i-Tree International Academy
Session 1
Introduction & i-Tree Database

i-Tree

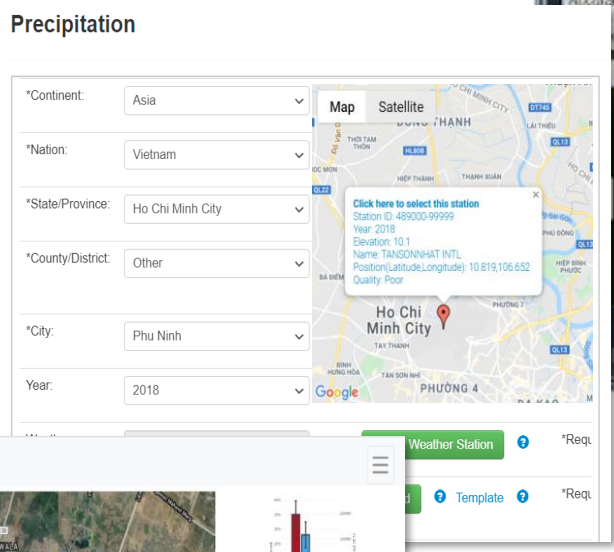
DAVEY Institute
A Division of The Davey Tree Expert Company

i-Tree Intl. Academy learning journey

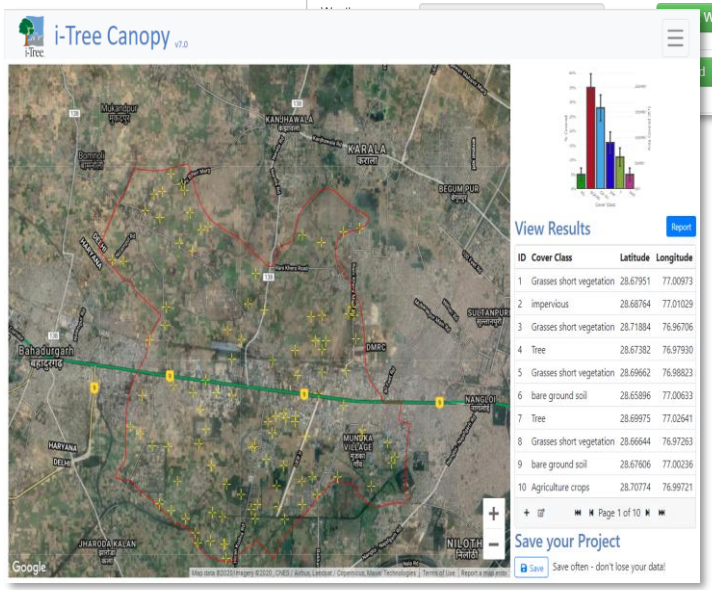
Session 1	Introduction & concepts Resources & i-Tree Database
Session 2	i-Tree Eco, Canopy, MyTree Advocacy and management
Session 3	i-Tree Canopy in-depth
Session 4	i-Tree Eco & Database
Session 5	Eco project phases: planning, set-up & data collection
Session 6	Eco inventory, import system, sample project
Session 7	Eco reports, external mapping, case studies
Session 8	i-Tree Action Plans

Eco

Database



Canopy

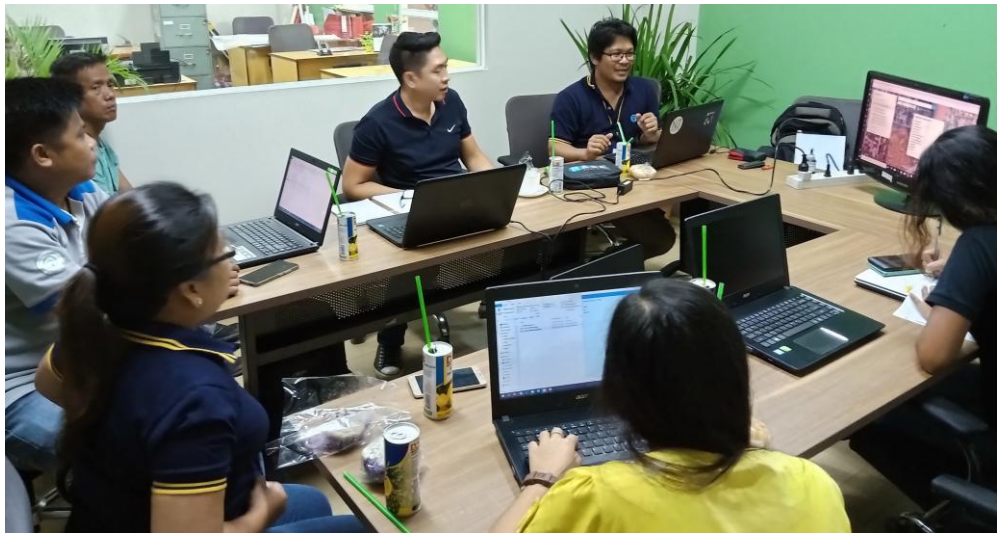


Plan for today

- i-Tree Academy welcome, introductions & logistics
- Learning plan overview
- i-Tree concepts & keys

-Break-

- Website & online resources
- i-Tree Database basics
- Introduce to international resource experts

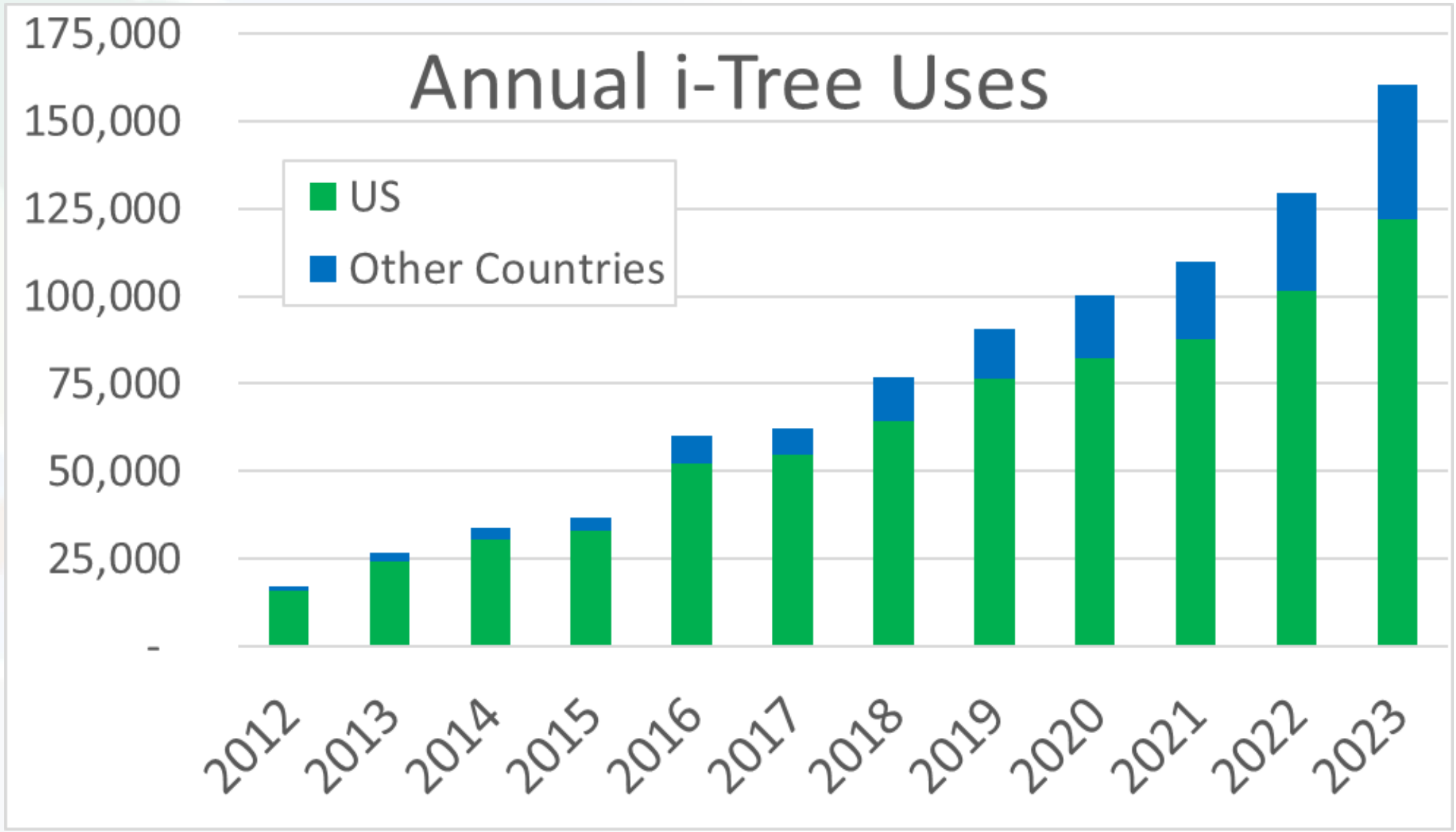


Why do we have trees in our communities?

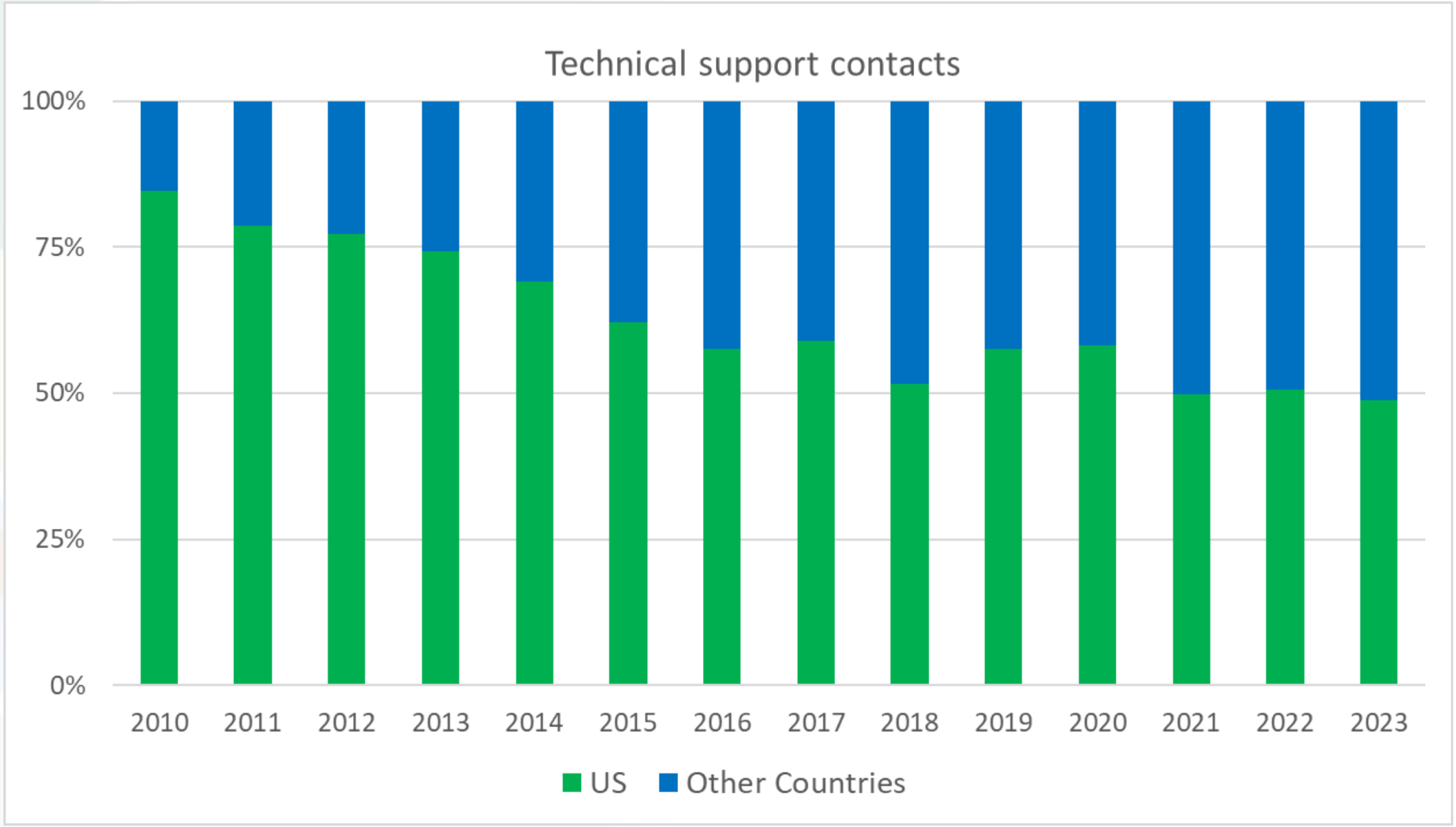
i-Tree has answers

- Answer with data
- Estimate tree benefits and their value
- Backed by peer reviewed science
- Suite of flexible software applications
- Continuously improved
- Completely free tools and support

i-Tree continues to grow: users, partners, capabilities



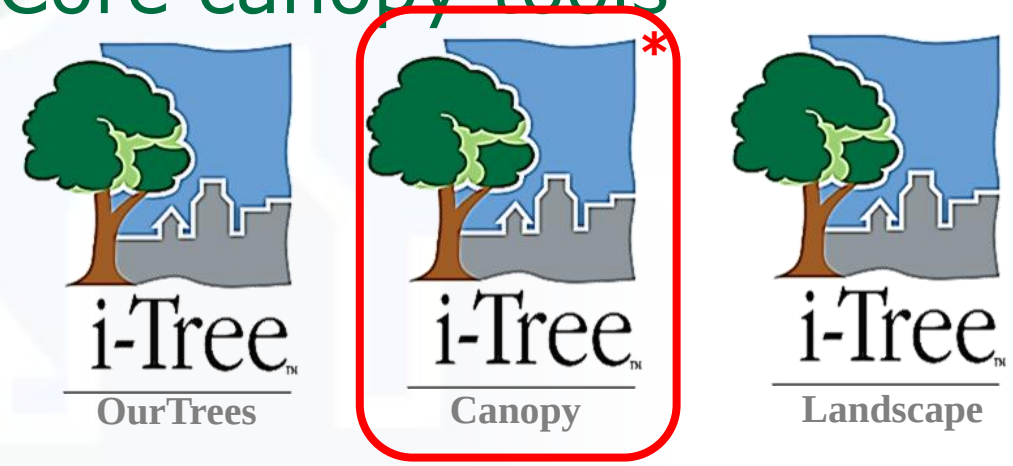
Support of international growth: 50% of technical support



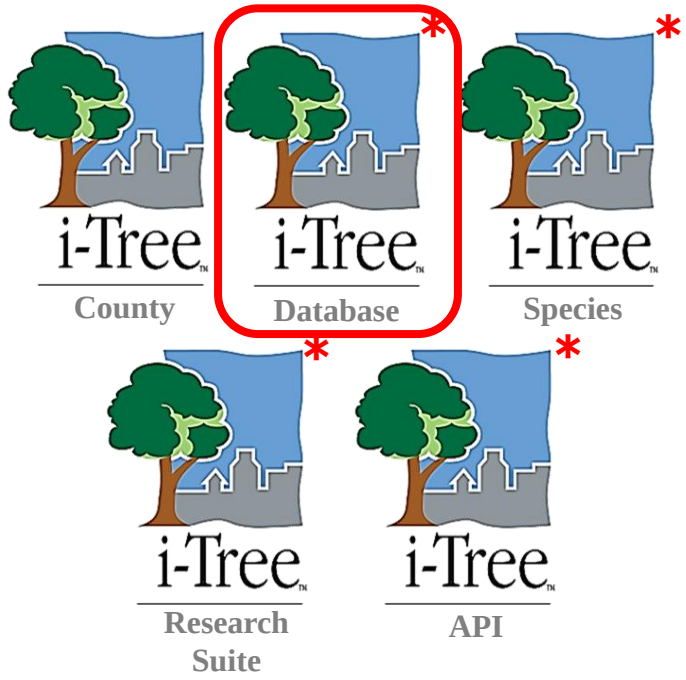
The 2024 i-Tree Suite of Tools

Core individual tree tools

Core canopy tools



Utilities

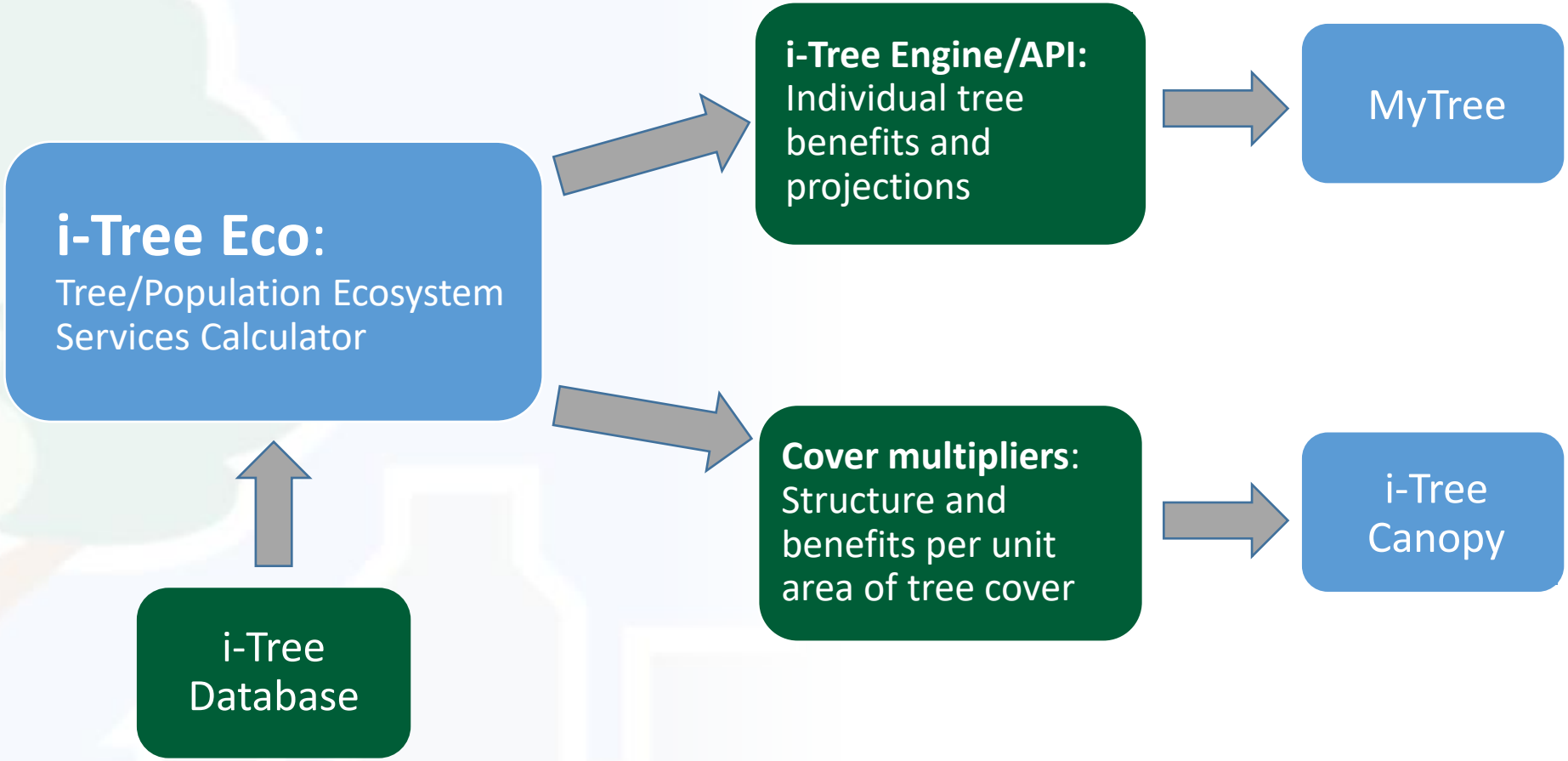


*i-Tree Tools that can be used internationally

i-Tree is a Cooperative Initiative among these partners

DAVEY · Arbor Day Foundation · sma SOCIETY OF MUNICIPAL ARBORISTS · ISA · Casey Trees · ESF State University of New York College of Environmental Science and Forestry

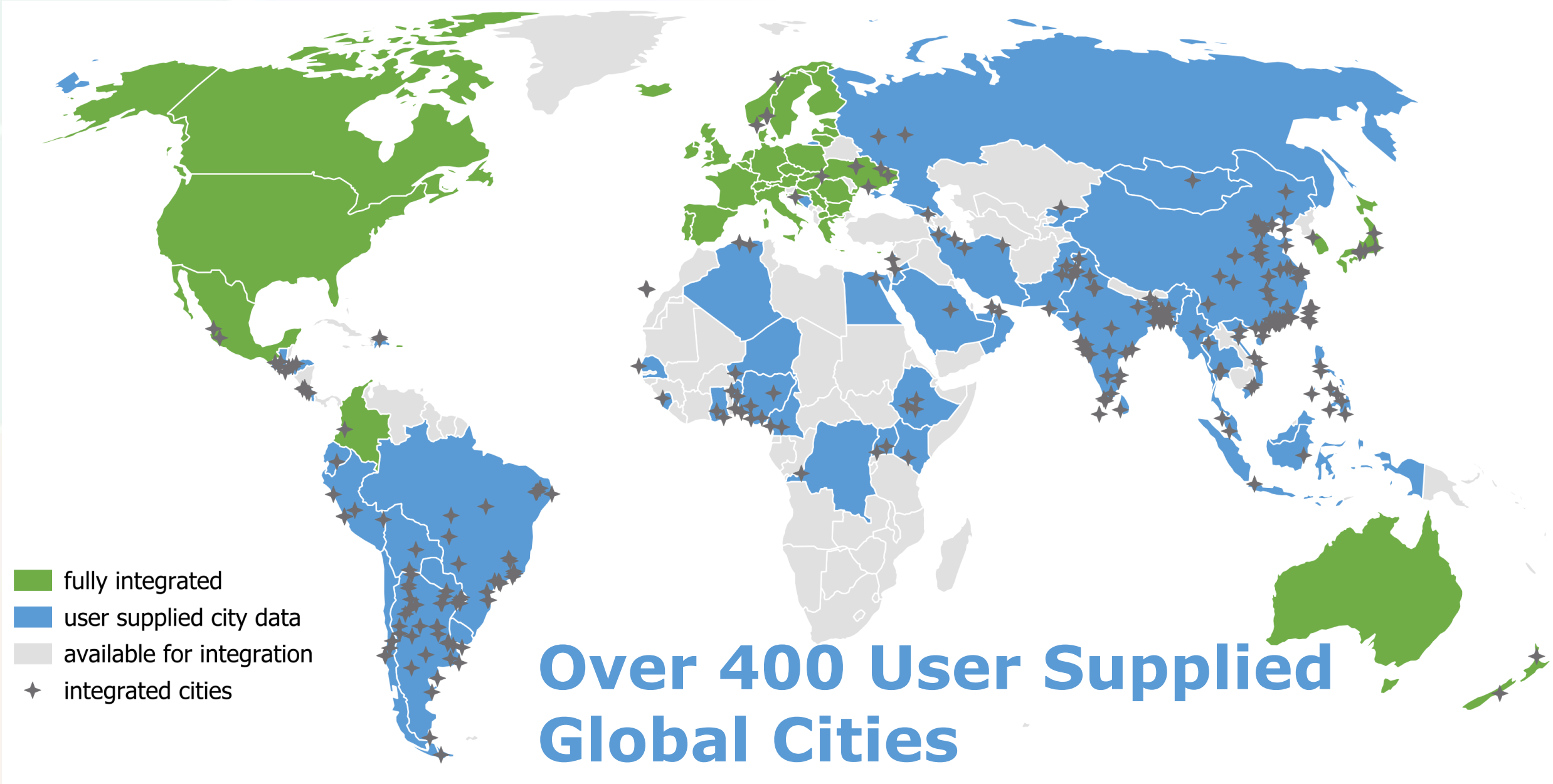
i-Tree Tool Relationships



i-Tree is a Cooperative Initiative among these partners

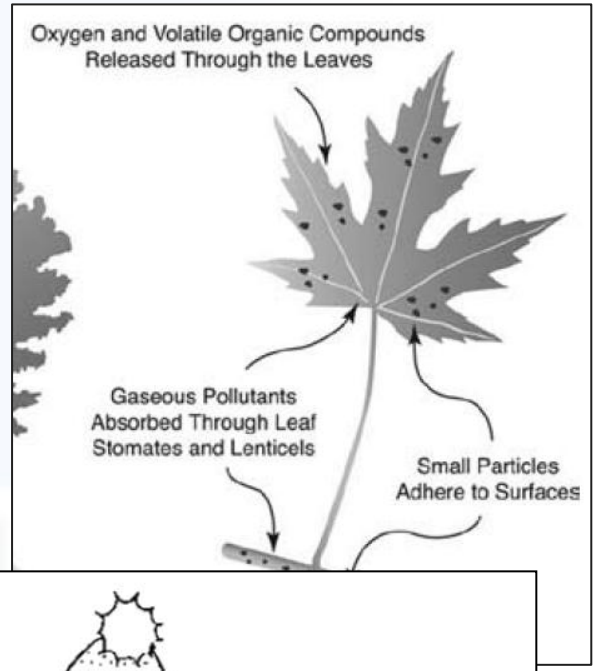
i-Tree | DAVEY | Arbor Day Foundation | SMA Society of Municipal Arborists | ISA | Casey Trees | ESF State University of New York College of Environmental Science and Forestry

