive natural areas program. Boston also recently passed an updated wetlands ordinance.

A 1976 report identified 143 sites across the city of Boston with significant flora, fauna, features of geological importance, recreational and/or aesthetic value which were unprotected with many sites located on private land. A local community member, Eugenie E. Beal was inspired by the report to protect these lands and worked with others to launch the Natural Areas Fund, a non-profit organization that spearheaded the protection of these properties in partnership with the municipal government. The 143 sites were prioritized for protection based on a framework that considered both social and ecological factors. Beal worked with partners to lead a public fundraising campaign to purchase the highest ranked parcels.

While the Natural Areas Fund no longer exists, acquisitions are still being made by the City of Boston's Urban Wilds Program through other means including willing seller purchases, eminent domain, foreclosure, and transfers from other City departments. This system of acquired natural areas was formalized into the Urban Wilds Program which now protects 223 acres on 31 properties across Boston.

The strength of state law in Massachusetts allows for the protection of Boston's Urban Wilds. Most properties in the Urban Wilds Program are held by the Boston Conservation Commission—a municipal environment agency. Conservation commissions are enshrined in Massachusetts state law. This ensures that without significant political and public processes, the land cannot be developed or converted to uses other than passive recreation.

While Boston has been successful in protecting natural areas, they still have extremely limited personnel to manage natural areas. They are currently developing maintenance staffing and programming.

Boston also uses wetlands protections to conserve natural areas. Recently, the City passed a wetlands ordinance which extended protections for areas adjacent to wetlands beyond the state-mandated riverfront area. This was done to combat climate change and potential negative impacts to rivers and other wetland resource areas. Increasing wetlands protections, particularly the buffer surrounding wetlands, can also protect upland forests.

Left: Boston Natural Area

Below: Allendale Woods Urban Wild



Below: Lake Houston Wilderness Park Nature Preserve
Photo Credit: Cassidy Kempf



HOUSTON

Protecting Nature in Parks Through a Nature Preserve Ordinance

In 2022, Houston City Council passed a groundbreaking Nature Preserves Ordinance which established a system of nature preserves across Houston.

This ordinance created a system of nature preserves on city park land to protect urban natural areas from development in perpetuity. Previously there were no protections for natural areas in Houston. Staff from the Houston Parks and Recreation Department's Natural Resources Division determined which parks property would be included in the nature preserve program based on size, quality and geographic spread of natural areas and drafted the ordinance in coordination with the city's Legal Department.

The process for creating this ordinance began with a period of researching similar efforts throughout the country; however, there are few examples of nature preserve ordinances, meaning that this was a groundbreaking effort. As there was little precedent, Houston officials had to define terms like "natural area" and "nature preserve." The ordinance was drafted and faced little opposition in being passed.

The ordinance currently protects 7,423 acres of 16,000 acres of natural areas in Houston Parks. In addition to protection in perpetuity, it also excludes conversion to other park uses. The preserves are located throughout the city and new preserves may be added to the ordinance if approved by the city council.

Houston also uses acquisition to protect land particularly around the city's bayous. The Bayou Greenways Project is funded through a 100 million dollar bond along with 120 million dollars raised by the Houston Parks Board, a nonprofit partner. The city uses a combination of conservation easements, public-private partnership, donations and purchasing for this project.

For more information visit:

<https://www.houstontx.gov/parks/naturalresources.html>

MIAMI

Protecting Endangered Ecosystems

Miami-Dade County, Florida is considered a global biodiversity hotspot, home to diverse ecosystems and species, some found nowhere else in the world, that require unique protection and management. This includes pine rocklands, which is a “globally critically imperiled ecosystem with limited geographic range.”

To preserve this unique habitat, Miami-Dade County has implemented a toolbox of measures across federal, state, county, and city jurisdictions aimed at biodiversity conservation.

Below: Pine Rockland Ecosystem in Miami
Photo Credit: James Duncan



Between the 1970s and the 1990s, political opinion was highly favorable to conserving land which allowed Miami to pass several pieces of legislation that laid the groundwork for land protection. This included a property tax reduction in exchange for preservation of private land. The Natural Forest Communities Protections Ordinance, which regulated development of forests was also passed. Crucially, the [Environmentally Endangered Lands](#) (EEL) Acquisition Program was created. Land acquisition through the program was funded by a referendum that imposed a tax for the EEL Acquisition Program.

In spring of 2023, all habitat patches larger than 3.5 acres were designated critical habitat under the Endangered Species Act. This creates new protections and potential funding sources for conservation of these areas. Miami also uses public outreach, such as the Connect to Protect Network, to educate the public in the hopes of preserving ecosystems, including distributing rare native plants to gardens.

