Session 1.1

Elysium: Creating the policy and legal framework to support the role of urban forests as public health infrastructure

Chair: Kathy Abusow

World Forum on Urban Forests

2nd World Forum on Urban Forests

Washington DC, 2023

The relationship between green infrastructure and public health in land use planning

Presented by

Anna Sunding, PhD Student

Swedish University of Agricultural Sciences

Thomas B. Randrup, Helena Nordh, Åsa Ode Sang, Kjell Nilsson

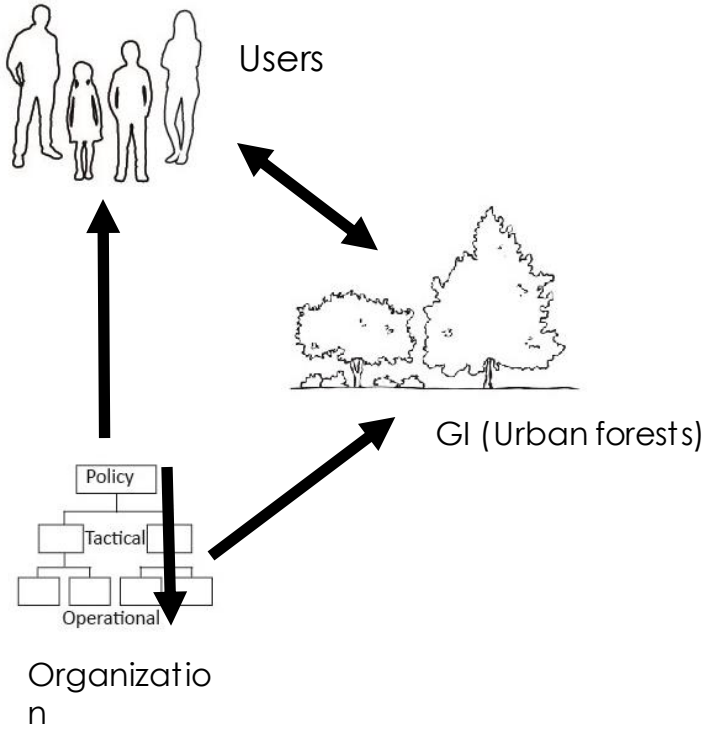
NORD GREEN Smart Planning for Healthy and Green Nordic Cities

Funded by NordForsk

Sustainable Urban Development and Smart cities, Project number 95322

Green infrastructure as a health promoting resource

- Well established connection between GI and human health (Hartig et al., 2014; WHO ROfE, 2016; Markevych et al., 2017; van den Bosch & Ode Sang, 2017; Bratman et al., 2019)
- Effective land use planning is fundamental for delivering increased and equitable HH&W outcomes (Sallis et al., 2017; WHO, 2020)
- Overarching plans specify and prioritize land use to
  reflect political long-term ambitions
  guide subsequent planning stages
- Growing but still relatively sparse knowledge on how the relation is handled in planning practice

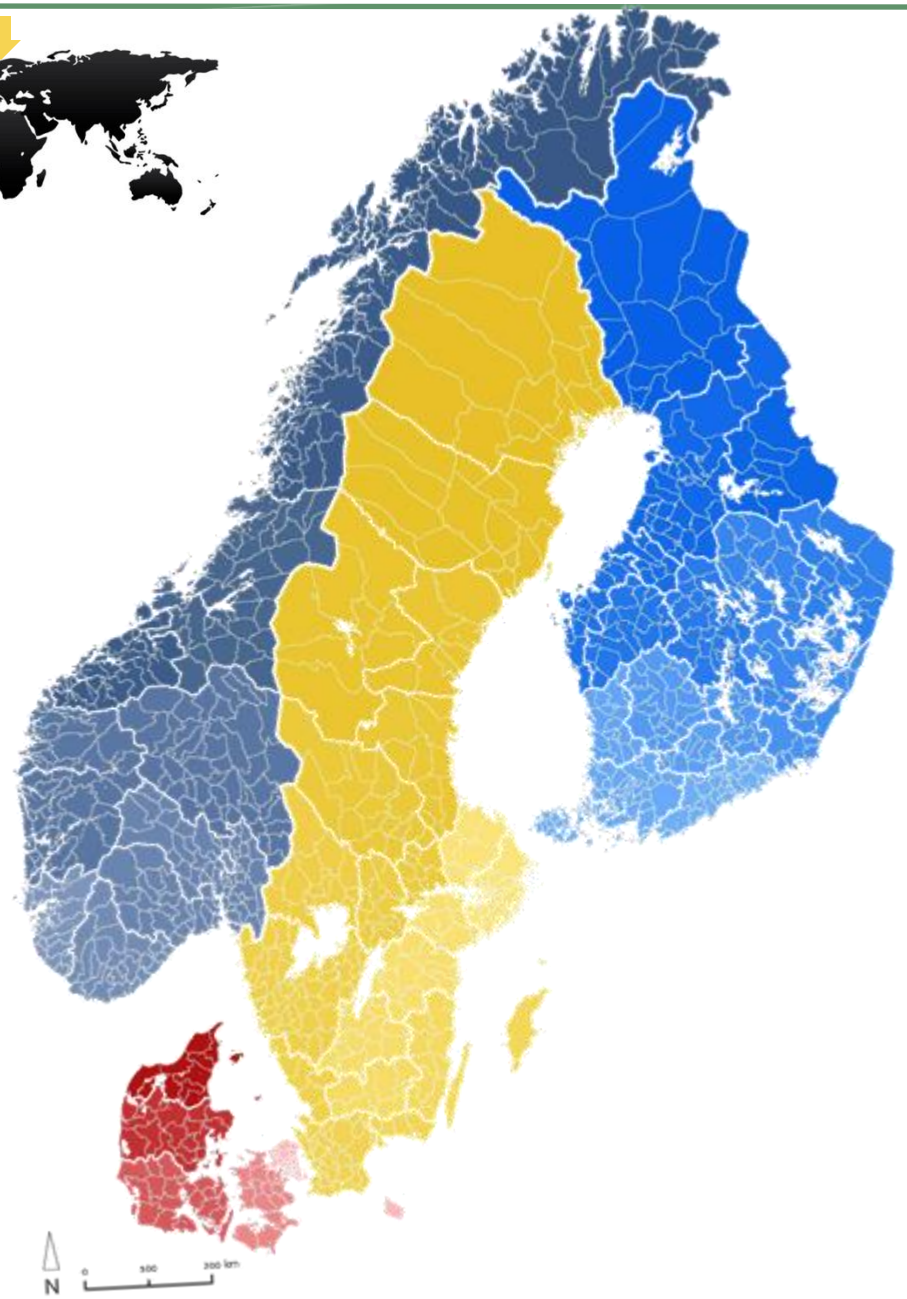


Randrup and Persson (2009)

The Nordic context:

Denmark, Norway, Finland, Sweden

- Similar from a global perspective, **Welfare states** with **high local government autonomy** (Borges et al., 2017)
- Similar **planning traditions** and **public health promotional responsibilities** on local gov. level (Davies and Lafortezza, 2017; Helgesen et al., 2014)
- Share the **comprehensive plan** as most **overarching planning document on local level** (Borges et al., 2017)



How is the GI-HH&W relationship described in Nordic comprehensive plans?

- What **terminology** is used?
- How are the concepts **interlinked**?
- Which **goals** are mentioned?

Plans studied in

Täby (SE), Espoo (FI)

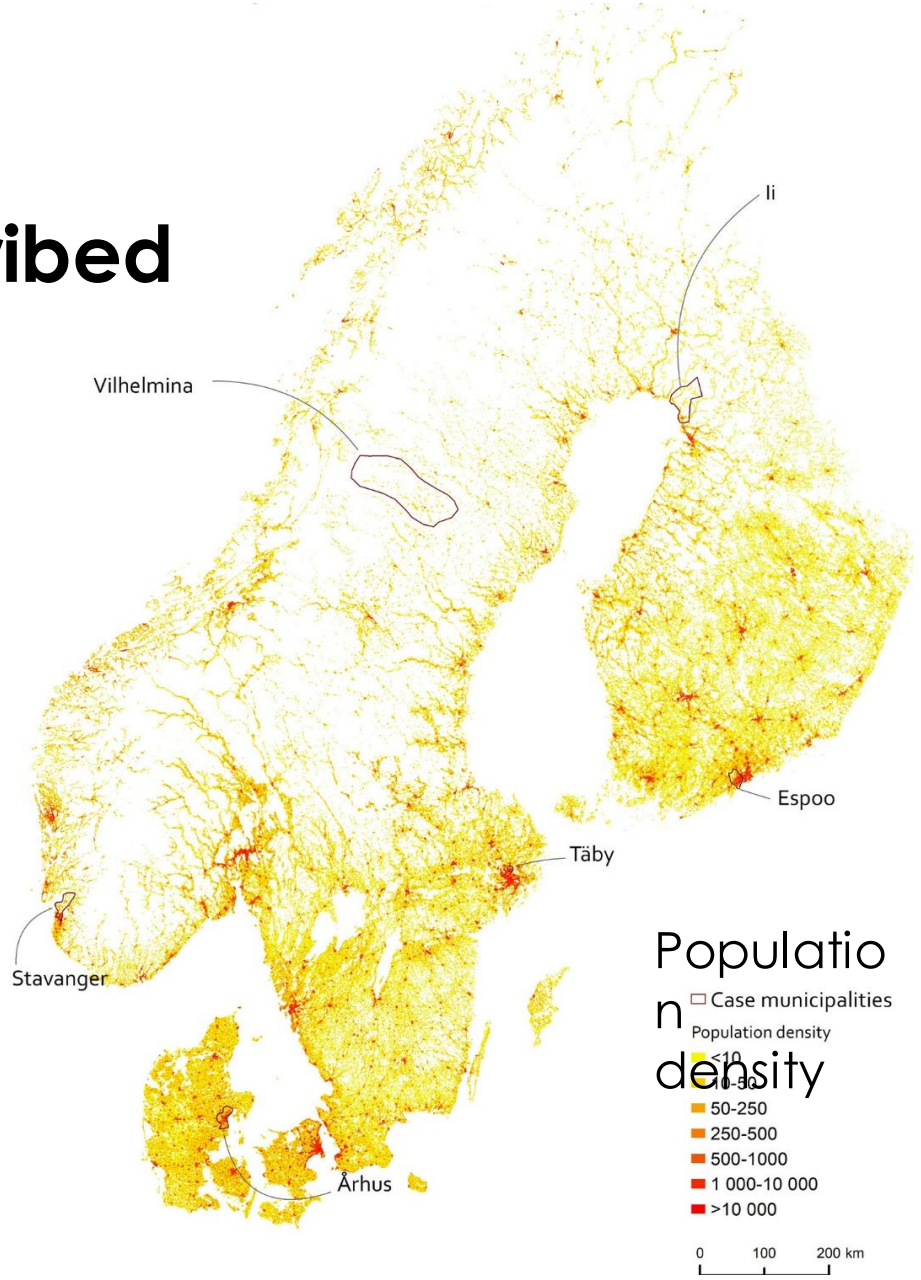
Stavanger (NO), Aarhus (DK)

Ii (FI), Vilhelmina (SE)

Capital region

2nd tier cities

Remote rural



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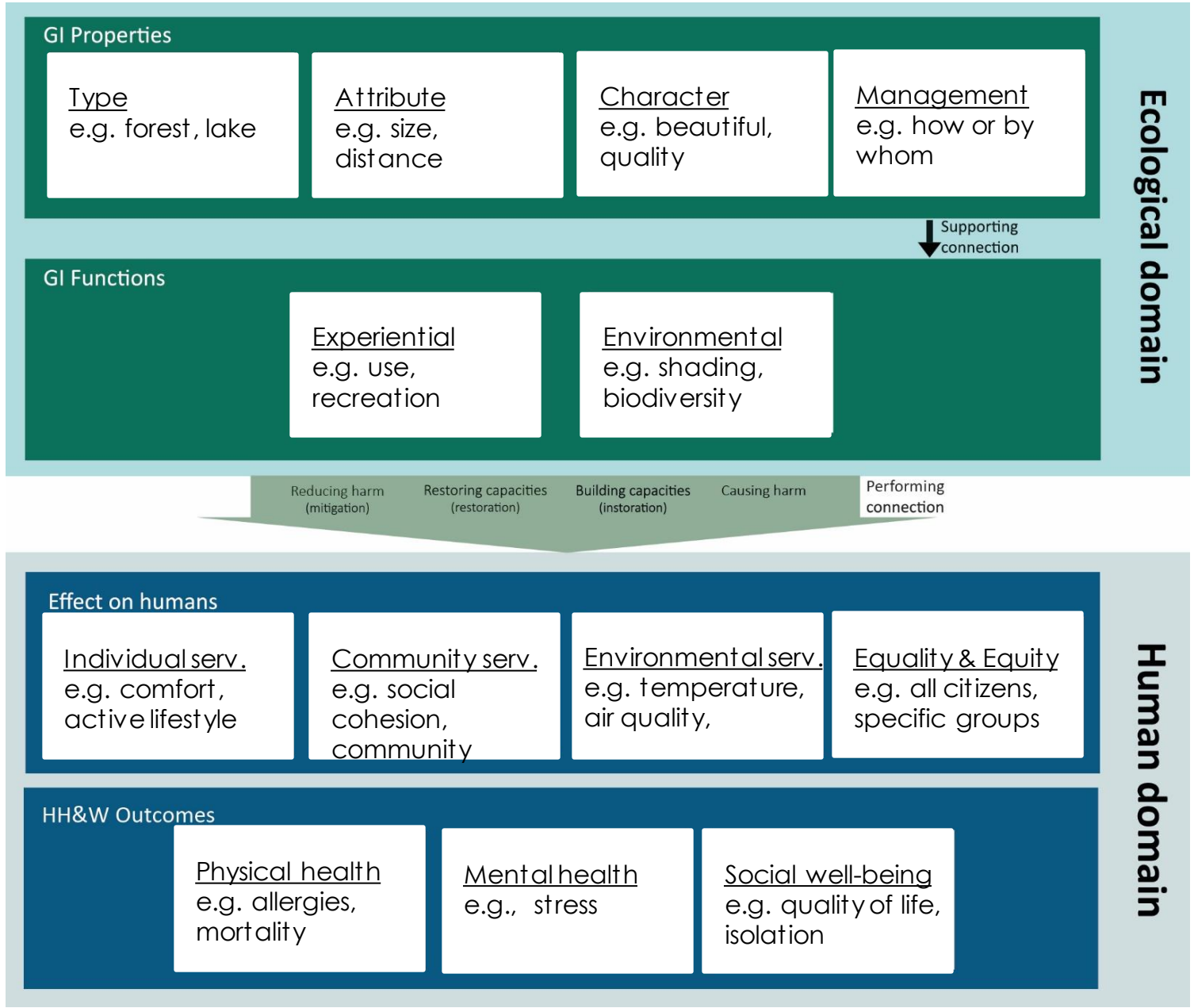
Washington DC, 2023

SLU

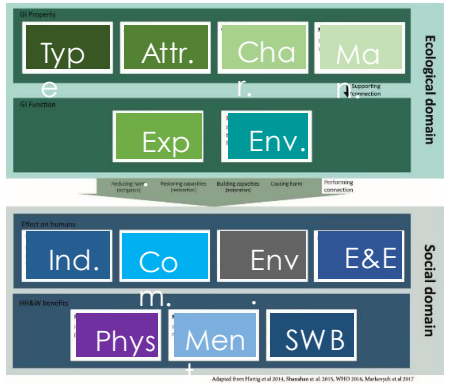
Analytical Framework

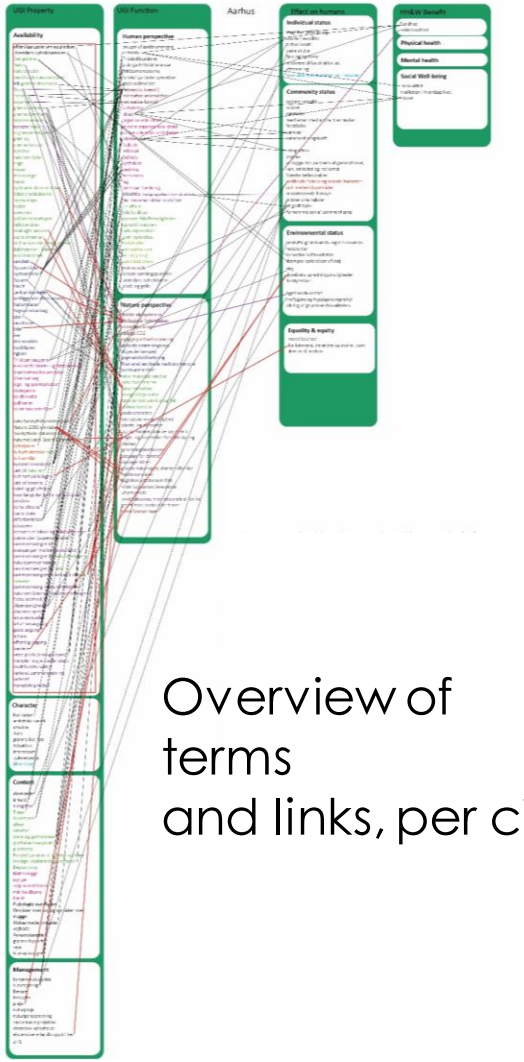


Adapted from WHO Regional Office for Europe (2017), Roué-Le Gall (2015)

Document content analysis

Pedestrian and bicycle paths as well as outdoor routes also serve as important sport venues and recreational destinations, which increase residents' exercise and thus also contribute to improving public health. *Espoo*



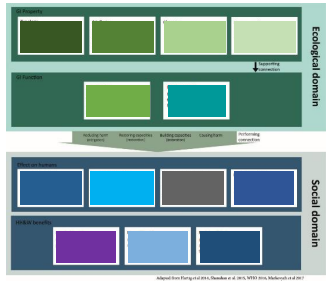


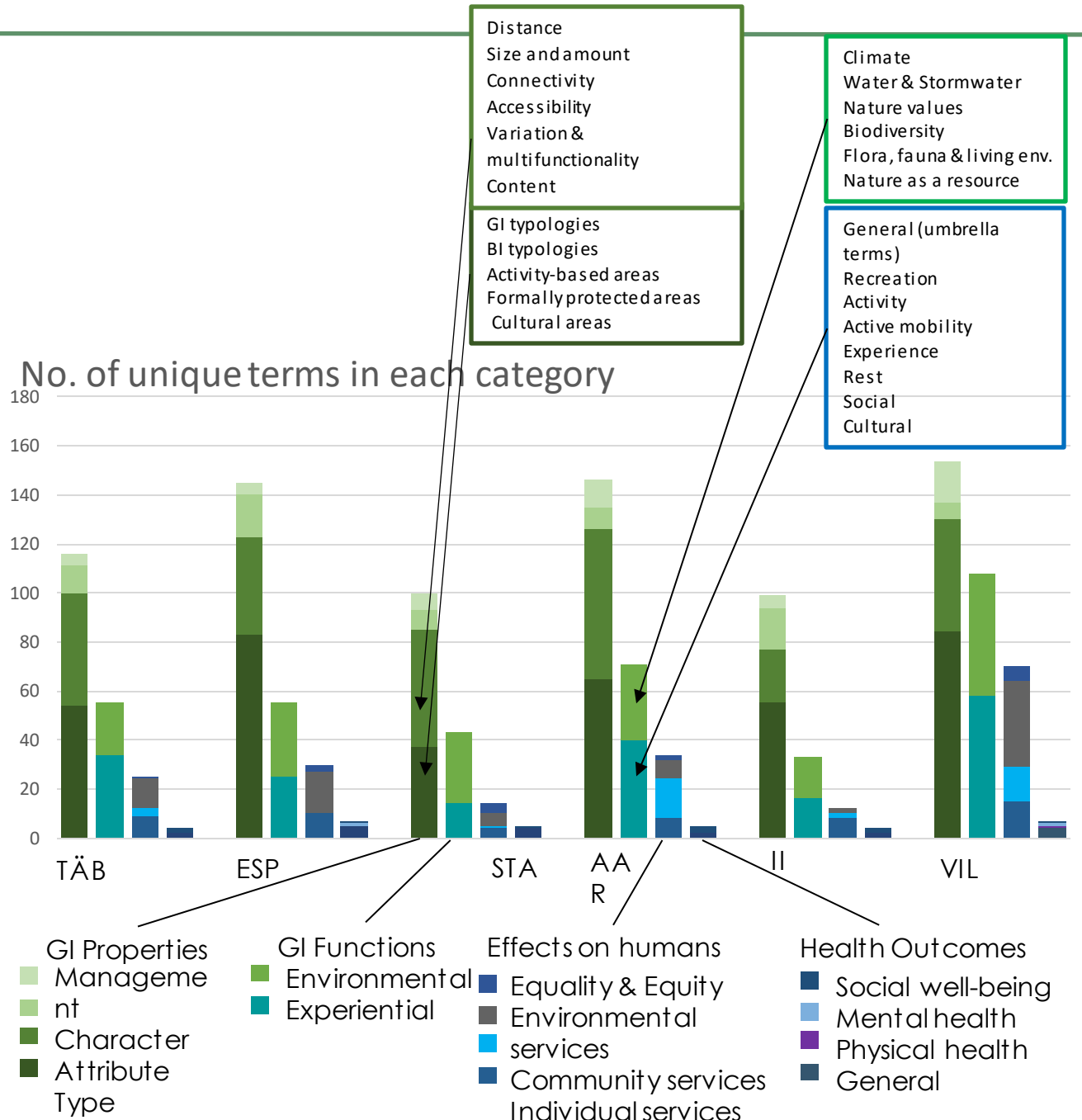
Overview of terms and links, per city

What terminology is used?