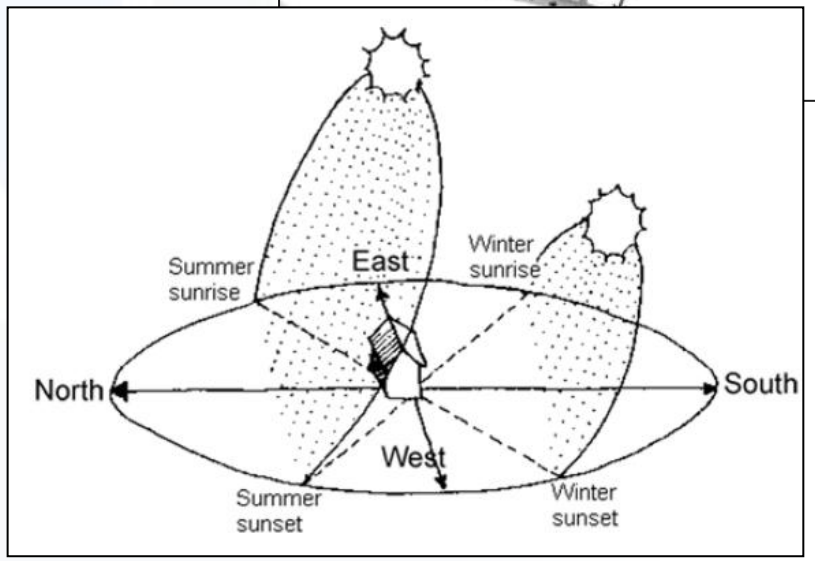
i-Tree Eco our flagship tool: Available in more places



The i-Tree Framework

Structure → **Function** → **Value**

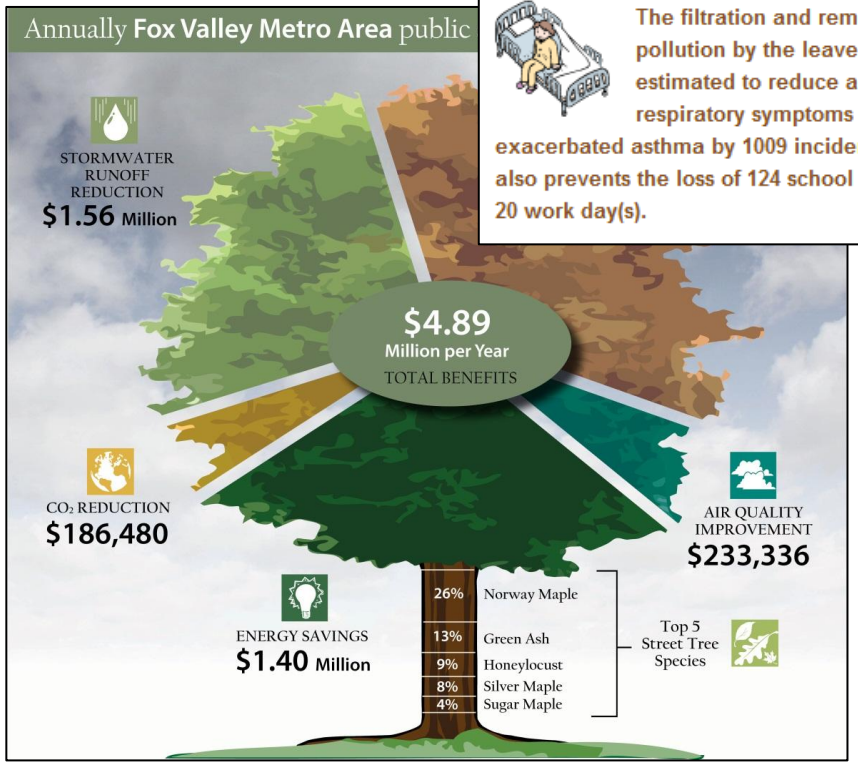




Annual Tree Benefits for Baltimore, MD

Sequestering carbon as wood in trees counteracts the CO_2 emissions of 7,387 gasoline powered passenger cars.

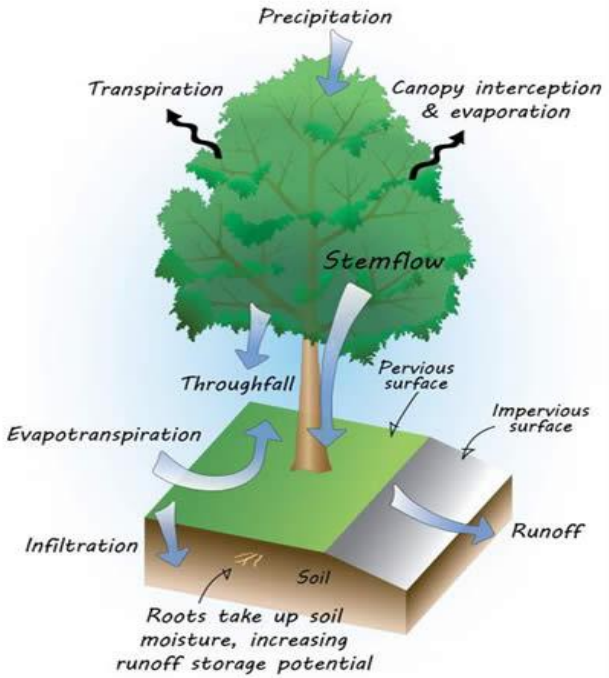
The filtration and removal of air pollution by the leaves of trees is estimated to reduce acute respiratory symptoms and exacerbated asthma by 1009 incidents. This also prevents the loss of 124 school day(s) and 20 work day(s).



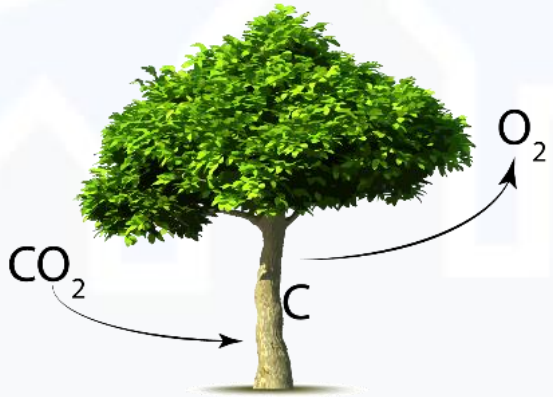
What does i-Tree Estimate?

Energy
Tree impacts on heating and cooling

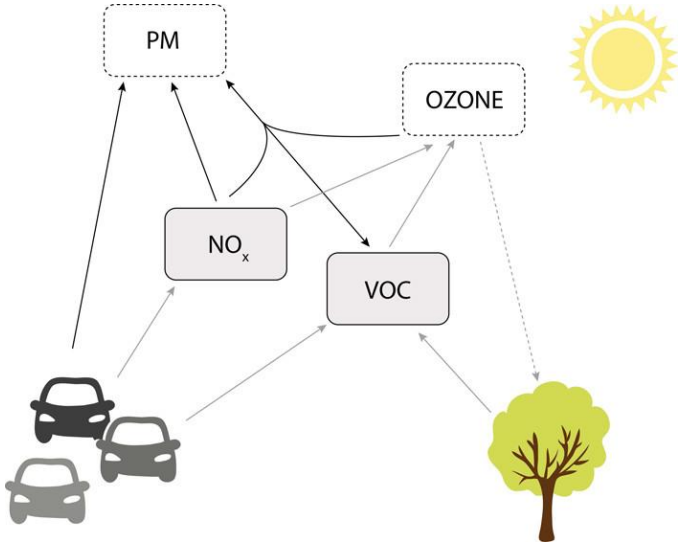
Stormwater
Avoided runoff, evaporation, transpiration



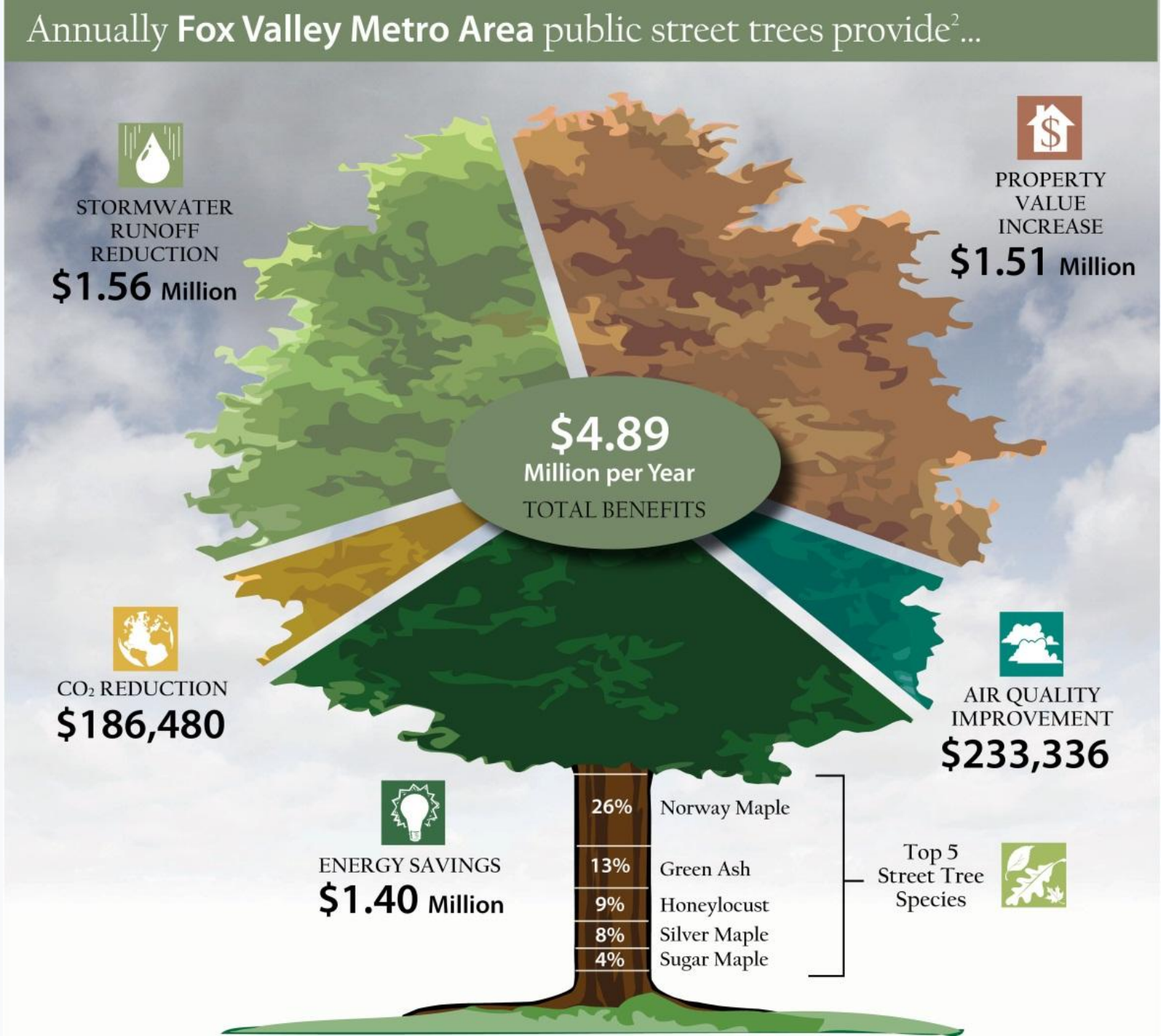
Carbon dioxide
Storage and sequestration of a greenhouse gas



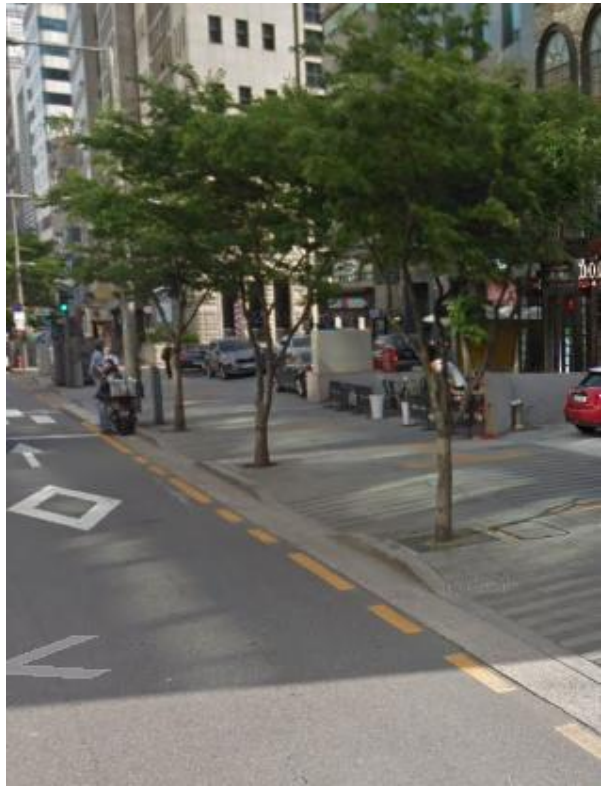
Air Quality
Interaction with key pollutants resulting in improved health



Putting a value on tree resources



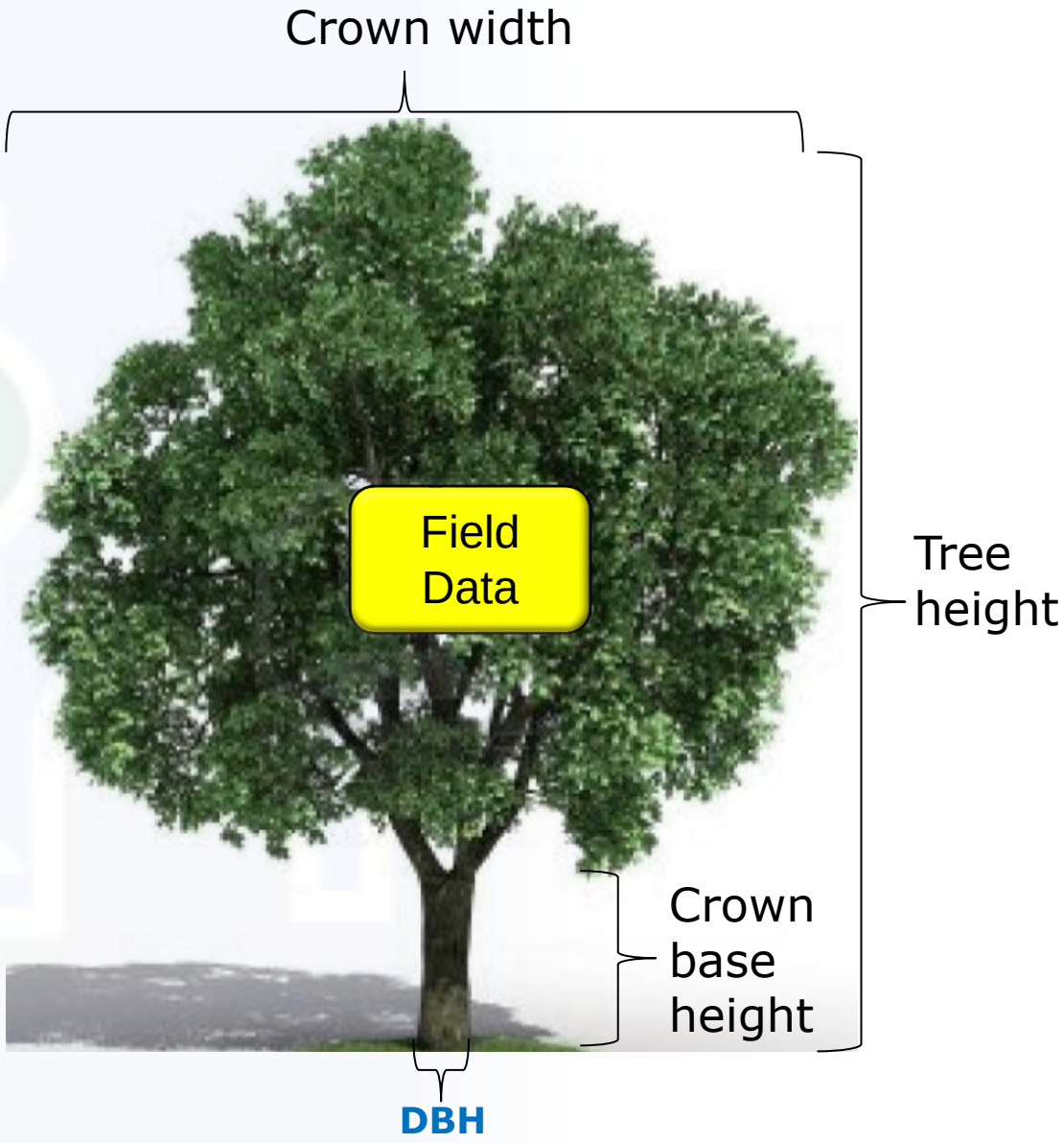
All Trees: forests to city centers



…individual tree, home, garden, park, campus, neighborhood, city, region, watershed…

i-Tree model basics: Inventory data ➡ tree benefits?

Tree species
Tree condition
Land use



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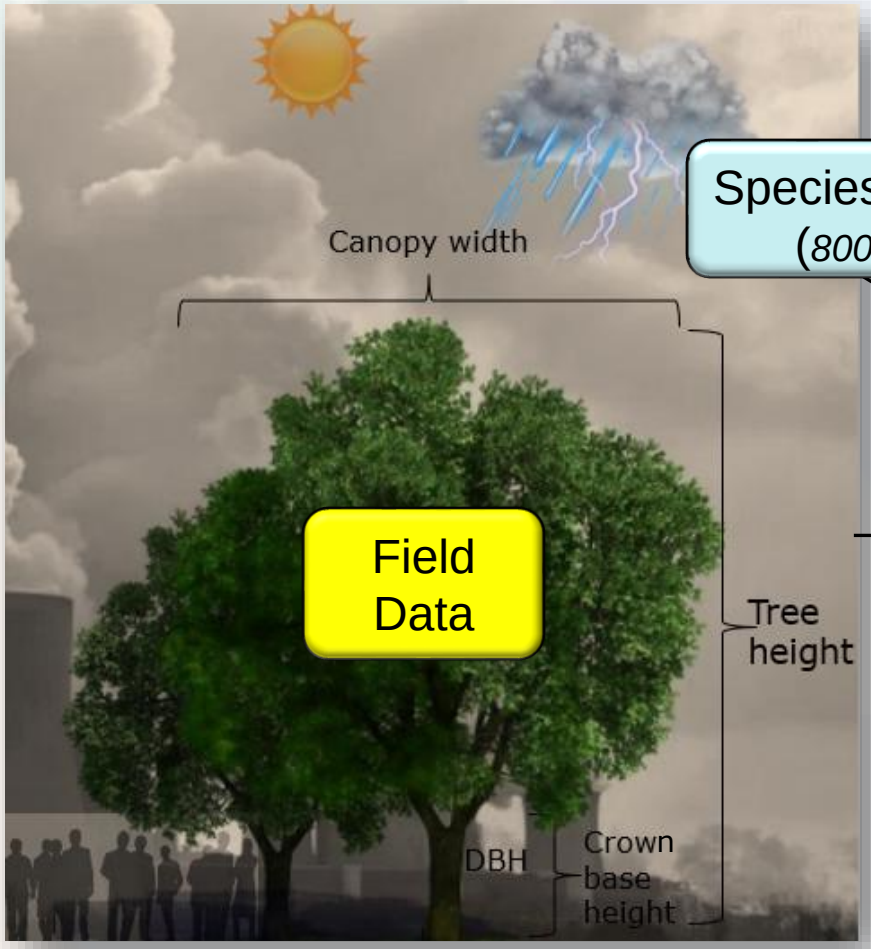


i-Tree Database for New User Data

City Data

Pollution Data

Weather Data

Species Data (*8000+*)