Assessment was crucial for determining which land to acquire—Land was evaluated based on biological value, vulnerability to destruction, and costs. These programs persist in the face of consistent headwinds from development pressures, skyrocketing land prices, and political pressure from the State of Florida.

One local strategy that assists in protecting forests is the prohibited species requirements of the county code and Comprehensive Development Master Plan. Prohibited species are a list of plant species that are known to be harmful to Miami’s native habitats. Both properties in development and developed properties are required to be maintained free of “prohibited species.” Additional prohibitions exist on propagating these plant species. This ordinance is not without its challenges. While using development-triggers for enforcement is successful, pro-active enforcement on developed properties not going through a permitting process is challenging. Since passing the ordinance, the state has preempted the county from adding more species to this list unless the State determines it is harmful. For this and other reasons, the county also has a controlled species list that prohibits planting of species within 500 feet from the natural plant community it is known to invade.

To learn more visit their case study:

Duncan, James; Possley, Jennifer; Gil, Janet; and Grossenbacher, Craig (2020) “Conservation Strategies for a Globally Imperiled and Hyper-Fragmented Ecosystem: Acquisition, Regulations, Incentives and Outreach in Miami Dade County,” *Cities and the Environment (CATE)*: Vol. 13: Iss. 1, Article 23. DOI: [10.15365/cate.2020.130123](https://doi.org/10.15365/cate.2020.130123)



NEW YORK CITY

Protection of Forever Wild Natural Areas

The “Forever Wild” program is New York City’s biodiversity protection program which includes over 12,300 designated-acres representing more than a third of New York City’s parkland.

While this program is not mandated through a city ordinance, it serves to encourage the New York City Department of Parks & Recreation (NYC Parks) to conserve the ecological and social benefits of natural areas. Overall, the creation and expansion of this program has reclassified natural area parkland as a valuable asset rather than “undeveloped.”

The Forever Wild program began in 2001, drawing on surveys conducted by ecologists in the decades before that showed that “undeveloped parkland” was forests, wetlands, and grasslands teeming with biodiversity. The program protects both high-quality and degraded lands, each land type provides habitat, and degraded land provides the opportunity for future restoration.

Between 2018-2020 the program was updated and expanded. With the use of GIS and an ecological cover type map, there is now an improved understanding of where natural areas exist city-wide. Forever Wild sites are now included in the program if they are owned by NYC Parks, are dominated by natural vegetation, and are greater than two acres. The project has added land through these updated criteria and through some acquisition and transfer of public land to NYC Parks.

The program brings awareness to the importance and vulnerability of urban natural areas, which can help to protect them by raising their public profile and ensuring their proper management. Public outcry or trepidation on the part of elected officials or government employees can make it less likely that construction projects will impact natural areas; however, the influence of the program depends on political support and funding, and competing uses for land add vulnerability to the program.

To learn more visit their case study:

Cullman, G., D.N. Auyeung, J. Greenfeld, K. King, and M. Larson. 2022. Preserving Nature in New York City: NYC Parks' Forever Wild Program. Cities and the Environment.

Left: Photo Credit: Natural Areas Conservancy

Below: New York City, New York Botanical Garden



PHILADELPHIA

Expanding Tree Ordinance and Wetlands

Philadelphia's new wetlands and new tree ordinance protect and expand natural areas in the city.

In Philadelphia, natural areas were historically preserved, expanded, and managed in order to protect drinking water. Philadelphia Parks Department continues to manage upland forests, and has partnered with the Philadelphia Water Department to create new wetlands to reduce sedimentation in the Schuylkill River, which is the source of many Philadelphian's drinking water.