- Common nuanced description of GI Properties and GI Functions (Sub categories needed)
- Effects on humans primarily
- Effects on humans primarily include harm prevention

- Health outcomes are scarce and undifferentiated



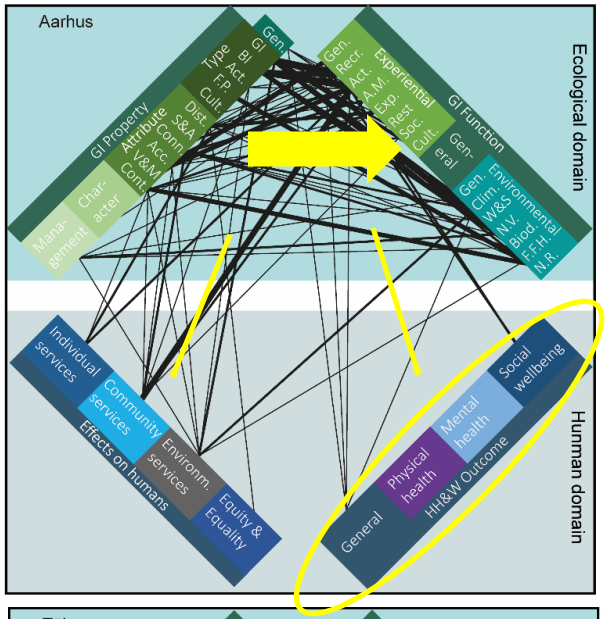


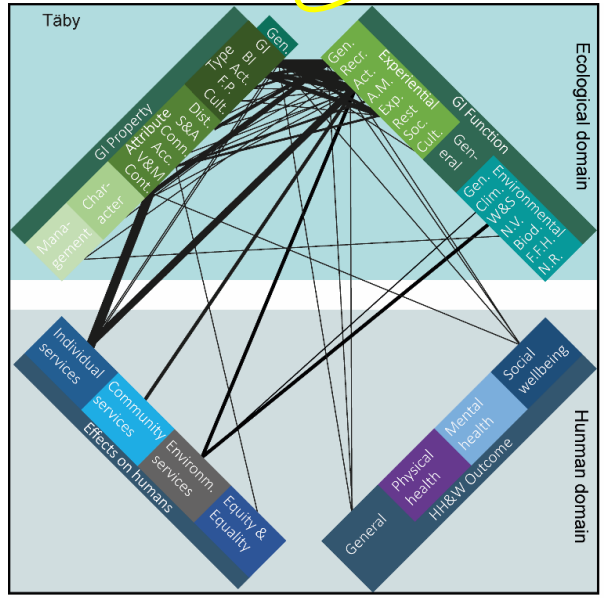
How are the concepts interlinked?

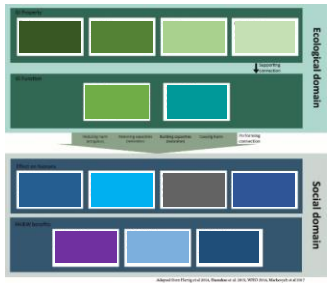
Pedestrian and bicycle paths as well as outdoor routes also serve as important sport venues and recreational destinations, which increase residents' exercise and thus also contribute to improving public health. *Espoo*

Bolder lines = more links

- Similar strong connections between Types & Attributes of GI, and Functions of GI
- Does not translate to effects or health outcomes
- Scarce and less coherent connections between the Ecological and Human domain







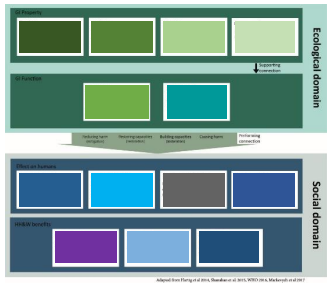
What goals are mentioned?

- Types of GI, and Attributes; distance, connectivity, accessibility
- Experiential GI Functions; "use"
- Equality (equal for all) & General health

"Wise use of space to create more nature & more health" (AAR)

"Increase forest area to 8000 ha before 2030, prioritizing new outdoor life opportunities close to the city." (AAR)

"Develop the green half of the city to promote citizens' quality of life, health and recreation – in dialogue with the citizens" (TÄB)



Terminology/City	TÄB	ESP	STA	AAR	II	VIL
Type						
GI	X	X	X	X	X	X
BI	X	X	X	X	X	X
Activity	X	X	X	X	X	X
Formal protection	X	X	X	X	X	X
Culture	X	X	X	X	X	X
Attribute						
Distance	X	X	X	X	X	X
Size & amount	X	X	X	X	X	
Connectivity	X	X	X	X	X	X
Accessibility	X	X	X	X	X	X
Variation & multifunct.	X	X	X	X	X	X
Content	X	X	X	X	X	X
Character	X	X	X	X	X	X
Management	X	X	X	X	X	X
Experiential						
General(overall)	X	X	X	X	X	X
Recreation	X	X	X	X	X	X
Activity	X	X	X	X	X	X
Active mobility	X	X		X	X	X
Experience	X	X	X	X		X
Rest		X	X	X		X
Social	X			X		X
Cultural	X	X	X		X	X
Environmental						
General(theoretical)	X	X		X	X	X
Climate	X		X	X		X
Water& Storm water	X	X	X	X	X	X
Nature values	X	X	X	X	X	X
Biodiversity	X	X	X	X	X	X
Flora, fauna & living env.	X	X	X	X	X	X
Nature as resource					X	X
Individual service	X	X	X	X	X	X
Community service	X	X	X	X	X	X
Environment service	X	X	X	X	X	X
Equality & equity		X	X	X		X
General health	X	X	X	X	X	X
Physical health	X					X
Mental health		X				X
Social Well-being	X	X	X	X	X	X

Conclusions

- **Health outcomes** are **not a strong focus** and superficially described in the studied plans
- **Strong focus** on describing connections between Types of GI and Functions of GI
- **Strong focus** on general use and activities; **less focus** on rest and social aspects
- **In relation to Urban Forests:** Attributes such as size and characters describing naturalness, serenity which are key for de-stressing are generally lacking.
  (Grahn and Stigsdotter, 2010; Ode et al., 2017)
- **Goals and visions** are scattered and generally **superficial and spacious**

And in practice? (Interview study w. GI & public health practitioners)

- Plan goals are often spacious enough to support "anything"
  – good and bad
- Difference between "policy in plans" and "policy in use"
  – generous green visions are ignored or 'a hard bargain' in implementation stages
- Difference between planners' and managers' attitudes
  – Resources don't increase with responsibilities on operational levels
- Overall economic rationale supports short term investment focus
  – overlooking long term sustainability

Implications and take aways

- **Current descriptions of the GI – public health are general, risk**
  not withstand against other strong land use interests
  not guide decision-making in further stages

- Plans need **differentiate land use needs** in relation to
  a more **nuanced description of intended health outcomes**

- Plans contain abundant information, potential to **reframe and sharpen**

- With **intended outcomes** as a basis, **implementation and long term sustainability**
  needs to be addressed policy making in order to connect the circle from vision to evaluation

Thank you

Anna Sunding | SLU
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Food and Agriculture Organization of the United Nations

2nd World Forum on Urban Forests

2023

World Forum on Urban Forests





Bogotá tiene mucho que contar

URBAN FORESTS FOR LIFE

Public Policy Framework In BOGOTÁ

Martha Perdomo

General Director

JARDÍN BOTÁNICO DE BOGOTÁ

October 16, 2023

ALCALDÍA MAYOR DE BOGOTÁ D.C.

JARDÍN BOTÁNICO DE BOGOTÁ

BOGOTÁ

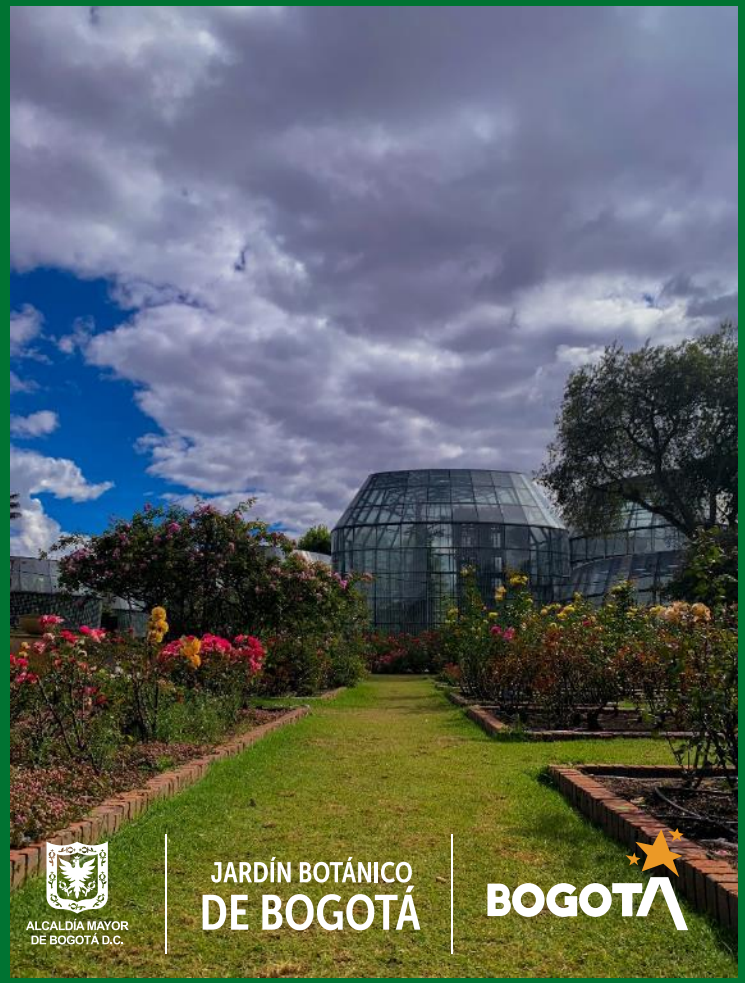
BOTANICAL GARDEN OF BOGOTA

Mission

To investigate and conserve flora, urban forests and green spaces of the high Andean and Paramo ecosystems, contributing to the **generation**, **application** and **social contribution** of knowledge, aiming for climate change adaptation, quality of life improvement and sustainable development of the Capital District and the Region.

Vision

In 2038 we will be recognized nationally and internationally as a **reference research center in the high Andean and Paramo ecosystems and as a nature-focused destination,** which contributes to the **transformation of environmental thinking** for the sustainability of the territory.



Conservation Research

Knowledge management in conservation, restoration and sustainable use of flora in areas of ecological structure and environmental interest in the city region.

RESEARCH CENTER
Science Ministry Res. 469 2022

Urban Green Space Management

Improve and increase ecological restoration, connectivity, Biodiversity, environmental functions and services and social aspects of plant cover and green infrastructure.

IN CONJUNTION WITH THE ENVIRONMETAL SECRETARIAT

Conservation Education & Stewardship

Education and environmental stewardship for the promotion of a environmental culture in Bogotá, and marketing strategies for institutional management.

EDUCATION LEADERS IN BOGOTA D.C.

URBAN GREEN SPACE MANAGEMENT

ACHIEVEMENTS & AWARDS

* **Institutional agreement with the USDA-FS** for the application of the iTree model together with the SIGAU for the **calculation of ecosystem services of urban trees.**

* **FAO and Arbor Day Foundation recognition** and membership for 3 consecutive years as part of **Tree Cities of The World.**

***First place** in the 2022 version of the "**Greening Cities**" recognition awarded by the **International Association of Horticultural Producers -AIPH**) - Urban Agriculture.

* Joint formulation with Environmental Secretariat - SDA of the **urban forest implementation plan,** in compliance with the POT (Territorial Arrangement Planning).

TREE CITIES OF THE WORLD™

A programme of:

Food and Agriculture Organization of the United Nations

Arbor Day Foundation

Tree Cities of The World recognition for 3 consecutive years (2021, 2022, 2023) for **good practices in planning, technical and social management of urban trees, urban gardens, orchards, green spaces.**

AIPH
(International Association of Horticultural Producers) recognition

In 2022, the District Urban Agriculture Program of Bogotá received **First place**

In the **Greening City category**: “Living green for biodiversity”.

AIPH
The world's champion for the power of plants

WORLD GREEN CITY AWARDS 2022

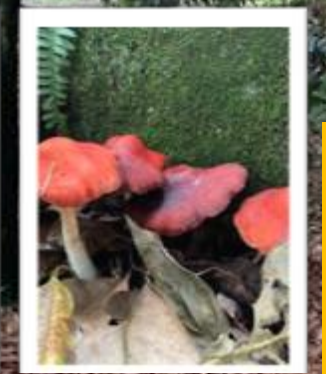
An URBAN FOREST is much more than just **trees**...

Urban forests promote the creation of habitat for multiple forms of life,

improve and increase the supply of ecosystem services and ecological connectivity,

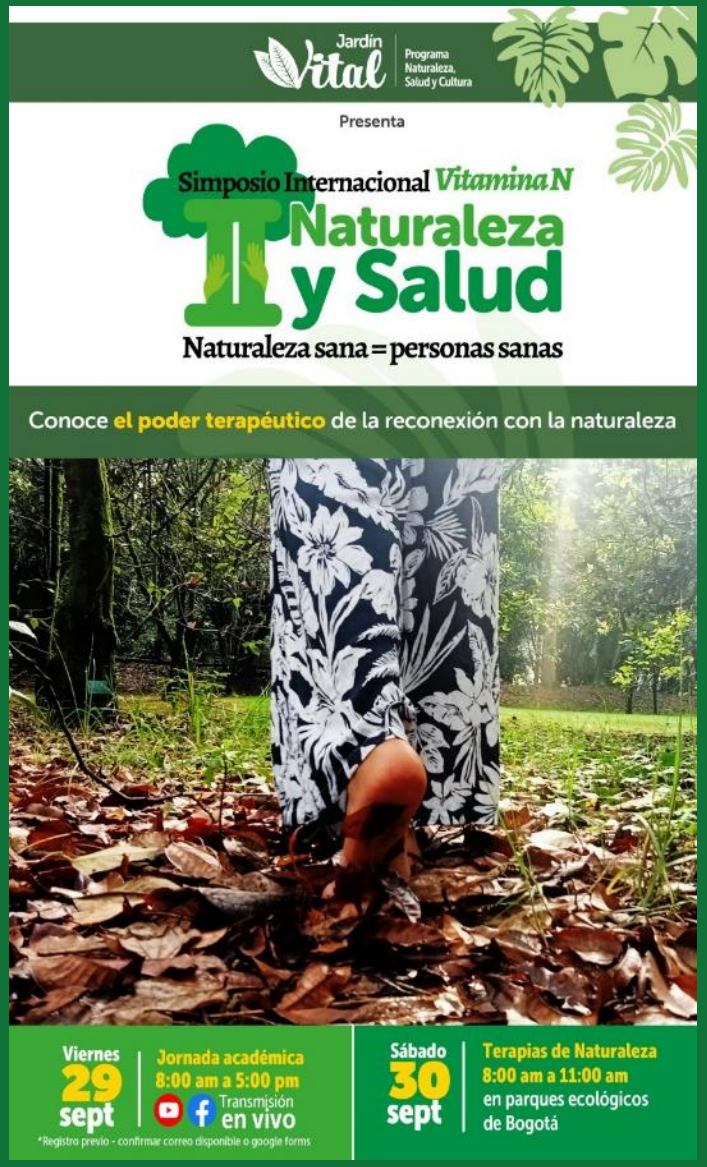
Urban Forests consolidate and generate new green spaces, micro habitats and biodiversity flows.



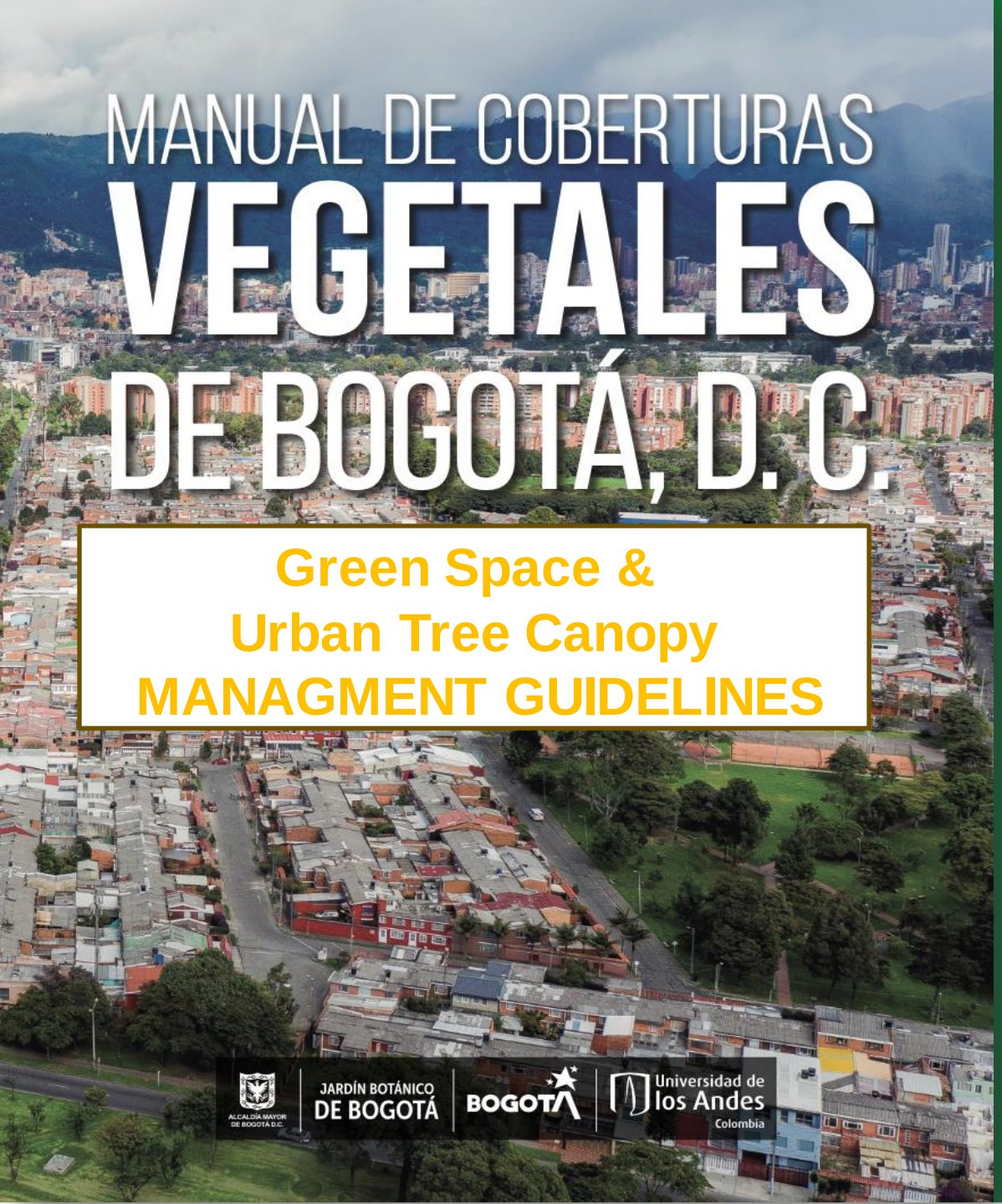



Maintain biogeochemical cycles, protect the soil from erosion, regulate the water cycle and guarantee permeability.

Urban forests help to mitigate the effects of climate change (reduce heat islands) and improve air quality.



They provide spaces for passive recreation, education and research, promoting stewardship, environmental governance and citizen-community participation.



DESING & COMPOSICTION CRITERIA

Gráfico 31.
Composición monocromática en arborización y jardinería

Gráfico 32.
Composición complementaria en arborización y jardinería

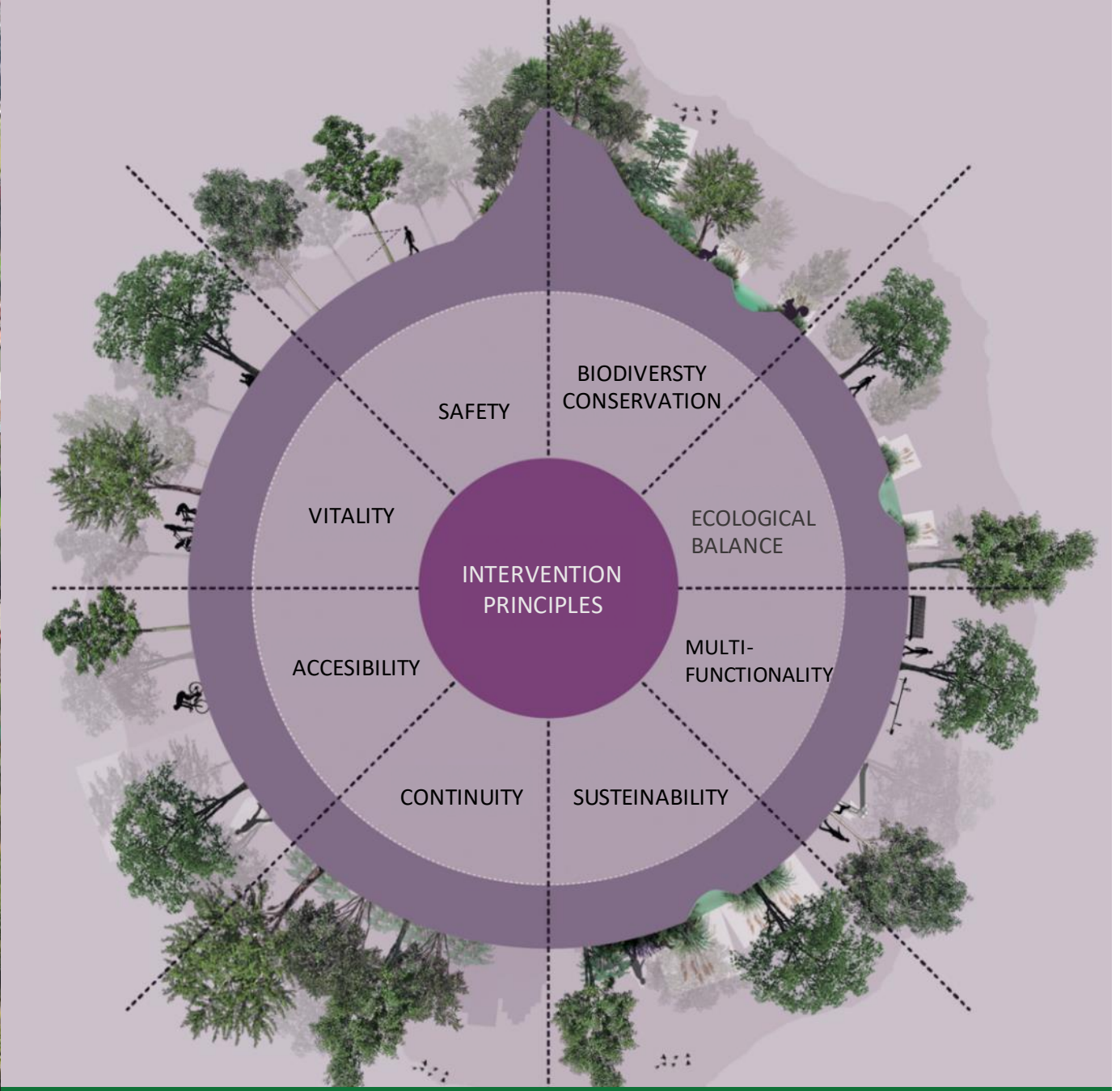
Gráfico 33.
Composición con colores diferentes en arborización y jardinería

Gráfico 34.
Composición de diferentes texturas en arborización y jardinería

Gráfico 35.
Composición con texturas similares en arborización y jardinería

Gráfico 36.
Masas en grupos en arborización y jardinería

Technical guidelines for the planning and management of trees, gardens, orchards and urban forests, from plant production, planting, management, maintenance and care.