Location Data

Field Data

i-Tree Eco

Carbon

Air Quality

Hydrology

Energy

Volatile Organic Compounds

Structure

Value

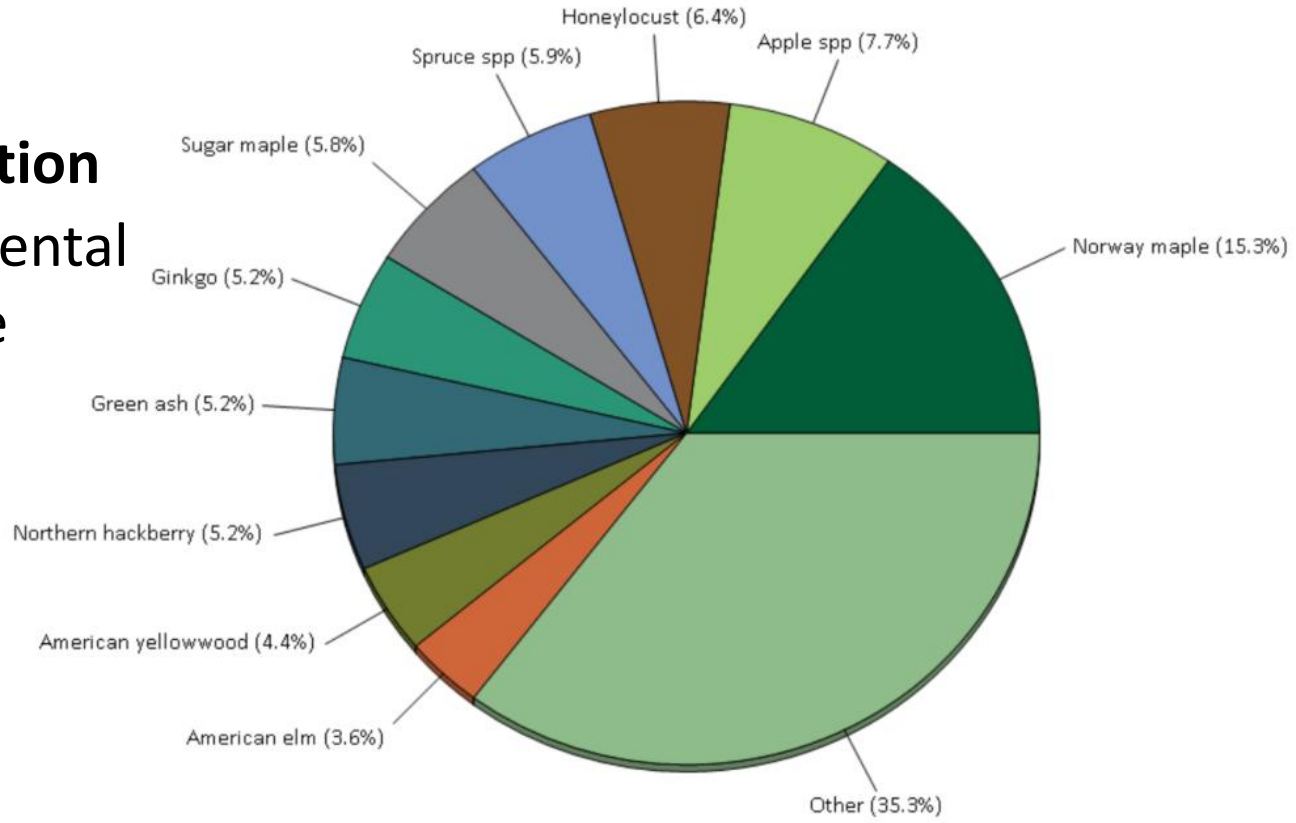
Forecast

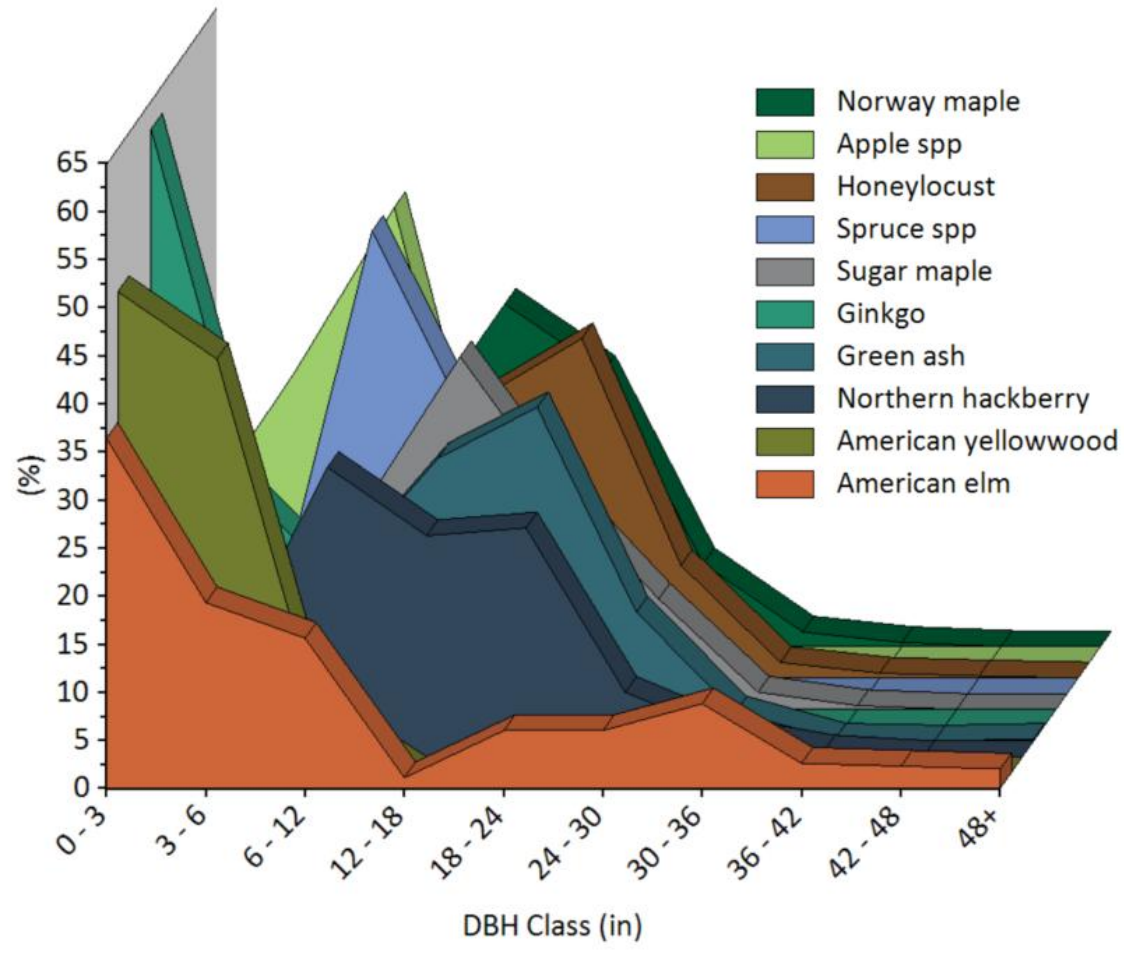
www.itreetools.org/resources/archives.php

i-Tree Eco structure results

Species Diversity/Composition

Diversity reduces environmental threats, increases resilience

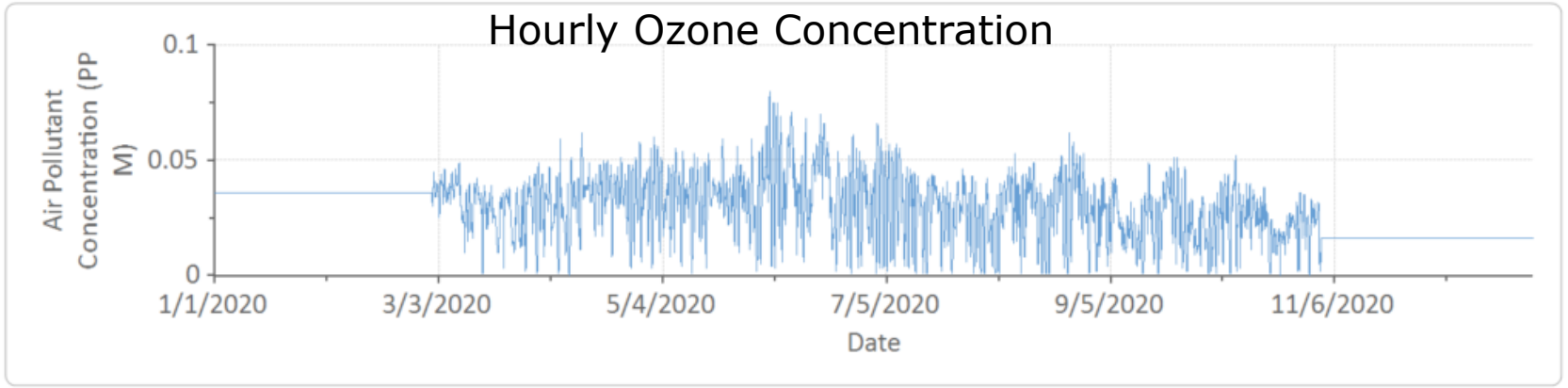


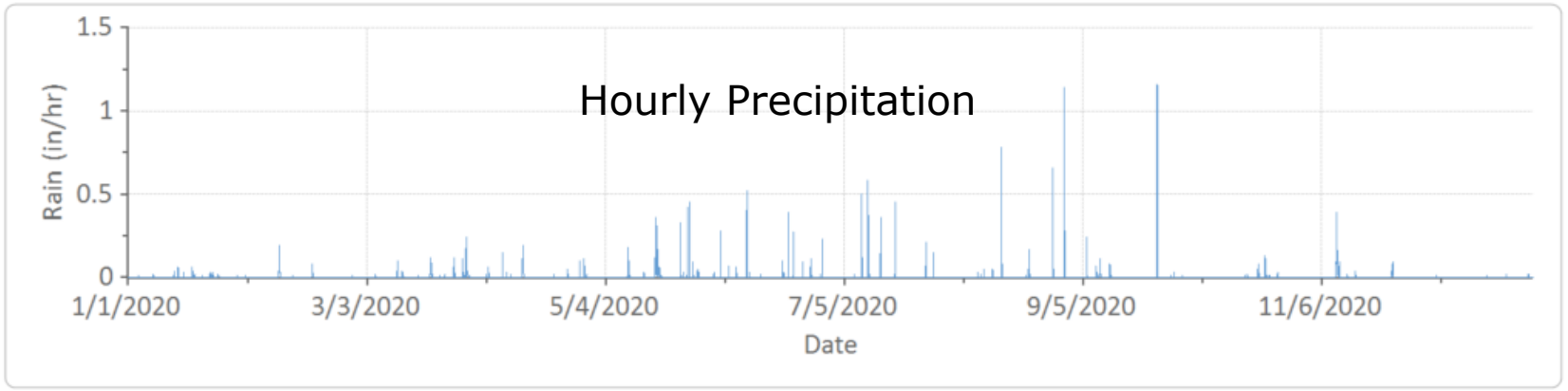


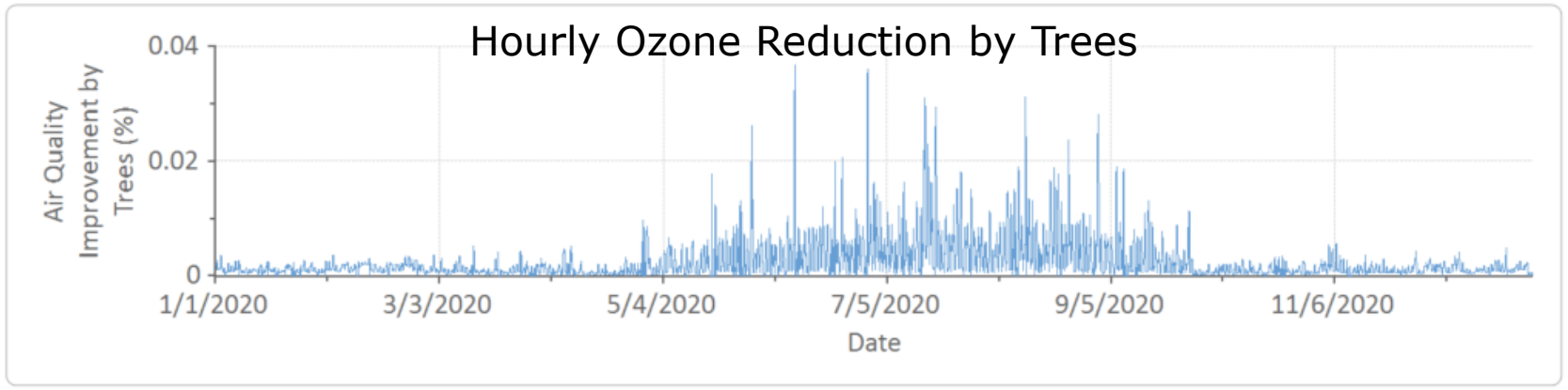
Size/Age Class Distribution

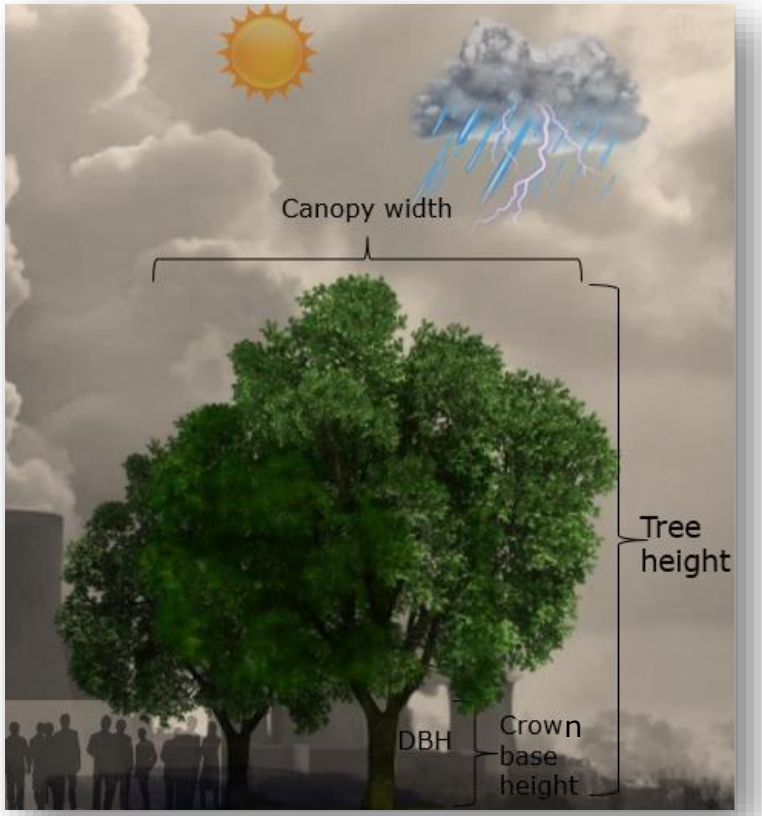
Distribution of age informs sustainability

i-Tree Eco detailed results



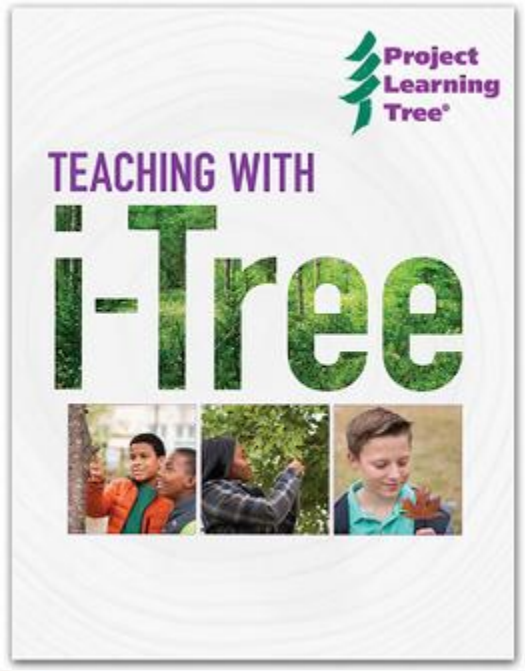






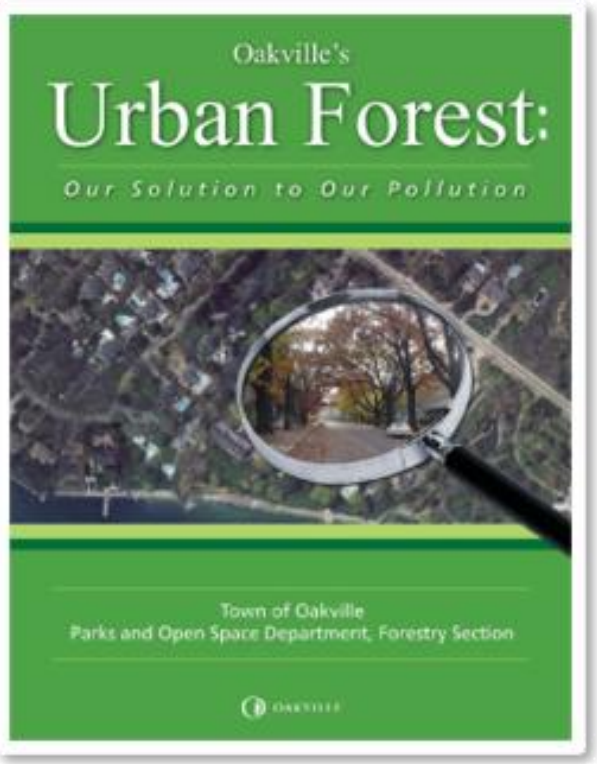
Ways to use i-Tree

Education
- Connect students with trees
- Teach public about tree benefits
- Create engaged community
- Support math, science, ecology learning



Advocacy
- Show policy makers the benefits of trees
- Create policy focused on maximizing tree benefits
- Convince doubtful audiences
- Funding and accounting

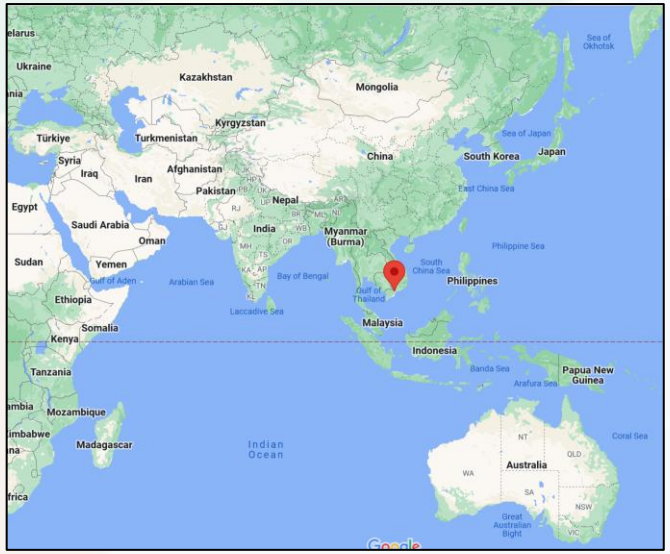
Strategic Management
- Decide where to plant trees
- Support care, maintenance, and protection of trees
- Create optimal species palette



My Tree for Education in Ho Chi Minh City, Vietnam

Tree Lover's Day

From: Huyen Do



Gaia NATURE CONSERVATION

Góp 1 cây là góp rừng

Phần 2.

Hướng dẫn tính toán tác động của Cây bằng I-Tree

Bước 1: Vào đường link:

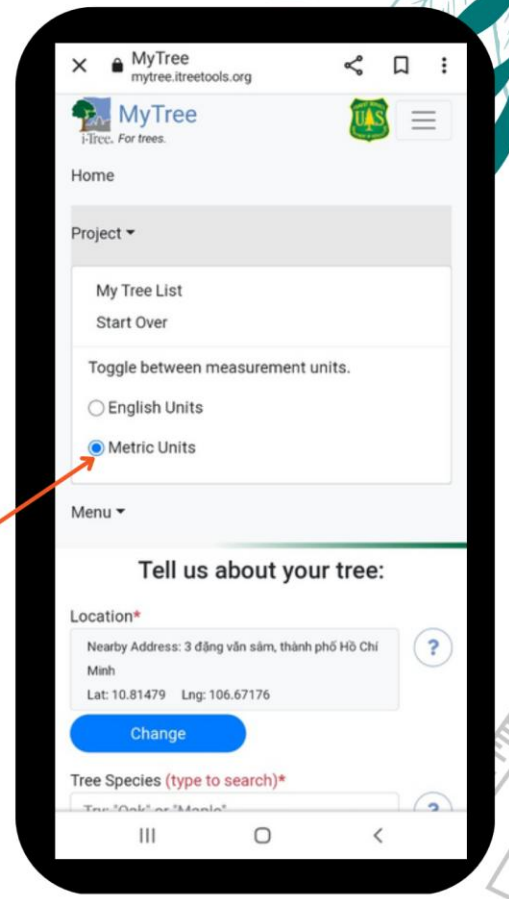
https://mytree.itreetools.org/#/tree

hoặc quét QR này để vào link trên

Bước 2: Đổi hệ đo sang mét.

Bấm vào 3 dấu gạch ngang góc trên bên phải màn hình, sau đó nhìn các menu đổ xuống bên trái, chọn Project. Sau đó chọn: Metric Unit

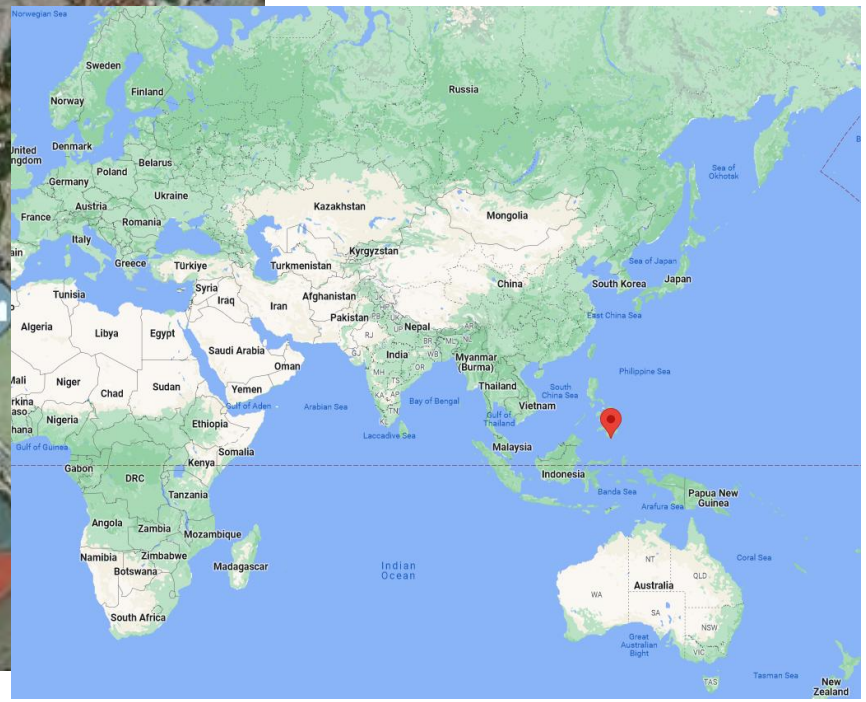
Bước 3: Nhập thông tin về cây



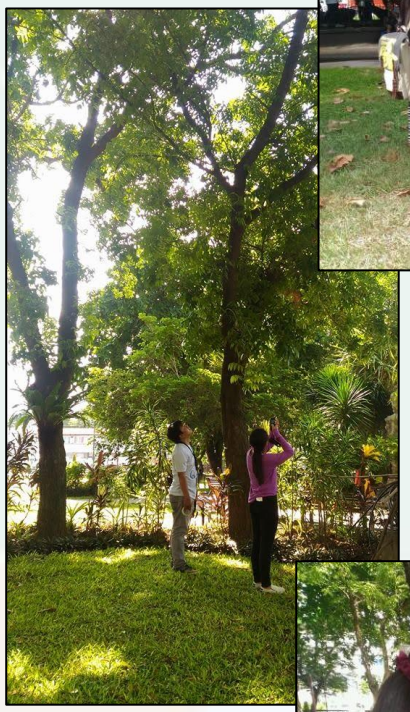
[Hướng dẫn đo cây - MyTree]

i-Tree Eco for Advocacy in General Santos, Philippines

General Santos City
only location data

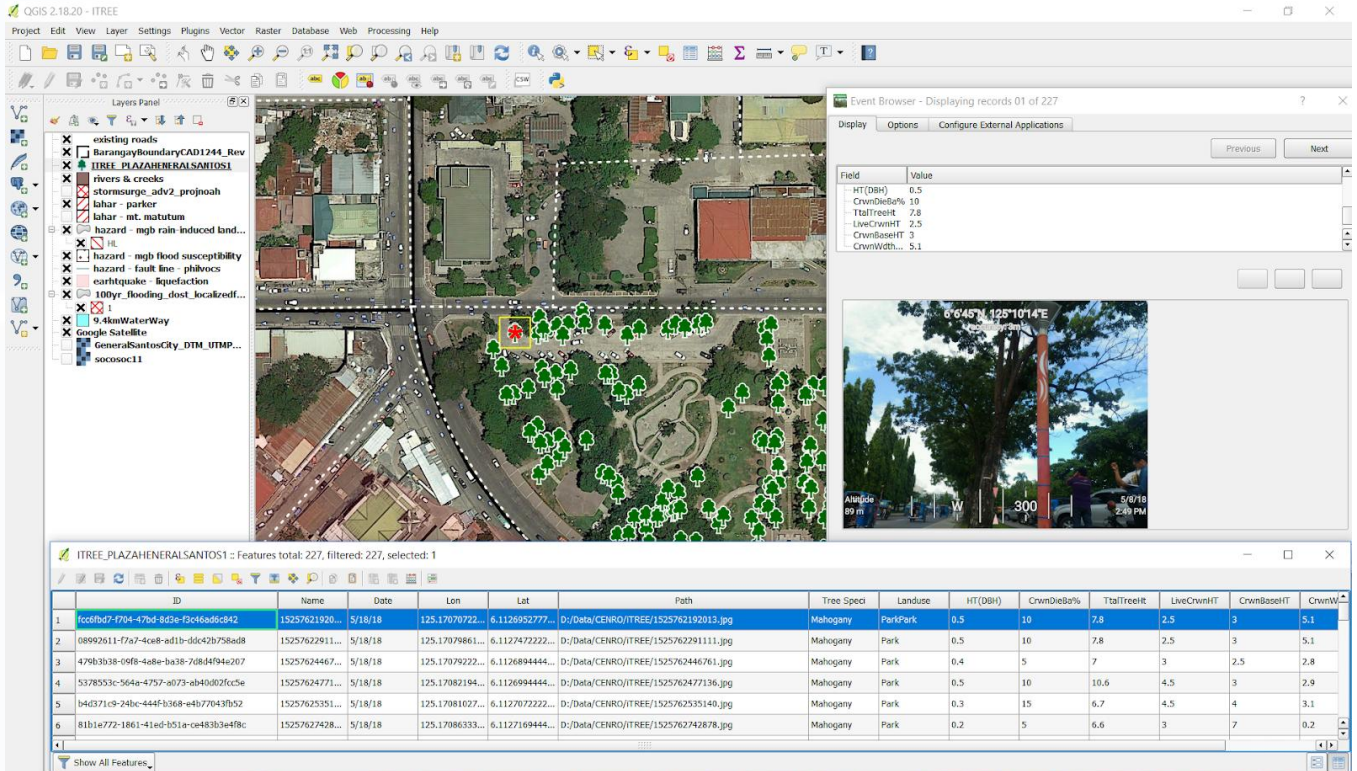


Collect Data: At least species and diameter



Beth Casten
GIS Specialist
City Planning and Development Office
General Santos City