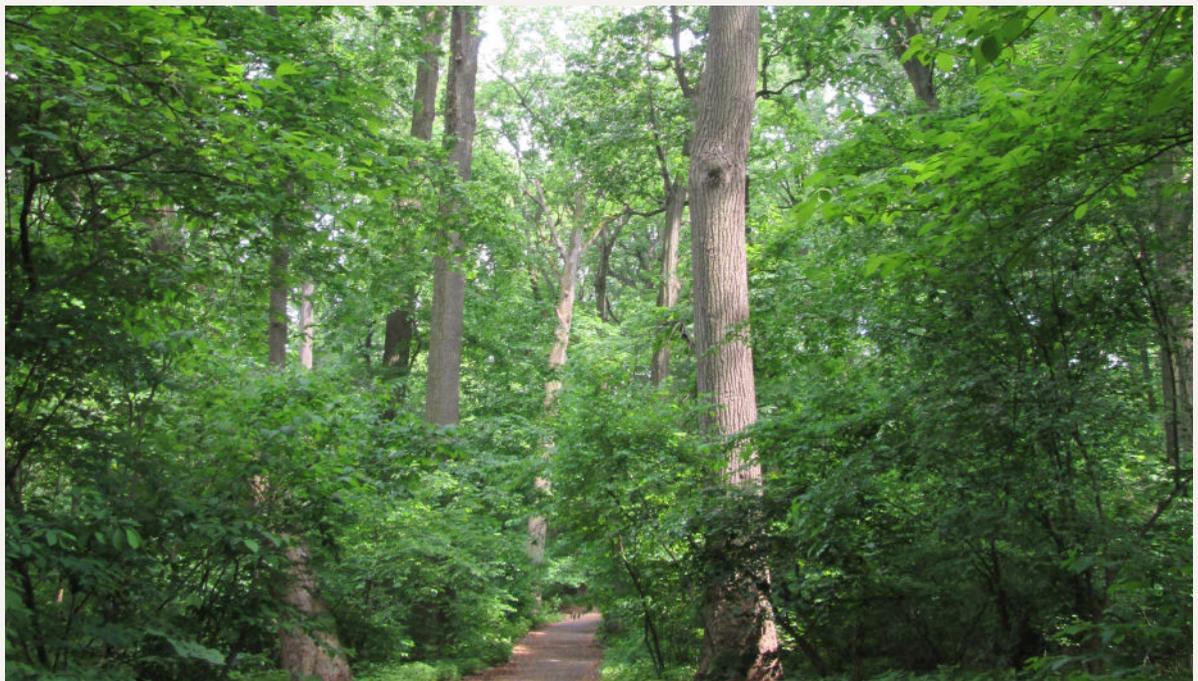
In 2022, the City of Philadelphia developed a comprehensive city-wide urban forest strategic plan to grow, protect, and care for the city's tree canopy. As part of this effort, the city passed a new tree ordinance in 2022, which expands requirements for developers around preserving and planting

trees, and sets new fees for removing trees without replacements. The bill applies to both public and private property. Restoration projects are exempt from the new ordinance, including streambed, floodplain or forest restoration; wetland or meadow creation; or green stormwater improvements.

The tree ordinance also set new restrictions on development over 5,000 square feet with the exception of affordable housing. Developments must have a tree preservation and landscape plan to be approved by the city government.

To learn more visit their case study:

[Anthes, Richard Jr; Compton, Aelin; and Rhodes, Luke \(2023\) "Ecological Benefits of Creating Stormwater Wetlands and Woodlands in Philadelphia, PA," Cities and the Environment \(CATE\): Vol. 13: Iss. 1, Article 31.](#)



SEATTLE

Acquiring and Protecting Land

The City of Seattle has used innovative approaches to acquire and protect valuable urban natural areas.

Seattle recently passed an improved tree ordinance which took effect in the summer of 2023. The ordinance was spurred by pressure from citizens to pass a new ordinance that would protect more trees and took many years of planning and advocacy to pass. As in many cities, builders and developers opposed new tree protection measures that would hinder development or make their work more costly and regulated. The new ordinance applies to private property and decreases the required diameter of exceptional trees that are protected in the ordinance from 30 to 24 inches diameter at 4.5 feet height. Additionally in Seattle, landowners, depending on zoning, may only remove two trees under 12 inches diameter within a three year span.

Left: Inwood Hill Park, New York, NY.
Photo by Natural Areas Conservancy

In addition to a tree ordinance, Seattle also has an ordinance defining and governing Environmentally Critical Areas which include geologic hazards such as steep slopes prone to landslides, flood/wetland areas, and wildlife habitat. Within these areas that apply to both public and private land, there are further restrictions on removing trees and other vegetation, including by government agencies or utilities. This ordinance was updated in 2017.

Seattle has a robust land acquisition program which seeks to preserve open space. Areas in the 1993 Green Space Resolution, a local land acquisition law, provide blanket acquisition authority to the City of Seattle to purchase land within those boundaries including forested natural areas. Additionally, Initiative 42, a city ordinance, ensures all park and open space in Seattle is protected in perpetuity.

WASHINGTON D.C.

Protecting Forests by Protecting Heritage Trees

Washington D.C. uses legislation, land acquisition and local partnerships to protect forested natural areas.

Washington D.C.'s Urban Forest Preservation Act, passed in 2002, sets standards to protect mature trees on private property. Special trees (44-99" circumference) may not be cut down without a permit. Heritage trees (over 99" circumference) may not be cut down but may be moved. The law also establishes a tree fund which is used to plant trees on public land or can be used to assist low-income residents with costs related to the removal and replacement of hazardous trees. While these regulations are used most often to protect single trees, they also help protect forested natural areas on private property with existing mature trees.

Land conservation efforts in Washington D.C. include conservation easements on private and public land. Conservation easements, held by organizations such as Casey Trees as a land trust and 501(c)3 organization, place restrictions on land use including impervious cover. Conservation easements can protect land in perpetuity and often require monitoring by the organization which holds the easement.