Balance in the composition of the urban landscape

ABC of Urban Forests in Bogotá

How did this concept emerge in the city of Bogotá?

In Bogotá City we have 2 main planning legislative documents: The District Development Planning (PDD) and the Territorial Arrangement Planning (POT) for their Initials in Spanish.

Art. 110
District Development Plan (PDD)

The District Development Plan (PDD) 2020-2024, called "A new social and environmental contract for Bogota in the XXI century" in article 110' stays that:

The District Government will develop strategies for the consolidation of public or private green spaces, aiming to:

- To Improve the supply of ecosystem services for mitigation and adaptation to climate crisis.
- To prioritize the reconversion of hardscape to softscape, with native species and urban agro - parks.

Art. 130
Territorial Management Plan (POT)

The Territorial Management Plan (POT) Calls for the consolidation of urban forests as a silvicultural management strategy in the Main Ecological Structure (EEP) areas to promote biodiversity of multi-layered vegetation, favoring native species.

Where the following process must be taken under consideration:

- Design of indicators of elements part of the public space system for pedestrian use.
- Renaturalization and greening: increasing vegetation cover in quantity and diversity, with native species as a priority, to obtain greater benefits and services from biodiversity and ecosystems.

The District Administration, through the competent entities, integrates the concept of Urban Forest into the dyna

The District Administration, through the competent entities, integrates the concept **of Urban Forests into the dynamics of planning and territorial ordering of the city**, in order to be **managed and consolidated** in green spaces and/or **public spaces**, within the framework of the guidelines for environmental justice, equitable distribution of environmental burdens and benefits among all people in society, while strengthening the participation and cohesion of the social fabric (City Agreement 859 of 2022).

Urban Forests in the POT:

Bogota Greens Up is the name of the main environmental objective on the plan.
It presents the following four goals:

1

Protecting and connecting the city's green areas.

2

increasing tree corridors, both in quality and quantity, to promote connectivity and social co-responsability in its management and administration.

3

Combating climate change and heat islands.

4

Promoting ecological connectivity between diverse ecosystems, articulating it with the Main Ecological Structure **(EEP).**

21 new lungs for Bogotá

Planned Urban Forests

- Brazo salitre canal
- Santa Helena
- San Carlos Forest
- Park way
- National Park
- Salitre Treatment Plan
- Simón Bolivar
- La Esmeralda urbanization
- Santa Lucia
- Diana Turbay
- Boyacá Modelia Canal
- Gustavo Uribe Botero
- Independencia
- Indio Park
- Zona Franca
- Arborizadora Alta
- Bavaria
- Arzobispo canal

Among the responsibilities
and competencies of the Capital District we have:

- **Prioritizing sectors of the city with the greatest deficits of trees,** green spaces and environmental quality.
- **Characterization of natural areas** and definition of management instruments.
- **Natural areas** typologies.
- **Composition and density of the urban forests,** management and monitoring.
- **Incorporation of ecosystemic and socio-environmental attributes of urban forests in the** City Management Tree System (SIGAU).

Where can an Urban Forest be established

In parks, clubs, schools, residential complexes, partial plans, etc.

- In public space
- In private space
- Open green spaces (including lawn).

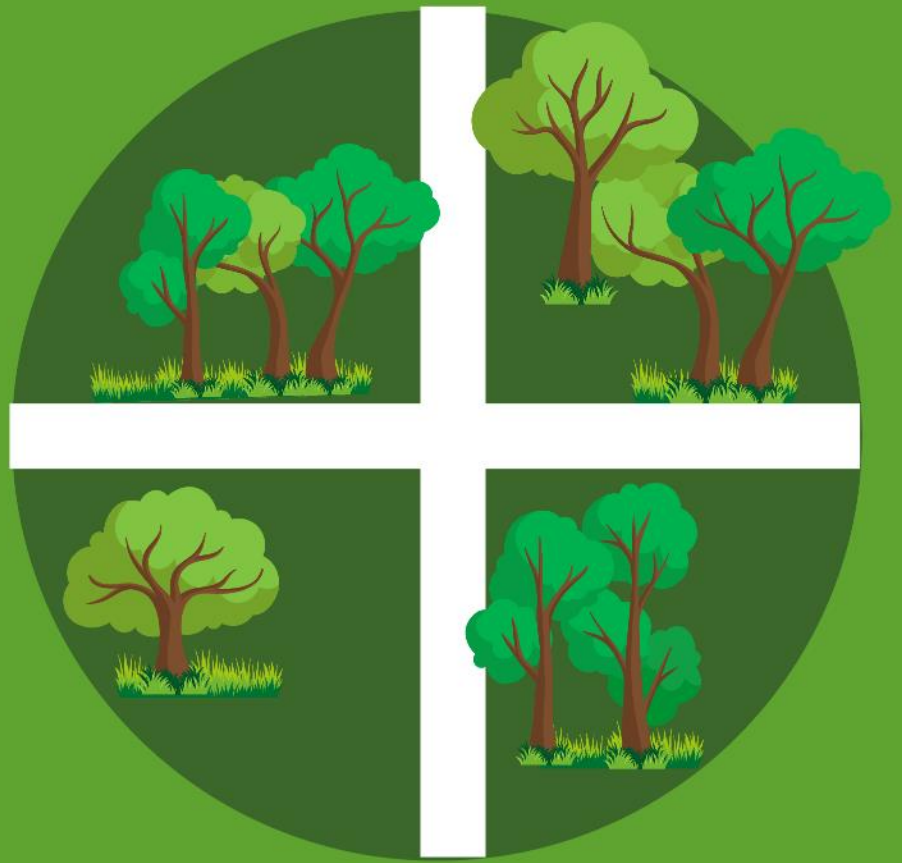
Where can an Urban Forest not be established?

- In protected areas
- Road reserve (without studies or designs)
- Grounds destined for public or private works (without studies or designs)

Benefits of the Urban Forest

Economic aspects

- Increased value of real estate
- Promotion of green jobs
- Reduction in AVC systems usage



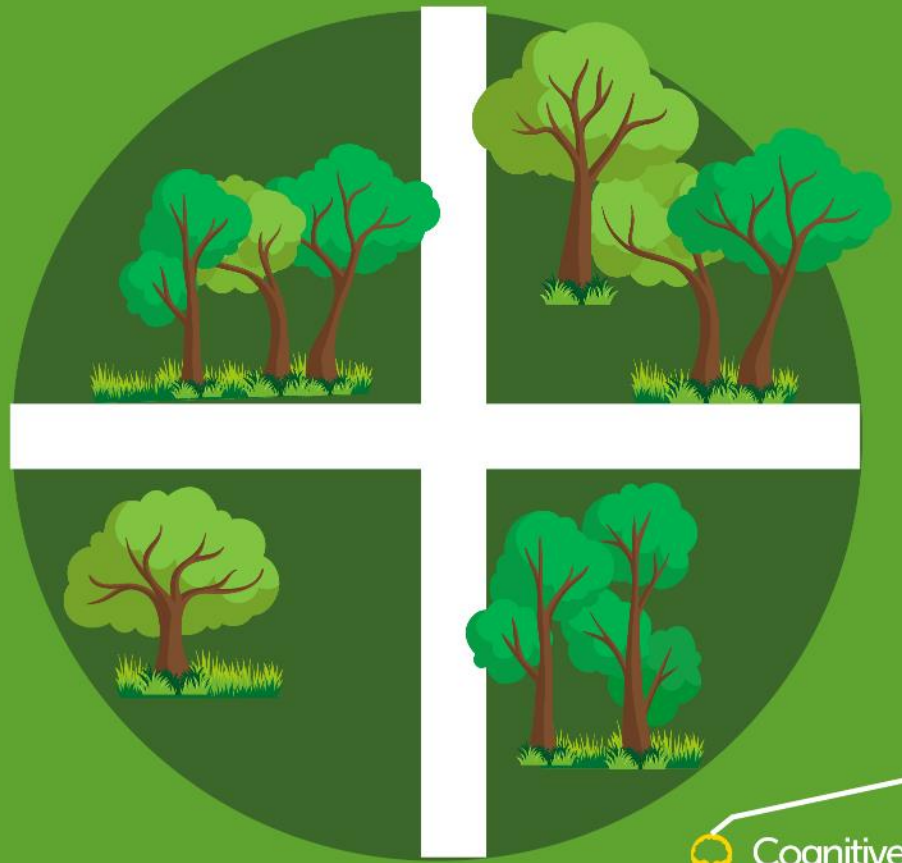
Environmental aspects

- Decreased air pollution
- Reduced impact of torrential rainfall
- Reduced impact of urban heat island (2°C to 8°C temperature reduction)
- Increased urban habitats and biodiversity
- Improved air quality

Benefits of the Urban Forest

Social aspects

- Increased accessibility to green areas
- Meeting point for social dynamics
- Development of educational and social projects



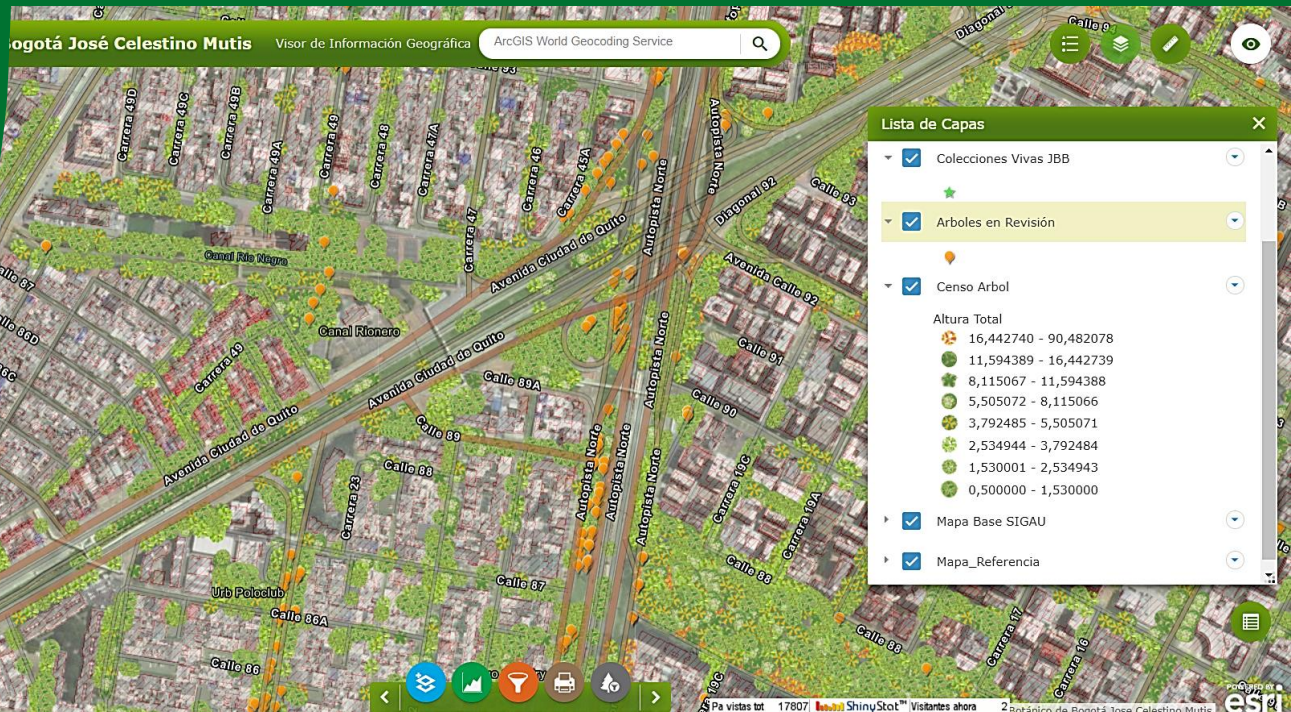
Health aspects

- General wellness promotion
- Stress reduction
- Physical, mental and emotional health improvements
- Reduction of sedentary lifestyles
- Calming, therapeutic areas
- Cognitive benefits

URBAN FOREST SIGAU REGISTRATION

(Urban Trees Management System)

The Botanical Garden of Bogotá, in coordination with the District Environment Secretariat, will create the District Registry of Urban Forests, in the Urban Trees Management System of Bogotá D.C – SIGAU, in order to have a consolidated registry of these areas.



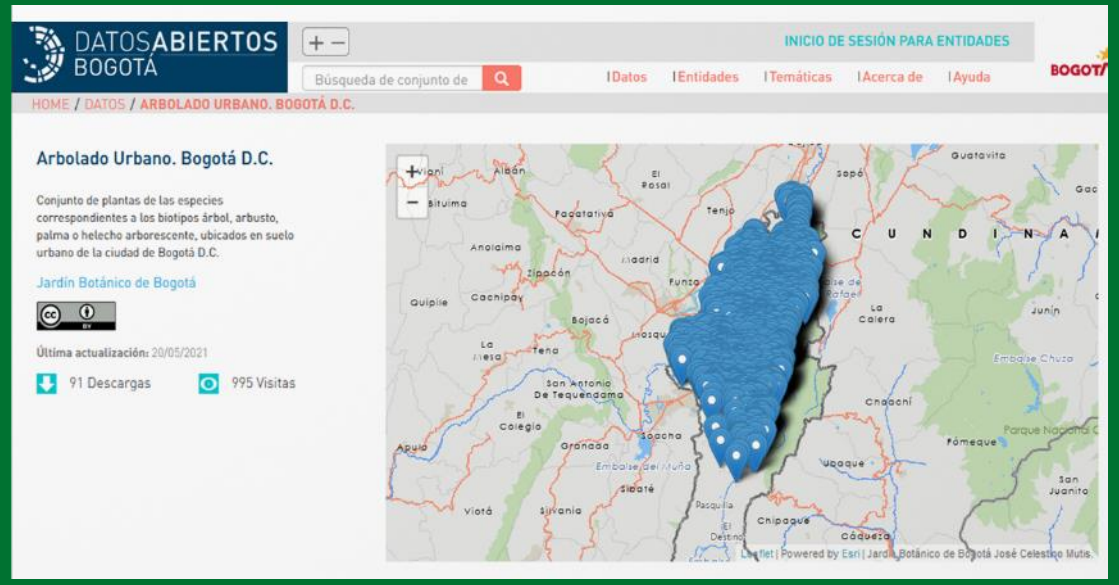
SIGAU APPS

Geoportal

Indicators of geographically represented urban forests, number of trees, trees per hectare, diversity indices, distribution of groups by height, property and public space analysis, application for community or private application for new urban forests.

https://datosabiertos.bogota.gov.co/dataset/censo-arbolado-urbano

https://jbb.gov.co/transparencia/datos-abiertos/publicacion-de-datos-abiertos/



Upload and Download "Datos Abiertos Bogotá"

Publication of relevant and quality information from the public sector in structured formats available to users for reports, statistics, investigations, social control, business opportunities, among others.

Urban Tree App
“Arbolapp Bogotá”

App Functionalities:

* Urban tres and green space indicators

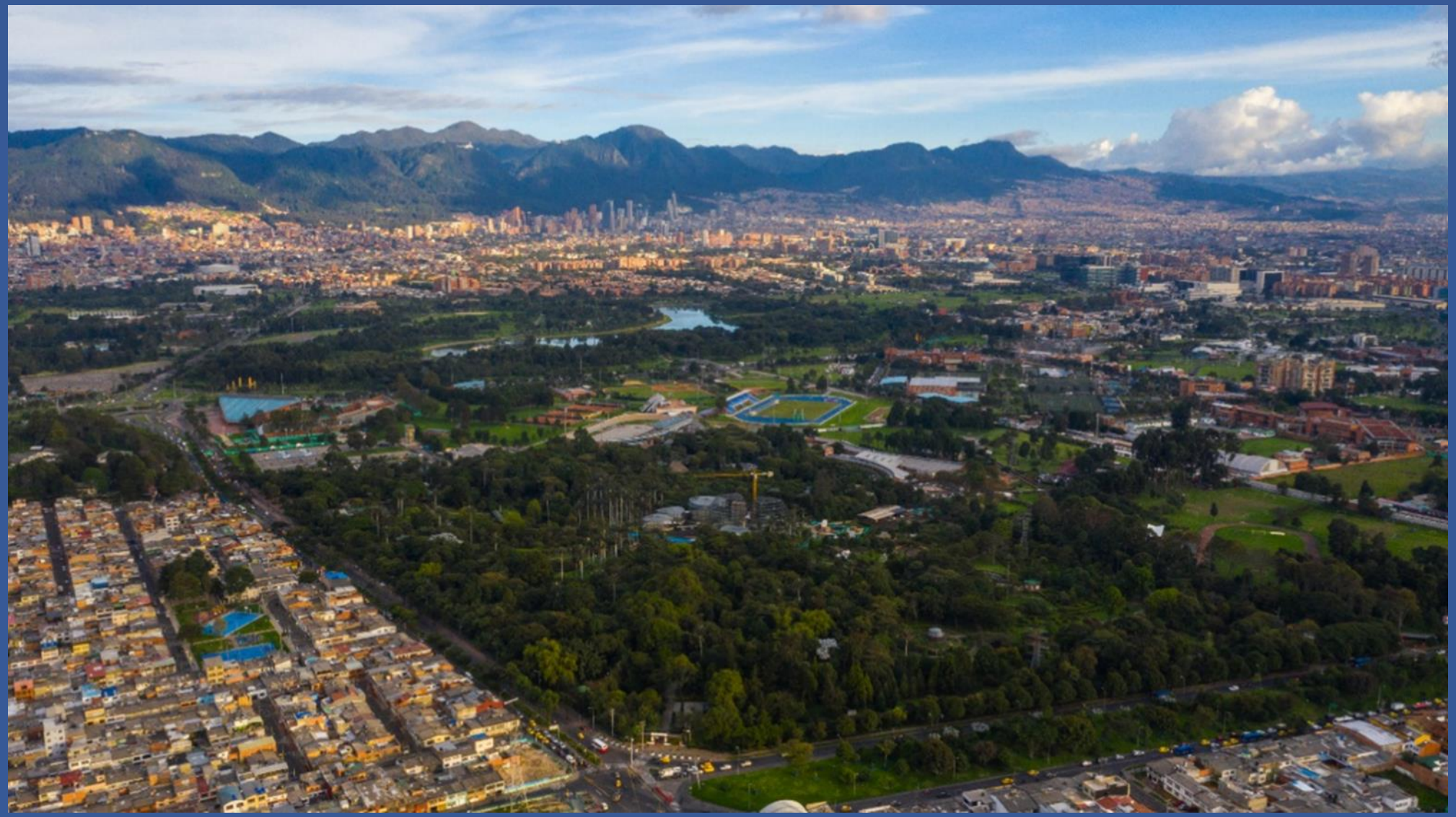
* Planting rates

* News y Reports

* QR Code

Allows the visualization of trees within a radius of 100 m from any location.

SIGAU Applications



Thank You

2nd World Forum on Urban Forests

2023

World Forum on Urban Forests

2nd World Forum on Urban Forests

Washington DC, 2023

Science to Policy

Nature in Urban Planning for Better Human Health

Presented by

Kathleen Wolf, University of Washington

Jennifer Egan, University of Maryland

Sagar Shah, American Planning Association

Medessa Burien, University of Maryland

Nature & Health
Translations to Planning

Sponsored by
USDA Forest Service

American Planning Association
University of Maryland, Environmental Finance Center
University of Washington, College of the Environment

Project Purpose

to provide planning tools
that envision nature
as a comprehensive system
to promote public health
in cities

Project Partners

- Dr. **Jennifer Egan** & **Medessa Burien**, MPH, University of Maryland, Environmental Finance Center

- Dr. **Sagar Shah**, AICP - Planning and Community Health Manager at American Planning Association

- Dr. **Kathleen Wolf** - University of Washington, Human Dimensions of Urban Forestry & Urban Greening

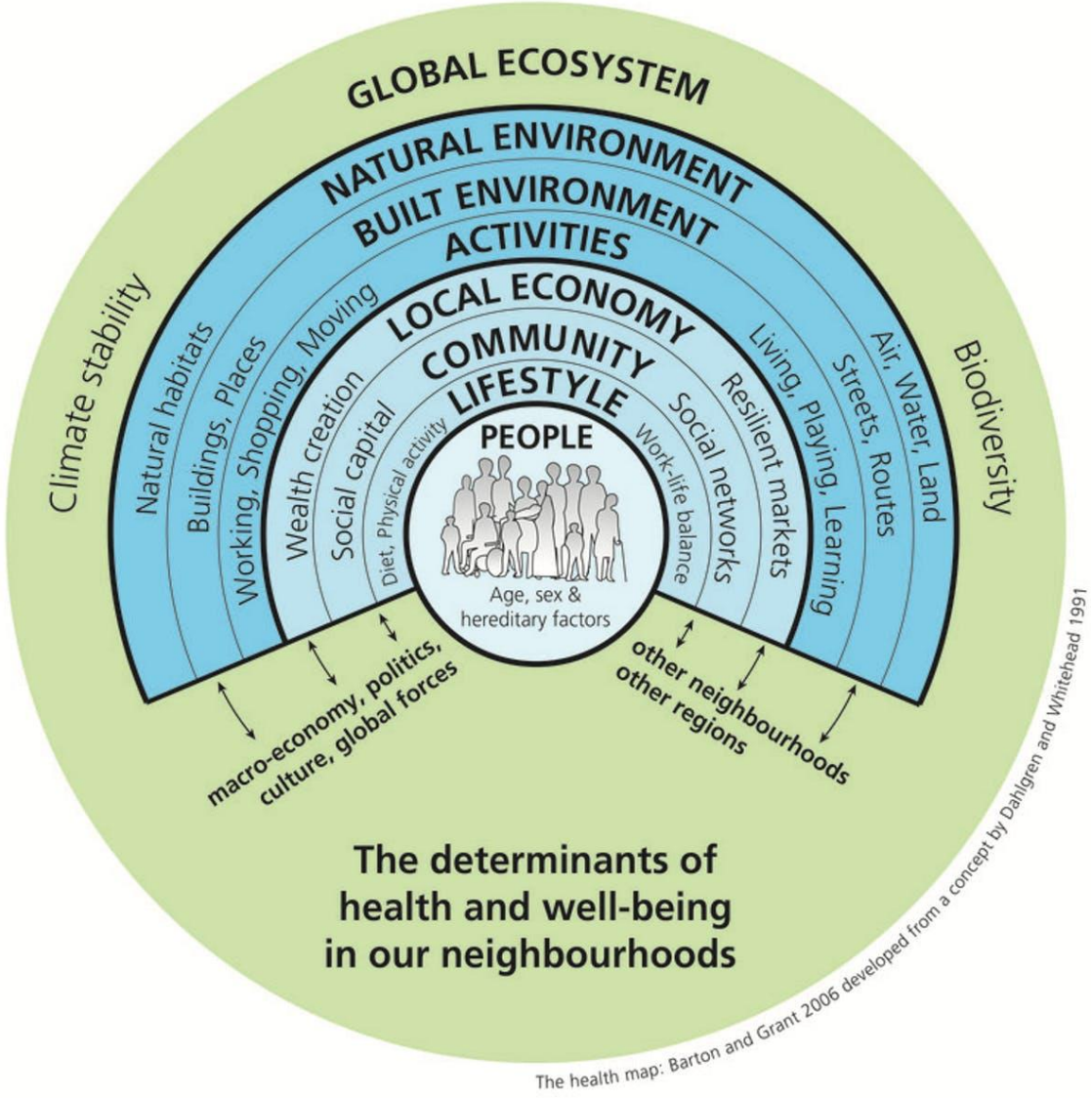
What is the Nature & Health evidence?