Pilot project measuring trees in a plaza outside city hall



GenSan – Urban Forest Management Integrated in City Policy

Approved EnviCode2018 in

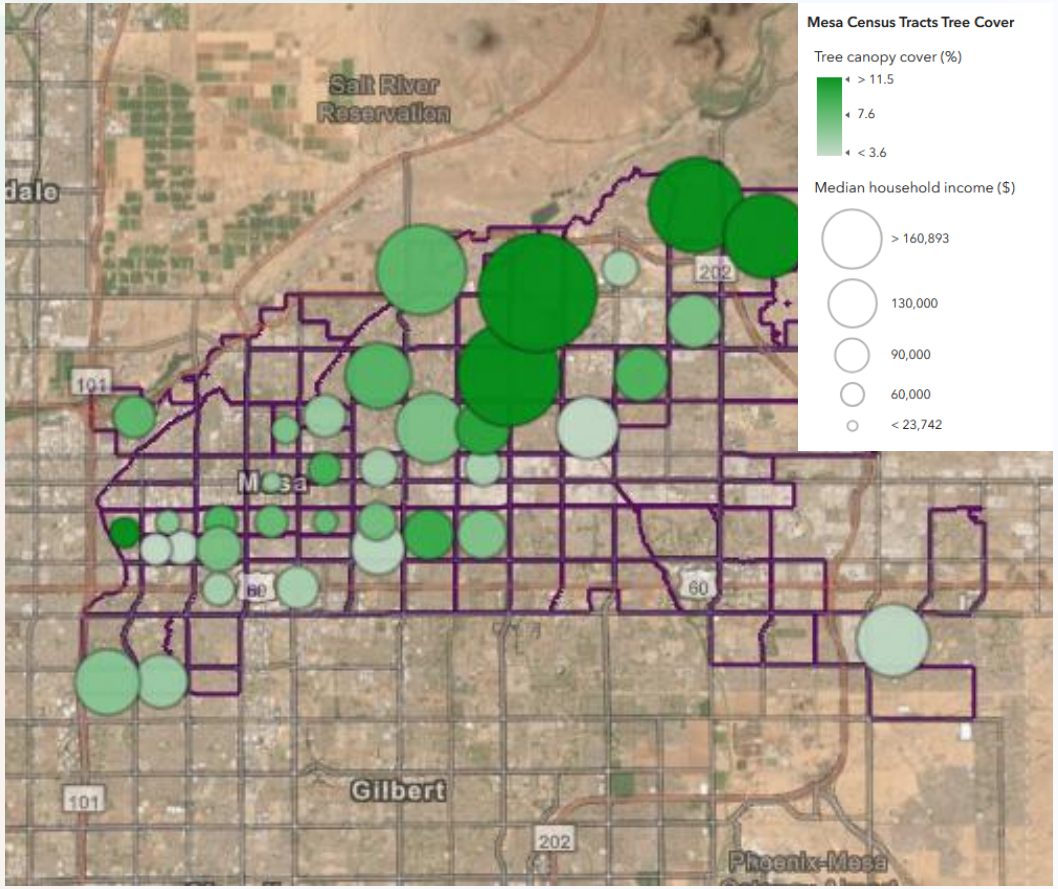
Article XI
(MANAGEMENT OF THE CITY GREENING PROGRAM);

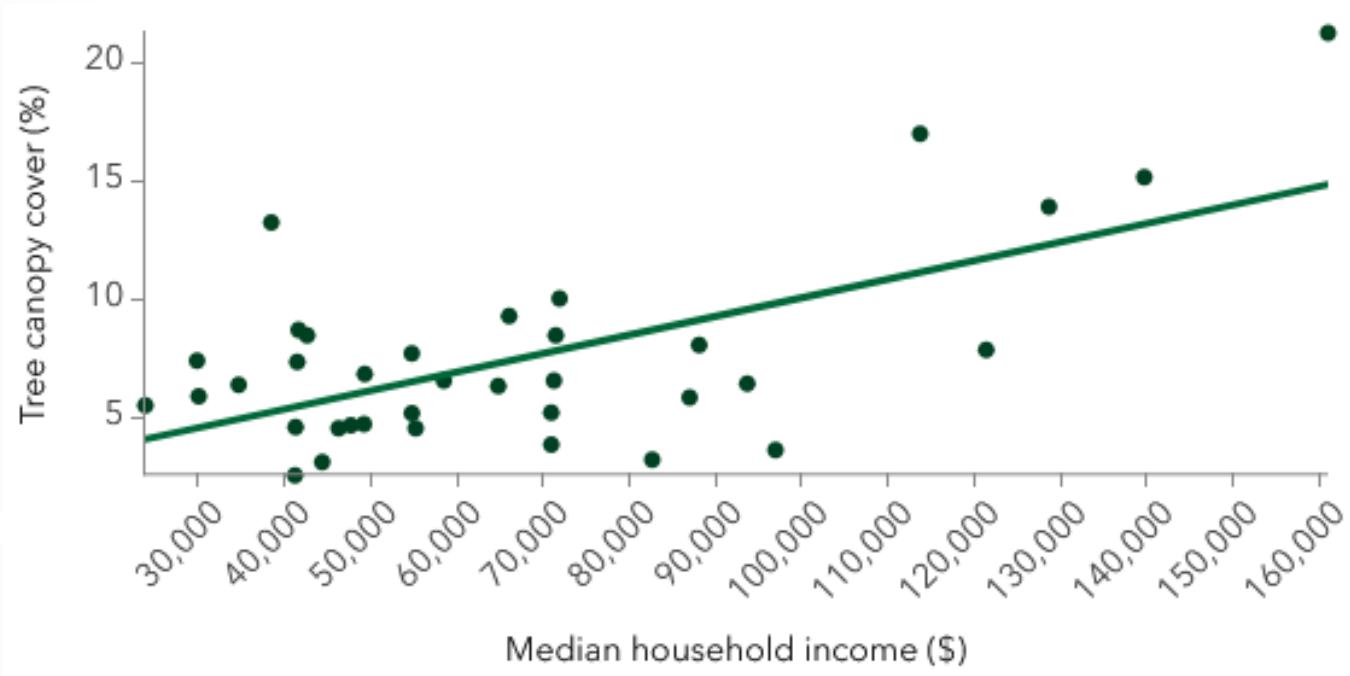
Section 7. Inventory, Mapping, Tagging, and Numbering of Trees in the City.

There shall be installed in the City Environment and Natural Resources Office (CENRO) a GIS-based registry of trees using the i-Tree Tool and Open Data Kit (ODK) that should reflect tree classification by species, location, ownership, age and other related data like the cost and benefit of the trees. In this regard, all trees planted or naturally grown within forest, coastal and urban areas, whether private or publicly owned, shall be numbered and entered into the registry for monitoring and management purposes.

i-Tree Canopy for equity focused strategic management

Tree cover vs. income in Mesa
MCC BIO 105 research project





Courtesy of Sean Whitcomb:
https://experience.arcgis.com/experience/7eedcd77946842f69c68f62203451887/

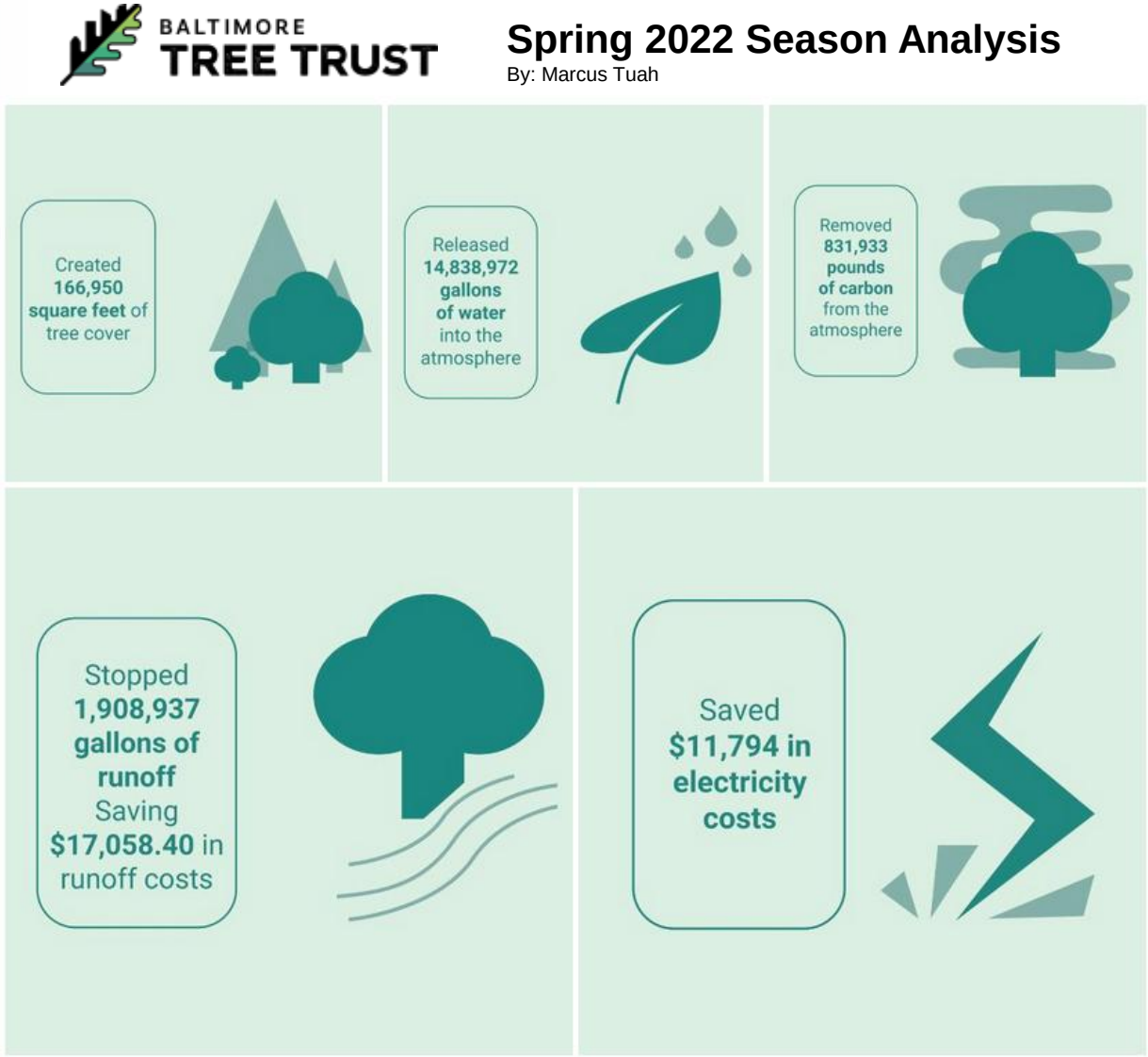
i-Tree opportunities…

- Plan and manage urban forest resources more strategically and equitably
- Integrate urban forests in policies
  - sustainability
  - climate
  - resiliency
  - air quality
  - public health
  - stormwater
  - equity
  - … and more
- Support advocacy efforts with data
- Improve preservation & health of trees and forests
- Connect urban and rural forest importance

i-Tree opportunities…

Support delivery of tree benefits

- Science and data backed decision making
- Specificity around species, location, and people
- Realistic scenarios and goals
- Accountability



https://storymaps.arcgis.com/stories/1140f07f5212458592c3b60c8e2b59e5

Keys to using i-Tree Effectively

What are your organization's biggest challenges?

https://www.nytimes.com/2019/11/01/world/asia/delhi-pollution-health-emergency.html

Floods Afflict Ukraine as It Tries to Control the Coronavirus

Environmentalists say illegal logging in the Carpathian Mountains is contributing to flooding. Rising waters forced the partial evacuation of a hospital treating Covid-19 patients.

https://www.nytimes.com/2020/06/24/world/europe/ukraine-flood-coronavirus.html?auth=login-google

PRESS RELEASE | MARCH 19, 2018

Climate Change Could Force Over 140 Million to Migrate Within Countries by 2050: World Bank Report

https://www.worldbank.org/en/news/press-release/2018/03/19/climate-change-could-force-over-140-million-to-migrate-within-countries-by-2050-world-bank-report

Keys to using i-Tree effectively

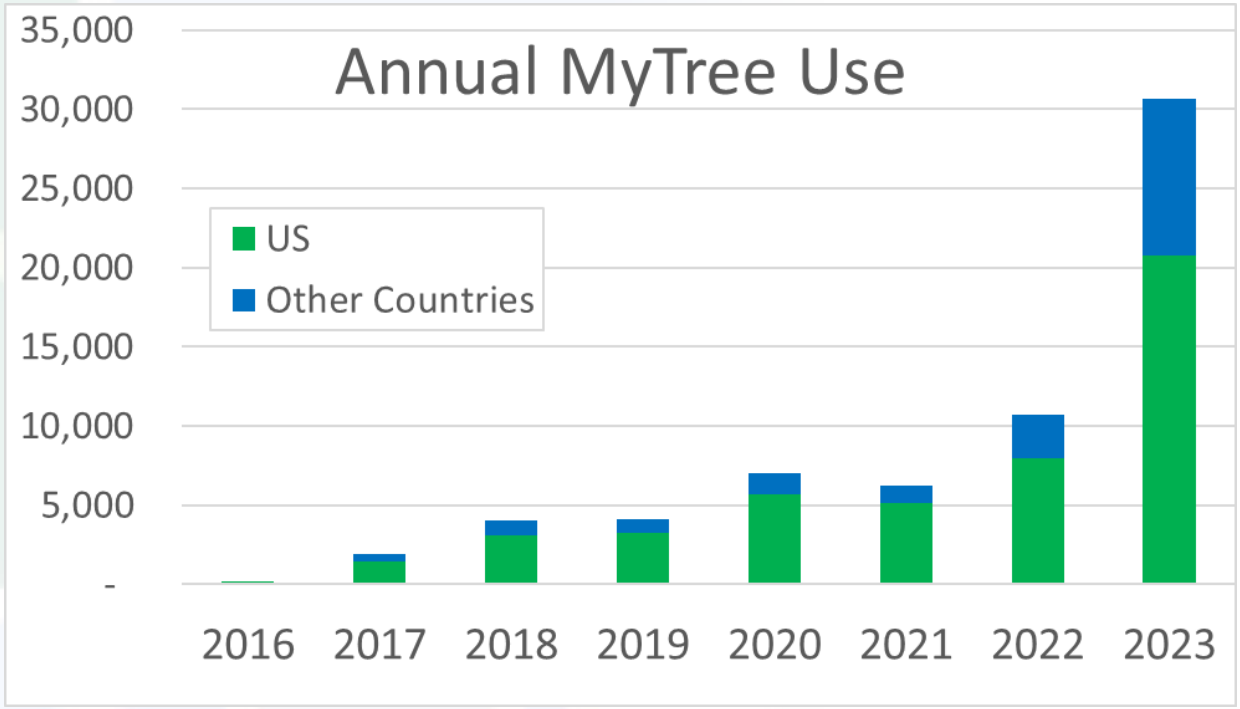
- Understand tool advantages, limitations, and options available
- Define your objectives *(what does success look like?)*
- Can i-Tree help you achieve desired outcomes?
- Evaluate your resources (*time, equipment, money, technical capacity, potential collaborators*)
- Consider pilot projects
  - used to learn
  - show potential
  - justify scaling up projects

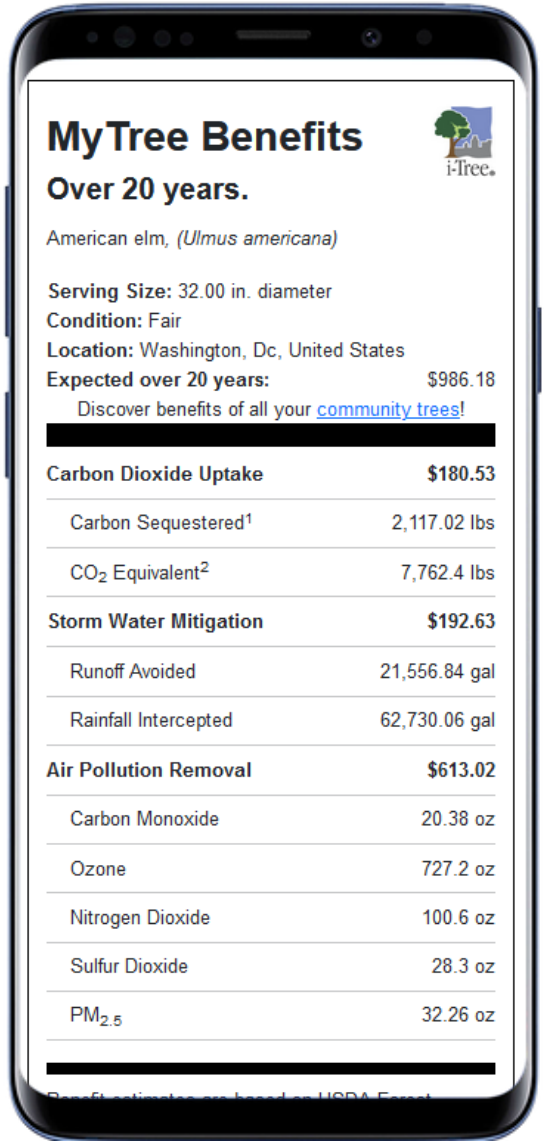
Connect to issues that matter to people

Get started with MyTree…

Try using your browser's **Translate** function

Includes local currency conversion





MyTree Benefits

Over 20 years.

American elm, *(Ulmus americana)*

Serving Size: 32.00 in. diameter
Condition: Fair
Location: Washington, Dc, United States
Expected over 20 years: $986.18

Discover benefits of all your community trees!

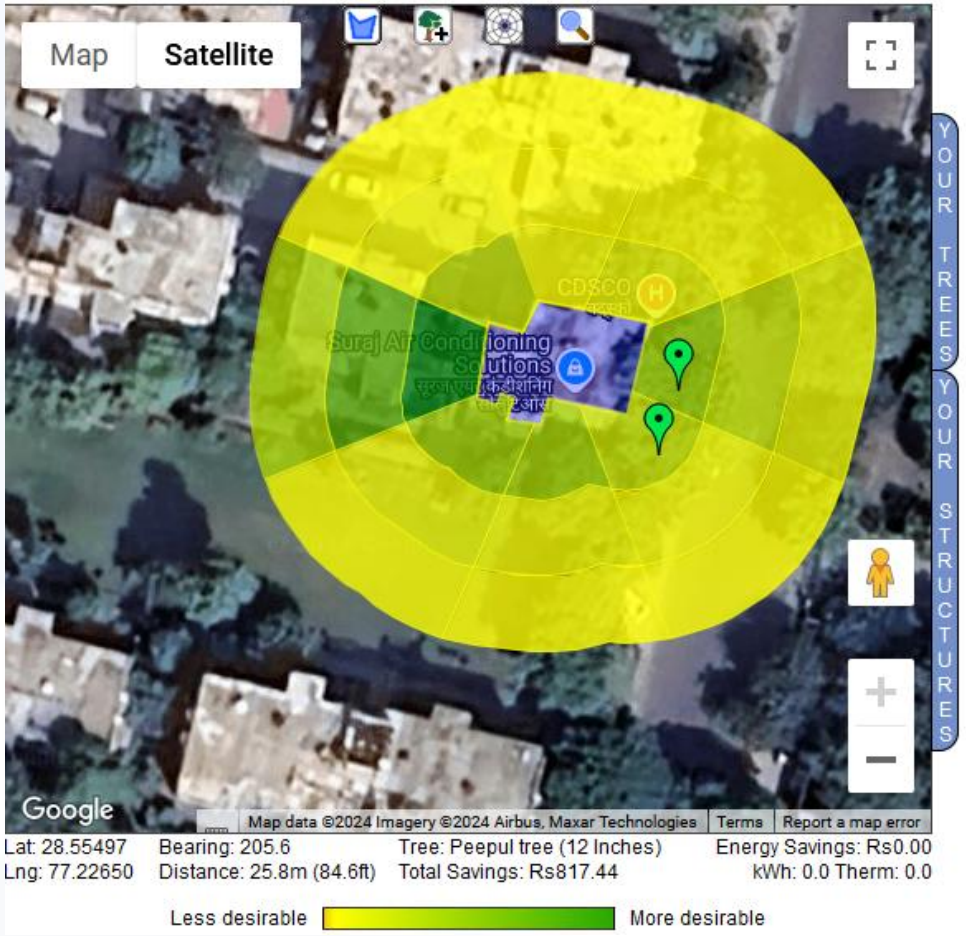
Carbon Dioxide Uptake	**$180.53**
Carbon Sequestered[1]	2,117.02 lbs
CO_2 Equivalent[2]	7,762.4 lbs
Storm Water Mitigation	**$192.63**
Runoff Avoided	21,556.84 gal
Rainfall Intercepted	62,730.06 gal
Air Pollution Removal	**$613.02**
Carbon Monoxide	20.38 oz
Ozone	727.2 oz
Nitrogen Dioxide	100.6 oz
Sulfur Dioxide	28.3 oz
$PM_{2.5}$	32.26 oz

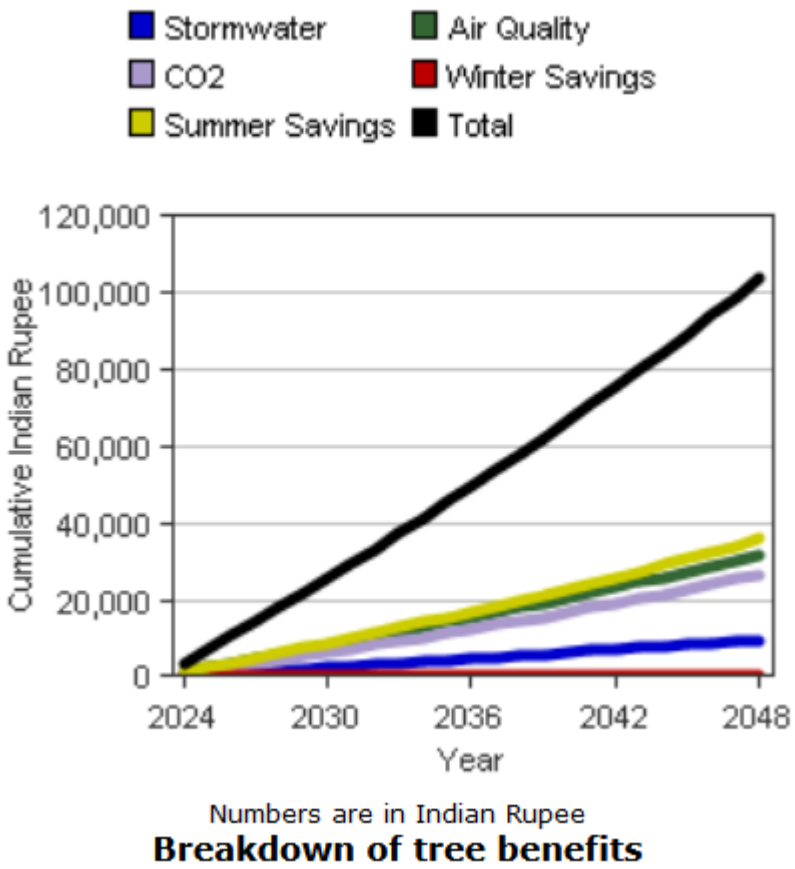
MyTree.itreetools.org

…or try i-Tree Design in selected locations

Available in

- Colombia
- Mexico
- Delhi, India
- South Korea
- New Zealand
- Canada





design.itreetools.org

Website & online learning resources next

i-Tree

Support & Resources› Resources Overview› Video Learning

Video Learning

Explore instructional videos and archived webinars to learn more about the i-Tree applications.
You can learn about new i-Tree video learning opportunities by subscribing to the i-Tree Tools channel on YouTube!

i-Tree Eco v6

What's New in i-Tree Eco v6 - Highlights

Eco v6 highlights and overview - 5 min. - This YouTube video highlights new features and options available in the new i-Tree Eco v6 application.

How to convert an existing Eco v5 project to Eco v6

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i-Tree

ECO GUIDE TO
Post-stratified Samples

What Is a Post-stratified Sample?

If you have decided to conduct a **sample inventory**, you will be collecting data f throughout your study area. In this type of project, you can choose to stratify or s study area into smaller units that can help clarify differences across the study are example, you might stratify your study area by land use, neighborhood, or politica so that you can compare urban forest effects in different strata.

