

Entity Guidelines – Managed Forest Systems Chapter V.3 Roadmap Planning Document

Urban Forest Management

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Background and Basic Methodology

There are three general methods for estimating carbon storage and annual sequestration in urban forests:

1. Gathering data on the ground from trees in the field
2. Collecting photointerpretation of tree canopy from aerial imagery
3. Using preexisting and summarized carbon data of specific geographies from an online geospatial database

i-Tree tools cover these three methods

What is i-Tree?

- A dynamic system of tree benefit estimation science built on a collaborative platform facilitated by a public-private partnership primarily between the Davey Institute and the USDA, Forest Service in service for almost 20 years
- Not just carbon estimates, lots of other tree benefits that help inform urban and community forest management
- Growing domestic and global usage, lots of online resources
- Collaborators continue to update and expand i-Tree with new tools, science, and reporting options



Trees provide more than just beauty and shade.

They remove hazardous pollutants from the air you breathe, absorb carbon dioxide from the air to store as wood, and control storm water by intercepting and absorbing rainfall.

They work hard for all of us, every day!

[Click here to learn more.](#)

Tools for Assessing Individual Trees



easy

MyTree

Are you new to i-Tree? Start with our EASIEST tool! MyTree helps you quickly assess **individual trees** with a minimum of fuss. *web browser or Android / Apple devices; Learn [How to use it!](#)*



i-Tree Design

A full-featured web tool with expanded building interactions and forecasting for estimating the benefits of **individual trees**. *via your web browser; Learn [How to use it!](#)*



advanced

i-Tree Eco

Eco is our flagship tool that accommodates tree inventory IMPORT or field data evaluation to derive **individual tree** benefit estimates. *requires installation on a Windows PC; Learn [How to use it!](#)*

Tree Canopy Assessment Tools



easy

OurTrees

Quick **tree canopy** and related information for your community within the continental US! *web browser or Android / Apple devices*



i-Tree Landscape

US **tree canopy** and Census maps/data at your fingertips! Identify priority planting & protection areas for climate & social issues. *via your web browser; Learn [How to use it!](#)*



office assessment

i-Tree Canopy

From your chair, easily estimate land cover and **tree canopy** plus benefits using random point sampling on aerial imagery. *via your web browser; Learn [How to use it!](#)*

www.itreetools.org

Level 1

To get basic carbon values including storage and annual sequestration, the easiest and most accessible options are...

- i-Tree Eco, MyTree, or Design for field data collection,
- i-Tree Canopy for aerial data collection, or
- i-Tree Landscape for the online geospatial database method

Level 2

MyTree, Canopy, and Landscape outputs can be used with lookup tables to account for carbon effects beyond simple storage and annual sequestration (ie. maintenance emissions)

In addition, many i-Tree tools generate some of the additional carbon effects (ie. avoided emissions from power plants) as well as many other environmental service values so that additional work may not be needed

Level 3

Uses i-Tree Eco, level 2 calculations, and user input

- i-Tree Eco raw data (from sample plots and/or inventory)
- Eco reported output values
- User contributions – individuals and community of practice and research

Gaps

Forest carbon estimation methods and their ongoing development and refinement demonstrate clear opportunities for greater integration, consolidation and user utility within and among the sectors

- If supported, would provide a better understanding of and the options available for increasing carbon storage and sequestration through improved biomass utilization and carbon neutral management strategies
- Further development of these efforts would also improve the tools and processes used by stakeholders and the public for forest carbon estimation and management

Gaps

- The i-Tree suite of tools is always being updated with new science and data, including substantial contributions from FIA, to improve the data collection, analysis, modeling, and output values
- Like FIA and Urban FIA, the i-Tree project and program continues to **need reliable, continuous, consistent, and additional financial and programmatic support, both to maintain the core system of software, databases, and web-based delivery system and to continue the enhancements and expansion of the i-Tree suite of tools**
- Keep moving toward the big long-term goal of “all lands, all vegetation” in FIA
- A thank you to our leadership