Health is…

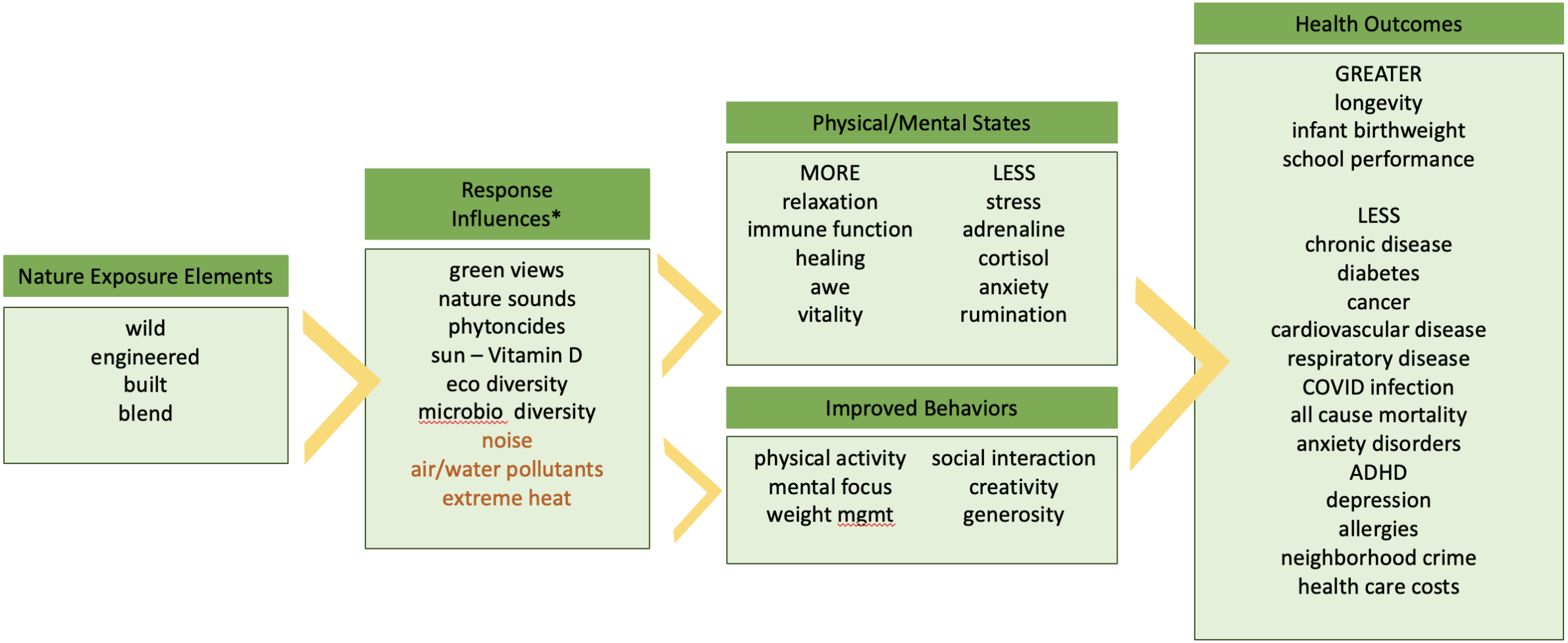
A state of complete physical, mental, and social well-being and not merely the absence of disease or infirmity

(World Health Organization, 1946)

Social Determinants of Health



Summary of Current Evidence



What are the Nature Exposure elements?

a better term?

Nature Exposure Elements

Wild	Engineered	Built	Blend
natural area/reserve	street boulevard	courtyard	formal park
critical area	complete/green street	residential entries	community garden
floodplain	green roof	transit stations	food forests/orchard
riparian buffer	green wall	playground	waterfront
wetland	green stormwater infrastructure		streetscape
shoreline	gray/brownfield remediation		quasi-public grounds
			urban civic space
			green schoolyard

nature is not a luxury

US Forest Service

City of Chicago

The Guardian

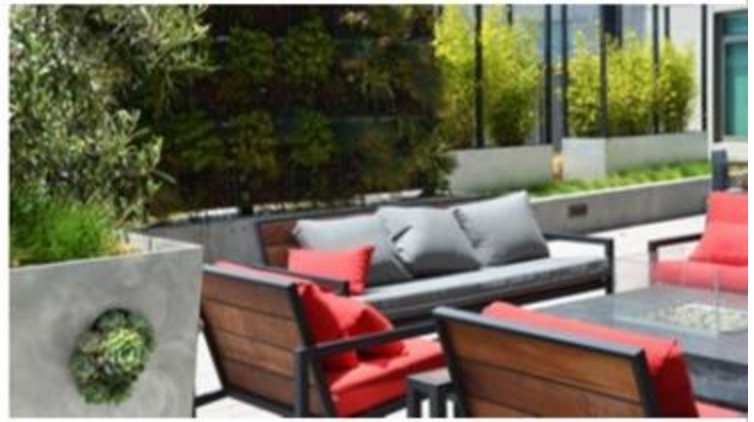
Taylor Quality Guitars

Austin 2nd Street

Green Schooyards America




THE Sustainable SITES Initiative®




Nature-Based System in Cities & Communities?

equivalent
to other
city systems

Report & Training

I. Nature and Health: A Planning Issue

II. Nature and Health: In Communities

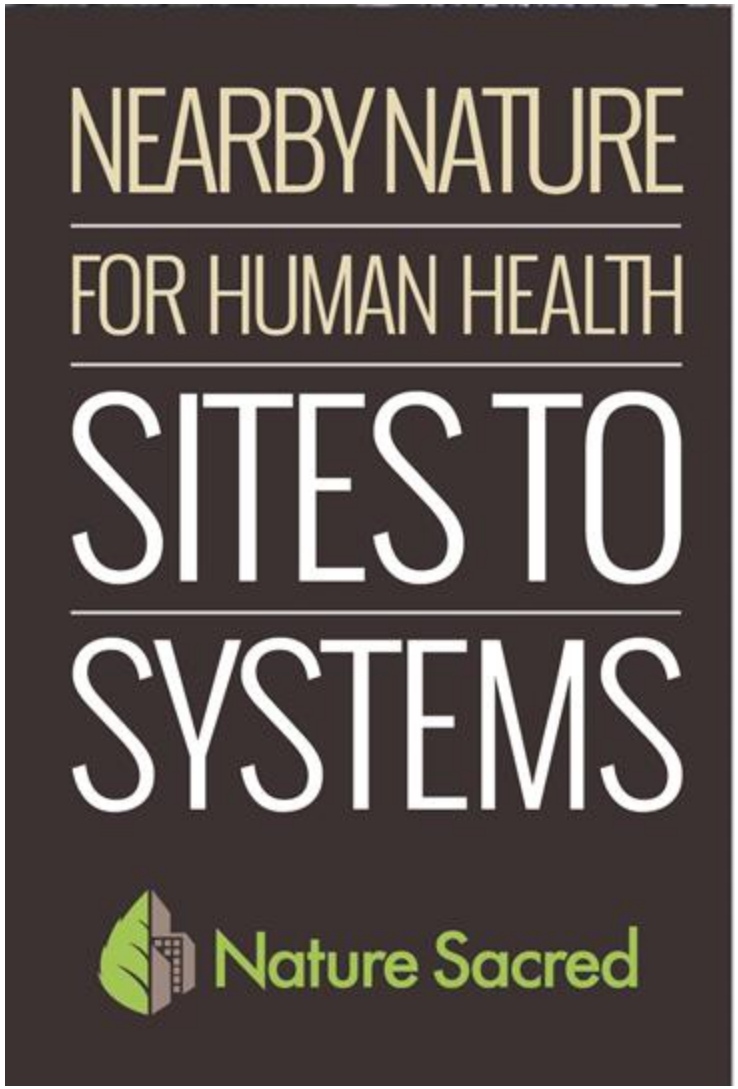
III. Cross-Sector Collaboration

IV. Indicators and Metrics

How to connect Nature & Health using Planning?

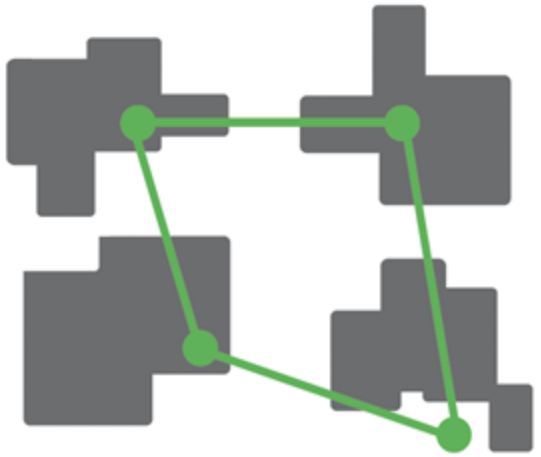
Cecil C. Konijnendijk, Journal of Forestry Research

perceptual linkages



Wolf & Brinkley, 2016

Nested with Links



Fill in the Squares

Hub & Spoke

Planning Implementation & Interventions

Visioning & Goal Setting

Plan Making

Regulatory Approaches

Incentives

Investments

Development

Do you have . . .

Examples or case studies of planning for nature?

Examples of case studies of physical planning for mental health?

Thank you

Kathleen Wolf, University of Washington

kwolf@uw.edu

Jennifer Egan, University of Maryland

jegan@umd.edu

Food and Agriculture Organization of the United Nations

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2nd World Forum on Urban Forests

2023

World Forum on Urban Forests

2nd World Forum on Urban Forests

Washington DC, 2023

Fulfilling the promise of urban forestry: How do we align site-level urban forest management to achieve city-wide plans?

Presented by

Corinne (Corey) Bassett

PhD Candidate, University of British Columbia, Faculty of Forestry

Co-authors: Dr. Susan Day, UBC
Dr. Cecil Konijnendijk, UBC & NBSI
Dr. Lara Roman, USDA Forest Service

Research Assistant:
Chanel Yee, UBC


GEORGE
PAVILION

1. Cities need to achieve their goals.

1. Cities need to achieve their goals.

2. Urban foresters make management decisions every day which prioritize certain benefits over others.

1. Cities need to achieve their goals.
2. Urban foresters make management decisions every day which prioritize certain benefits over others.

…are we aligning decisions with our cities' goals?

Aim

?

Street tree mgmt

City goals

Methods: Semi-structured interviews

- 20 cities in US (n=16) and Canada (n=4):
  - advanced UF programs
  - city plans with UFES goal

Pop.	<100K	100K-700K	>700K
East ↕ West	Watertown, NY	Hartford, CT	New York, NY
	Iowa City, IO	Ann Arbor, MI	Mississauga, ON
	Eau Claire, WI	Chattanooga, TN	Austin, TX
	Missoula, MT	Louisville, KY	Denver, CO
	Woodland, CA	Vaughan, ON	Seattle, WA
	Kirkland, WA	Kansas City, MO	
	Victoria, BC	Sacramento, CA	

Interview Participants

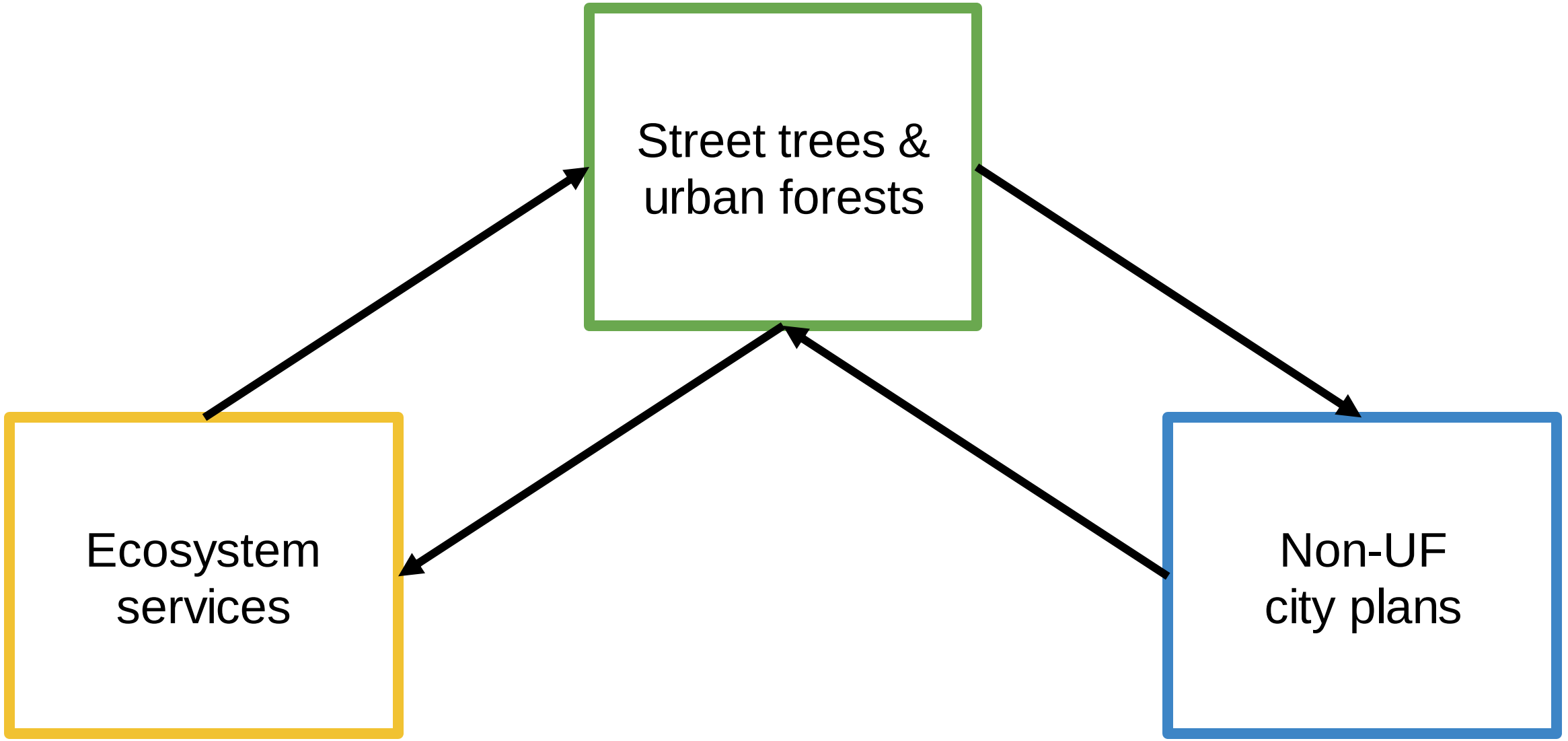
- Municipal employees
- Responsible for management decisions about street trees
  - ex. city forester, urban forestry supervisor, chief arborist, etc.
- Highly educated and trained
- Avg 20 years experience in urban forestry

Analysis & Results

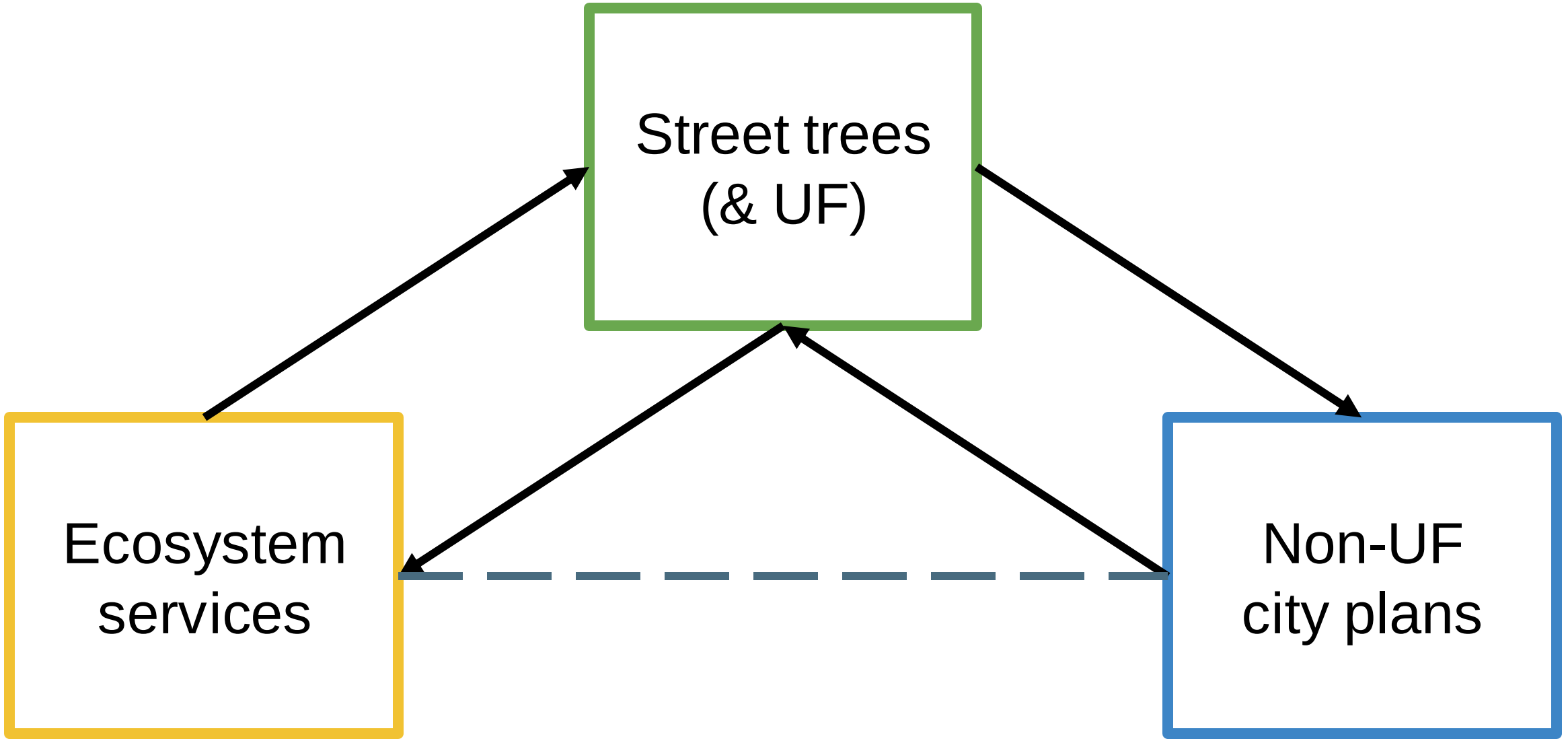
Results – Overall

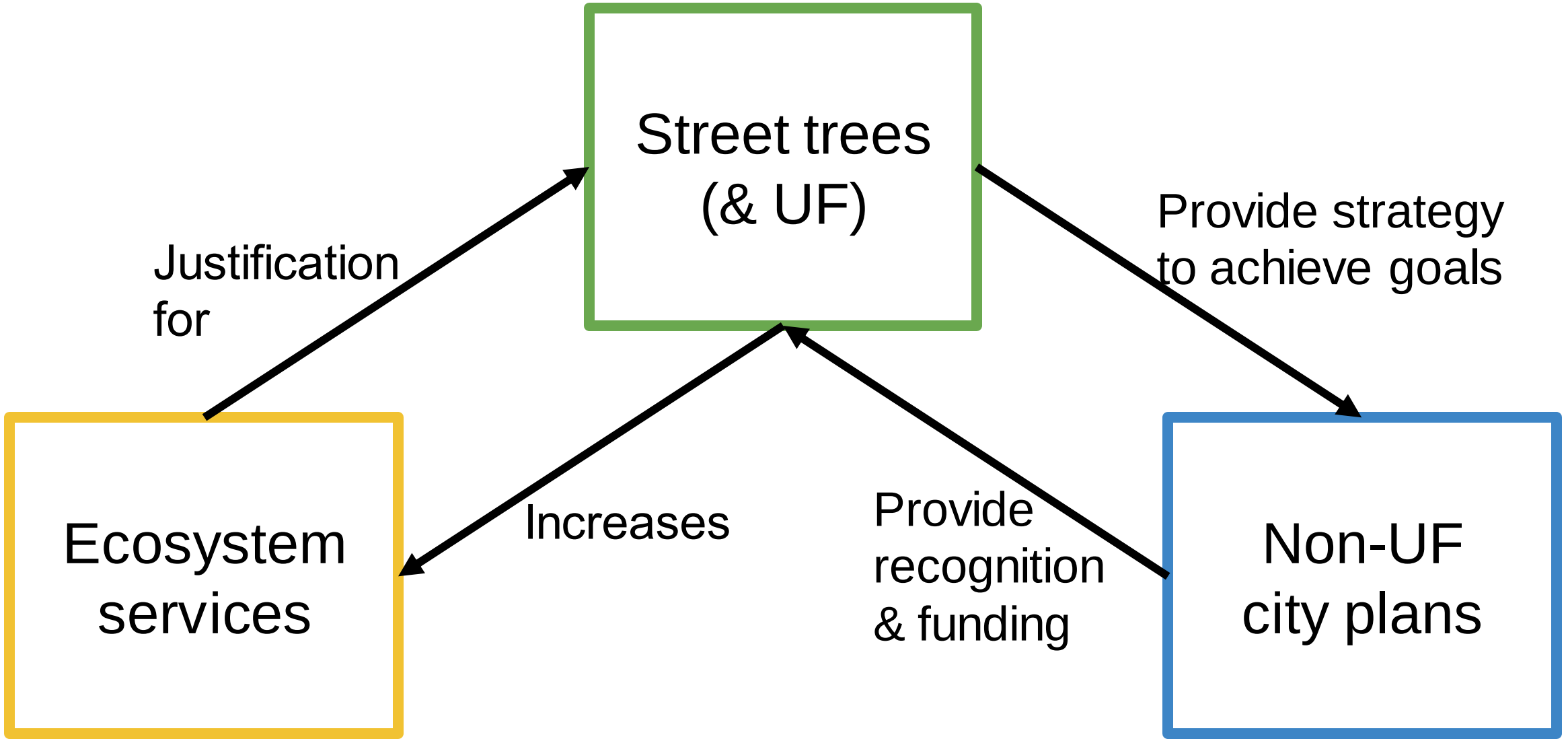
- Most important mgmt objectives:
  - Public safety
  - Customer service
  - Growing tree canopy
- Very familiar with concept of ESS
- Range in their perception of how aligned their programs were with non-UF city plans