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Tip

The directions in this guide assume that you are working with an exis project that has already been designed and created as described in t User's Manual. See the User's Manual for help if you have not com these steps.

Post-stratified Sample Methods

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To open an existing project:

1 Click **File > Open Project**.
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Understanding i-Tree:
Summary of Programs
and Methods

J. Nowak
Forest Service

ASSESSING ECOSYSTEM SERVICES AND VALUES IN ECO

To see which tree field variables are used to estimate various ecosystem services and values, see Table 2.

AIR POLLUTION REMOVAL

This section relates to estimating hourly pollution removal by trees, shrubs and grass for carbon monoxide (CO), nitrogen dioxide (NO_2), ozone (O_3), particulate matter less than 10 microns (PM_{10}), particulate matter less than 2.5 microns ($PM_{2.5}$) and sulfur dioxide (SO_2). Air pollution removal is estimated based on modeling of gas exchange and particulate matter interception at the leaf level based on local environmental conditions.

Required user inputs
- Tree, shrub and grass cover
- Tree species

Methods Overview
This module calculates the hourly dry deposition of O_3, SO_2, NO_2, CO, PM_{10} and $PM_{2.5}$ to vegetation throughout the year based on tree, shrub and grass cover data, hourly NCDC weather data, and U.S. Environmental Protection Agency (EPA) pollution-concentration monitoring data. Missing hourly pollution data are filled in based on procedures detailed in Hirabayashi and Endreny (2016). Weather data quality information are detailed in Hirabayashi (2017). Daily particulate matter data are used as hourly inputs (i.e., daily average is used for each hour of the corresponding day). If multiple monitors exist, the average of all monitor data are used. Missing hourly pollution data are filled in based on procedures detailed in Hirabayashi and Kroll (2017).
Pollution removal or downward pollutant flux (F; in $g/m^2/s$) is calculated as the product of the deposition velocity (V_d; in m/s) and the pollutant concentration (C; in g/m^3):

$$F = V_d C$$

Deposition velocity is calculated as the inverse of the sum of the aerodynamic (R_a), quasi-laminar boundary layer (R_b) and canopy (R_c) resistances (Baldocchi et al. 1987).

$$V_d = 1/(R_a + R_b + R_c)$$

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-Break-

i-Tree International Academy
Session 1
Online Resources & i-Tree Database

i-Tree

DAVEY Institute
A Division of The Davey Tree Expert Company

Website & online learning resources

i-Tree

Support & Resources› Resources Overview› Video Learning

Video Learning

Explore instructional videos and archived webinars to learn more about the i-Tree applications.
You can learn about new i-Tree video learning opportunities by subscribing to the i-Tree Tools channel on YouTube!

i-Tree Eco v6

What's New in i-Tree Eco v6 - Highlights

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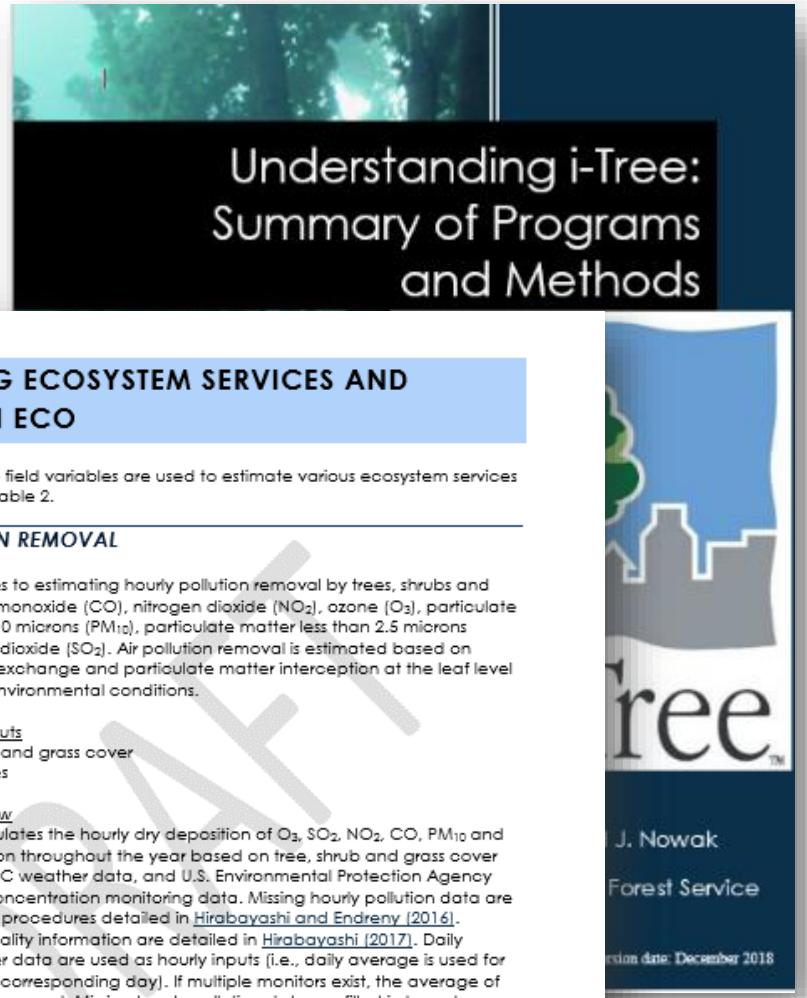

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$$V_d = 1/(R_a + R_b + R_c)$$

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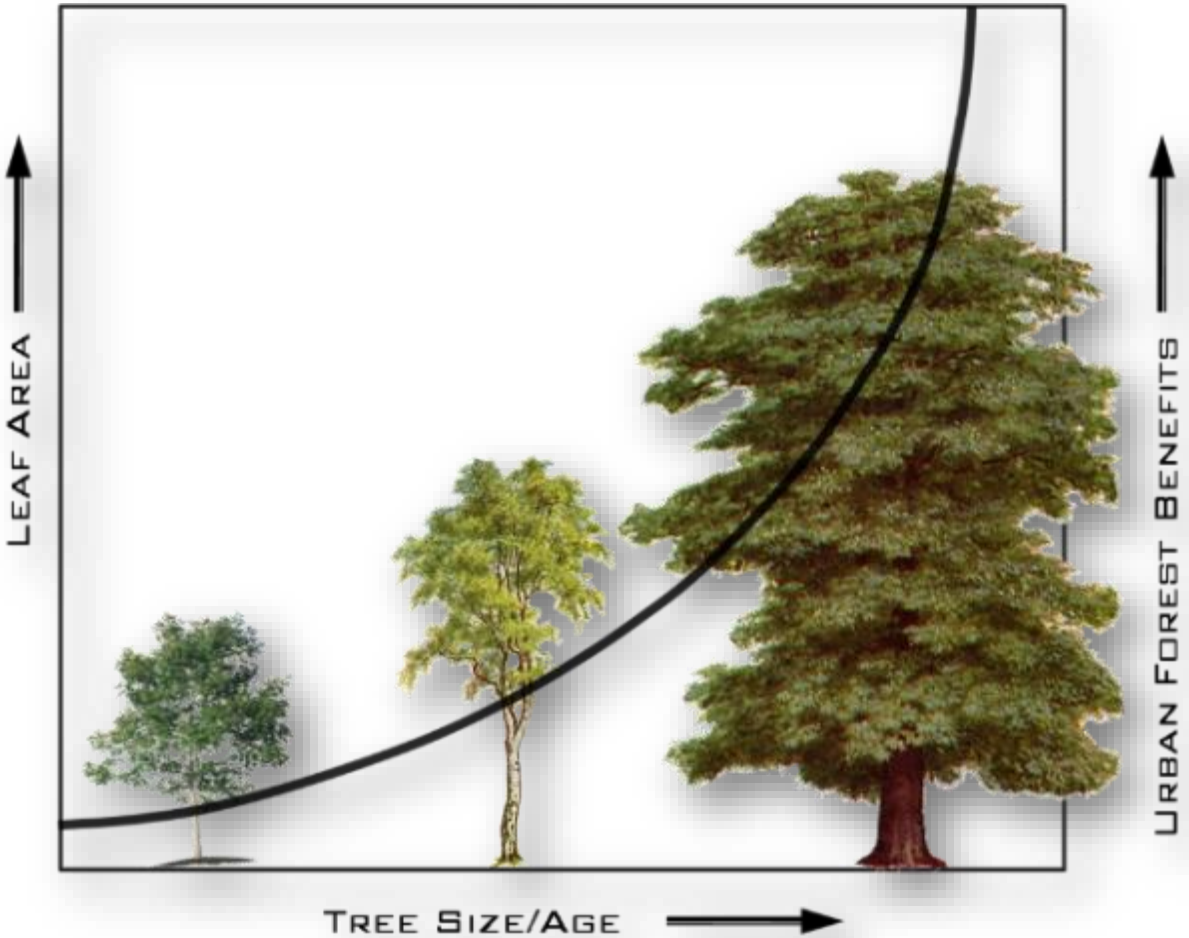
i-Tree model basics: ***Structure > Function > Value***

Structure

- Measured tree variables used to estimate foliage volume and wood volume
- Eco estimates tree leaf area using species specific equations, or averaging of equations

Function

- Estimated benefits largely based on leaf area interactions with local weather and air pollution



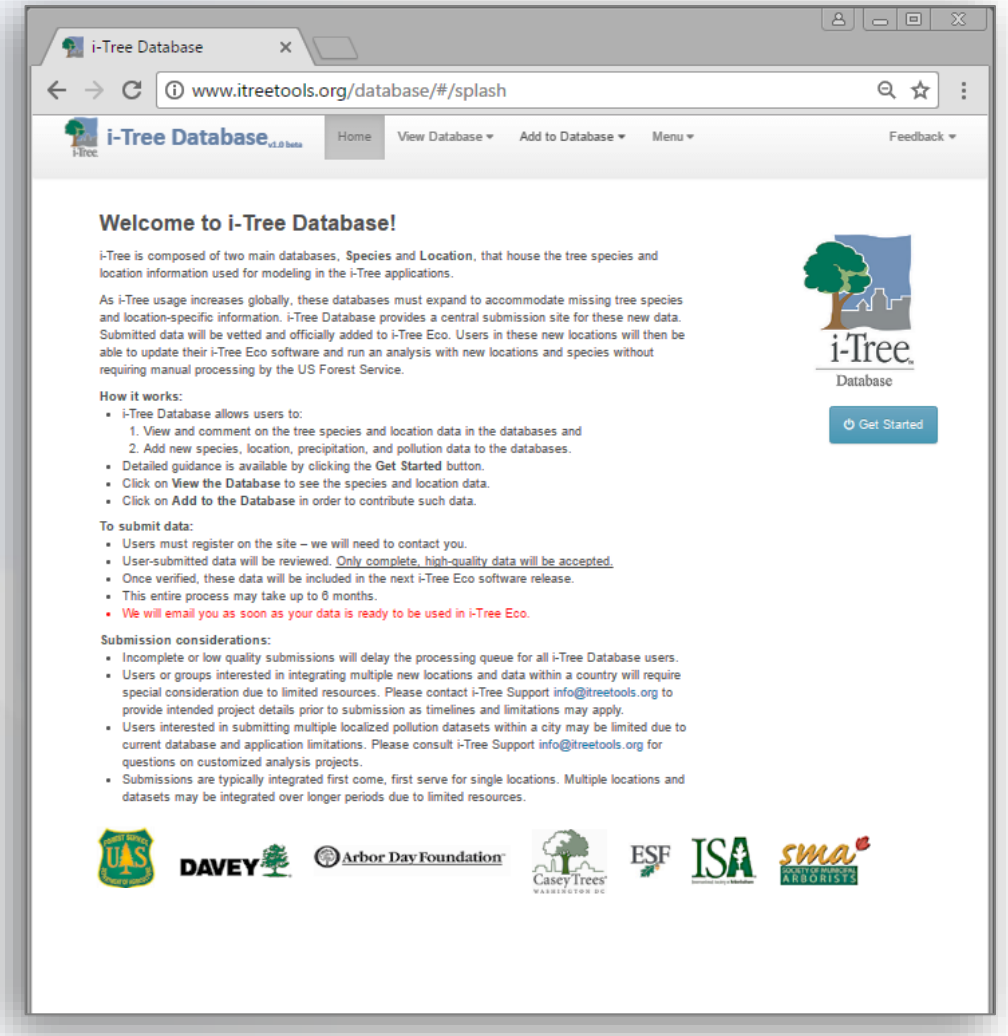
Value

- Model summarizes tree and forest resource structure, function & value.
- Monetary values are based on various US-based economic methods (e.g. social cost of carbon, EPA BenMap for pollution, regional infrastructure & mgt. cost for hydrology)

How do locations outside the US get into Eco?

i-Tree Database

- Web-based submission of data for a single city
- Partial data acceptable
- City permanently integrated into i-Tree Eco for all users
- New species submission



database.itreetools.org

Location Data

City Data

Pollution Data

Weather Data

Species Data

i-Tree Database integration options & considerations

Full Integration Countrywide

- Extensive data required for all desired national cities
- $$$ funding required for integration work
- Collaborating partners work directly with i-Tree Development Team
- Longer development & integration timeline
- Key Benefit: Countrywide access to i-Tree Eco
- Future countrywide updating not typically considered
- Options available for updating individual city data

Individual Global City with Pollution & Precipitation

- City info, hourly pollution and precipitation for (1) city
- No fee for integration
- Individual submits all info & data using i-Tree DB form using templates
- New city & data typically available in Eco within 3-6 months
- Key Benefit: Eco use for individual city or nearby location
- Key Use: Student projects or pilot or demo projects
- Multiple individual cities can be submitted
- Future updating using i-Tree Database

Global City with Partial Data

- City information submitted using ITDB with available precipitation and/or partial pollutant data (e.g. PM2.5 only)
- No fee for integration
- Additional pollutant or precipitation data can be added when available
- New city & data typically available in Eco within 3-6 months
- Pollution and hydrology reports limited to available pollutant data, or inaccurate rainfall
- Multiple cities can be submitted, and data updated with ITDB

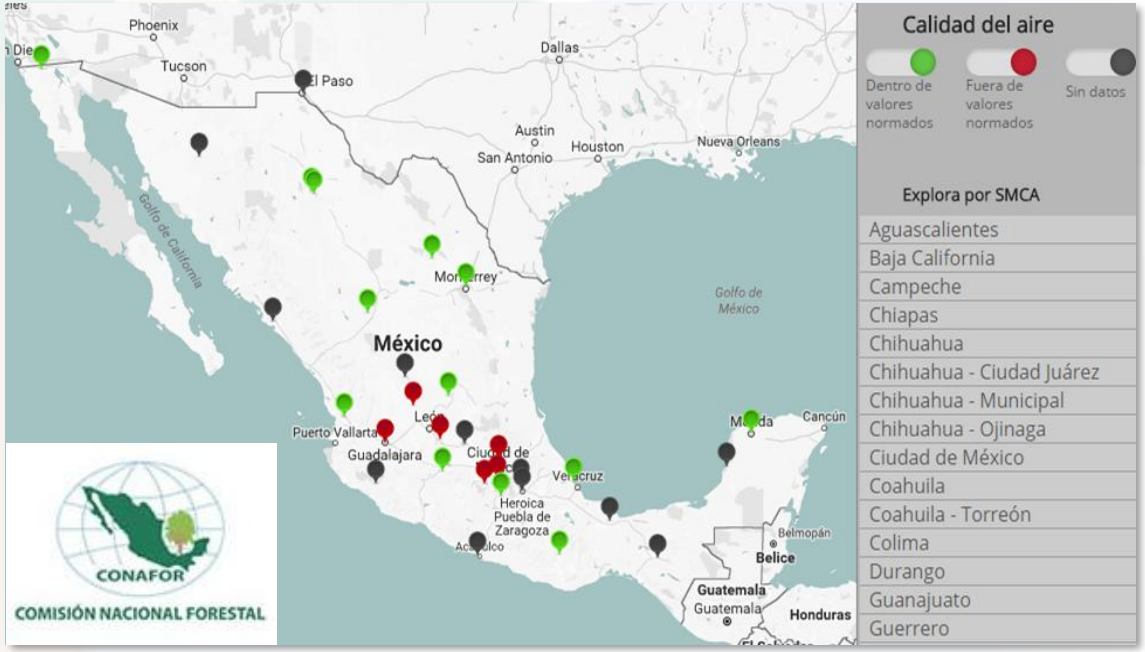
Global City with No Data

- City location only information submitted using ITDB
- No fee for integration
- No pollution reports and inaccurate hydrology effects reports
- Good option for cases with no pollution or rainfall data
- Numerous reports still available including written summary, structural analyses, carbon sequestration & storage, oxygen
- Commonly used to start project data collection while working on obtaining precipitation & pollution data

How do *countries* get into Eco?

Full integration of entire country

- Local partners provide data and funding to support integration
- i-Tree Eco functions the same as it does in the US



Canada
Australia
United Kingdom
Mexico
European Union
Colombia
South Korea
Japan
New Zealand
Ukraine

Location Data

City Data

Pollution Data

Weather Data

Species Data

i-Tree Member Countries – Data Inputs

Species Data - Additions or updates

Required

- Genus and Species
- Common Name
- Leaf Type
- Growth Rate
- Longevity
- Height/DBH at Maturity

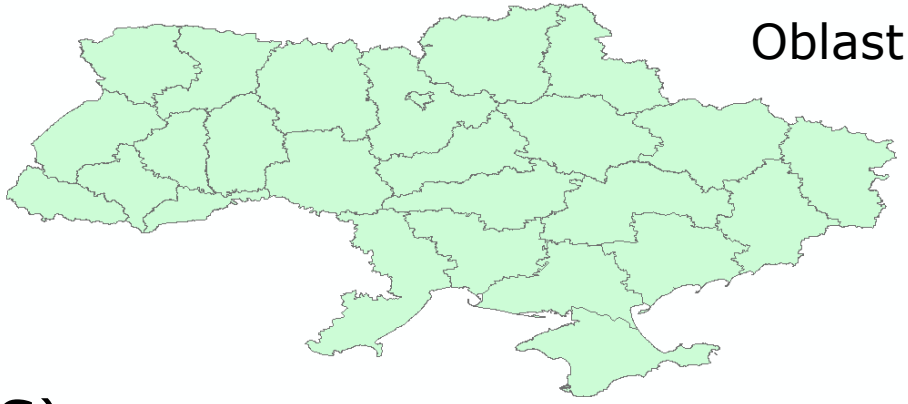
Optional

- Native status
- Invasive
- Threatened or Endangered
- Pest Risk

i-Tree Member Countries – Data Inputs

Location data for each administrative division

- Boundary Data (GIS)
- Name
- Elevation
- Population
- Frost Free Period
- Mean minimum temperature
- Climate indices



i-Tree Member Countries – Data Inputs

Hourly Pollution Monitor Data

- Address
- Location – Latitude/Longitude
- Pollutants
  - Carbon Monoxide
  - Nitrogen Dioxide
  - Ozone
  - PM 2.5 - particulate matter 2.5 micrometers or less
  - PM 10 - particulate matter 10 micrometers or less
  - Sulphur Dioxide

Year	Month	Spname	Cityname	Addr	Units	Quantity	Day	Hour
2013	1	NO2	Aberdeen City	ABDN1	7	0	1	1
2013	1	NO2	Aberdeen City	ABDN1	7	0	1	2
2013	1	NO2	Aberdeen City	ABDN1	7	0	1	3
2013	1	NO2	Aberdeen City	ABDN1	7	0	1	4
2013	1	NO2	Aberdeen City	ABDN1	7	0	1	5
2013	1	NO2	Aberdeen City	ABDN1	7	0	1	6
2013	1	NO2	Aberdeen City	ABDN1	7	0	1	7
2013	1	NO2	Aberdeen City	ABDN1	7	0	1	8
2013	1	NO2	Aberdeen City	ABDN1	7	0	1	9
2013	1	NO2	Aberdeen City	ABDN1	7	0	1	10
2013	1	NO2	Aberdeen City	ABDN1	7	0	1	11
2013	1	NO2	Aberdeen City	ABDN1	7	0	1	12
2013	1	NO2	Aberdeen City	ABDN1	7	0	1	13
2013	1	NO2	Aberdeen City	ABDN1	7	0	1	14

i-Tree Member Countries – Optional Data Inputs

Weather Data

- Hourly precipitation data linked to an NCDC weather station
- Submission of local weather station data for improved accuracy or improved local coverage

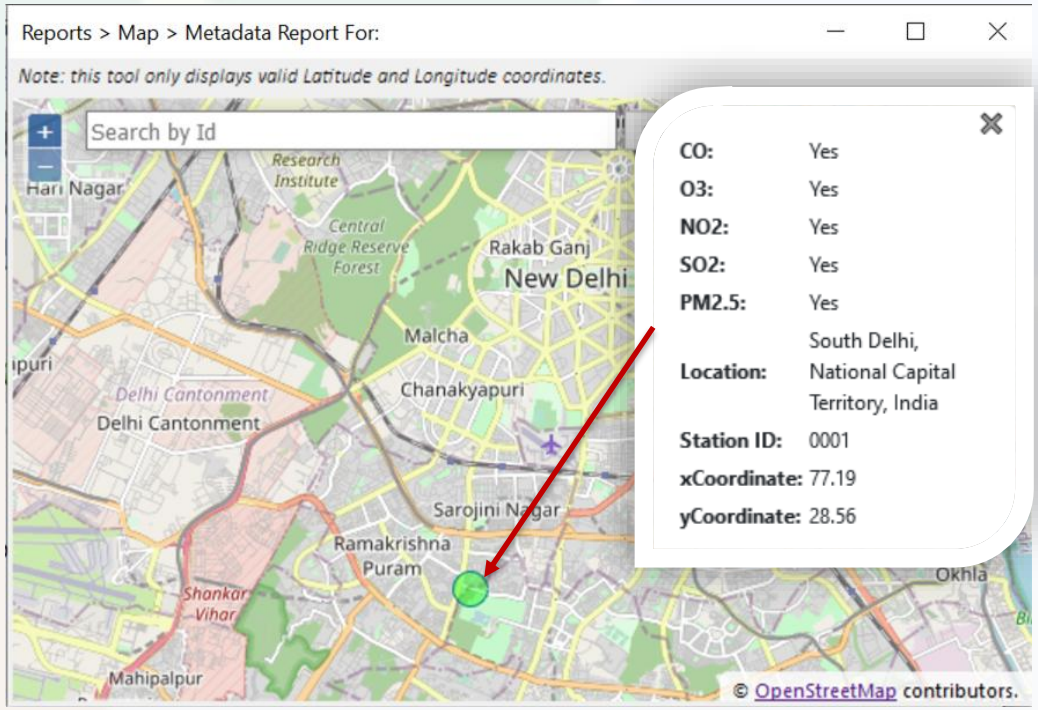
Local Monetary Values

- Pollution
- Carbon
- Hydrology
- Energy Costs
- Structural Value
- Produce Price Indices

How do *individual global cities* get into Eco?

Global city integration

- Global users provide data for their city.
- i-Tree Eco functions the same as it does in the US for that individual city
- No cost & partial data options



Many individual global cities available with pollution & precipitation

Delhi, India
Montevideo, Uruguay
Concepcion, Chile
Sao Paulo, Brazil
Bangkok, Thailand
Kowloon, Hong Kong
Beijing, China
Auckland, New Zealand
Lahore, Pakistan
Kaohsiung City, Taiwan
Tokyo, Japan …

Location Data

City Data

Pollution Data

Precipitation Data

Species Data

i-Tree Database – View Database

If you see incomplete or erroneous information in the database, please send us a comment using the Feedback menu.