In addition to ordinances and easements, local advocacy and cross sector partnerships have played a key role in how forests are protected in Washington D.C. Recent proposed projects, including siting for a public safety agency, that would cut down forest patches were stopped by citizen advocacy. A different location that did not require clearing forested land was chosen.

Various partners including the D.C. Citizen Forest Health Working Group successfully advocated for new legislation called the Office of Natural Area Conservation Establishment Act of 2023 which establishes a new office of natural areas conservation. It also requires the development of a long-term plan to respond to invasive plants and the coordination of volunteer engagement in conservation efforts.

Conclusion

Forested natural areas are under threat in urban areas throughout the United States. Due to pressure from private development, conversion to other public uses, infrastructure projects, and degradation from climate change, invasive species, and encroachment, urban forested natural areas are vulnerable. Gaps in protection and loopholes allow for chipping away at forests. Additionally, much of this land is on private property and subject to fewer protections.

Below: Seattle Natural Area
Photo Credit: Michael Yadrick





This review and supplementary interviews found that cities use a toolbox of different approaches to conserve forested natural areas in the face of mounting threats. Aligning with wider efforts to protect the urban forest, water resources, and biodiversity, cities use a combination of overlapping laws, policies and programs to prevent the destruction of forests. However, not all strategies are equally effective. For example, placing a monetary restitution value on trees may not be sufficient because wealthy developers will pay to cut them down. Placing land in the public domain may be more effective because there is public input for decision making, but full protection on public land must also entail some other form of protection to ensure forests are not converted to other types of public space. The strength of laws and policies also depends on how they are written and enforced.

Using the findings outlined in this report, cities can evaluate, strengthen and add to their own toolboxes. This process begins with an assessment of the laws and policies currently in place protecting forested natural areas. Next, establishing a definition and conducting an assessment of extent and condition of forested natural areas themselves is necessary. Knowing the extent and state of natural areas allows for trends to emerge and will make advocating for preservation much easier.

This work uncovered some powerful and effective strategies for preserving forested natural areas. First, it is more expedient to update existing legislation and policies than to implement new ones. We recommend first determining where existing laws and policies can be strengthened. Next, successful cities examine other cities' policies. We hope that this report can help facilitate comparison with other cities. Though a one-size-fits-all approach is not what we are recommending, seeing how other cities approach land protection for urban forested natural areas will help to formulate proven strategies that have been implemented across the country.

Finally, successful efforts to strengthen protections for forested natural areas entailed finding partners and local champions to spearhead this effort. It is essential to understand the local political process to implement these changes. Often an enthusiastic elected official or agency commissioner is needed to move projects forward, in addition to an engaged and passionate network of local advocates. We have found that the actions of these champions reverberate for decades afterward, so it is important to move forward while political winds are favorable for conservation of forested natural areas. It is crucial to communicate the value of forested natural areas, and conduct research about these spaces, including the effects of climate change and equitable access to forested natural areas in order to best facilitate their long-term protection and conservation.

Call to Action

Forested natural areas are valuable, but are underfunded and underprotected, leaving them imperiled in cities across the country. These spaces cannot persist without your help. For preservation to be a reality, policymakers need to allocate sufficient funding for natural area maintenance to reduce the risks of degradation, and pass land protections laws to prevent development. Without proper funding and protection, the vast benefits of natural areas will diminish in many cities, leading to less livable cities. Without these changes, cities face challenges in preserving their natural areas and sharing the advantages that come with them.

But you can help:

- Contact elected officials and request additional funding and protection for natural areas in your city.
- Connect to organizations in your city that conduct land protection such as land trusts or park advocacy organizations.
- Encourage your local environmental organizations to become aware of conservation of natural areas.
- Does your city have a volunteer stewardship program? Sign up and pitch in to help maintain your local trails and natural spaces.
- Visit your local natural areas and post about it on social media. The best way for natural areas to get more protection is to give them attention.

Appendix

Links in Report

Houston Nature Preserve Ordinance

https://library.municode.com/tx/houston/codes/code_of_ordinances?nodeId=COOR_CH32PARE_ARTVNAPR_S32-116PUPO

NYC Nature Map

<https://naturalareasnyc.org/map>

EPA Clean Water Act Summary

<https://www.epa.gov/laws-regulations/summary-clean-water-act>

EPA Endangered Species Act Summary

<https://www.epa.gov/laws-regulations/summary-endangered-species-act>

Miami Environmentally Endangered Lands Program

<https://www.miamidade.gov/environment/endangered-lands.asp>

Miami Prohibited Species List

<https://www.miamidade.gov/environment/prohibited-plants.asp>

Miami Comprehensive Development Master Plan

<https://www.miamidade.gov/planning/cdmp.asp>

Find out more about our work at naturalareasnyc.org