Relationships between…

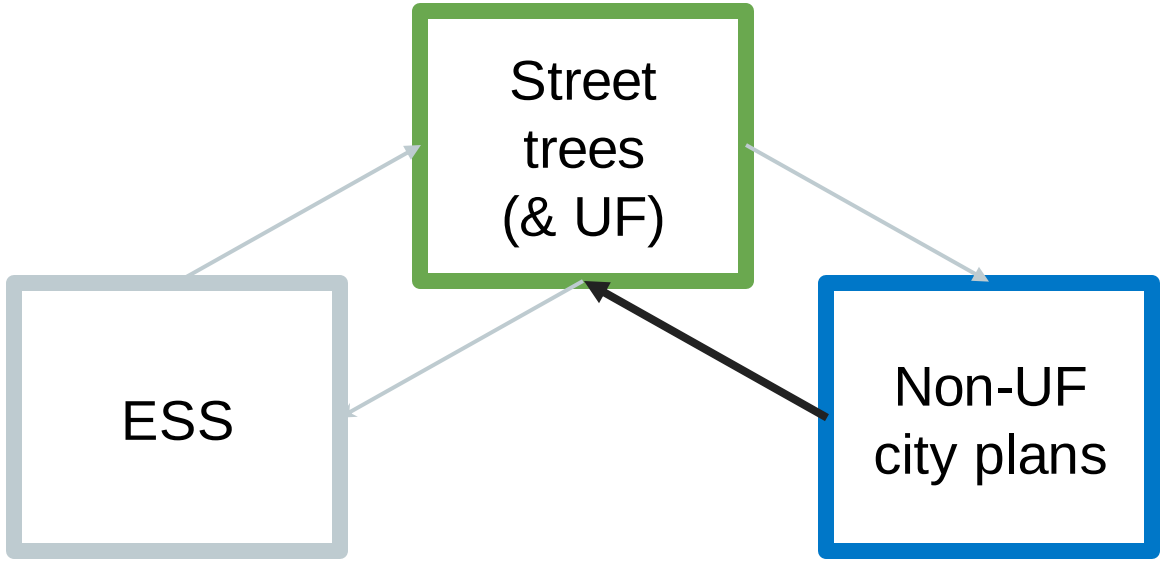


Relationships between…



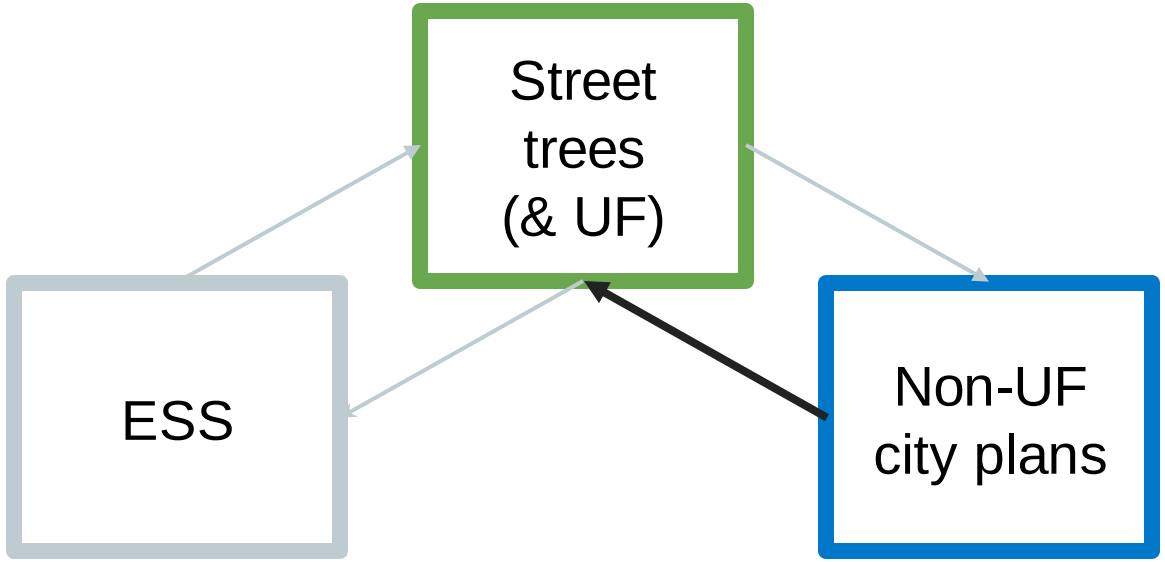

Street trees
(& UF)
Justification
for
Provide strategy
to achieve goals
Ecosystem
services
Increases
Provide
recognition
& funding
Non-UF
city plans

Emergent themes



- Flexible guide (n=8)
- Small influence on decisions (n=7)
- Source of recognition or support (n=8)

Emergent theme



*"**We do refer to the, you know, to the Climate Action Plan**, […] but, overall, like, from a **day-to-day standpoint, it's just trying to get more trees in more spaces.**" (P2)*

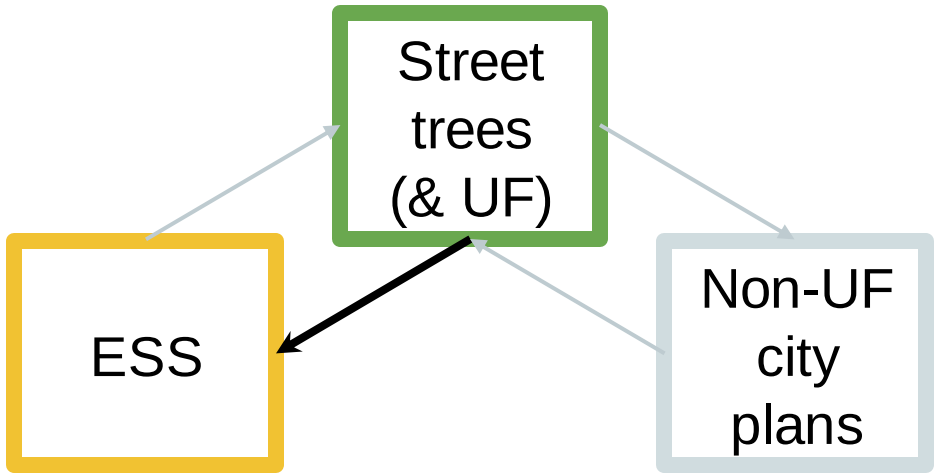
Non-UF city plans as a “flexible guide”

*“**...I don't use them as my Bible** […] my focus is health of trees, health of the urban forest, you know, keeping what we have as long as we can […] I think the benefit of that is, is providing what we need for those goals […] **my goal is the forest, their goal is they want these things to happen**. But I just use that as like **guides**” (P20)*

“[…] we will meet those goals where we can, but not spend a lot of energy trying to” (P19)

Emergent themes

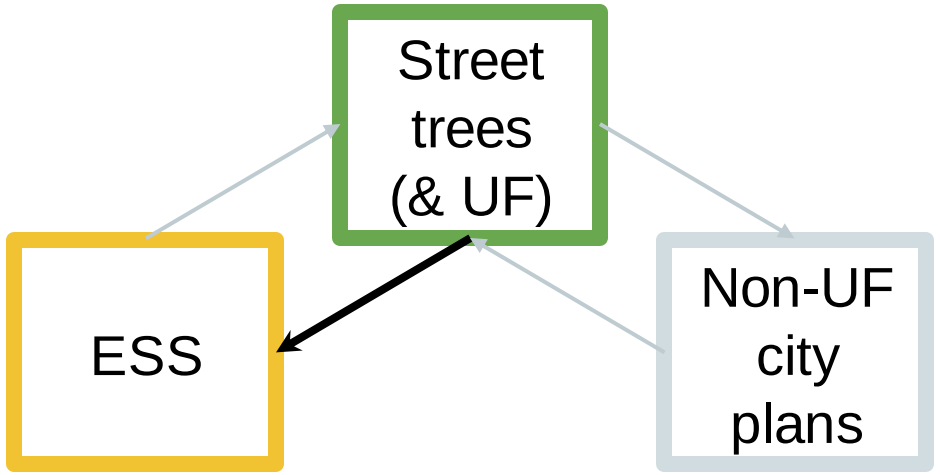
- More trees, more ESS (n=10)
- Larger trees, more ESS (n=12)
- Increase tree longevity, increase ESS (n=15)
- Improve urban forest health, benefits will come (n=14)



Emergent themes

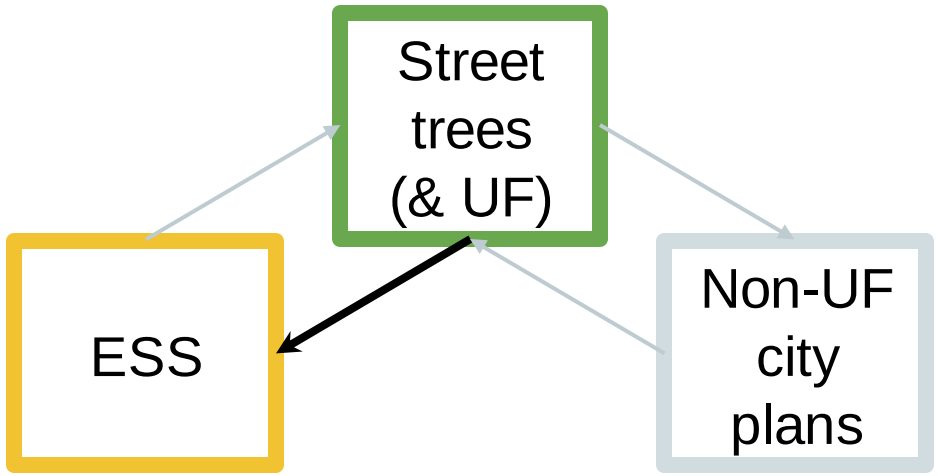
- More trees, more ESS (n=10)
- Larger trees, more ESS (n=12)
- Increase tree longevity, increase ESS (n=15)
- Improve urban forest health, benefits will come (n=14)

- **Specific UF types, different ESS (n=12)**
- **Mgmt choices can result in different ESS (n=8)**



Emergent themes

*"When I said I focus on **canopy coverage**, that's going to hit all the **climate** goals about **heat island effect**, about **stormwater retention**, about **habitat**. You know, it's gonna hit all those things. As much as possible." (P19)*



Strategies to align street tree mgmt with city ESS goals

Align site design and species selection (n=18)

Strategy: Align site design and species selection

*"We try to **overlap goals**. So if we have a low-income area that is also stormwater susceptible, that will be a priority planting area**.**" (P11)*

"My overall goal would be more space for trees […] but within that natural space, hey, let's also design a way for water to be collected. (P20)"

*"First, it's going back to GIS and like 'hey, is this an area of high need of trees, based on all the factors, low canopy, **high urban heat**, **underserved** neighbohood?'" (P1)*

Strategies to align street tree mgmt with city ESS goals

Partnership with specialist organizations (n=11)

- Internal
  - Ex. water department
- External
  - Ex. food forest NGO, wildlife NGO

Strategy: Partnership with specialist organizations

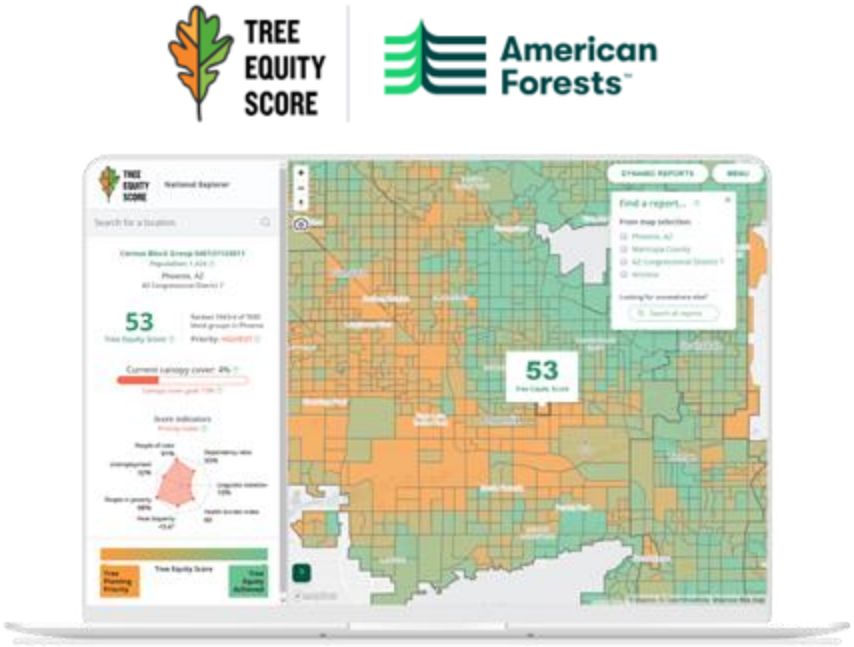
- Internal
  - Ex. City water department
- External
  - Ex. food forest NGO, wildlife NGO

"We partner and support each other with the department of utilities who handle stormwater. […] on one hand, ***I'm working with a tree, but I'm promoting a goal that is actually somebody else's goal."*** *(P19)*

Strategy: Partnership with specialist organizations

- Internal
  - Ex. City water department
- External
  - Ex. food forest NGO, wildlife NGO

Partner organization
AND site alignment example:



…are we aligning decisions with our cities' goals?

Sometimes!

Conclusions

- Public safety and resident requests are the top operational priorities for municipal urban foresters

Conclusions

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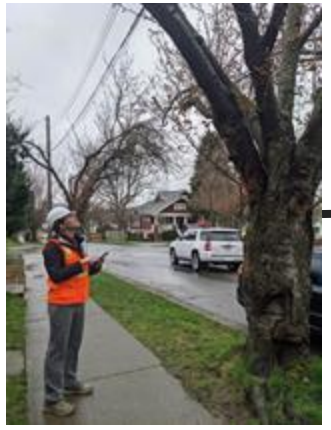
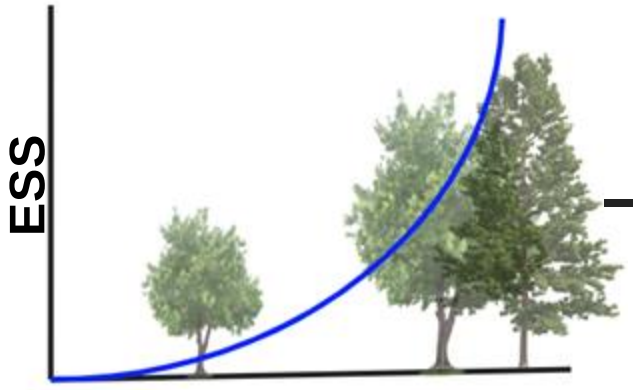
- Urban forest management could be better aligned with non-UF city plans

Conclusions

- Public safety and city resident requests are the top operational priorities for municipal urban foresters
- Urban forest management could be better aligned with non-UF city plans
- Perceived alignment based on idea that increasing urban tree canopy will result in “more” ecosystem services, which will in turn contribute to city goals





…what's next?

Street Tree Futures

This research is funded in part by the Social Sciences and Humanities Research Council of Canada.

Social Sciences and Humanities Research Council of Canada

Conseil de recherches en sciences humaines du Canada

Canada

Street Tree Futures

Thank you

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Social Sciences and Humanities Research Council of Canada
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2nd World Forum on Urban Forests

2023

World Forum on Urban Forests

2nd World Forum on Urban Forests

Washington DC, 2023

On tree-related microhabitats in urban areas

Presented by

Thomas Campagnaro[1]

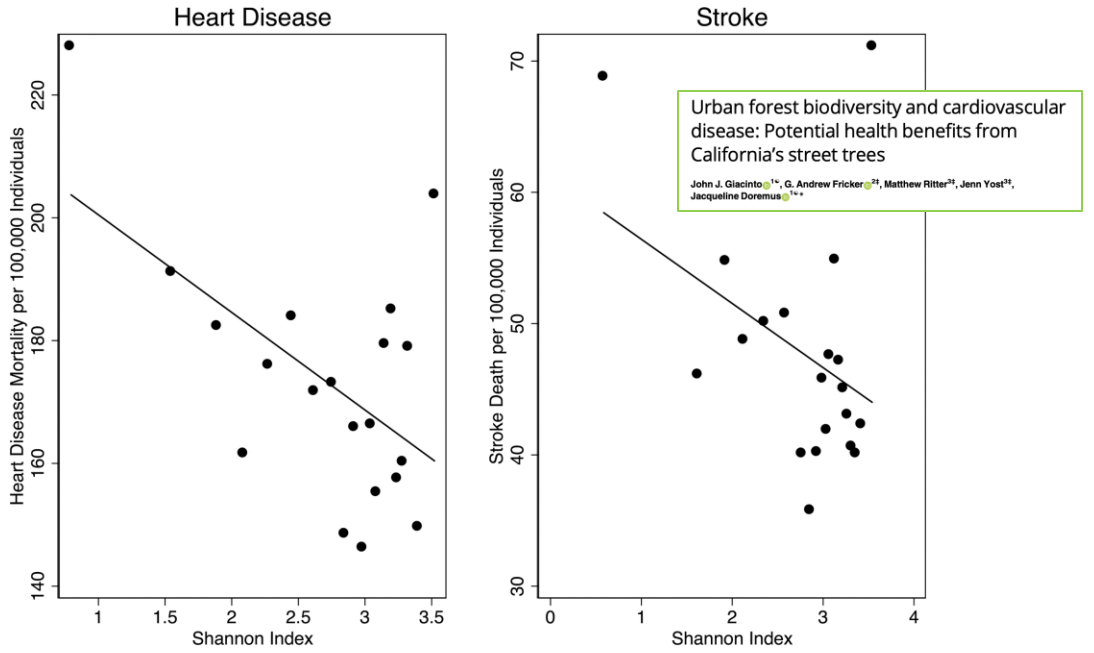
Nicola Menon[1], Dina Cattaneo[1], D. Johan Kotze[2], Yoan Paillet[3], Paolo Semenzato[1]

1. Department of Land, Environment, Agriculture and Forestry, Università degli Studi di Padova, Italy
2. Faculty of Biological and Environmental Sciences, Ecosystems and Environment Research Programme, University of Helsinki, Finland
3. INRAE, LESSEM, Université de Grenoble Alpes, France

Urban trees and forest are important for biodiversity

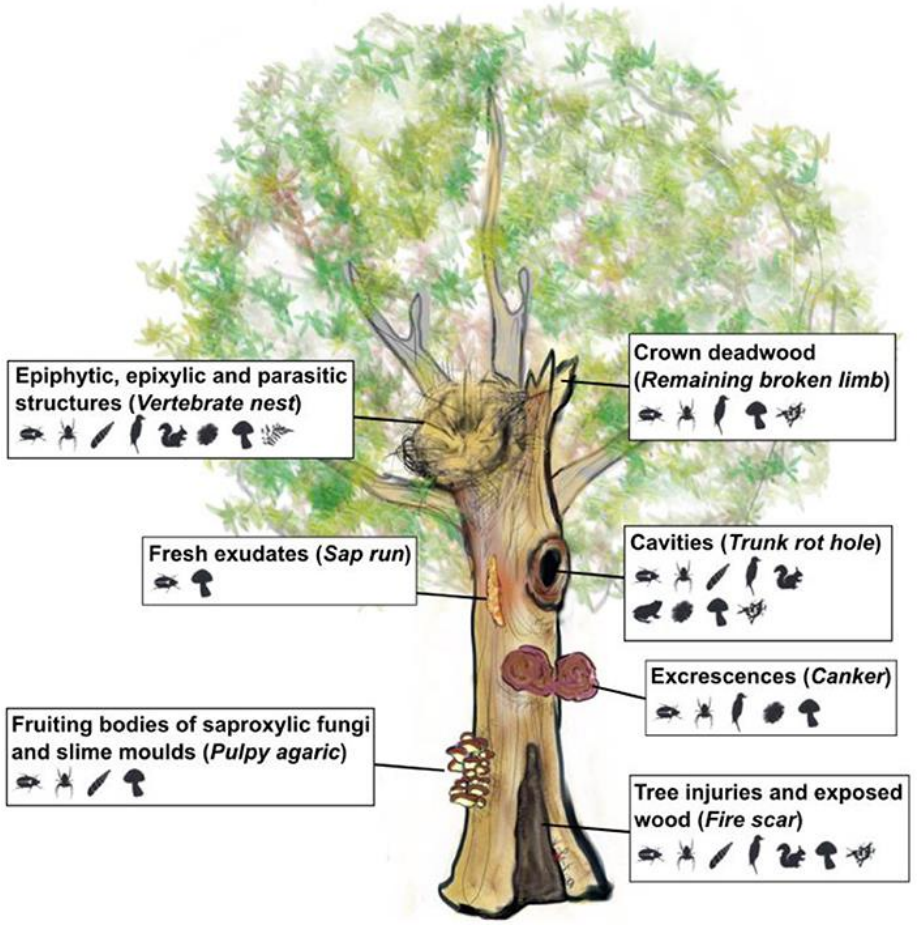
«Covering only 2% of land globally, cities are home to one-sixth of the world's tree diversity with urban forests composed of up to 10 billion trees, and more than 100 genera.»

https://unece.org/sites/default/files/2022-12/COP15_infographic_final.pdf



Conservation of many species of flora and fauna
Related benefits: environmental awareness, the mental health and well-being of citizens,..