Search Species

Search by: Scientific Name (genus) | Pinus

A B C D E F G H I J K L M N O P Q R S T U V W X Y Z

Search | Clear | Export to CSV

Genus Name	Species Name	Synonyms	Family	Order	Class	Common Name	Species Code	Growth Form	Percent Leaf Type	Leaf Type	Growth Rate	Longevity	Height at Maturity (feet)
Pinus	albicaulis		Pinaceae	Pinales	Pinopsida	Whitebark pine	PIAL	Tree	Pinus	Evergreen	Slow	Long (55+yrs)	65
Pinus	aristata		Pinaceae	Pinales	Pinopsida	Bristlecone pine	PIAR	Tree	Pinus	Evergreen	Slow	Long (55+yrs)	40
Pinus	arizonica		Pinaceae	Pinales	Pinopsida	Arizona pine	PIAR5	Tree	Pinus	Evergreen	Slow	Long (55+yrs)	70

Search Location

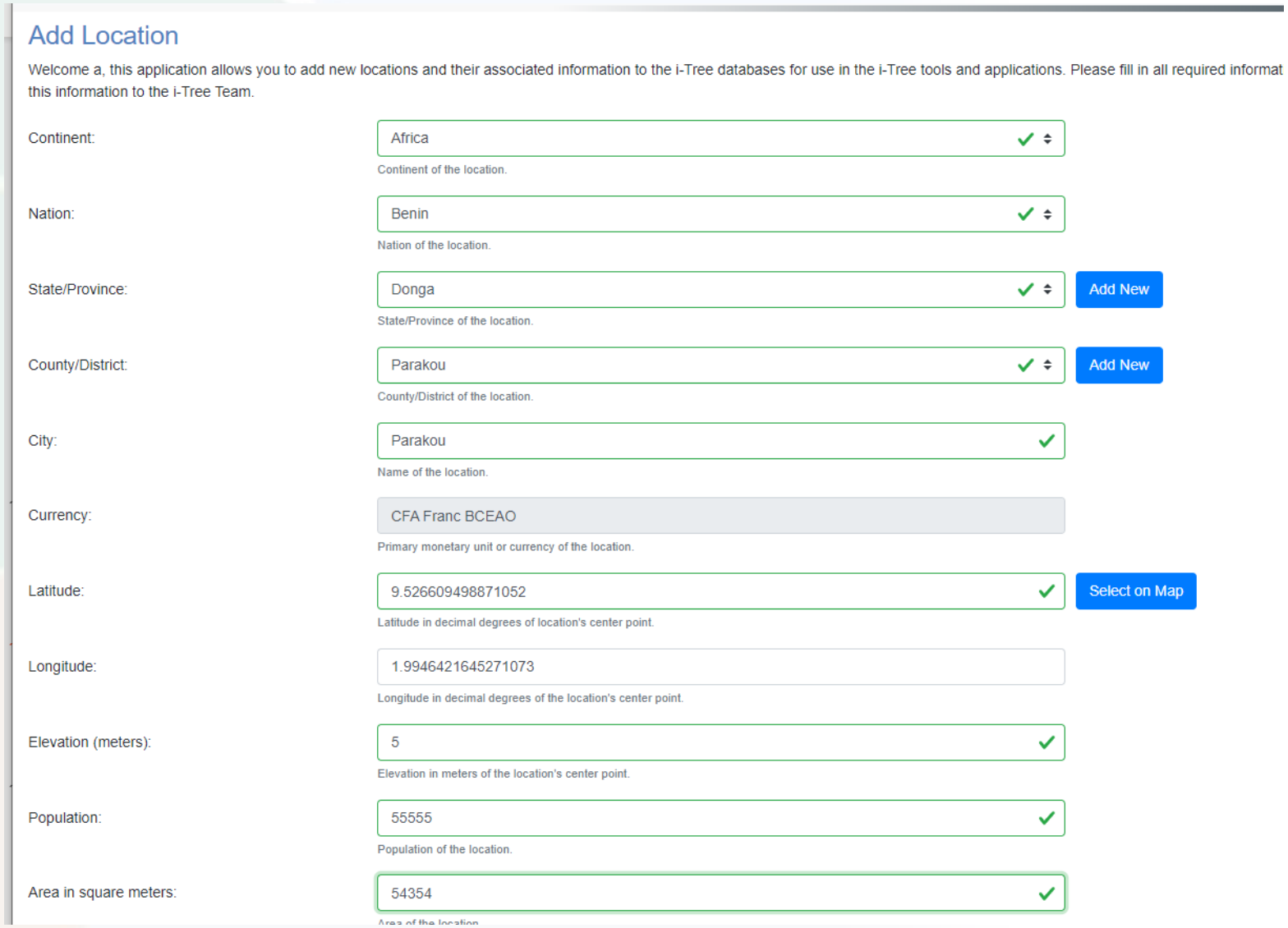
Search by: Ukraine | Ivano-Frankivska | -- Select --

Search | Clear | Export to CSV

Nation	Oblast	Rayon	District	Latitude	Longitude	Elevation (meters)
Ukraine	Ivano-Frankivska	Ivano-Frankivskyi	Bilshivtsivska	49.2222668535	24.7988546772	280.142502901376
Ukraine	Ivano-Frankivska	Ivano-Frankivskyi	Bohorodchanska	48.7811406552	24.5142779533	385.322183441021
Ukraine	Ivano-Frankivska	Ivano-Frankivskyi	Bukachivska	49.2746015951	24.445306801	265.422183450795
Ukraine	Ivano-Frankivska	Ivano-Frankivskyi	Burshtynska	49.2562638831	24.6461220114	257.576100335213
Ukraine	Ivano-Frankivska	Ivano-Frankivskyi	Dubovetska	49.1032823765	24.8502742039	269.573232367601

https://database.itreetools.org/

i-Tree Database – Add Data



https://database.itreetools.org/

i-Tree Database – Add Data

Add Species

Welcome a, this application allows you to add new tree species and their associated information to the i-Tree databases for use in the i-Tree tools and applications. Please fill in all required information and then submit this information to the i-Tree Team.

It is recommended that prior to attempting to submit species information you should go to the View Database page to make sure that the species is not already in our database. Please only submit tree species, do not submit data for shrubs, vines, or herbaceous plants.

Genus: Abelia — Add New
Genus name of new species used to establish taxonomic rank.

Species: chinensi
Species name of new species used to establish taxonomic rank. Please only enter the species name in this field.

Family: Caprifoliaceae
Family name of new species used to establish taxonomic rank.

Order: Dipsacales
Order name of new species used to establish taxonomic rank.

Class: Magnoliopsida
Class name of new species used to establish taxonomic rank.

Common Name:
Common name of new species. Please use an English common name where possible.

Growth Form: Tree
Expected life-form of new species if located in a natural setting.

Percent Leaf Type: Picea
Leaf characteristic of new species used to determine leaf density.

Leaf Type: Evergreen
Leaf characteristic of new species. Used to inform if and when leaves are dropped.

Growth Rate: Slow (0-0.24 in/yr)
Expected diameter growth rate, in inches per year, of new species.

Longevity: Short (0-35 yrs)
Expected lifespan, in years, of new species.

Height at Maturity (feet): 33
Expected height at maturity, in feet, of new species.

Native Continent(s):
-- Select Native Continent(s) --
Africa
Antarctica
Asia
Continent(s) where new species is naturally found.

Resubmission: No
Select 'Yes' if this submission replaces one of your previous species submissions.

Submit Reset

Use of this tool indicates acceptance of the EULA.

https://database.itreetools.org/

Database Home View Database Add to Database Menu Feedba

Add Precipitation

Welcome Ana Cristina Castillo, this application allows you to add hourly rainfall data associated with a weather station to the i-Tree databases for use in the i-Tree tools and applications. Please use the template provided to format your data and then submit this information to the i-Tree Team.

Year: 2021

Calendar year in which new precipitation data was collected.

Weather Station

Select on Map

Weather station that precipitation data will be added to.

Precipitation Data: Choose file Browse

Template

Select file to upload and submit.

Resubmission: -- Select --

Change this to 'Yes' if this submission replaces one of your previous precipitation submissions.

Submit Reset

Local benefits from local trees start with LOCAL DATA!!

- **Fabiola Lopez**
U.S. Forest Service International Programs
Mexico and Latin America

- **María del Pilar Arroyave**
U.S. Forest Service International Programs
Colombia

- **Akshat Tyagi**
Give Me Trees Trust
India

2025 – i-Tree Open Academy

Session 1: **Introduction to i-Tree**

Understanding the benefits of trees for people, places, and planning

María Arroyave
Urban Ecology Coordinator
U.S. Forest Service – International Programs
Colombia Program
mariaarroyaveusfs@gmail.com

i-TREE INTEGRATION TO COLOMBIA

Location
Climate
Air pollution
Tree species

Adding to i-Tree Eco the data required by the software

i-Tree Eco Projects:

- Barranquilla
- Bogotá
- Cali
- Cartagena
- Medellín
- Quindío (12 cities)
- Santa Marta
- Valledupar
- Valle de Aburrá (10 cities)
- Valle del Cauca (12 cities)

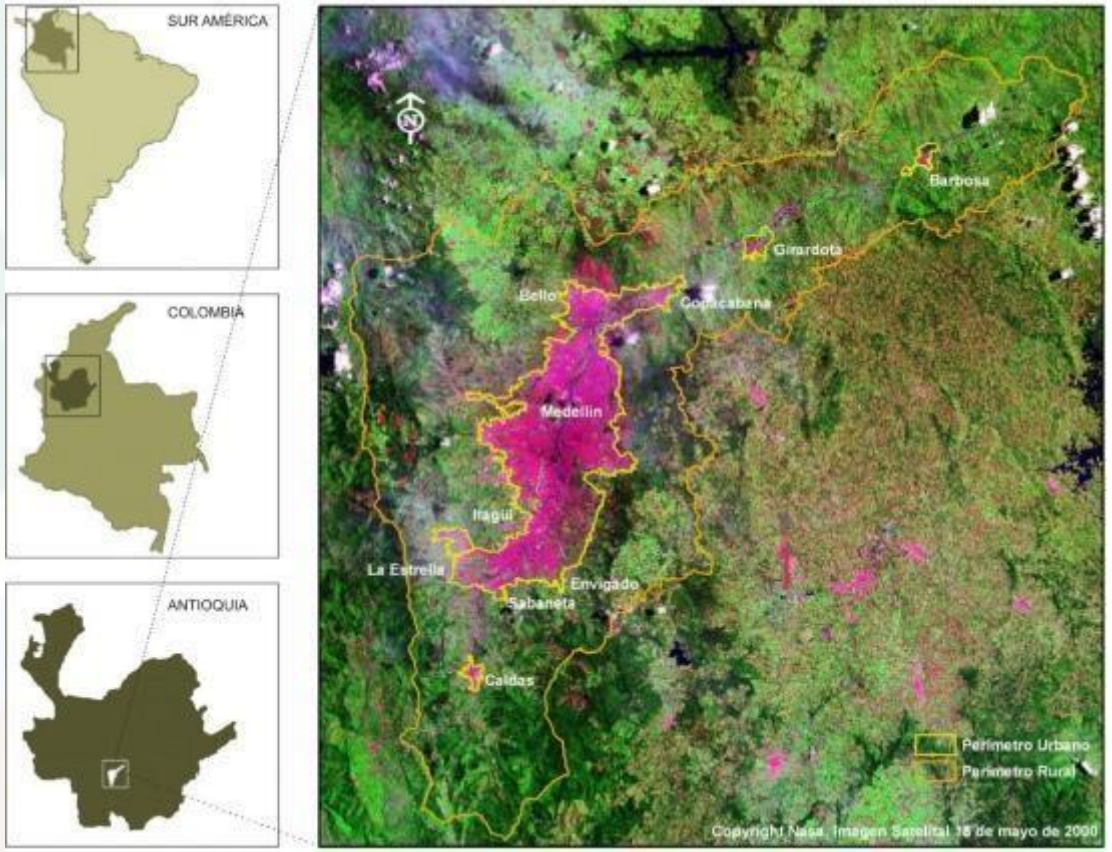
URBAN FOREST ECOSYSTEMS SERVICES AT DIFFERENT SCALES

Individual trees

Groups of trees in parks, residential areas, university campus

Neighborhoods, City, Metropolitan area

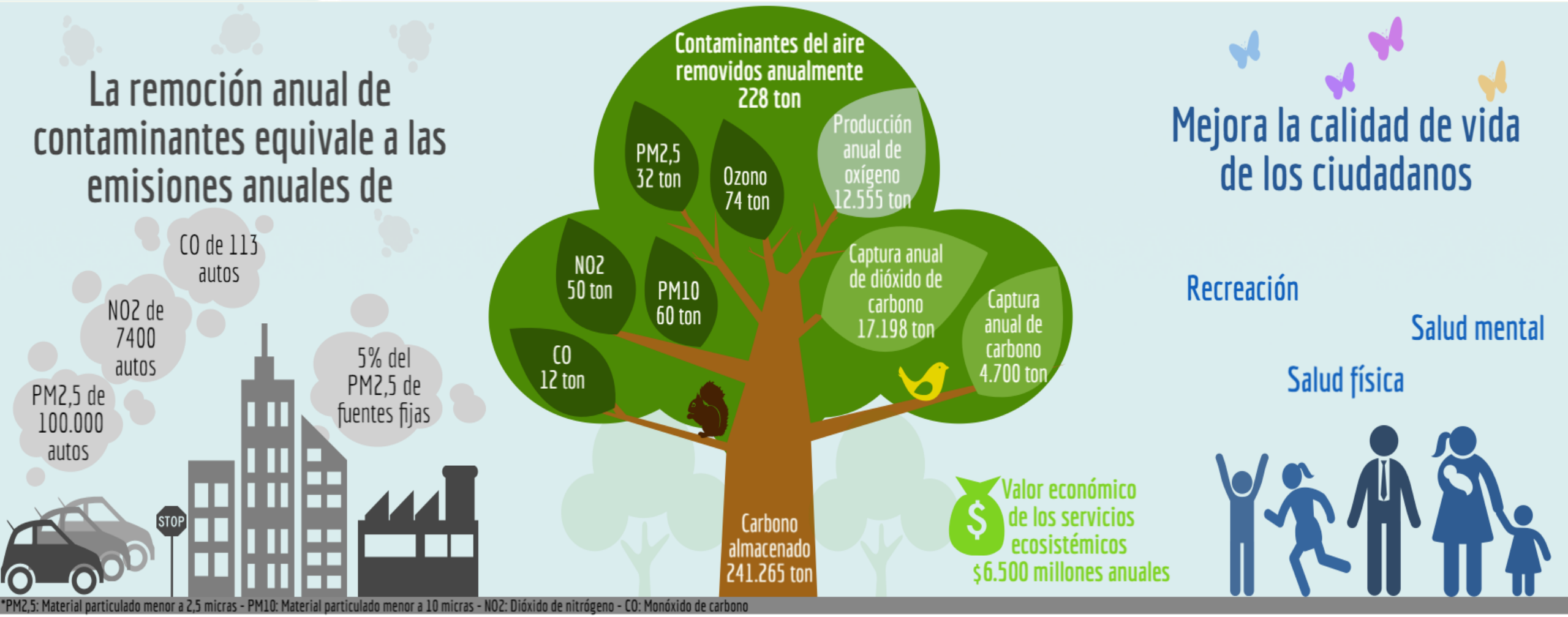
MEDELLÍN AND THE ABURRÁ VALLEY



- Extension: 1.152 km^2
- Temperature: 18 – 22 °C
- Height above sea level: 1300 – 2800 m
- Rainfall: 1500 - 2500 mm
- Population: 3.306.490

We established 398 plots of 400 m^2 distributed randomly through the urban area

URBAN FOREST ECOSYSTEM SERVICES IN MEDELLÍN AND ABURRÁ VALLEY

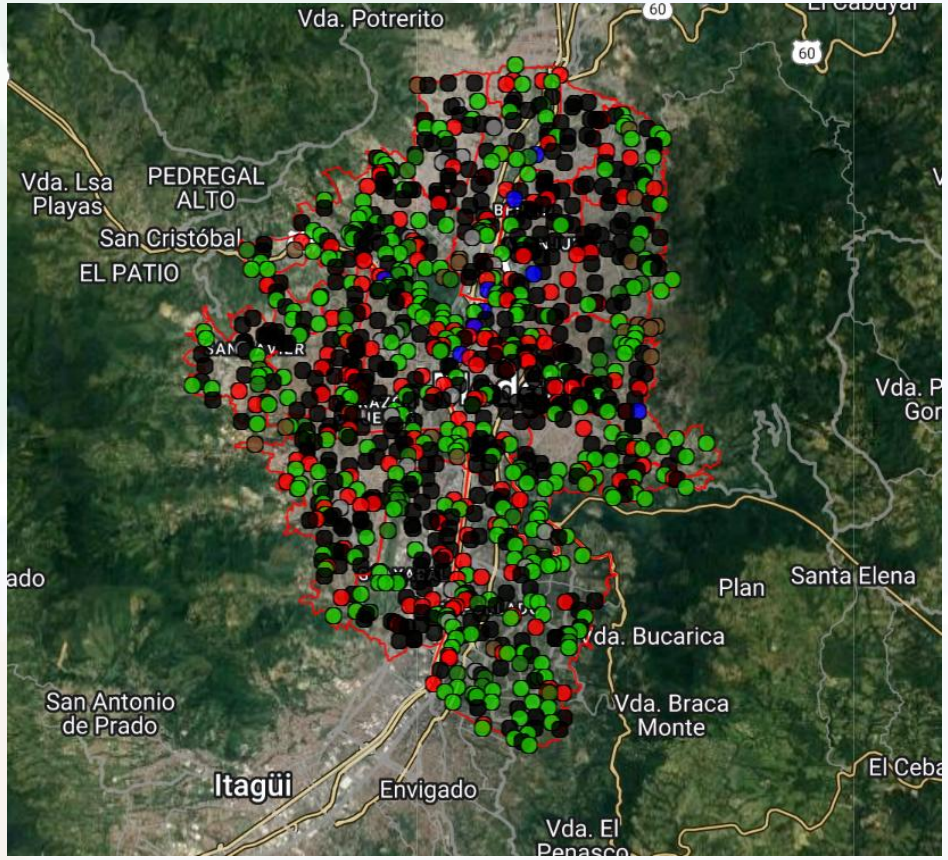


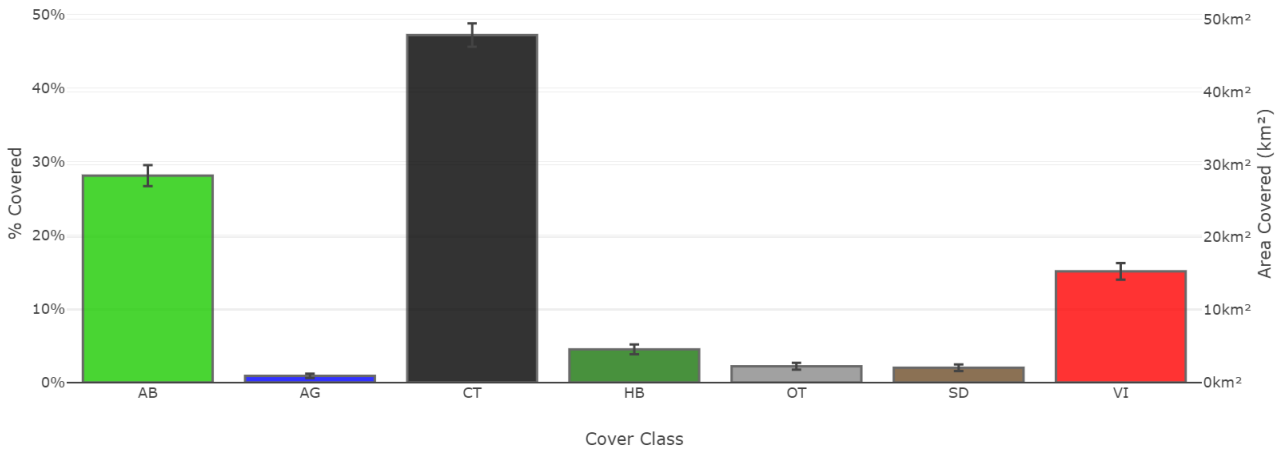
*PM2,5: Material particulado menor a 2,5 micras - PM10: Material particulado menor a 10 micras - NO2: Dióxido de nitrógeno - CO: Monóxido de carbono

Proyecto "Evaluación de servicios ecosistémicos del bosque urbano del Valle de Aburrá" - Cofinanciado por Colciencias - Grupo SITE (Sostenibilidad, Infraestructura y Territorio)
Investigadoras: María del Pilar Arroyave (MSc.), Martha Isabel Posada (MSc.), María Elena Gutiérrez (MSc.) y Catalina Londoño (PhD.) - contacto: maria.arroyave@eia.edu.co
Abril 2017

UNIVERSIDAD EIA

i-TREE CANOPY MEDELLÍN – COLOMBIA





.	Clase de cobertura	Descripción	Puntos	% Cobertura ± SE	Área (km²) ± SE
AB	Arbórea	Incluye árboles y arbustos. Esta es la cobertura sobre la cual se analiza la remoción y retención de contaminantes.	281	28,10 ± 1,42	28,48 ± 1,44
AG	Agua	Incluye ríos, quebradas, lagos.	9	0,90 ± 0,30	0,91 ± 0,30
CT	Construcción	Incluye todo tipo de edificación y viviendas.	472	47,20 ± 1,58	47,83 ± 1,60
HB	Herbácea	Incluye pastos, grama y rastrojo.	45	4,50 ± 0,66	4,56 ± 0,66
OT	Otros	Incluye centros deportivos, parqueaderos y las demás coberturas que se encuentren en la ciudad y no se recojan en las anteriores	22	2,20 ± 0,46	2,23 ± 0,47
SD	Suelo desnudo	Incluye suelo sin ninguna cobertura.	20	2,00 ± 0,44	2,03 ± 0,45
VI	Vías	Incluye vías pavimentadas.	151	15,10 ± 1,13	15,30 ± 1,15
Total			**1000**	**100.00**	**101.34**

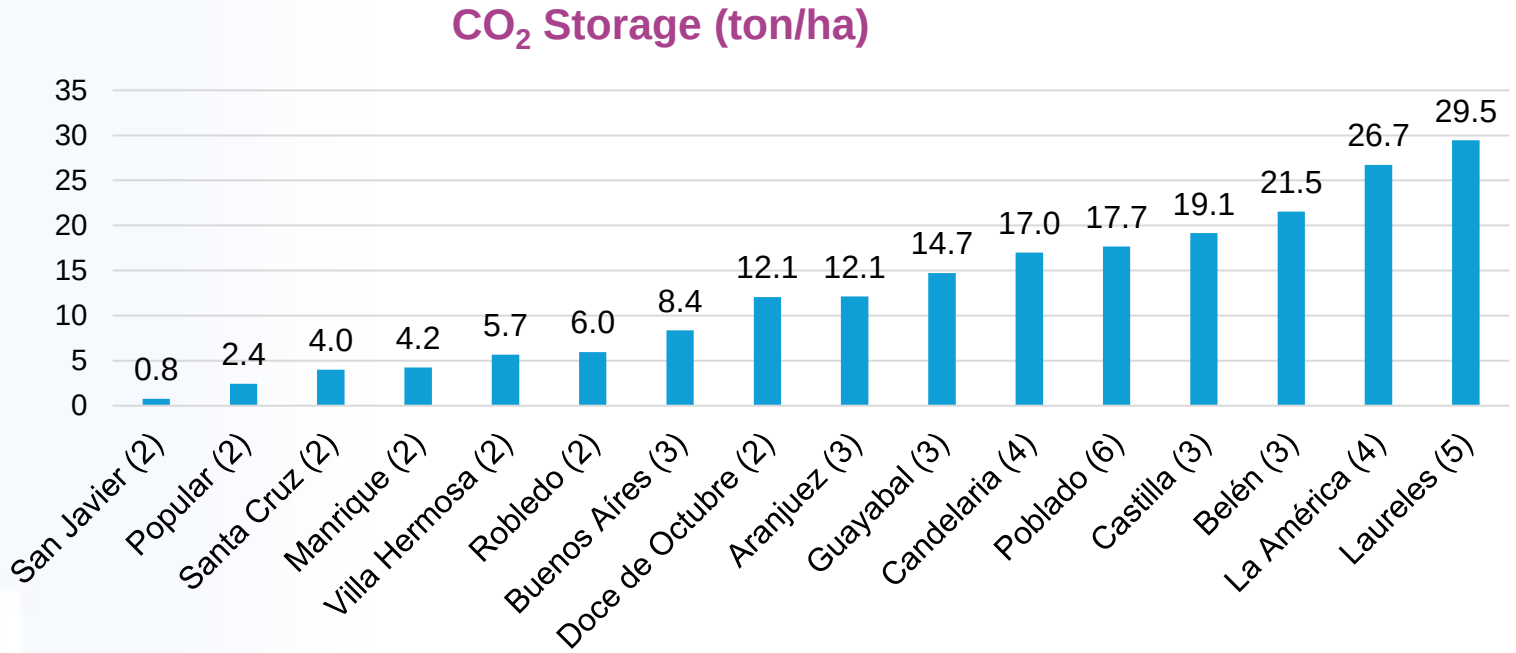
i-TREE ECO RESULTS FOR MEDELLÍN

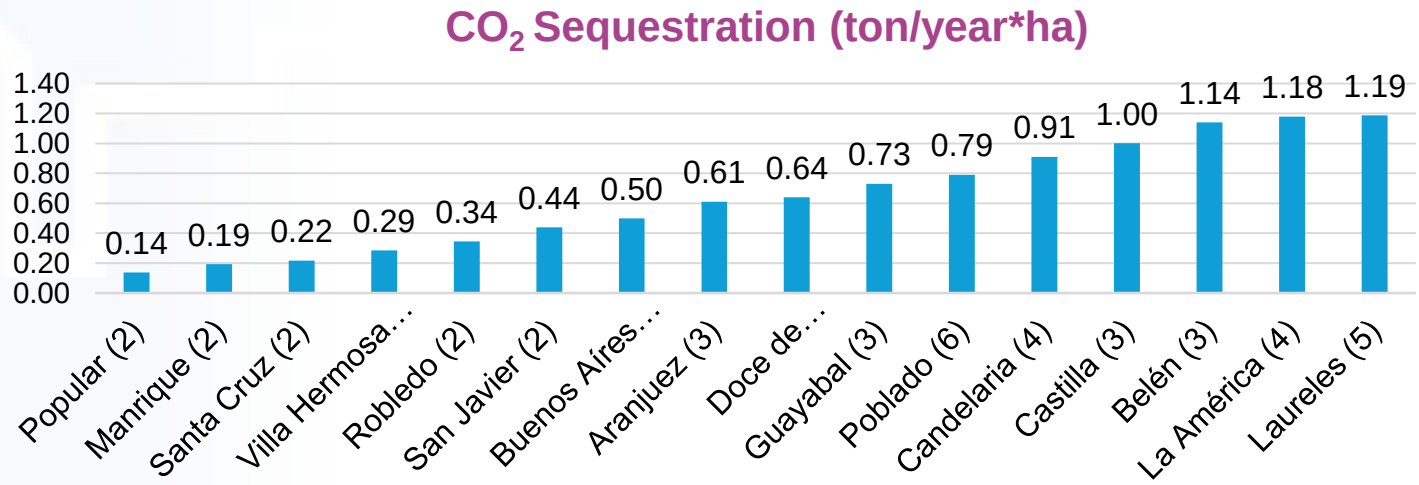
- Tree cover: 28%
- Number of trees: 660.000
- Number of species: 1.135
- Native species: 60%
- CO_2 storage: 140.482 ton
- CO_2 sequestration: 7.066 ton/year
- Total removal of pollutants: 102 ton/year
- Oxygen production: 5.134 tons/year

