

# Preservation and protection of open space

## REDUCE EMISSIONS BY INCREASING PROTECTED OPEN SPACE, PARKS, AND TREE CANOPY

**Description and purpose of strategy:** Natural lands consist of forests, grasslands, agricultural areas, wetlands, and recreational lands such as parks. These spaces are important parts of a community and ecosystem, providing environmental and economic benefits. They give people an opportunity to interact with the outdoors, which is linked to better physical and mental health outcomes. In addition, they offer ecosystem services such as carbon sequestration and water filtration and represent a significant opportunity to reduce greenhouse gas (GHG) emissions. Preserving open spaces, parks, and forestland, are an important part of climate mitigation.

**Content of fact sheet:** An evaluation of the financial and non-market benefits of green spaces such as parks and forests. Includes an investigation of how these areas are acquired, enhanced, and maintained—which is important for equity and environmental outcomes. See the fact sheets on wetlands and agriculture for more information.

**Implementation support:** This fact sheet expands upon strategies and actions from the Climate Actions Database, which can be found at: [capecodcommission.org/climate](https://capecodcommission.org/climate).

### BENEFITS

- Greenhouse gas (GHG) emissions reductions or sequestration
- Health improvement from reduced pollutants
- Increased recreation
- Lower maintenance/operational costs
- Environmental enhancement/protection
- Less damage to infrastructure
- Higher property values
- Increased resilience
- Job and economic growth

### COSTS

- Higher capital costs
- Higher maintenance costs
- Higher operational costs
- Additional time for municipal staff to implement

## KEY FINDINGS



**Equity:** Creating and preserving parks and other green space can provide access to outdoor resources for all communities. Improved air quality can lead to improved health outcomes, and trees can also reduce urban heat island effects, which often disproportionately affect vulnerable communities.



**Financial benefits:** Green space preservation can increase property values and provide economic opportunities through the value residents place on open space and recreation. However, land acquisition can also be costly, so financial outcomes are largely dependent on the project.



**Non-market benefits:** Improvements in physical health from increased recreational opportunities are an important benefit of green spaces. Additionally, access to green spaces has been linked to improved mental health outcomes.



**GHG reductions:** Preserving green spaces leads to GHG reductions through increased carbon sequestration and decreased development.



**Ease of implementation:** Cape Cod can ensure protection of its green spaces by developing and implementing Open Space and Recreation Plans and enacting policies that allocate resources to conserving lands and improving parks.

## BENEFIT COST ANALYSIS

Land conservation creates financial and non-market benefits by providing recreational opportunities and ecosystem services. People are willing to pay for access to green spaces for outdoor activities, even if they are not charged to do so. The value of green spaces can be estimated based on what individuals are willing to pay, though estimates can vary based on methodology and geography. Data from Oregon State University's Recreational Use Values Database reveal the following willingness to pay values for certain activities in the Commonwealth of Massachusetts:

### VALUE OF RECREATION FOR SELECTED ACTIVITIES

ACTIVITY	BENEFIT ESTIMATE (PERSON PER DAY)
Backpacking	\$23
Beachgoing*	\$45
Camping	\$25
Freshwater fishing	\$39
Hiking	\$91
Waterfowl hunting	\$29
Picnicking	\$13
Wildlife viewing	\$31
General recreation	\$31
Other recreation	\$42

\* Due to a lack of Massachusetts-specific data from Oregon State, the beach user-day value is taken from *Economic Impacts of Climate Change on Cape Cod* ([Cape Cod Commission, 2021](#)).

In addition to the recreational use residents get from green spaces, forests and other natural lands perform various ecosystem services that provide economic and environmental benefits, such as carbon sequestration, improved air quality, improved water quality, and avoided runoff. Avoided runoff is important to quantify because it represents pollutants and stormwater that do not have to be managed or filtered in any other way. According to the U.S. Forest Service's i-Tree landscape assessment tools, Barnstable County's trees sequester \$16 million worth of carbon annually and save roughly \$9 million in avoided runoff costs. In addition to sequestering carbon below ground, trees store carbon above ground as biomass, adding to their potential to act a carbon sink.

### ECONOMIC BENEFITS FROM TREE COVER IN BARNSTABLE COUNTY

CANOPY ACRES	CARBON SEQUESTRATION (\$/YEAR)	CARBON SEQUESTRATION (TONS/YEAR)	AVOIDED RUNOFF (\$/YEAR)	VALUE PER CANOPY ACRE (\$/YEAR)
114,359	\$16,809,046	88,581	\$9,059,264	\$67,236.49

Along with preserving existing parks and forestlands, identifying and acquiring new land for protection is important to increase Barnstable County's carbon sequestration potential. Acquiring open spaces both removes vulnerable land from the market and protects it in the long term. Land acquisition can take the form of donations from willing landowners or purchase of private land. Conservation land trusts, groups that own land or often manage land on behalf of the landowner, play a key role in land acquisition and preservation because private lands may be too expensive to purchase outright. To help defray the costs of land, towns can apply for [grants from the Massachusetts Division of Conservation Services](#) or [federal conservation programs](#). Additionally, towns can allocate funds from the Community Preservation Act to acquire open space, as the [Harwich Conservation Trust recently did to help purchase 85 acres](#).