Tree-related microhabitats (TreMs)



- Insects
- Arachnids
- Gastropods
- Birds
- Mammals
- Amphibians & reptiles
- Bryophytes
- Fungi
- Lichens
- Vascular plants & ferns

Tree-Related Microhabitats Are Promising Yet Underused Tools for Biodiversity and Nature Conservation: A Systematic Review for International Perspectives

Maxence Martin [1,2,3], Yoan Paillet [4], Laurent Larrieu [5,6], Christel C. Kern [7], Patricia Raymond [3,8], Pierre Drapeau [3,9] and Nicole J. Fenton [1,3]*

- ✓ "a distinct, well delineated structure occurring on living or standing dead trees that constitutes a particular and essential substrate or life site for species or species communities during at least a part of their life cycle to develop, feed, shelter or breed"

Ecological Indicators 84 (2018) 194–207
Contents lists available at ScienceDirect
Ecological Indicators
journal homepage: www.elsevier.com/locate/ecolind

Tree related microhabitats in temperate and Mediterranean European forests: A hierarchical typology for inventory standardization

Laurent Larrieu[a,b,*,1], Yoan Paillet[c,1], Susanne Winter[d,1], Rita Bütler[e], Daniel Kraus[f], Frank Krumm[g], Thibault Lachat[g,h], Alexa K. Michel[f], Baptiste Regnery[g,k], Kris Vandekerkhove[l]

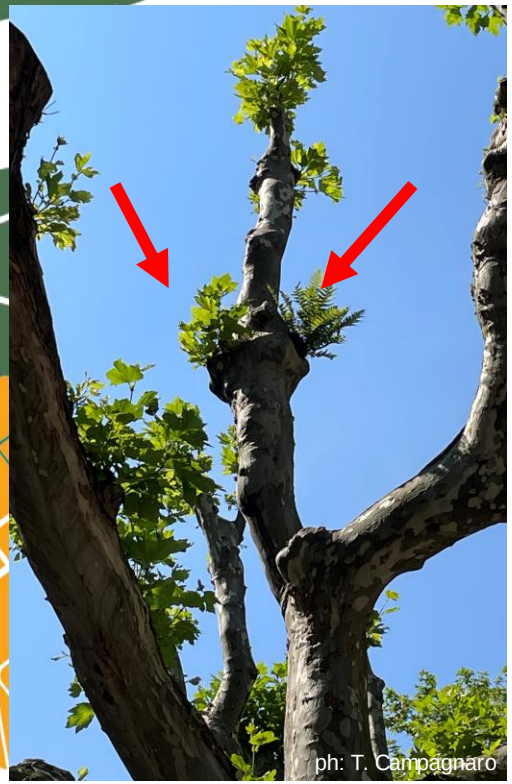
- ✓ The concept of TreMs "is an approach to assess and manage multi-taxon species richness in forest ecosystems"

Current Forestry Reports (2021) 7:59–68
https://doi.org/10.1007/s40725-020-00132-5
ECOLOGICAL FUNCTION (J BAUHUS, SECTION EDITOR)

The Use of Tree-Related Microhabitats as Forest Biodiversity Indicators and to Guide Integrated Forest Management

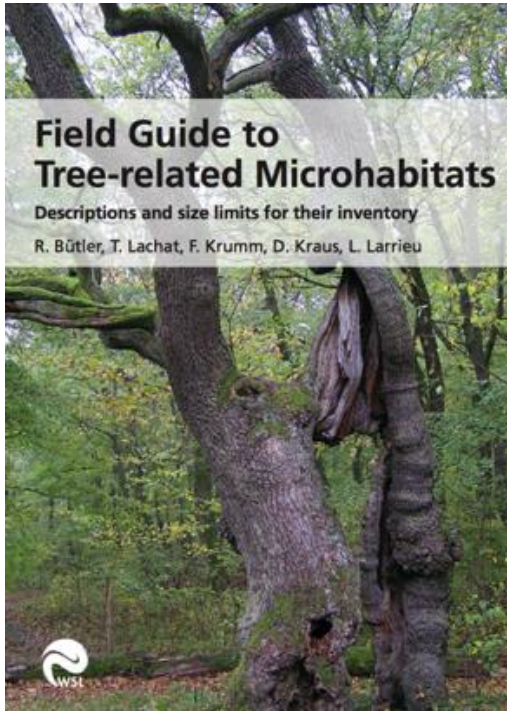
Thomas Asbeck[1] · Josef Großmann[1,2] · Yoan Paillet[3] · Nathalie Winiger[4] · Jürgen Bauhus[1]

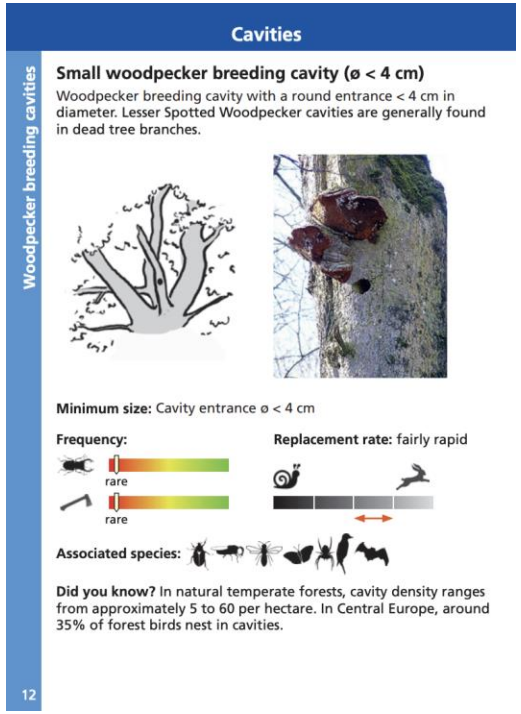
Tree-related microhabitats
some examples



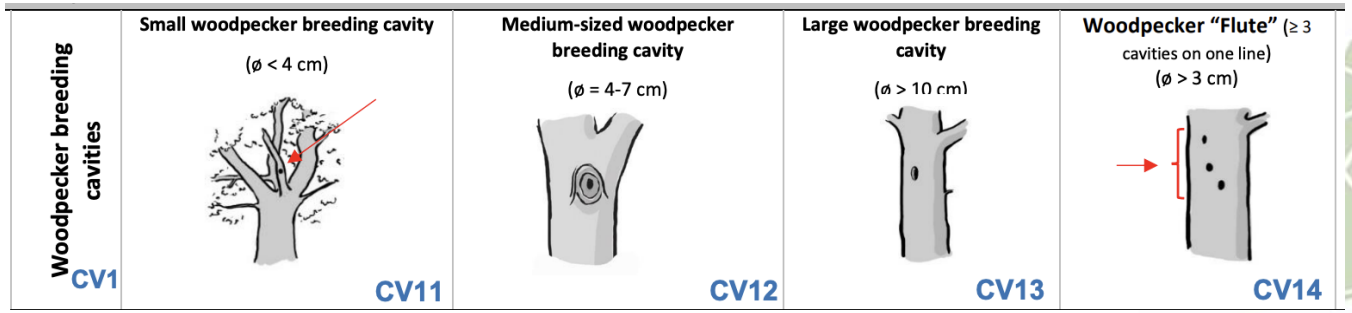
Food and Agriculture Organization of the United Nations

Surveying tree-related microhabitats

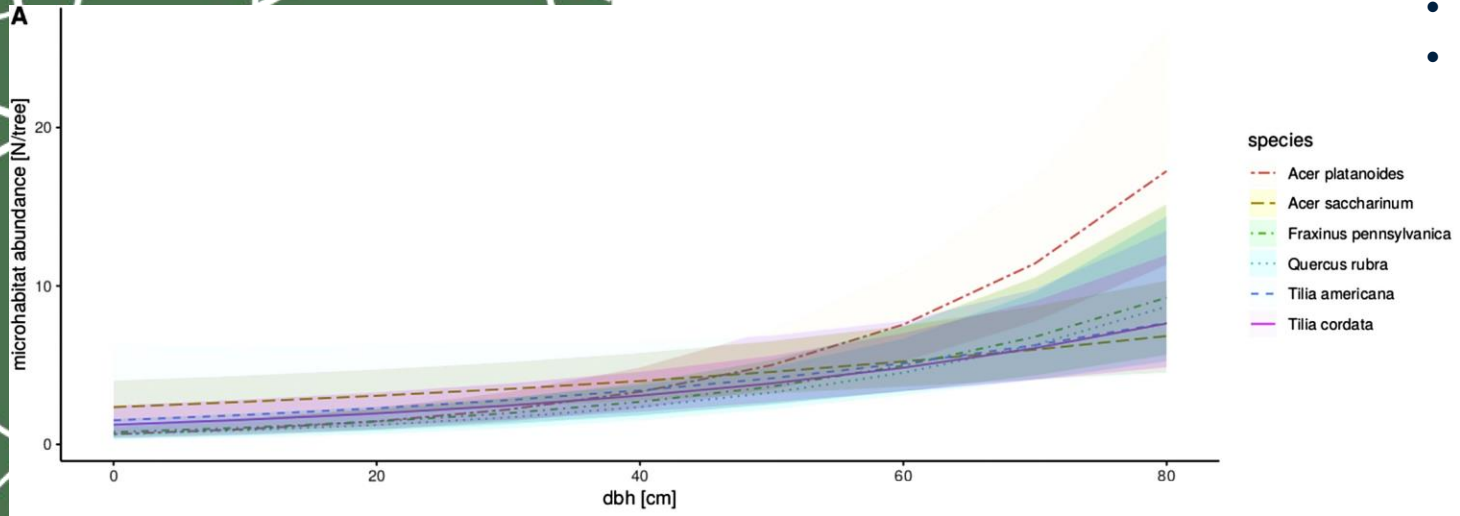


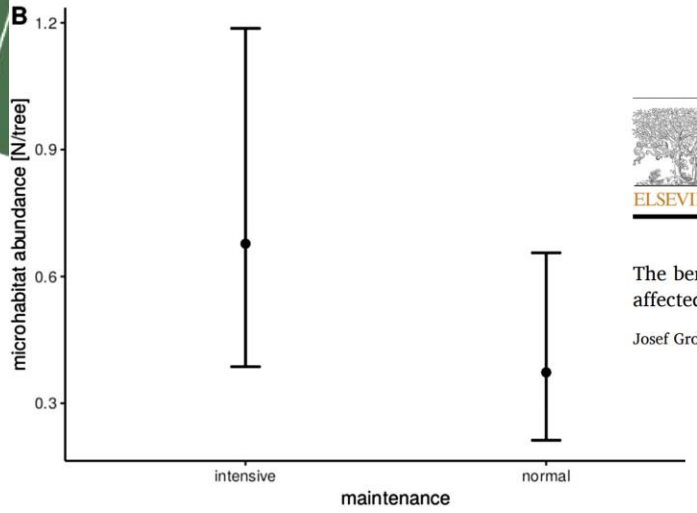


- Existing protocols
- Possible adaptations of the categories
  - exposed wood due to pruning (due to human interventions)
- Bias (i.e., view from below)



What do we know of urban TreMs





- Several studies on specific TreMs (i.e. cavities)
- Few dealing with multiple TreMs
  - Increasing TreMs with increasing DBH
  - Increasing TreMs with management intensity
  - Differences between tree species

Urban Forestry & Urban Greening 55 (2020) 126817

Contents lists available at ScienceDirect

Urban Forestry & Urban Greening

journal homepage: www.elsevier.com/locate/ufug

The benefits of tree wounds: Microhabitat development in urban trees as affected by intensive tree maintenance

Josef Großmann[a,b,*], Patrick Pyttel[a], Jürgen Bauhus[a], Bastien Lecigne[c], Christian Messier[c]

EFUF 2023 · URBAN FORESTS AS NATURE-BASED SOLUTIONS · Book of Abstracts

Microhabitat richness and abundance varied between species origin (exotic vs. native), size, growing environment (park vs. street), and crown management intensity: a study on four species from the city of Karlsruhe, southwest Germany

Saha, Somidh | Institute for Technology Assessment and Systems Analysis (ITAS), Karlsruhe Institute of Technology (Germany), somidh.saha@kit.edu

Petridis, Zoe | Institute for Technology Assessment and Systems Analysis (ITAS), Karlsruhe Institute of Technology (Germany)

Schmidtlein, Sebastian | Institute of Geography and Geoecology (IfGG), Karlsruhe Institute of Technology (KIT) (Germany)

Köhler, Mario | Horticulture Department of Karlsruhe City (Gartenbauamt), Karlsruhe (Germany)

EFUF 2022 Adaptive Measures in Urban Forests Urban Forest Techniques

Tree-related microhabitats in urban areas: preliminary results from urban parks in Padova (Italy)

Thomas Campagnaro[a], Yoan Paillet[b], Dina Cattaneo[a] and Paolo Semenzato[a]

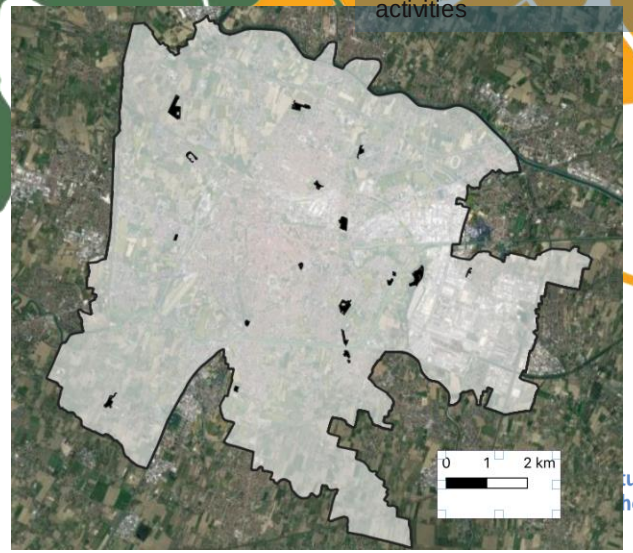
Institution: [a]Dept. of Land, Environment, Agriculture and Forestry - Università degli Studi di Padova (Italy); [b]Univ. Grenoble Alpes, INRAE, Lessem, F -38402 Saint Martin d'Hères (France)

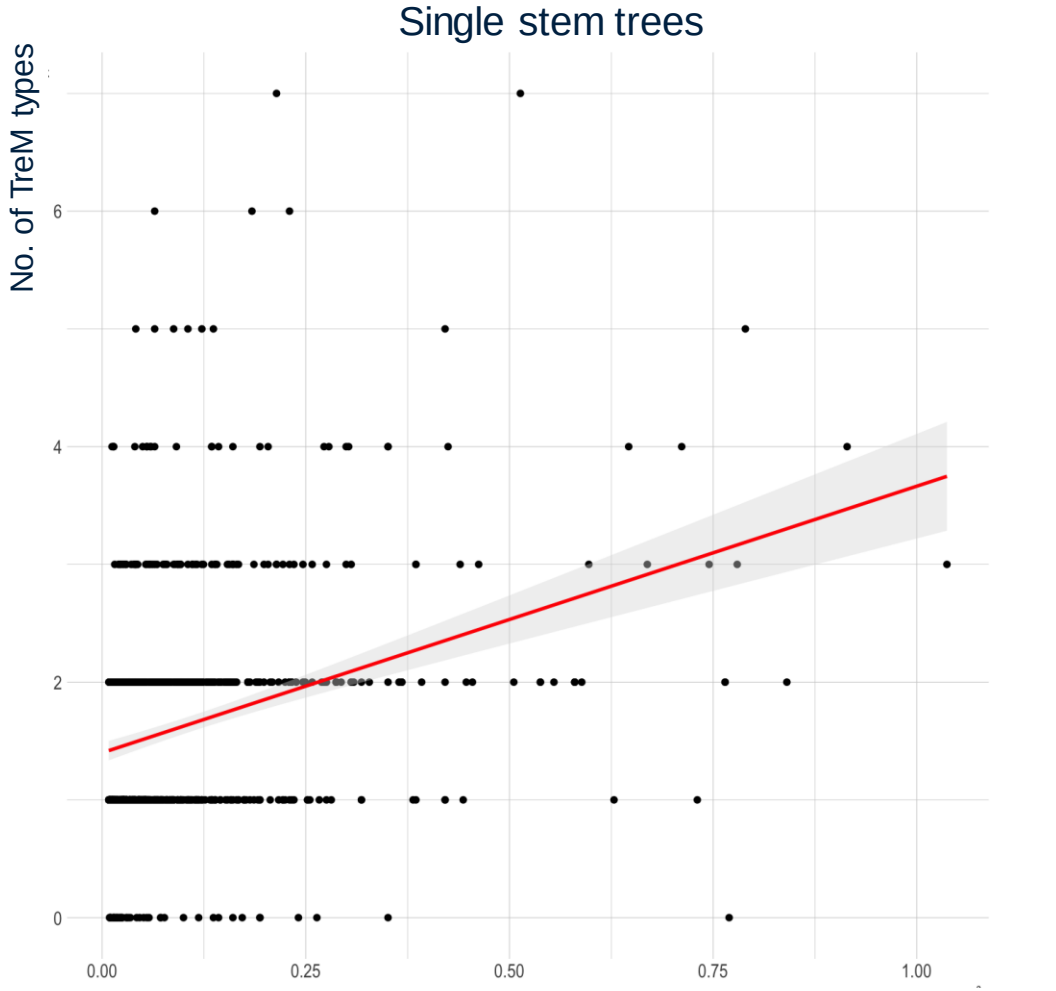
TreMs in urban parks (Padova - Italy)

17 urban parks

- 20% of trees per park surveyed
- 943 trees
  - 810 single stem trees

We thank Alberto Ferrante and Ramona Pricop for support in field activities

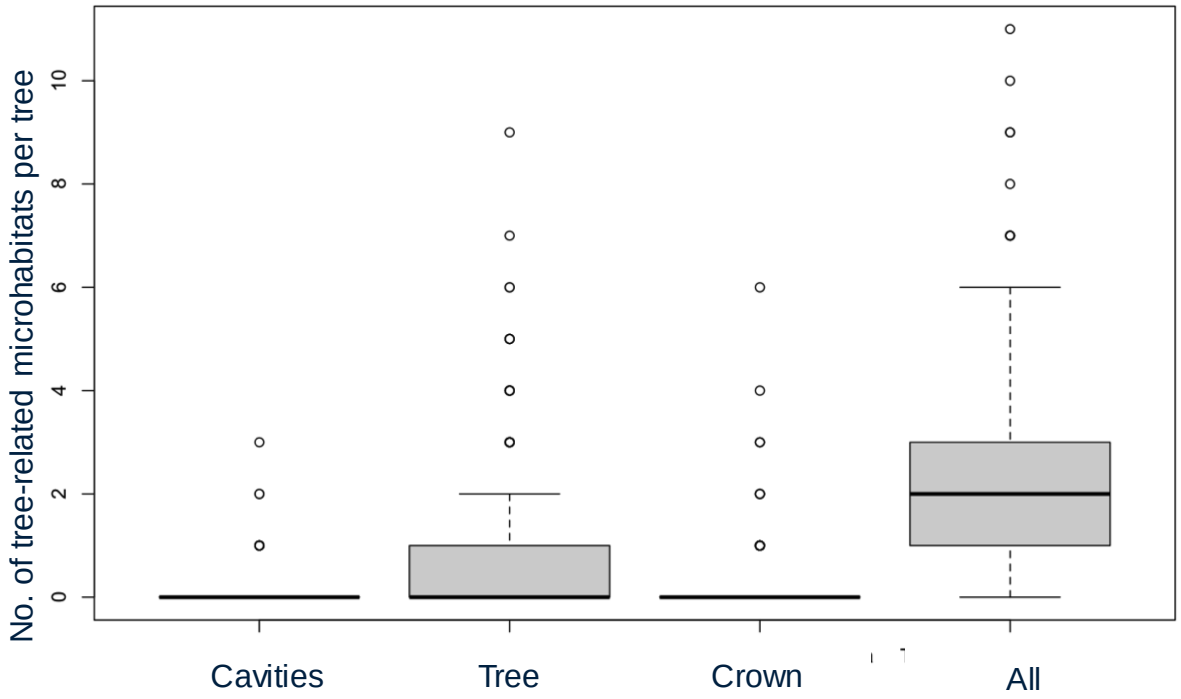




TreMs in urban parks (Padova - Italy)

Frequency of different TreMs types:

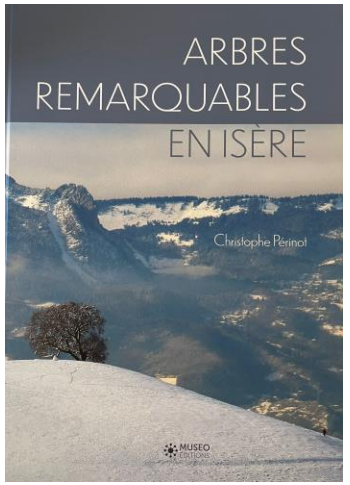
- 81% of trees with mosses/lichens
- 26% of trees with exposed wood due to cuts
- 16% of trees with ivy & lianas
- 13% of trees with invertebrate nests

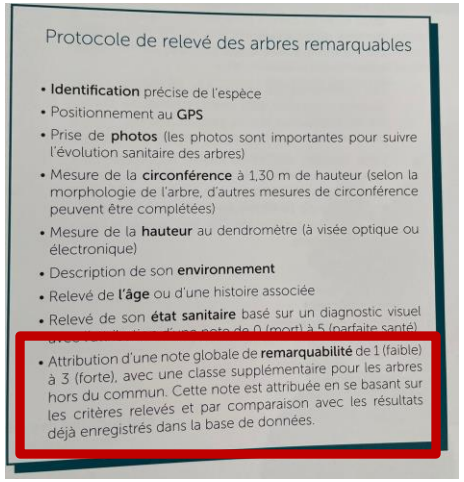


“Important” trees in Grenoble (France)

Different types of tree:

- Monumental from experts (citizen science) [FO, MO, FA]





- Identified in urban planning regulations [IE, IL]

Végétation : Arbres isolés, groupes d'arbres, haies, ripisylves, secteurs particuliers (boisement, sites paysagers remarquables, etc.)	Protection d'éléments remarquables	L. 123-1.7	• article 2 : tous travaux ayant pour effet de détruire un élément de paysage identifiés par le PLU au titre de l'article L.123-1.7 doivent faire l'objet d'une autorisation préalable au titre des installations et travaux divers • article 13 : espace boisé classé • article 13 : les plantations existantes sont maintenues ou remplacées par des plantations d'essences équivalentes.
	Création d'EBC	L. 130-1	• article 13 : les espèces végétales seront choisies de préférence dans la liste figurant en annexe du présent règlement, ou interdiction d'utiliser certaines espèces. Aspect et typologie. • EBC à créer, signalé sur le document graphique de la même manière que les EBC existants

- Both previous categories [CC=FO or MO + IE or IL]