CARBON STORAGE AND SEQUESTRATION

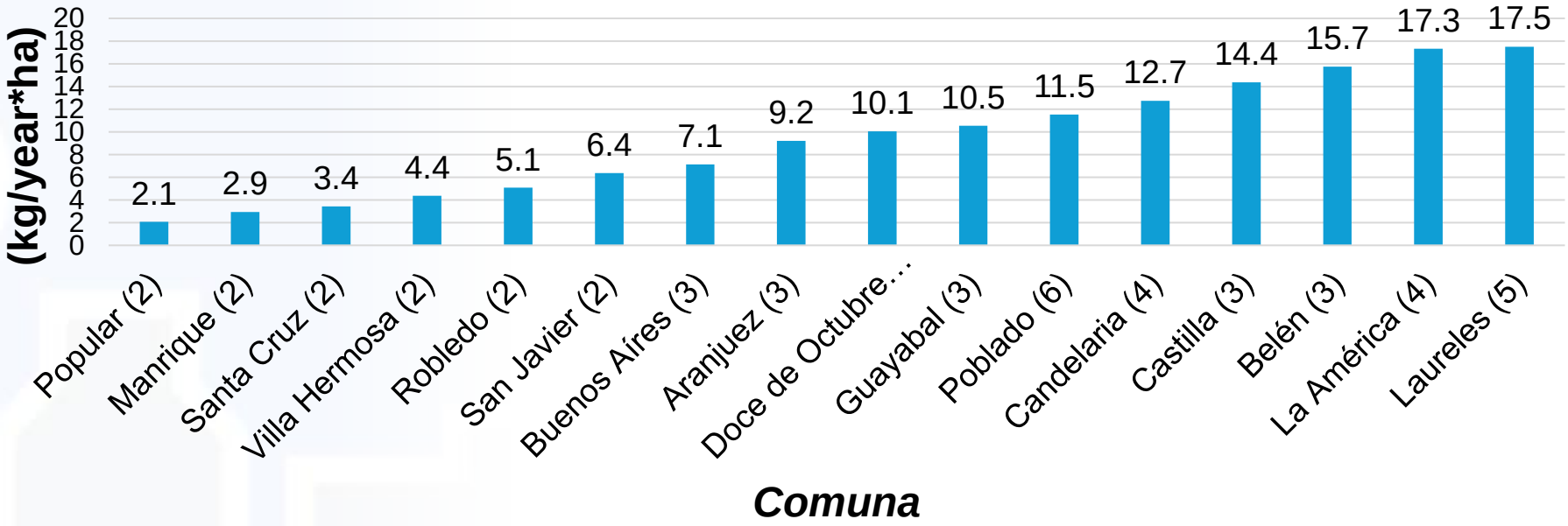
Comunas in Medellín

Communities with lower economic resources have a lower supply of ecosystem services.





POLLUTANT REMOVAL



URBAN FOREST ECOSYSTEM SERVICES MAP MEDELLÍN

ID Árbol
350

Longitud
-75.56176094

Latitud
6.255151485

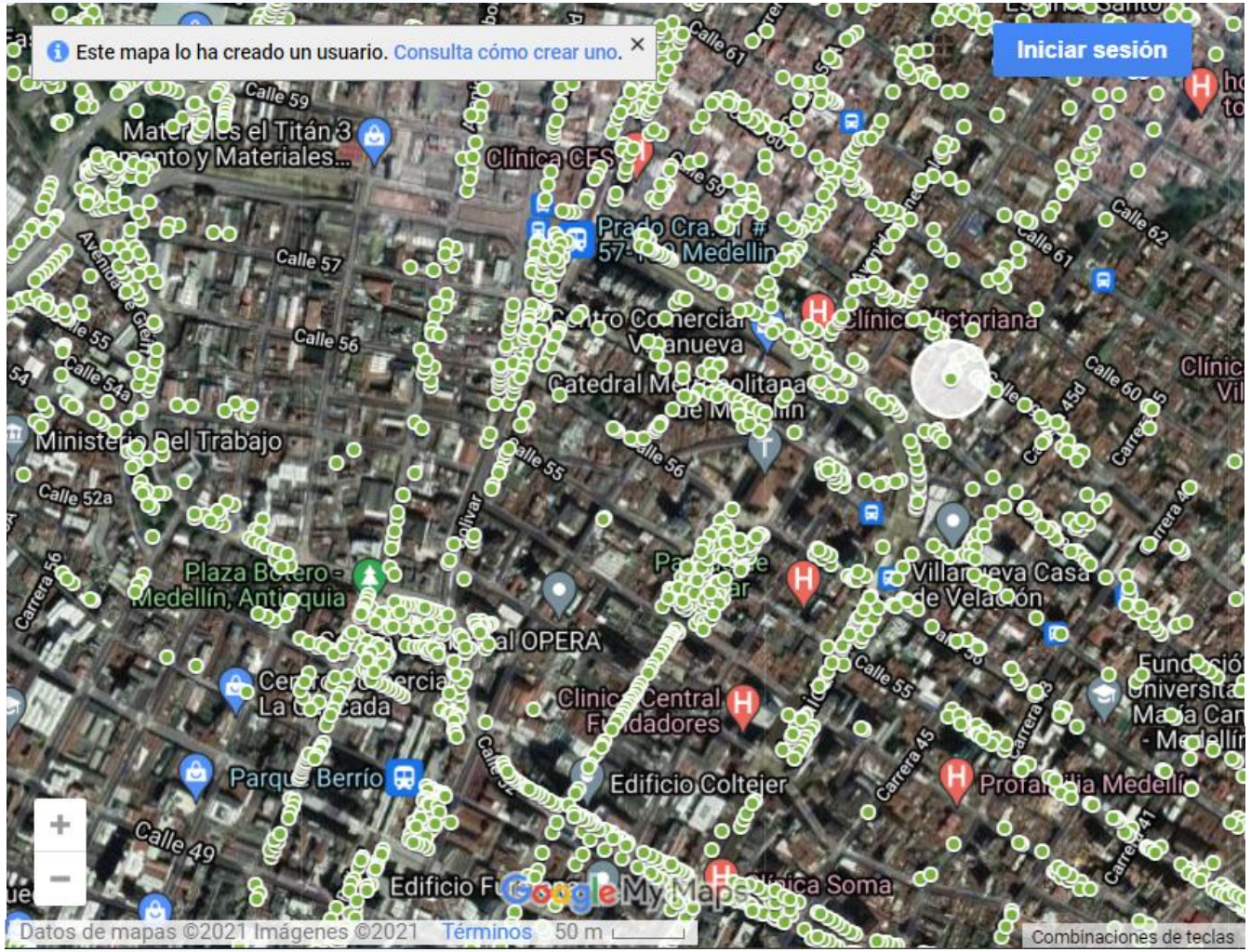
Nombre de la especie
Handroanthus chrysanthus

Nombre común
Guayacan amarillo

Diámetro (cm)
27

Altura (m)
12

Condición
Buena



https://www.google.com/maps/d/edit?mid=11Gc6p21-vUXc7S75cLVZhIxeMgDtxB0&usp=sharing

Almacenamiento de carbono (kg)
187

Secuestro bruto de carbono (kg/año)
16

Escurrimiento evitado (m³/año)
2

Eliminación de la contaminación (g/año)
349

BENEFITS OF HERITAGE TREES IN MEDELLÍN

Especie

Tabebuia rosea

Nombre común

Guayacán Rosado, Roble

DAP (cm)

49.34

Altura total (m)

12.5

Almacenamiento de carbono (kg)

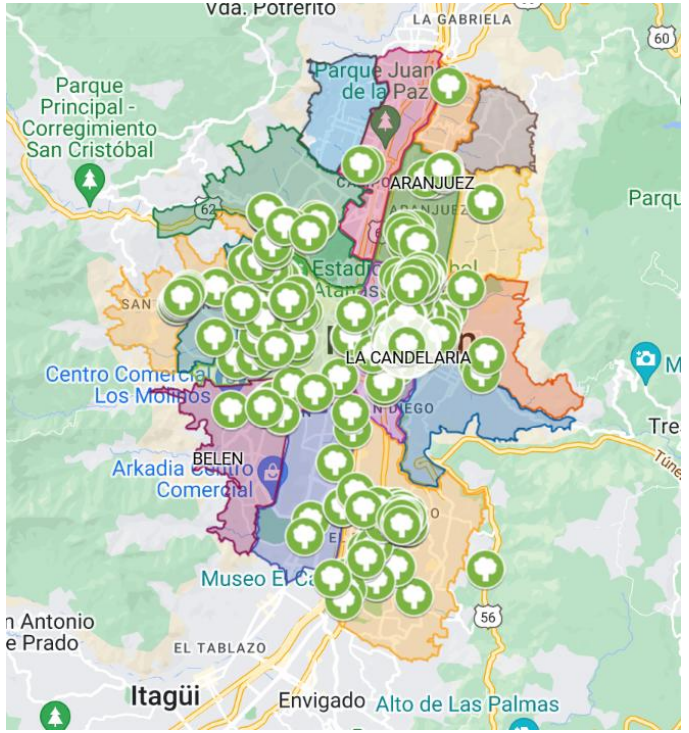
426

Captura de carbono (kg/año)

20.5

Escurrimiento evitado (m³/año)

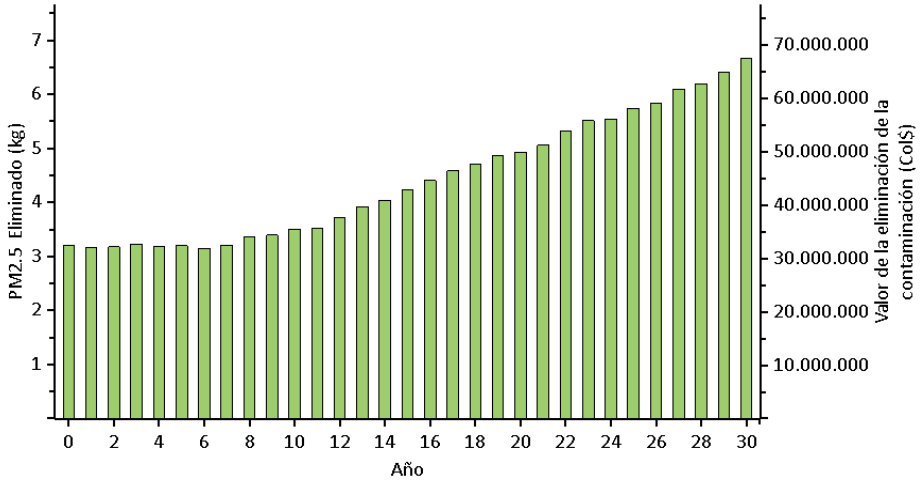
2.5

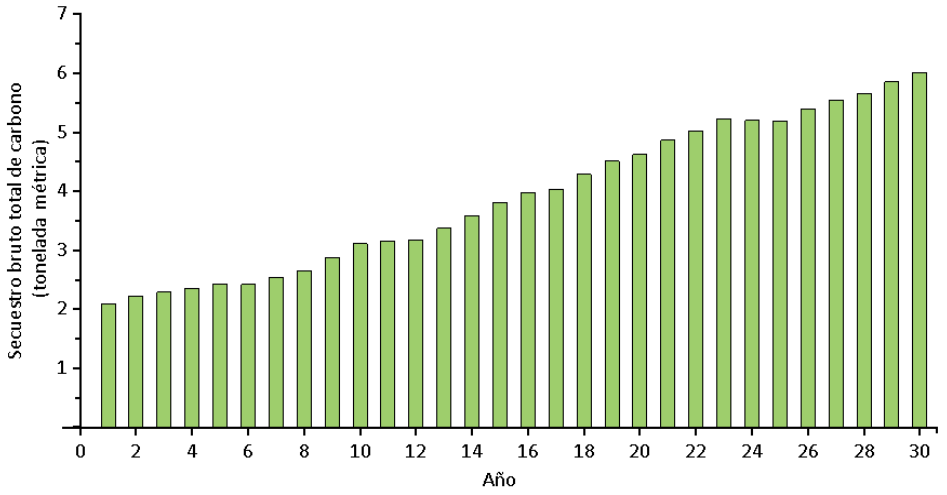


https://www.google.com/maps/d/edit?mid=1QLxYputKRXqgiUcq8CB4wB2z4DWjMuvk&usp=sharing

ECOSYSTEM SERVICES FORECAST (30 YEARS)

GRI DOR – ORI EDELLÍ





ALCALDÍA MAYOR DE BOGOTÁ D.C.

JARDÍN BOTÁNICO DE BOGOTÁ

URBAN FOREST ECOSYSTEM SERVICES IN BOGOTÁ

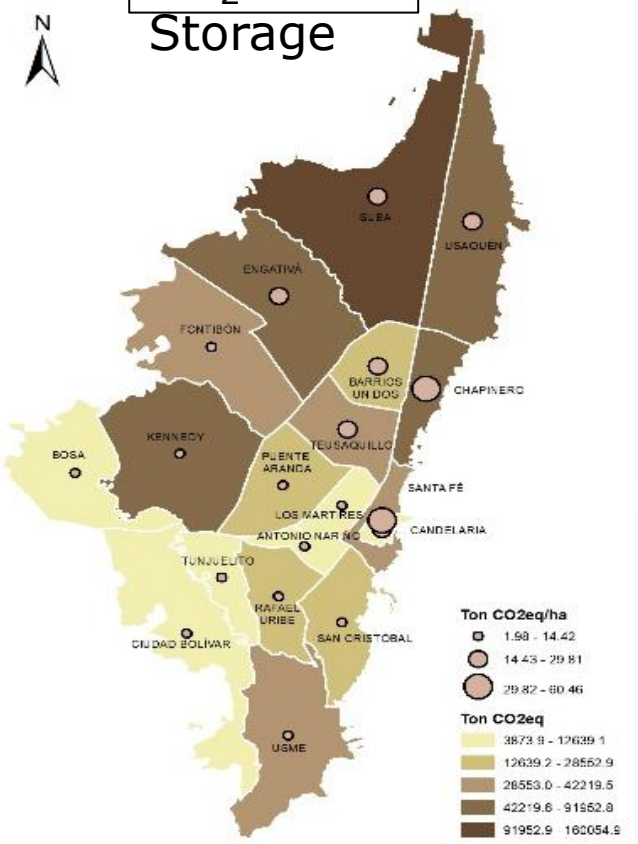
Carlos Vicente Rey Guerra
Johan Manuel Calderón Rodríguez
Miguel Quirama Aguilar

Línea de Investigación Aplicada - STO

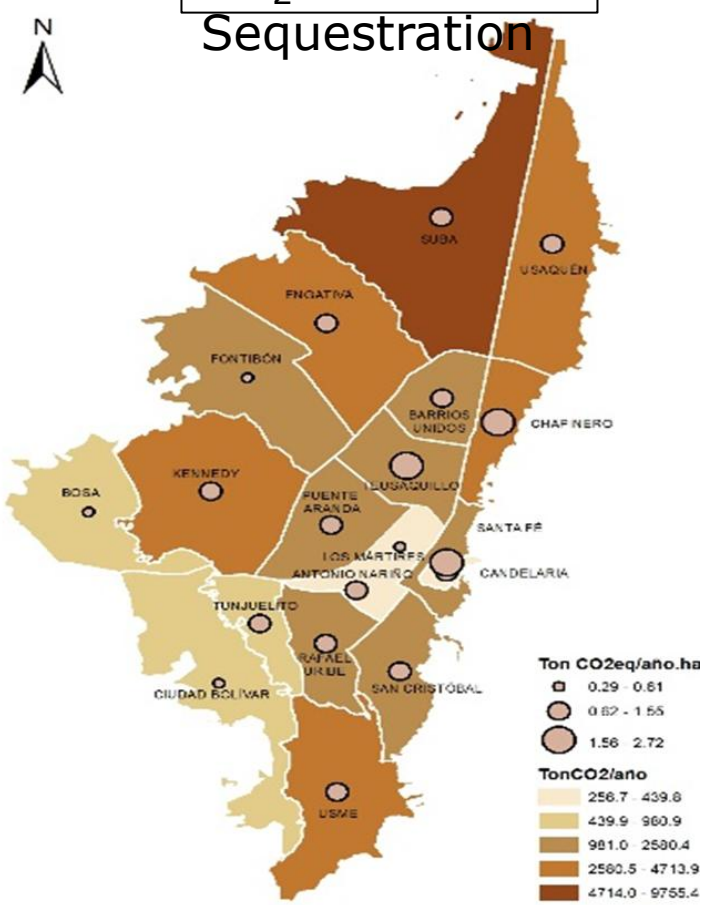
Jardín Botánico de Bogotá
José Celestino Mutis

URBAN FOREST ECOSYSTEMS SERVICES IN BOGOTÁ

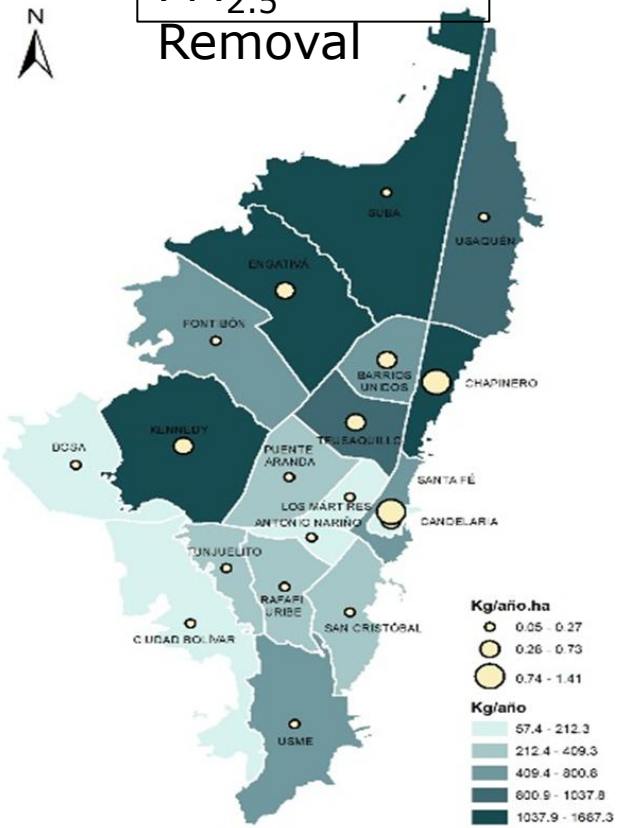
CO_2 Storage



CO_2 Sequestration



$PM_{2.5}$ Removal



Rey, Calderón & Valenzuela, 2023

URBAN FORESTS IN CALI

COMMUNITY NETWORK

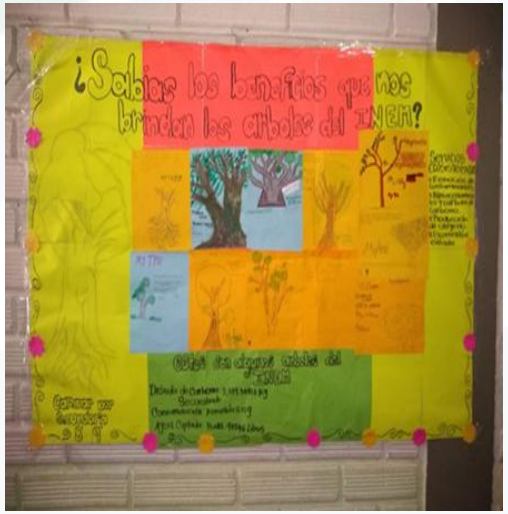
Ecosystem services:

- Pollutant removal: 280 kg/year
- Carbon storage: 1.528 ton
- Carbon dioxide sequestration: 51 toneladas/year
- Oxygen production: 37 ton/year
- Avoided runoff: 481 cubic meters/year

Red comunitaria Bosques Urbanos Santiago de Cali

Kuratomi & Acosta (2023)

CITIZEN SCIENCE USING MyTree



MyTree Benefits

For this year.

Guayacan amarillo, *(Handroanthus chrysanthus)*

Serving Size: 37.24 cm. diameter
Condition: Excellent
Location: Medellín, Antioquia, Colombia
Estimated this year: $16.59

Annual values:	
Carbon Dioxide Uptake	**$7.52**
Carbon Sequestered[1]	47,66 kg
CO_2 Equivalent[2]	174,74 kg
Storm Water Mitigation	**$0.14**
Runoff Avoided	61,37 L
Rainfall Intercepted	364,47 L
Air Pollution Removal	**$8.93**
Carbon Monoxide	61,66 g
Ozone	186,27 g
Nitrogen Dioxide	210,58 g
Sulfur Dioxide	133,51 g
$PM_{2.5}$	3,83 g
Values are totals to date:	
Carbon Dioxide Uptake[4]	**$89.76**
Carbon Storage[4]	568,67 kg
CO_2 Equivalent[2, 4]	2085,14 kg

USE OF i-TREE RESULTS

- ✓ Show the contribution of the urban forest as a Nature Based Solution for climate change and air pollution mitigation
- ✓ Support for the design of Payment of Ecosystem Services mechanisms.
- ✓ Input for carbon footprint offset estimation: How many trees would offset my carbon footprint?
- ✓ Identify the oportunities to involve people in conservation and management of green areas
- Justification for the investment for the maintenance of Urban Forests
- Recognition of the importance of the urban forests by the community.

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Thank you!