Gaps

Ongoing and initiation of new research focused on improving and updating the allometric equations in i-Tree and developing methods for sequestration by shrubs

Gaps

State and county level carbon storage and sequestration estimates per square meter of tree canopy cover need to be improved and refined so that there is more appropriate scalability in carbon accounting

Gaps

Estimates of maintenance emissions and altered building energy use effects need further evaluation and refinement to advance more complete carbon accounting while also improving our understanding of these relationships between trees and building energy usage

Gaps

The research of urban forest management activities should also include more carbon and environmental benefit analysis of urban biomass utilization and waste

Gaps

Ongoing and new high-resolution aerial imagery and land cover projects/products throughout the country will improve methods

Gaps

Ongoing and new development of stakeholder/public tools to enhance broader understanding of and participation in carbon management, like suggested urban expansion planning tools for municipalities

Description of Need	Priority Level (high, medium, low)	Dependencies	Supporting Work/ Opportunities (e.g., existing research or data streams)	Feasibility (rank 1-3, with 1 being the most feasible and 3 being the most unfeasible)
Ongoing support of i-Tree system – database, webtools, software	High	Full and consistent funding of program critical to maintain basic systems <ul style="list-style-type: none"> Urban FIA and unit staffing Davey Institute contracting External research, contributions and feedback 	<ul style="list-style-type: none"> Urban FIA i-Tree integration efforts Davey Institute work ongoing for i-Tree tools and system External research, contributions and feedback ie. i-Tree academic suite Database updates to ensure temporal relevance 	3
Improving/updating allometric equations and developing methods for sequestration by shrubs	High	<ul style="list-style-type: none"> Internal FS research External research Database entry 	<ul style="list-style-type: none"> Ongoing but could be expanded with additional and intentionally focused funding for research projects 	1
State and county level carbon storage and sequestration estimates per square meter of tree canopy cover need to be improved and refined	Medium	<ul style="list-style-type: none"> Investments in finer/locally scaled geographic databases Internal FS research External research Coding for updates to i-Tree Tools 	<ul style="list-style-type: none"> Currently no established research projects and would need additional support 	2
Building energy use research	Medium	<ul style="list-style-type: none"> Internal FS research External research Coding for updates to i-Tree Tools 	<ul style="list-style-type: none"> Ongoing but could be expanded with additional and intentionally focused funding for research projects 	2
Urban biomass utilization – integration with HWP/LCA/Substitution	Medium	<ul style="list-style-type: none"> FPL author and external research Coding for updates to i-Tree Tools 	<ul style="list-style-type: none"> Ongoing but could be expanded with additional and intentionally focused funding for research projects 	2
Geospatial database	Low	<ul style="list-style-type: none"> Investments in finer/locally scaled geographic databases Modeling research Coding for updates to i-Tree Tools 	<ul style="list-style-type: none"> Need established through several manuscripts ie. USFSTCCvsPIWhitePaperNovember2023.pdf (itreetools.org), 	3
Urban expansion planning tools for municipalities	Medium	<ul style="list-style-type: none"> High- and medium-resolution earth observation data Internal/external research partnerships 	<ul style="list-style-type: none"> Leverage a new AI/ML pilot project Mihiar is starting with the CIO to classify land use with GEDI and Sentinel-2 imagery. CIO to provide funding for Google Cloud Platform. Leverage FS-SRS Partnership with NFS/FS R&D/Universities to map built-up changes neighboring at risk public forest and rangelands. This work supports EO14072 and is funded by BIL and IRA. Could be synergized with updates to the “avoided deforestation” calculator. Where given a need to build and approve new housing, municipalities can evaluate alternative plans with a focus on maintaining tree cover during development. This could also link to the LCA advancements to help track carbon/biomass removed during the development process. 	2