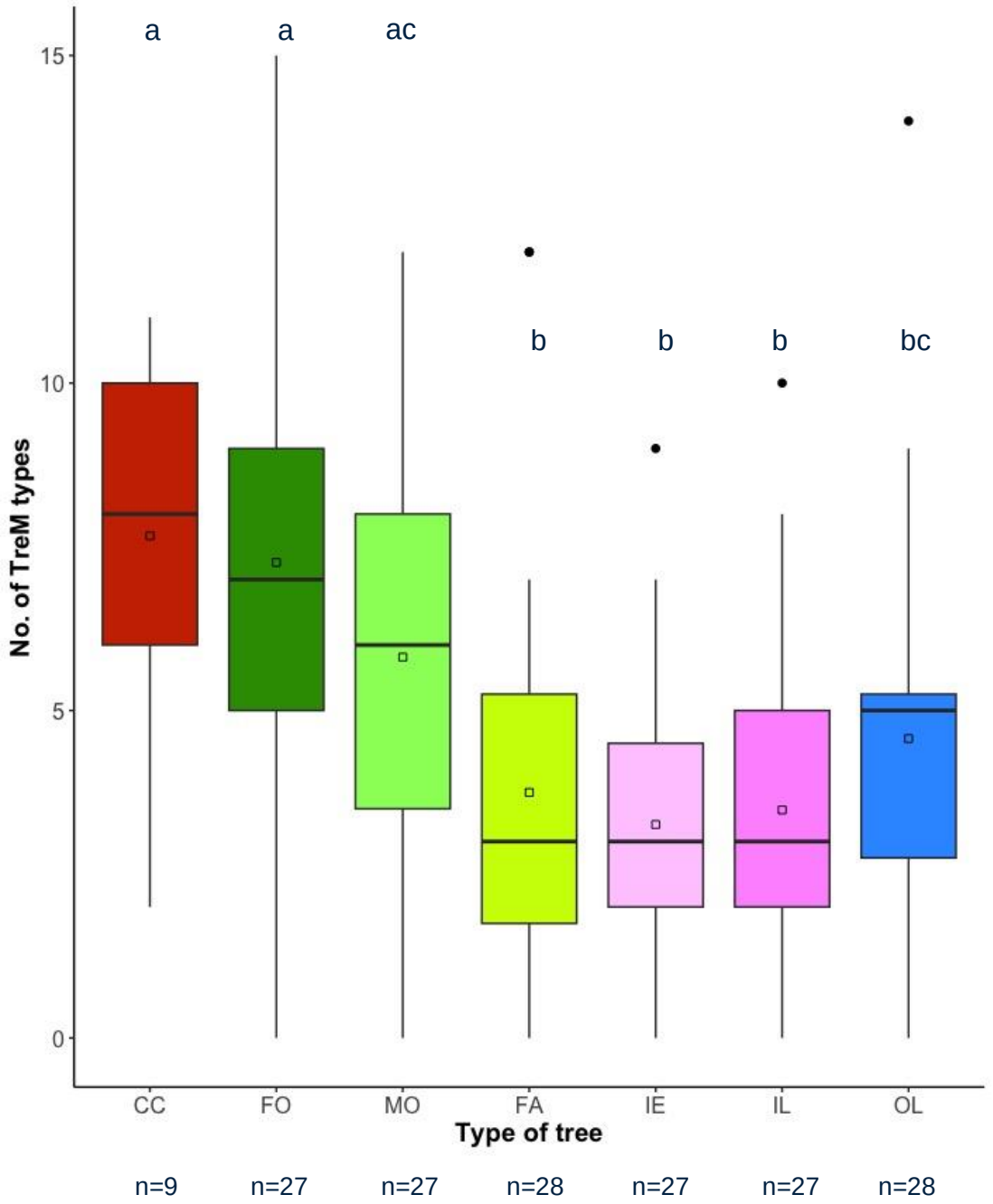
- Old trees (>70 ys) [OL]

Food and Agriculture Organization of the United Nations

“Important” trees in Grenoble (France)

- 173 trees of which 156 have a single stem
- Similar results when considering only single stem trees

Tree species
- CC: 9 species
- FO: 23 species (most freq.= *Populus nigra*, n. 3)
- MO: 23 species (most freq.= *P. nigra*, n. 4)
- FA: 25 species
- IE: 10 species (most freq.= *Aesculus hippocastanum & Platanus acerifolia*, both n. 6)
- IL: 5 species (63% are *P. acerifolia*)
- OL: 8 species (50% are *P. acerifolia*)



Different types of tree:
- Monumental from experts (citizen science) [FO, MO, FA]
- Identified in urban planning regulations [IE, IL]
- Both previous categories [CC=FO or MO + IE or IL]
- Old trees (>70 ys) [OL]

Food and Agriculture Organization of the United Nations
Arbor Day Foundation
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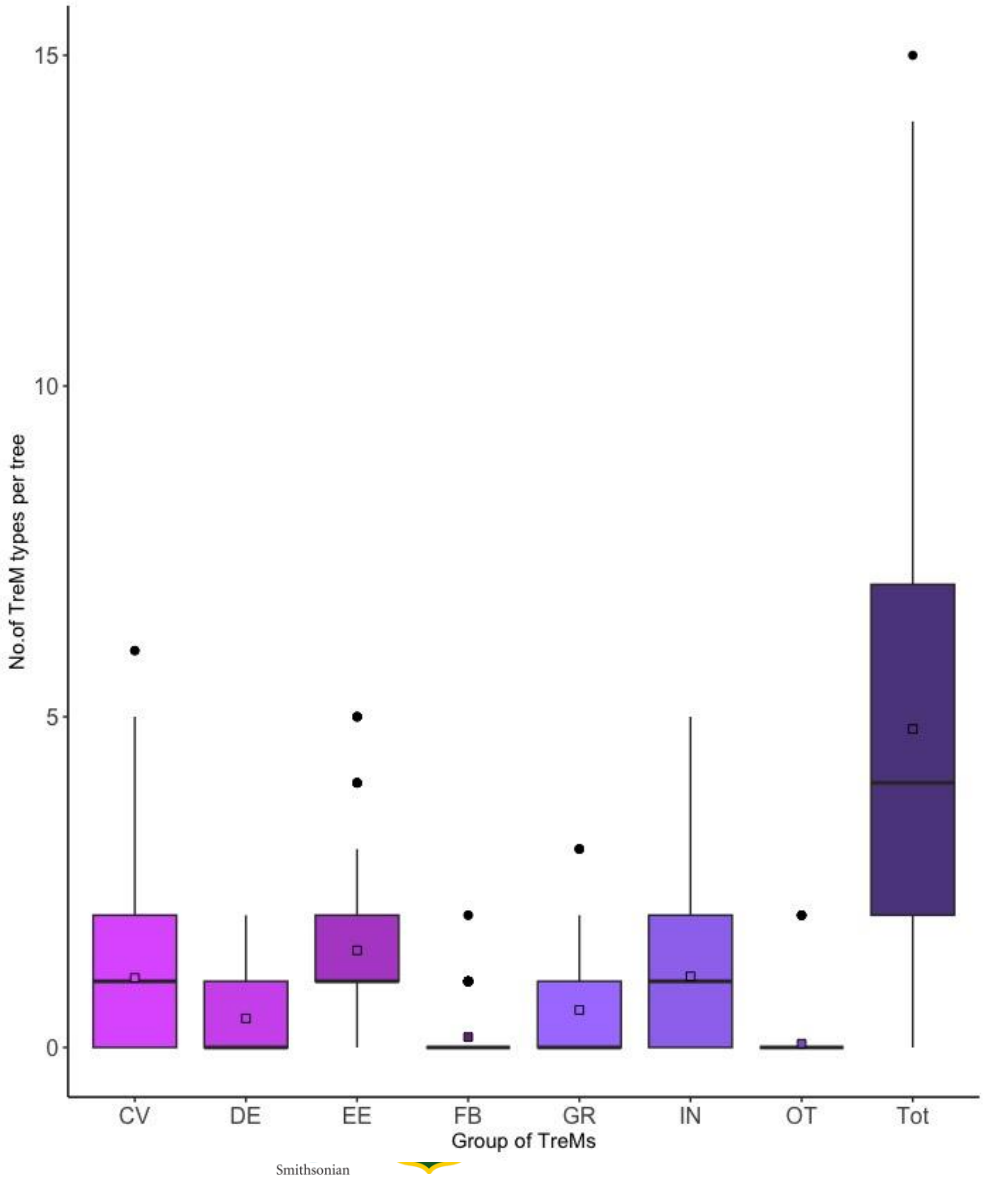
“Important” trees in Grenoble (France)

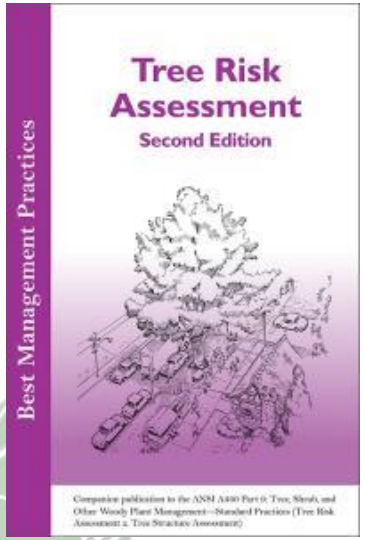
Type of TreM	Total (n=173)	CC (n=9)	FO (n=27)	MO (n=27)	FA (n=28)	IE (n=27)	IL (n=27)	OL (n=28)
Cavities (CV)	51.45 %	67%	78%	52%	21%	37%	52%	64%
Tree injuries & exposed wood (IN)	61.27 %	67%	82%	74%	57%	41%	63%	50%
Crown deadwood (DE)	38.73 %	67%	52%	48%	36%	37%	22%	29%
Excrescences (GR)	45.67 %	67%	48%	48%	25%	22%	52%	71%
Fruiting bodies (FB)	14.45 %	33%	22%	11%	4%	7%	22%	14%
Epiphytic & epixylic structures (EE)	75.72 %	100%	93%	82%	68%	70%	52%	82%
Exudates (OT)	2.89 %	0%	7%	7%	0%	0%	0%	4%

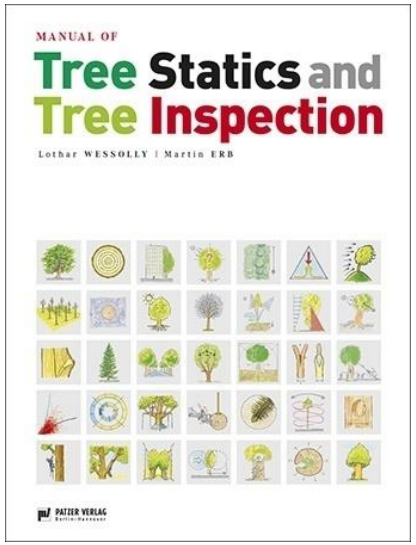
Different types of tree:
- Monumental from experts (citizen science) [FO, MO, FA]
- Identified in urban planning regulations [IE, IL]
- Both previous categories [CC=FO or MO + IE or IL]
- Old trees (>70 ys) [OL]



Planning and management

Possible “conflicts”



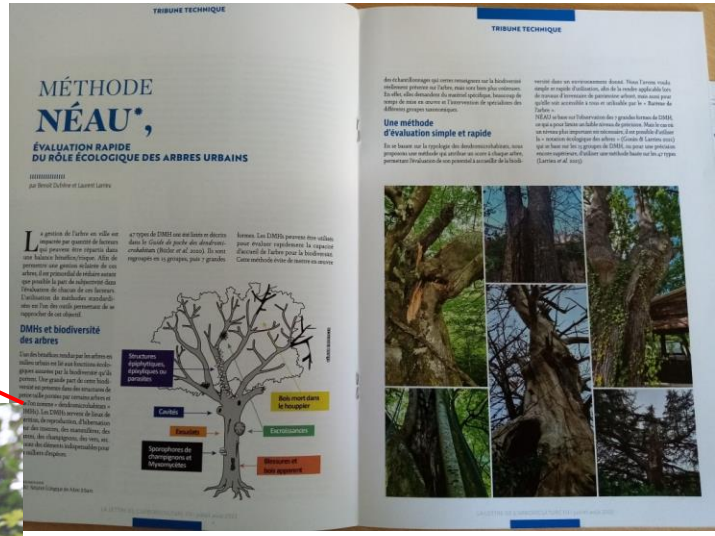


https://www.arborday.org/trees/bulletins/coordinators/resources/pdfs/015.pdf

Increasing attention by public administrations & private sector

- ✓ **Application of specific interventions, for example « Coronet cuts »**

- Interest by specialists



Lettre de l'arboriculture SFA n°113.

Conclusion

Variety of TreMs in urban areas = potential for biodiversity
Not all trees are equal for TreMs
Consider appropriate management & planning
Need of capacity-building & citizen awareness


ph: T. Campagnaro

Thank you

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2nd World Forum on Urban Forests

2023

World Forum on Urban Forests

2nd World Forum on Urban Forests

Washington DC, 2023

Bogotá's pruning plan, an essential planning and governance instrument

Presented by

Germán Tovar Corzo

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Bogota's pruning plan, an essential planning and governance instrument

SITUATIONS PRESENTED IN THE PAST WITH PRUNING IN BOGOTA'S URBAN TREES

- The commercial aspect (tree pruning contracts) was prioritized over the real need for tree pruning
- Lack of technical criteria to define the appropriate pruning
- Double intervention by different local government entities - Lack of coordination
- Scheduling and carrying out unnecessary pruning due to political or community pressure
- Deterioration of the physical and sanitary state of the trees.
- Large number of requests to the local government that can cause administrative collapse.
- Waste of logistical, technical and economic resources of the local government in the maintenance of urban tree cover
- Undefined maintenance costs for pruning

2nd World Forum on Urban Forests
Washington DC, 2023

Bogota's pruning plan, an essential planning and governance instrument

OBJECTIVE 1

Prioritize the technical criteria to define the appropriate treatment according to the need for pruning of each urban tree

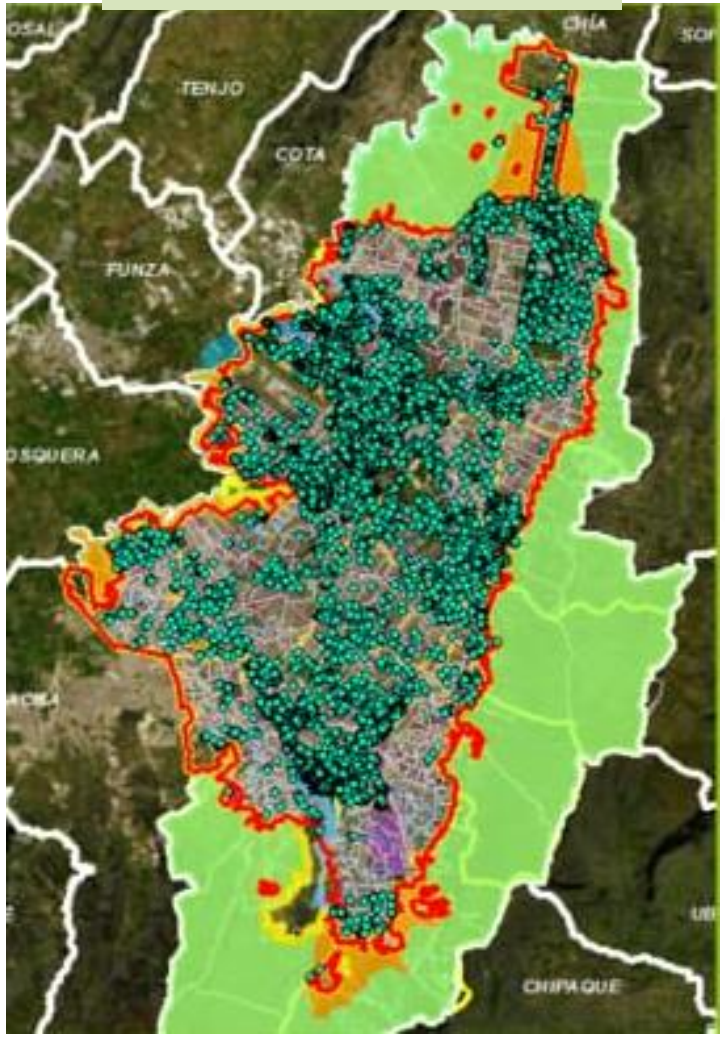
- Conformation of structurally strong trees, with a single dominant stem, balanced crown and branches with strong unions.

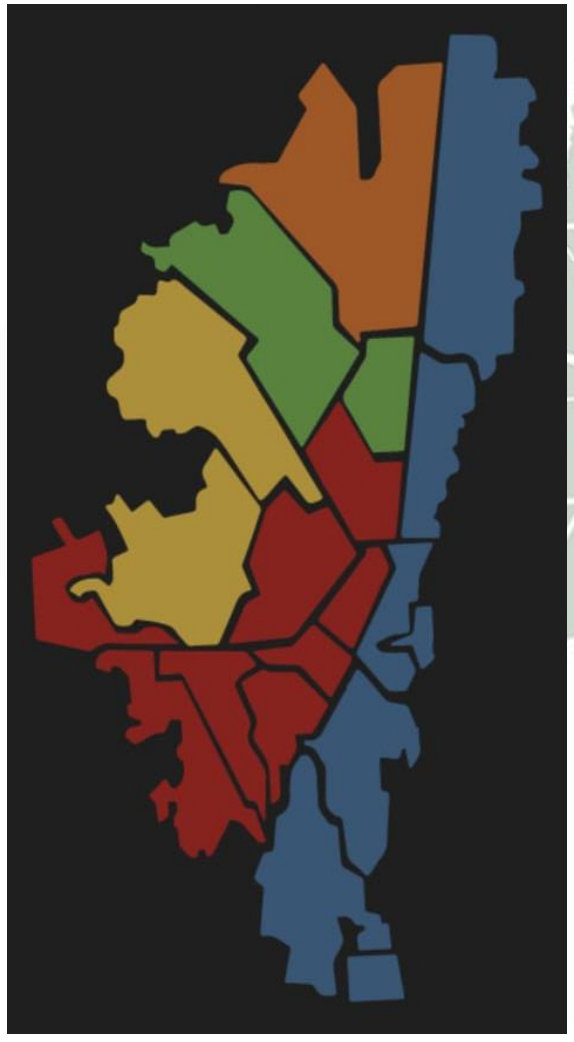
Pruning Plan must contain at least

- Pruning Type — Training (Height control, raising and thinning), forming (structure and sanitary) and balance.
- Pruning intensity
- Pruning cycle

- Trees' census analysis in aspects related present species, zoning of the area by presence of species, number of individuals (universe per area), sizes, heights, physical and crown and trunk health status

1.189.643 urban trees





Bogota's pruning plan, an essential planning and governance instrument

OBJECTIVE 1

Prioritize the technical criteria to define the appropriate treatment according to the need for pruning of each urban tree

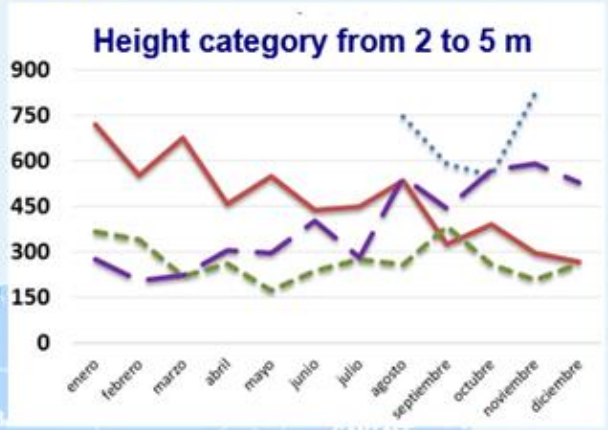
Pruning Plan must contain at least

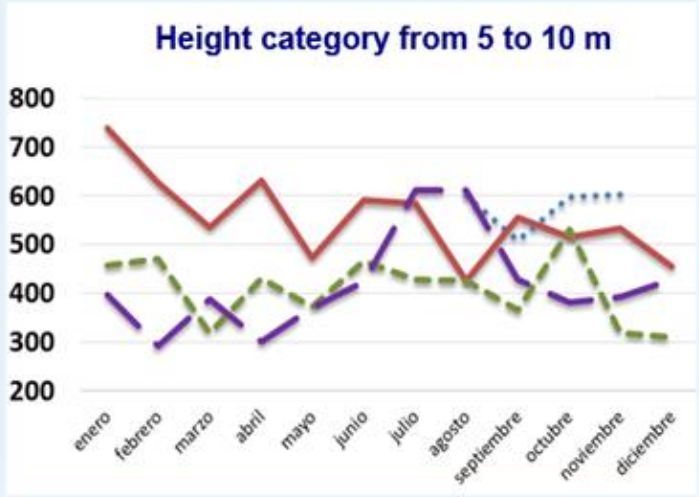
- Trees' census analysis in aspects related present species, zoning of the area by presence of species, number of individuals (universe per area), sizes, heights, physical and crown and trunk health status
- **Historical data analysis performance of pruning by area**

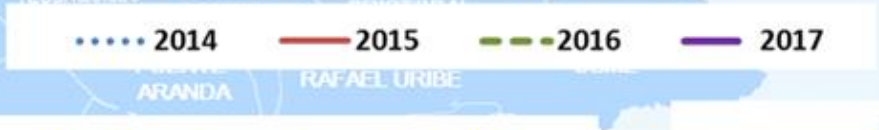
Bogota's pruning plan, Historical data analysis

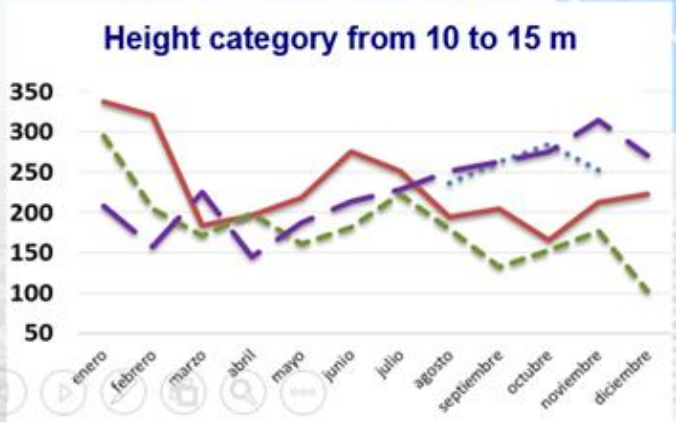
PRUNING CARRIED OUT ANALYSIS
From April 22, 2013 to February 10, 2018