María Arroyave
Urban Ecology Coordinator
U.S. Forest Service – International Programs
Colombia Program
mariaarroyaveusfs@gmail.com

i-Tree International Academy

I-TREE AROUND THE WORLD: MEXICO EXPERIENCE

S. Fabiola López L.

Project Coordinator, Mexico Program
IP, U.S. Forest Service

December 2024

i-Tree for Mexico

USDA Forest Service
U.S. DEPARTMENT OF AGRICULTURE

Integration by Davey Institute & i-Tree Mexico Consultant

- **Location and population of main cities**
  - **Hourly weather data by year**
  - **Hourly pollution data by year**
  - **Partition Maps**
- **New species and more.**
- **Translation of program interface and manuals into Spanish**

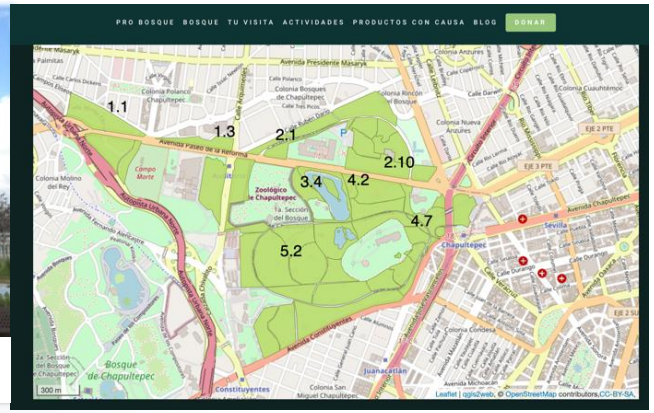
i-Tree Eco

Adapted to Mexico

2017-2018

Integration of main Mexico's cities to i-Tree (International Programs and Davey Institute)

Implementation of pilot projects in Mexico City



Plantings & Chapultepec Park Tree Inventory

i-Tree
Tools for Assessing and Managing Forests & Community Trees

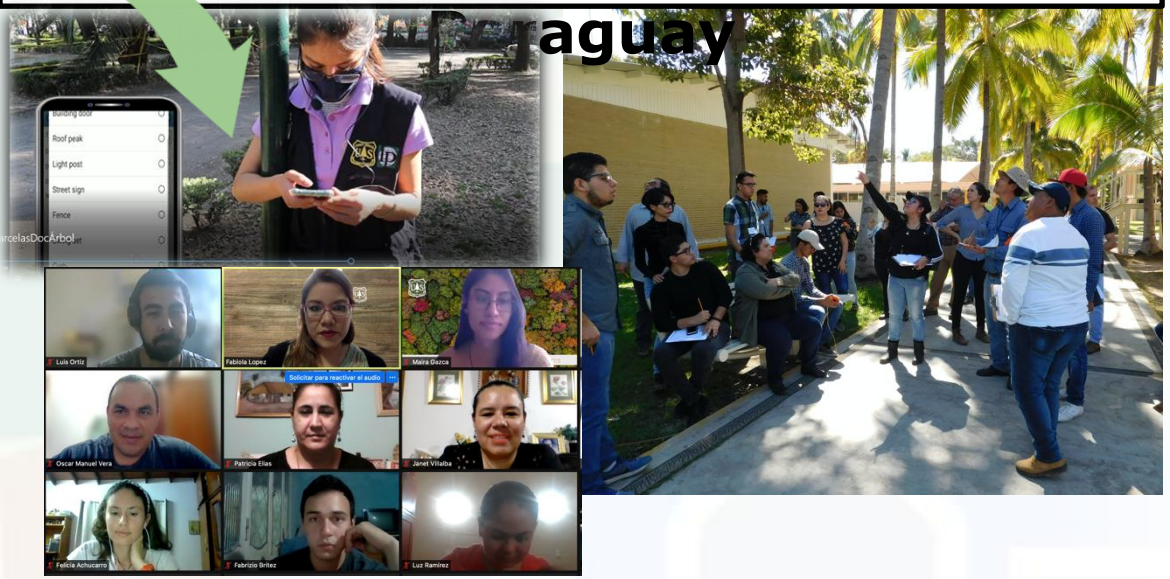
Support & training for implementing i-Tree international tools

i-Tree Tools for Assessing and Managing Forests & Community Trees

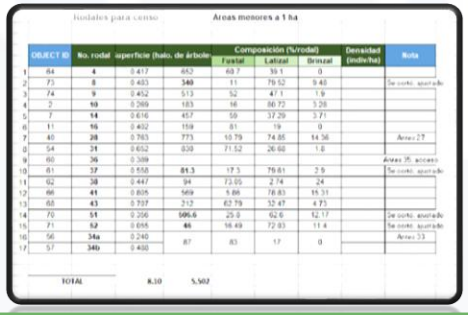
USDA Forest Service U.S. DEPARTMENT OF AGRICULTURE

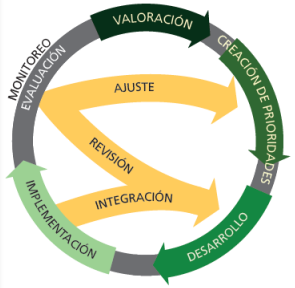
2019-2024

i-Tree Workshops in Mexico, Peru, Guatemala Salvador and Paraguay



Technical assistance in designing and implementing urban tree inventories





Support in analyses data and workshops to develop urban tree strategies and master plans

Who is using i-Tree in Mexico?

- Municipalities & consultants are using i-Tree to create tree maintenance or management plans or plant strategies

- NGOs are using it to encourage community engagement and urban greening efforts

- Strength tree advocacy efforts and divulge why trees are important

USDA Forest Service
U.S. DEPARTMENT OF AGRICULTURE

i-Tree
Tools for Assessing and Managing Forests & Community Trees

Other projects with i-Tree

i-Tree + Social assessment + Youth

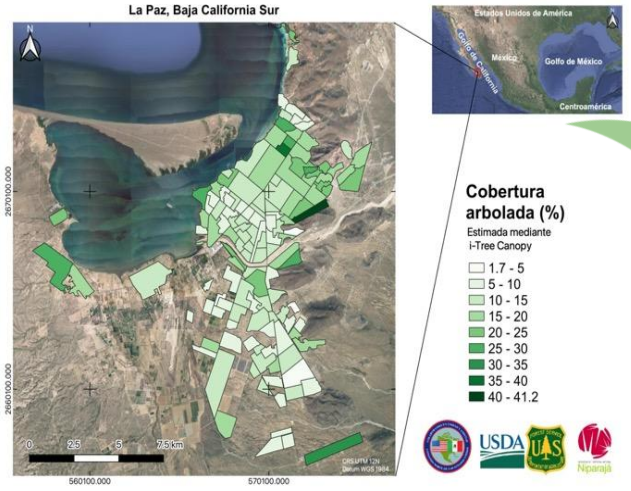
San Marcos Neighborhood – Merida City

1. Survey to know the community perception about trees
2. Tree Inventory with Eco to make a tree trial
3. Community Engagement Activities

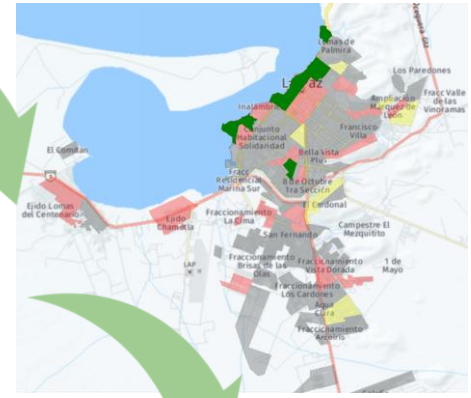
i-Tree + StewMap

La Paz City

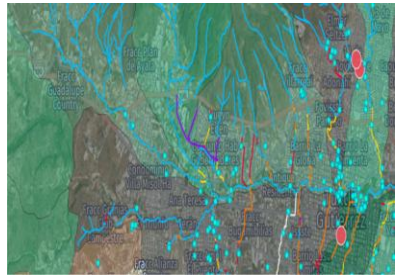
i-Tree Canopy Analysis



How Many Stewards Are In Each Neighborhood?



Basin information



Overlapping → where we could create Urban Oasis

Conclusions

i-Tree tools are useful to:

Strategies to improve tree condition & increase benefits

Trees value

Community engagement & Tree monitoring

(Volunteering & youth education)

Environmental services & Canopy cover

Structure & species composition
(Diversity & density)

Integral Management of Urban

i-Tree Delhi

Akshat Tyagi, Give Me Trees Trust

My organization- Give Me Trees

at a glance

22.7 million trees planted and preserved

600 schools

700

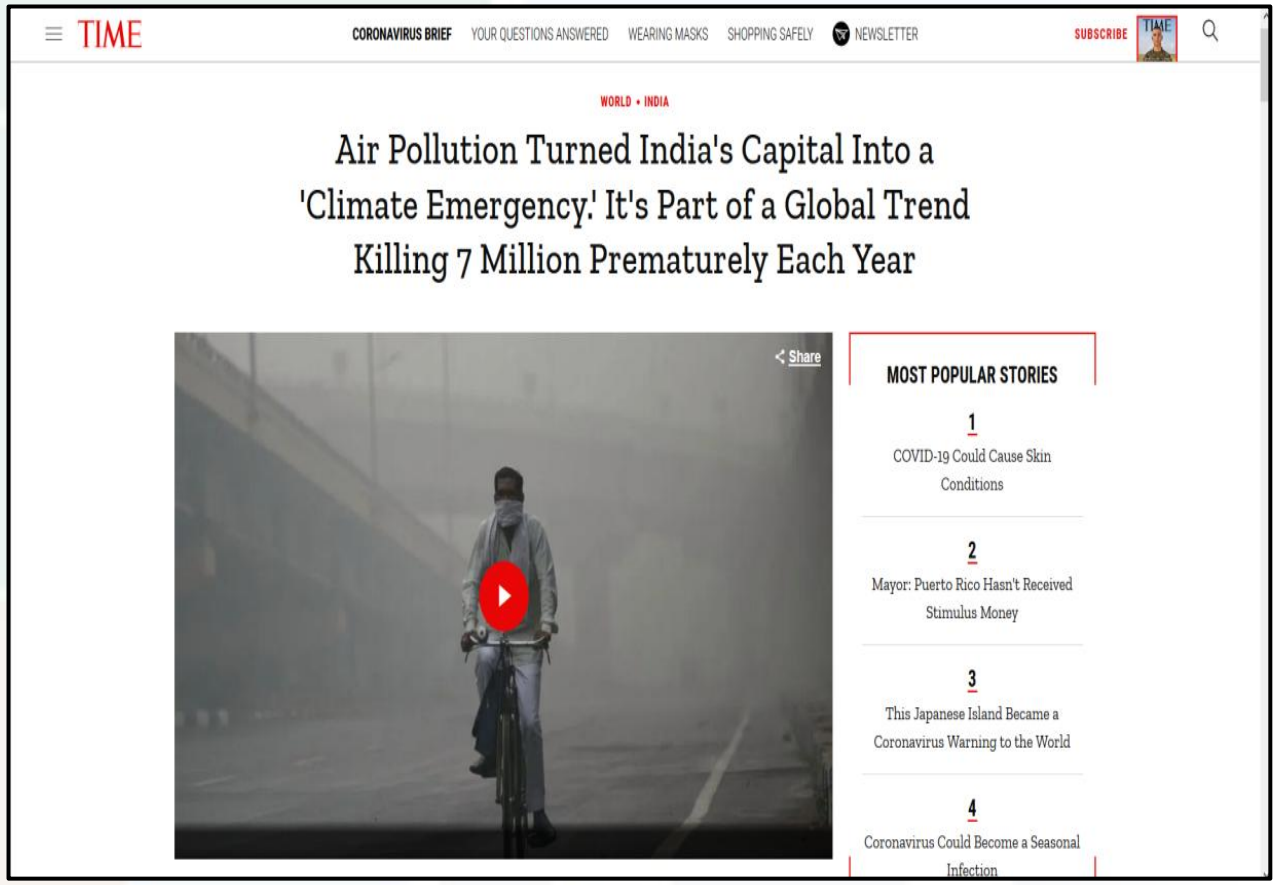
200 cities

17,000 volunteers

Before/after snapshopts of a few of the microforests we have developed

But the reality in Delhi is different....

IN THE NEWS……


TIME
CORONAVIRUS BRIEF
YOUR QUESTIONS ANSWERED
WEARING MASKS
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Air Pollution Turned India's Capital Into a 'Climate Emergency.' It's Part of a Global Trend Killing 7 Million Prematurely Each Year
Share
MOST POPULAR STORIES
1
COVID-19 Could Cause Skin Conditions
2
Mayor: Puerto Rico Hasn't Received Stimulus Money
3
This Japanese Island Became a Coronavirus Warning to the World
4
Coronavirus Could Become a Seasonal Infection

The New York Times
New Delhi, Choking on Toxic Air, Declares Health Emergency
Schools were closed after pollution in India's capital soared, reaching levels many times the global safe limit.

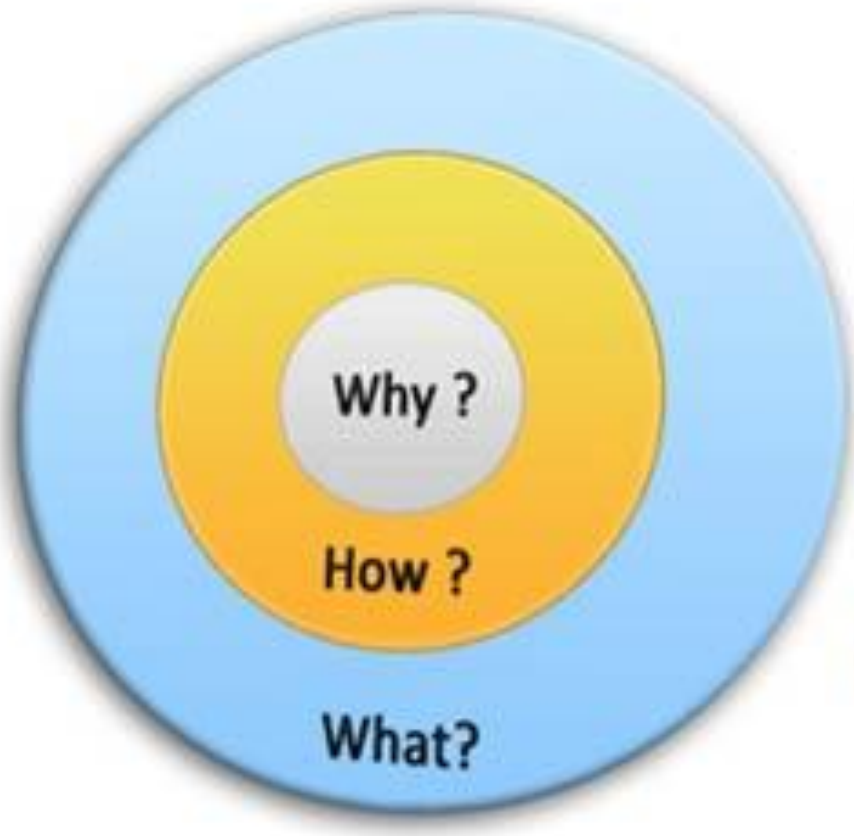
Air Quality Index : 50

Peak of COVID lockdown
in 2020

Air Quality Index : 350

Normal Day in
Delhi

The Golden Circle



Why = The Purpose

What is your cause? What do you believe?

How = The Process

Specific actions taken to realize the Why.

What = The Result

What do you do? The result of Why. Proof.

PART 1:
WHY did we start using i-Tree in Delhi?

The important questions to ask..

Even though the government figures say that there is 23% green cover in Delhi, the area still suffers from **extreme** air pollution.

It is important to understand:

(i) WHAT does the green cover in Delhi consist of?

(ii) How effective are the trees in removing air pollution?

(iii) Which tree species are most effective in removing air pollution?

No census of trees available for Delhi

Delhi has no data on number of trees, no census conducted in the last two decades: RTI reply

Jasjeev Gandhiok | TNN | Updated: Jul 24, 2020, 23:23 IST

A- A+

Image used for representational purpose only

NEW DELHI: No tree census has been conducted in Delhi in the past decade and no data is available on the number of trees in the New Delhi Municipal Council area for the past two decades. This has been revealed in an RTI reply to a Delhi-based researcher.

Kohli filed an RTI on the tree census carried out from 2010-2020, along with data on tree count conducted in the NDMC area between 2000 and 2020. According to the records maintained by the Delhi forest and wildlife department, no tree census had been conducted during the period.

The researcher, who works with Centre for Policy Research (CPR), said, Delhi Tree Authority — a statutory body set up under Delhi Preservation of Trees Act, 1992

PART 2:

HOW did we collect and analyse data using i-Tree in Delhi?

What have we done?

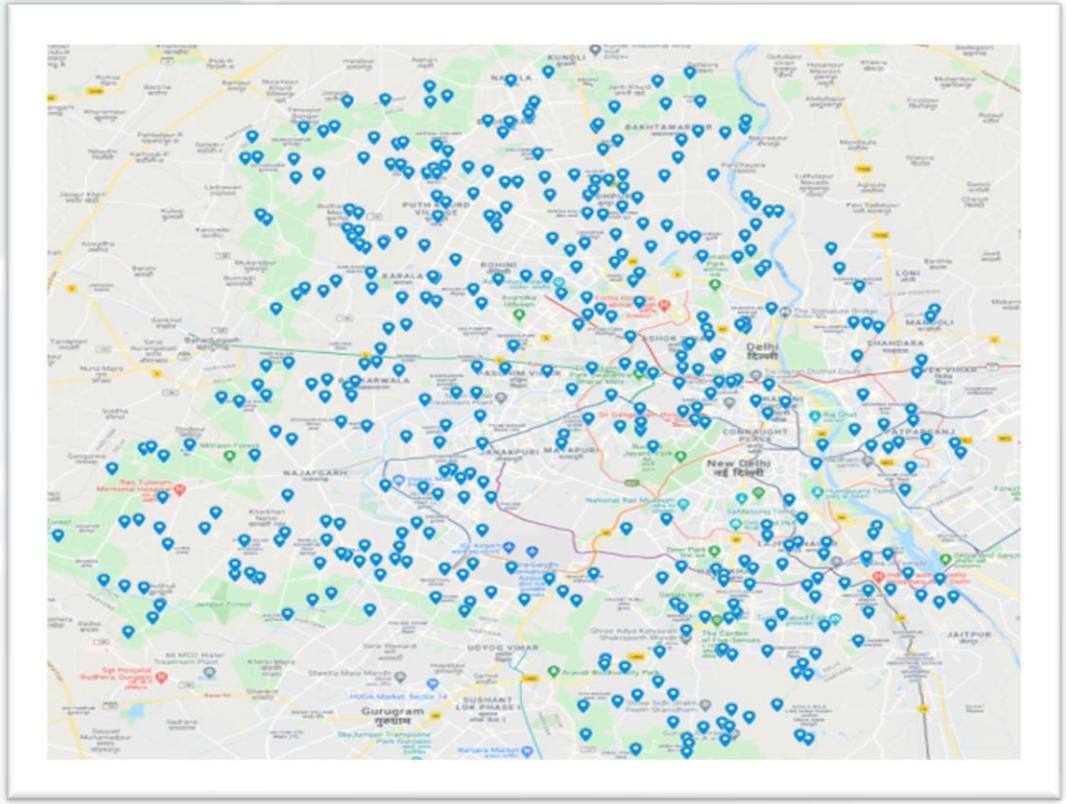
Adaption of i-Tree Eco

- **Using i-Tree Eco (Eco stands for Ecosystem services) to calculate benefits of trees in Delhi**
- For this, we have:
  - Collected data of trees from all across Delhi

HOW DID WE DO THIS?

- Randomized 400 points (plots) in Delhi to collect trees data

- A Plot is basically a circular area with 20 meters radius. We measure all the trees in the circular area

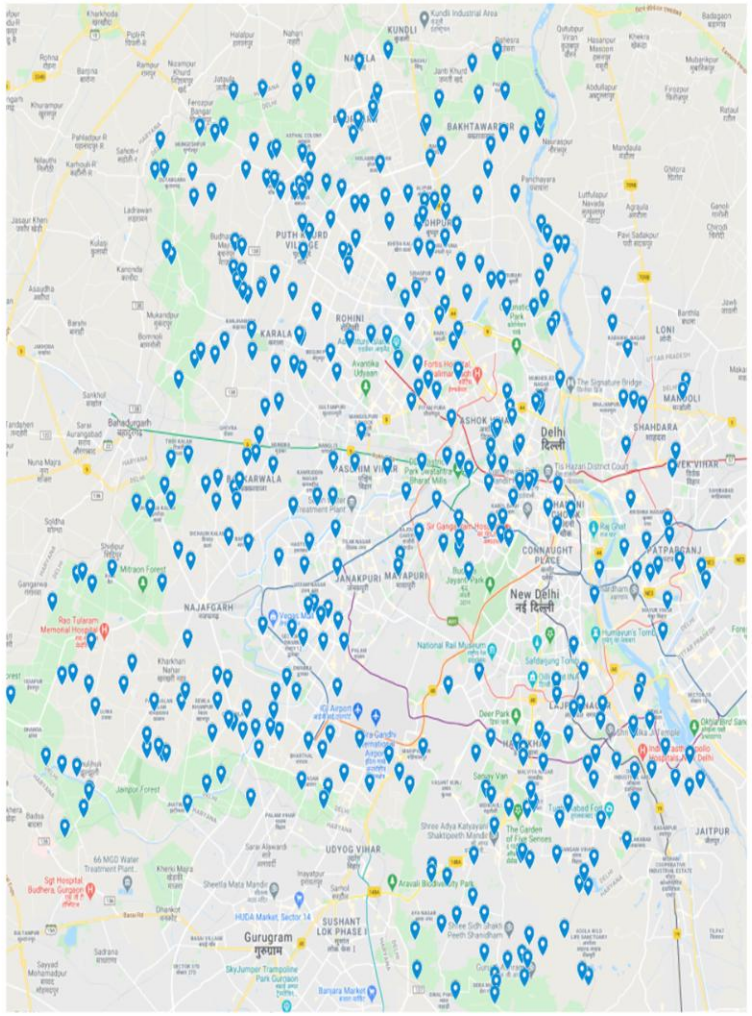


HOW DID WE DO THIS?

- Collecting trees & shrubs data from 400 random locations

400 Plots Completed

Plots covered across Delhi



- Completed data collection and inventory of all 400 plots across Delhi
- Total time taken for data collection : 1.5 years
- Number of people involved in data collection: 3
- More than 500+ field visits
- Detailed report on results completed

TYPES OF PLOTS

L-4A
DL3CCM0849

PART 3:

WHAT conclusion did we arrive at?

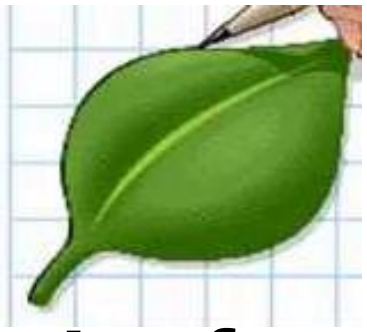
Results & Findings

Is 'Green cover' really effective?

Green cover: 23%

Tree cover: 8.1%

Top 10 species with highest population = **66%** of all trees



Leaf area

Invasive and ornamental

Least leaf area

Naturalized

14%

Medium leaf area

Native

10%

Highest leaf area

Snapshot of Results

Prosopis juliflora (Vilayati keekar/ Mesquite- invasive)

Carbon absorbed in lifetime by a mature tree:

Prosopis juliflora (27%)

Invasive

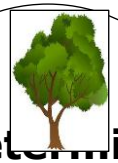
Ficus religiosa (Peepal tree –

Carbon absorbed in lifetime by mature tree:

Ficus religiosa (<2%)

Native

What else, apart from Air Pollution ?



Determine the Ecosystem services (benefits) of trees

Proper decision making and policy advocation

Calculate the amount of air pollution removal by trees

Create awareness

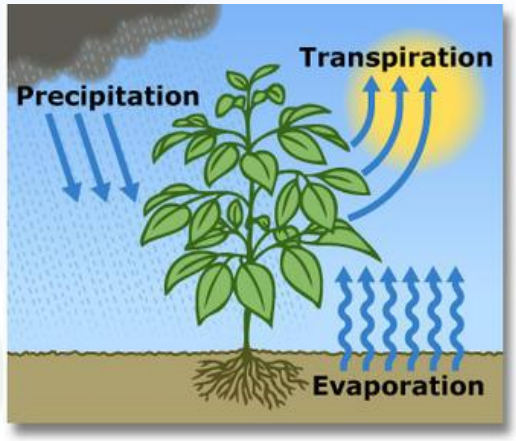
Calculate potential rainfall due to trees

Amount of carbon absorbed by trees annually

DIFFERENT WAYS THE DATA CAN BE USED

Correlation between trees and……

Air pollution removal



Evapo-Transpiration

Wealth divide

Carbon absorption

Human Health risk factor

Disasters

Street flooding

Emotional health