One strategy to augment existing parks and public green spaces is tree plantings that maximize ecosystem services of land. i-Tree can be used to estimate the benefits of planting trees in a certain geography. Among other things, i-Tree estimates the financial benefits of avoided runoff, the financial benefit of CO<sub>2</sub> emissions avoided due to reductions in energy uses from tree shading and increased insulation, and the value of the project's carbon sequestration based on the social cost of carbon. (The [Understanding i-Tree](#) report offers a complete breakdown of i-Tree's methodology). For example, the table below shows select lifetime benefits from an initiative to plant 50 maple trees within 20 feet of buildings in the Town of Barnstable.

ILLUSTRATION OF I-TREE USES FOR PROJECT PLANNING

TREE TYPE	NUMBER	LIFETIME CO <sub>2</sub> AVOIDED VALUE	LIFETIME CO <sub>2</sub> SEQUESTERED VALUE	LIFETIME AVOIDED RUNOFF VALUE
Maple	50	\$2,652	\$1,547	\$224

In addition to land acquisition costs, municipality-specific maintenance costs should be considered when preserving green spaces. A municipality can generate per-acre cost estimates by reviewing its recreation and natural resources budgets and comparing them to the numbers of acres it maintains.

## EQUITY

Equity must be a top consideration when preserving and acquiring green spaces on Cape Cod. Access to green spaces, as well as proximity to hazardous environmental conditions, is uneven among communities of differing race and class. According to a report from the Trust for Public Land, parks across the U.S. in majority non-white neighborhoods are [half as large and serve five times as many people as parks in majority white neighborhoods](#). Studies have shown race and class to be a predictor of pollution exposure and access to green spaces, which is why preserving and creating green spaces in all communities is important. This is an especially important consideration of late, as public outdoor spaces have acted as important gathering spots during the COVID-19 pandemic. Some equity benefits and considerations are as follows:

- **Better health outcomes for adjacent communities.** Studies have shown conserved land has positive impacts on physical health by improving air and water quality. Access to parks is also associated with higher rates of physical activity. Additionally, exposure to nature has been shown to have mental health benefits, as highlighted in a report from the Massachusetts Land Trust Coalition that notes nature's ability to reduce symptoms of post-traumatic stress disorder, reduce childhood obesity, and reduce mortality.
- **Temperature reductions in urban spaces.** Trees near residences and municipal buildings reduce summertime temperatures. For instance, in Worcester the removal of 30,000 mature trees due to insect damage resulted in an increased peak temperature of 1 to 6 degrees Celsius. Ensuring preservation of existing green spaces and installation of new ones—particularly in areas with high proportions of vulnerable communities—could help reduce instances of extreme heat in the summer.
- **Job and educational opportunities stemming from preserving natural lands.** As illustrated above, there are many economic benefits from land conservation. Jobs and labor are necessary to preserve and create green spaces, creating economic opportunity in areas that focus on conservation. In addition, access to the outdoors provides opportunities for outdoor education and recreational programs.

## Optimizing Equity During Implementation

An important consideration while preserving green spaces is that they can increase property values, making housing less affordable. This has been called the Green Space Paradox: residents who have not had access to green space are also the most likely to be displaced by the creation of new green spaces. Research has shown that the [location and function of](#)

[parks are a strong predictor of gentrification](#). Decision-makers must take action to ensure parks are accessible to all and to create safeguards from increased housing prices for low-income communities. Job opportunities relating to green spaces must be accessible to all communities, so municipalities should invest in incentives and targeted training opportunities for vulnerable populations. Municipalities should make note of [environmental justice populations](#), considering and prioritizing them while making decisions related to tree planting, park creation, and forest preservation.

## STATE OF PRACTICE

### General State of Practice

The State of Massachusetts has included natural carbon sequestration in its [2050 Decarbonization Roadmap](#) and published an associated [land sector technical report](#). Massachusetts forests have the capacity to sequester 7% of the Commonwealth's annual emissions and represent a powerful opportunity to remove carbon from the atmosphere. In the decarbonization roadmap, Massachusetts calls for increasing natural carbon stocks through afforestation, reforestation, forest management, and natural ecosystem restoration. Other publications such as the Massachusetts Land Trust Coalition's [How Conserving Open Space Provides Economic Benefits to Massachusetts Communities](#) and the [Massachusetts Healthy Soils Action Plan](#) highlight the potential for land conservation to generate benefits greater than the costs. Initiatives stemming from municipal climate action plans and statewide strategies are emerging as key components of GHG reduction—for example, the [San Jose Natural and Working Lands Strategy](#), which creates plans to expand parks, recreation, regenerative agriculture, and high-density neighborhoods.

### Cape Cod Context

The Cape Cod Commission completed a [GHG emissions inventory for 2017](#), in which it estimated sequestration potential on Cape Cod to be 340,582 MTCO<sub>2</sub>e per year, or 9% of the Cape's total emissions. In addition, the Cape Cod Climate Change Collaborative has identified conservation and land use as key in GHG reductions. The 2018 Cape Cod [Regional Policy Plan](#) sets additional goals for conservation and estimates that, as of 2012, about 40% of the Cape's assessed acres were protected. However, the Regional Policy Plan also notes that Cape Cod lost more than 2,300 acres of forest cover between 2001 and 2011, with the majority being replaced by development. It is of critical importance that open spaces on Cape Cod be preserved, and that development be done with environmental considerations in mind.



### CASE STUDY: HARWICH, MA

In December 2022, the Harwich Conservation Trust finished a fundraising effort that brought in \$3 million for a project to preserve 85 acres in the Six Ponds Special District. This area, the largest undeveloped tract on the Lower Cape, includes pine-oak forest, walking trails, and multiple recharge zones for freshwater resources. The effort was made possible by the landowner, as well as funding from the Massachusetts Department of Conservation, the Community Preservation Act, individual donations, and the Harwich Town Finance Committee. The land is important for water quality in the nearby area and provides recreation opportunities for residents and visitors. This project is a great illustration of municipalities working with residents and land trusts to preserve land, and can be viewed as a template for future endeavors.

- **Develop or update land inventories.** Land inventories are important for a municipality to understand its capacity to meet current and future needs. They should include developed and undeveloped land. In addition to planning, a land inventory can help assess the current benefits from different lands.
- **Create or update [Open Space and Recreation Plans \(OSRPs\)](#) with existing guidance from [mass.gov](#).** OSRPs can include land inventories but are broader in scope. They help communities plan open space projects and are a required part of eligibility for state open space funding.
- **Secure funding and incentives to preserve forested areas.** Funding can come from many sources at the state and local levels. Municipalities can work with land trusts to pursue opportunities such as the [Local Acquisitions for Natural Diversity](#) grant program or funds from the [Community Preservation Act](#).

REQUIRED EXPERTISE

**Internal:** Town planner, recreation department, local conservation board, tree warden

**External:** Subject matter experts, affected communities, local land trusts

Resources that may assist with preserving green spaces are listed below.

FINANCIAL AND TECHNICAL SUPPORT	
<a href="#">Division of Conservation Services Grants</a>	Grant programs for conserving and acquiring open spaces.
<a href="#">Parkland Acquisitions and Renovations for Communities (PARC) Grant Program</a>	Grant program that awards funding to cities and towns to acquire and develop land for outdoor recreation.
<a href="#">MassTrails Grants</a>	Explanation of the MassTrails program and where to apply for grants to build trails.
<a href="#">Managing for Forest Carbon</a>	Massachusetts Department of Conservation and Recreation report that describes carbon management strategies.
<a href="#">How Conserving Open Space Provides Economic Benefits to Massachusetts Communities</a>	MassLand report with content that can inform what areas of Cape Cod to target for preservation and what benefits might result.
<a href="#">i-Tree</a>	U.S. Forest Service tool that estimates the benefit and GHG reduction associated with forested and natural lands. Also allows the user to input projects with specific numbers of trees, area, and locations to estimate the benefits of proposed green space projects.
<a href="#">Open Space and Recreation Planner’s Workbook</a>	Commonwealth guide to creating OSRPs.
<a href="#">Recreation Use Database</a>	Database from Oregon State University.
<a href="#">The Value of Land Conservation</a>	MassLand toolkit for landowners and land trusts about the value of land conservation.
<a href="#">List of Land Trusts</a>	MassLand list of all land trusts in Massachusetts; features several on Cape Cod.

## ADDITIONAL INFORMATION

<a href="#">The Cape's Natural Resources—What's at Stake?</a>	Report from the Association to Preserve Cape Cod with information about the Cape's natural resources.
<a href="#">Nature-Based Solutions for Climate Change Mitigation</a>	United Nations (UN) guidance and information on climate change mitigation, with a strong component of land conservation.
<a href="#">Natural and Working Lands Element: Climate Smart San José</a>	Example of a natural and working lands strategy
<a href="#">New Jersey Natural and Working Lands Strategy</a>	Example of a natural and working lands strategy.
<a href="#">Fiscal Impacts of Land Use in Massachusetts</a>	Document showing the fiscal impacts of land use in four Massachusetts communities.