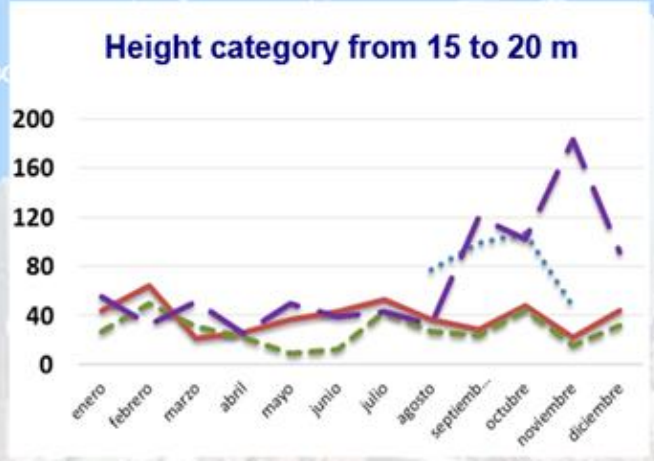
LIME - ASE 1
- Usaquén
- Suba

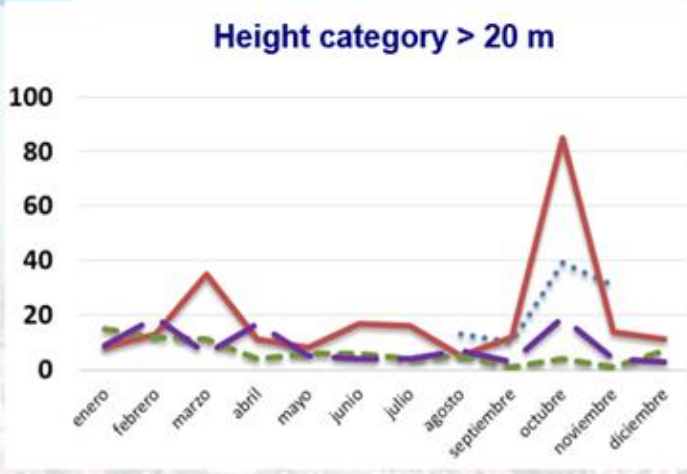












Bogota's pruning plan, an essential planning and governance instrument

OBJECTIVE 1

Prioritize the technical criteria to define the appropriate treatment according to the need for pruning of each urban tree

Pruning Plan must contain at least

- Trees' census analysis in aspects related present species, zoning of the area by presence of species, number of individuals (universe per area), sizes, heights, physical and crown and trunk health status
- Historical data analysis performance of pruning by area
- **Activities prioritization (Trees with branches at risk of falling, trees with unbalanced crowns, tall trees, trees of a certain species susceptible to falling down, and so on.)**

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- **Determination of pruning intensity according to the number of the intervention, pruning type and tree size.**
- **Determination of a pruning cycle per individual/species/location.**

Bogota's pruning plan, Determination of a pruning cycle

Common name	Scientific name	Height	Amount	Growth speed	Observations	Pruning type	PRUNING CYCLE (MONTHS)											
							GROUP 1 SPOT				GROUP 2 SPOT				GROUP 3 SPOT			
							TYPE 1	TYPE 2	TYPE 3	TYPE 4	TYPE 1	TYPE 2	TYPE 3	TYPE 4	TYPE 1	TYPE 2	TYPE 3	TYPE 4
Abutilón pequeño	*Abutilón Insigne*	Up to 3 meters	32	Fast	Species suitable for urban trees	Height control	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
						Raising	12	N/A	N/A	N/A	18	N/A	N/A	N/A	12	N/A	N/A	N/A
						Thinning	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
						Structure	12	N/A	N/A	N/A	18	N/A	N/A	N/A	12	N/A	N/A	N/A
						Sanitary	12	N/A	N/A	N/A	18	N/A	N/A	N/A	12	N/A	N/A	N/A
						Balance	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Alamo	*Populus deltoides*	Up to 10 meters	17	Media	Species suitable for urban trees	Height control	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
						Raising	18	24	N/A	N/A	18	24	N/A	N/A	12	18	N/A	N/A
						Thinning	24	42	N/A	N/A	24	42	N/A	N/A	18	36	N/A	N/A
						Structure	18	24	N/A	N/A	18	24	N/A	N/A	12	18	N/A	N/A
						Sanitary	12	24	N/A	N/A	18	24	N/A	N/A	12	18	N/A	N/A
						Balance	24	42	N/A	N/A	24	42	N/A	N/A	18	36	N/A	N/A

Types 1, 2, 3 and 4 correspond to the height classes as follows: Type 1 from 0 to 5 m. , Type 2 from 5 to 15 m, Type 3 from 15 to 25 m., and Type 4 trees over 25 meters

- Group 1: Trees located on platforms, vehicular and railway corridors, cycle paths and pedestrian paths.
- Group 2: Trees located in environmental strips and water circuits.
- Group 3: Trees located in squares, small squares, pocket parks, neighborhood, zonal and metropolitan parks.

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						Raising	12	N/A	N/A	N/A	18	N/A	N/A	N/A	12	N/A	N/A	N/A
						Thinning	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
						Structure	12	N/A	N/A	N/A	18	N/A	N/A	N/A	12	N/A	N/A	N/A
						Sanitary	12	N/A	N/A	N/A	18	N/A	N/A	N/A	12	N/A	N/A	N/A
						Balance	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
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						Raising	18	24	N/A	N/A	18	24	N/A	N/A	12	18	N/A	N/A
						Thinning	24	42	N/A	N/A	24	42	N/A	N/A	18	36	N/A	N/A
						Structure	18	24	N/A	N/A	18	24	N/A	N/A	12	18	N/A	N/A
						Sanitary	12	24	N/A	N/A	18	24	N/A	N/A	12	18	N/A	N/A
						Balance	24	42	N/A	N/A	24	42	N/A	N/A	18	36	N/A	N/A

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Bogota's pruning plan, an essential planning and governance instrument

OBJECTIVE 1

Prioritize the technical criteria to define the appropriate treatment according to the need for pruning of each urban tree

Pruning Plan must contain at least

- Trees' census analysis in aspects related present species, zoning of the area by presence of species, number of individuals (universe per area), sizes, heights, physical and crown and trunk health status
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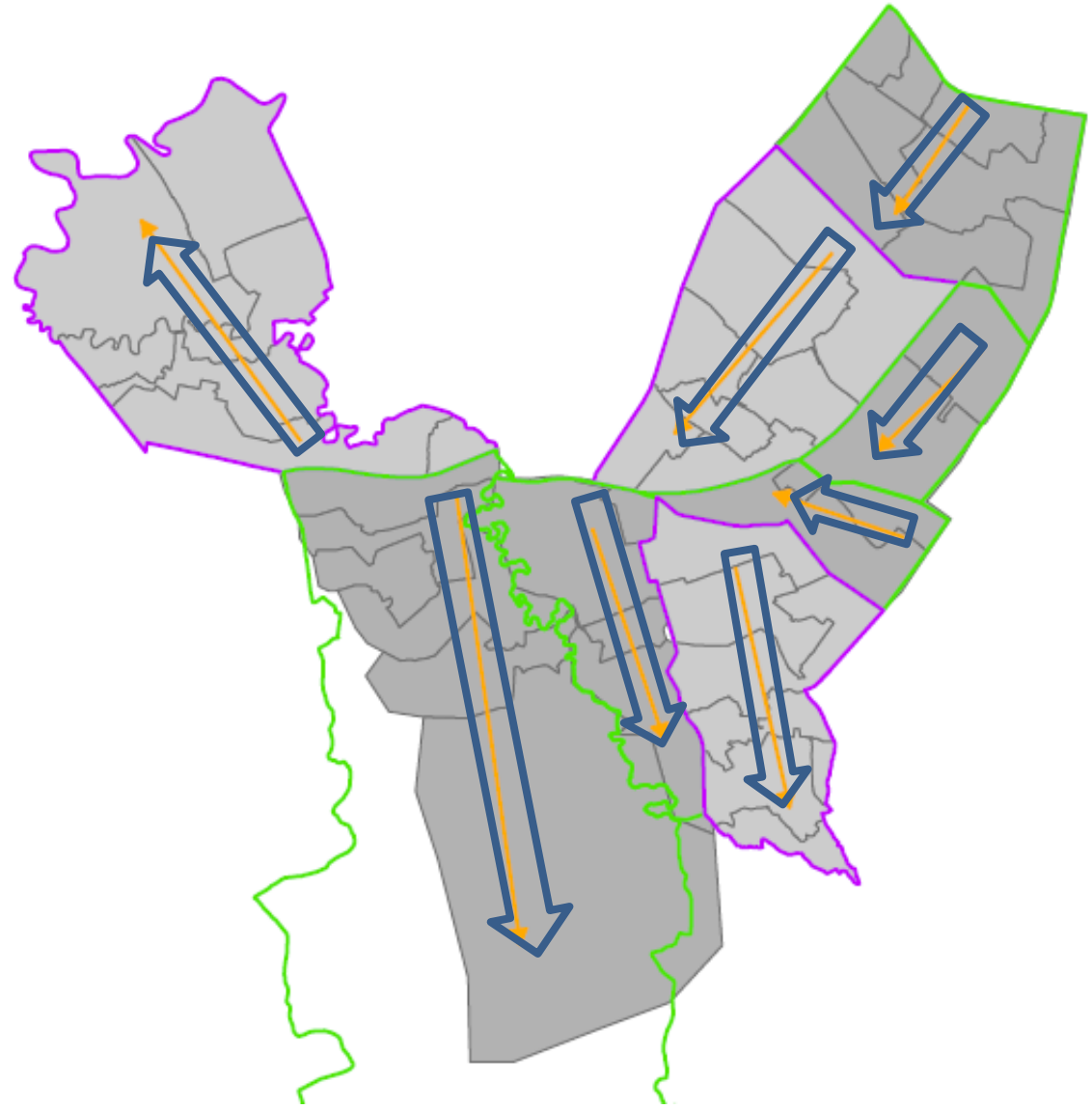
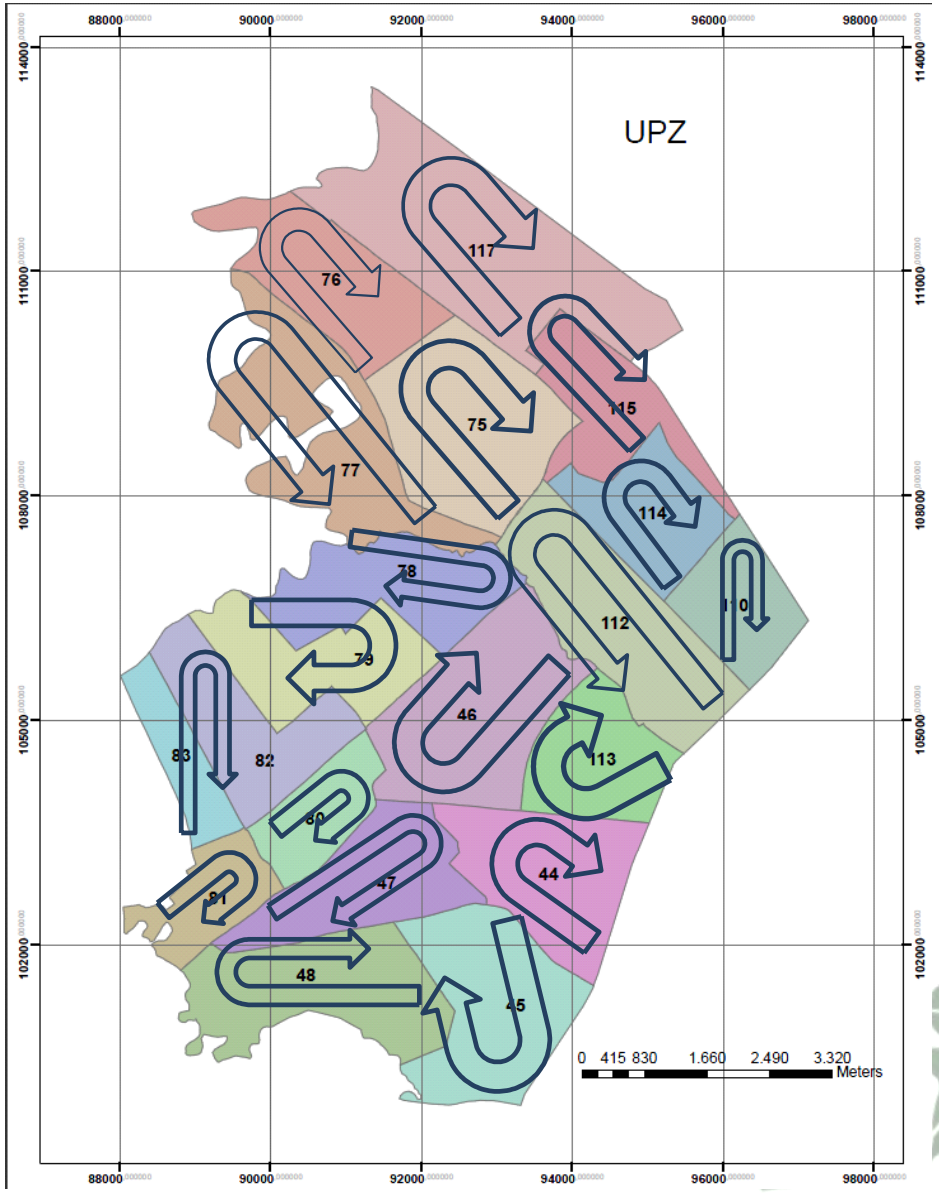
- Determination of pruning intensity according to the number of the intervention, pruning type and tree size.
- Determination of a pruning cycle per individual/species/location.
- **Scheduling activities to fulfill the Pruning Plan**

Bogota's pruning plan,
Scheduling Activities and Routes definition

RUTA	Neighborhood	A	B	C	D	E	Total general	CICLO 1	CICLO 2	CICLO 3	MES 1	MONTHS													MES 18	MES 19	MES 20
	SAN ISIDRO RURAL II	22	6	15	12	1	56	34	28	15	34														28		
	SAN LUIS ALTOS DEL CABO RURAL	19			1		20	1	19	0	1														19		
	SAN LUIS ALTOS DEL CABO RURAL I	270	157	96	90	47	660	390	427	96	390														427		
	PARAMO	1	1	1	2		5	4	2	1	4														2		
	LA ESPERANZA	6	4	3	1		14	8	10	3	8														10		
	LA CABRERA	549	144	754	748	9	2204	1655	693	754	1565	90													693		
ROUTE 1	SEMINARIO	14	23	122	44	1	204	190	37	122		190														37	
	CHICO NORTE II SECTOR	453	218	735	459	7	1872	1419	671	735		1419														671	
	CHICO NORTE III SECTOR	641	141	748	892	67	2489	1848	782	748		300	1548													782	
	CHICO NORTE	892	239	857	985	66	3039	2147	1131	857			500	1647													1131
	EL CHICO	955	188	976	1213	177	3509	2554	1143	976				400	2000	154											
	ANTIGUO COUNTRY	439	140	515	617	11	1722	1283	579	515						1283											
	TOTAL	4261	1261	4822	5064	386	15794	11533	5522	4822	2002	1999	2048	2047	2000	1437	0	0	0	0	0	0	0	0	0	1179	1490	1131
	EL REFUGIO I	18		36	16	2	72	54	18	36						54											
	EL REFUGIO	391	94	198	440	24	1147	756	485	198						510	246										
	EL BAGAZAL				4		4	4	0	0							4										
	INGEMAR	246	30	99	106	10	491	245	276	99							245										
	INGEMAR I	4					4	0	4	0							0										
	INGEMAR ORIENTAL I	30	3	50	47	1	131	101	33	50							101										
	LA SALLE	496	54	455	150	1	1156	660	550	455							660										
	MARIA CRISTINA	209	37	123	198	2	569	360	246	123							360										
	JUAN XXIII	3		2	6	8	19	16	3	2							16										
	GRANADA	201	53	200	145	5	604	403	254	200							403										
	EMAUS	66	47	91	18	4	226	160	113	91								160									
ROUTE 2	LAS ACACIAS	4		8	1		13	9	4	8								9									
	BELLAVISTA	330	155	425	180	3	1093	763	485	425								763									
	LOS ROSALES	416	106	352	301	8	1183	767	522	352								767									
	BOSQUE CALDERON	275	84	292	190	14	855	580	359	292								310	270								
	CHAPINERO CENTRAL	112	74	96	66	6	354	242	186	96									242								
	CHAPINERO NORTE	115	84	142	60	4	405	290	199	142									290								
	QUINTA CAMACHO	270	194	408	157		1029	759	464	408									759								
	ESPARTILLAL	119	58	189	103	2	471	352	177	189									352								
	PORCIUNCULA	243	110	274	86	1	714	471	353	274									100	371							
	LAGO GAITAN	126	36	232	129	2	525	399	162	232										399							
	EL NOGAL	234	136	415	267	4	1056	822	370	415										822							
	EL RETIRO	154	71	317	244	5	791	637	225	317										410	227						
	TOTAL	4062	1426	4404	2914	106	12912	8850	5488	4404	0	0	0	0	0	564	2035	2009	2013	2002	227	0	0	0	0	0	0	0	0

Bogota's pruning plan, Scheduling Activities and Routes definition



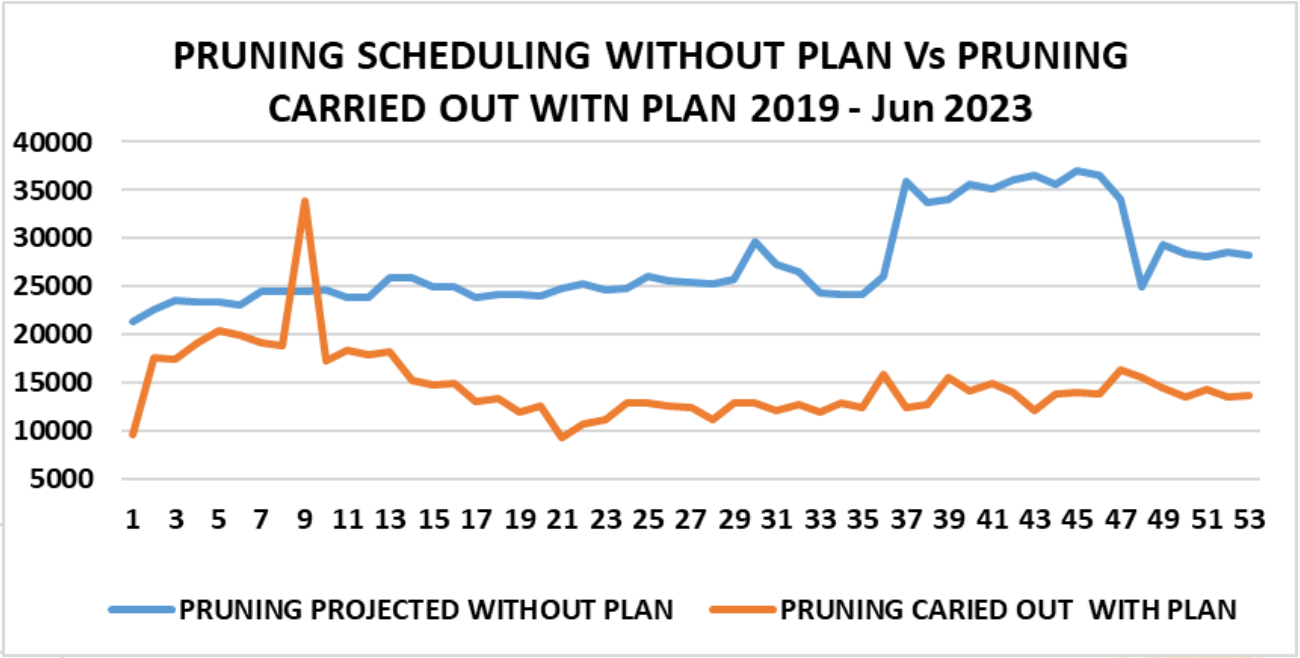


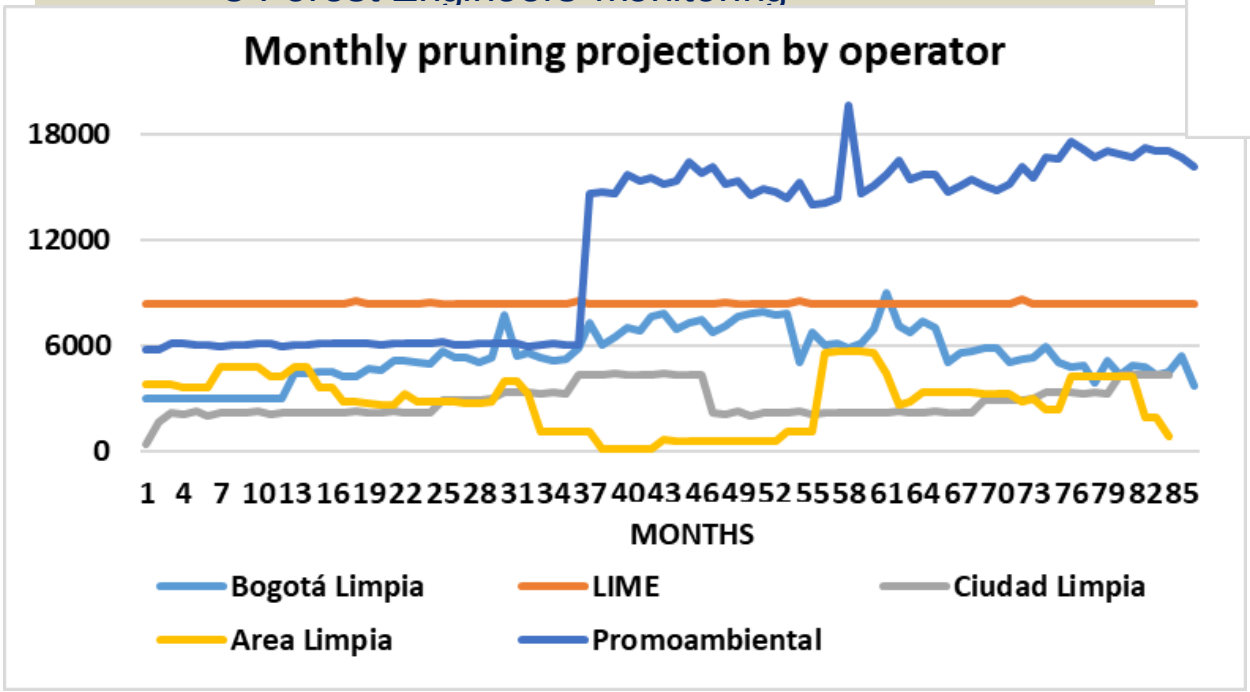
Bogota's pruning plan, Community information advertising brochures

Bogota's pruning plan, Pruning Projection

REQUIRED STAFF:

- 10 Forest Engineers for Coordination of activities
- 14 crews
- 14 Forest Engineers Crew Leaders
- 70 Pruners
- 30 Auxiliaries
- 14 Drivers
- 8 Forest Engineers monitoring





2nd World Forum on Urban Forests

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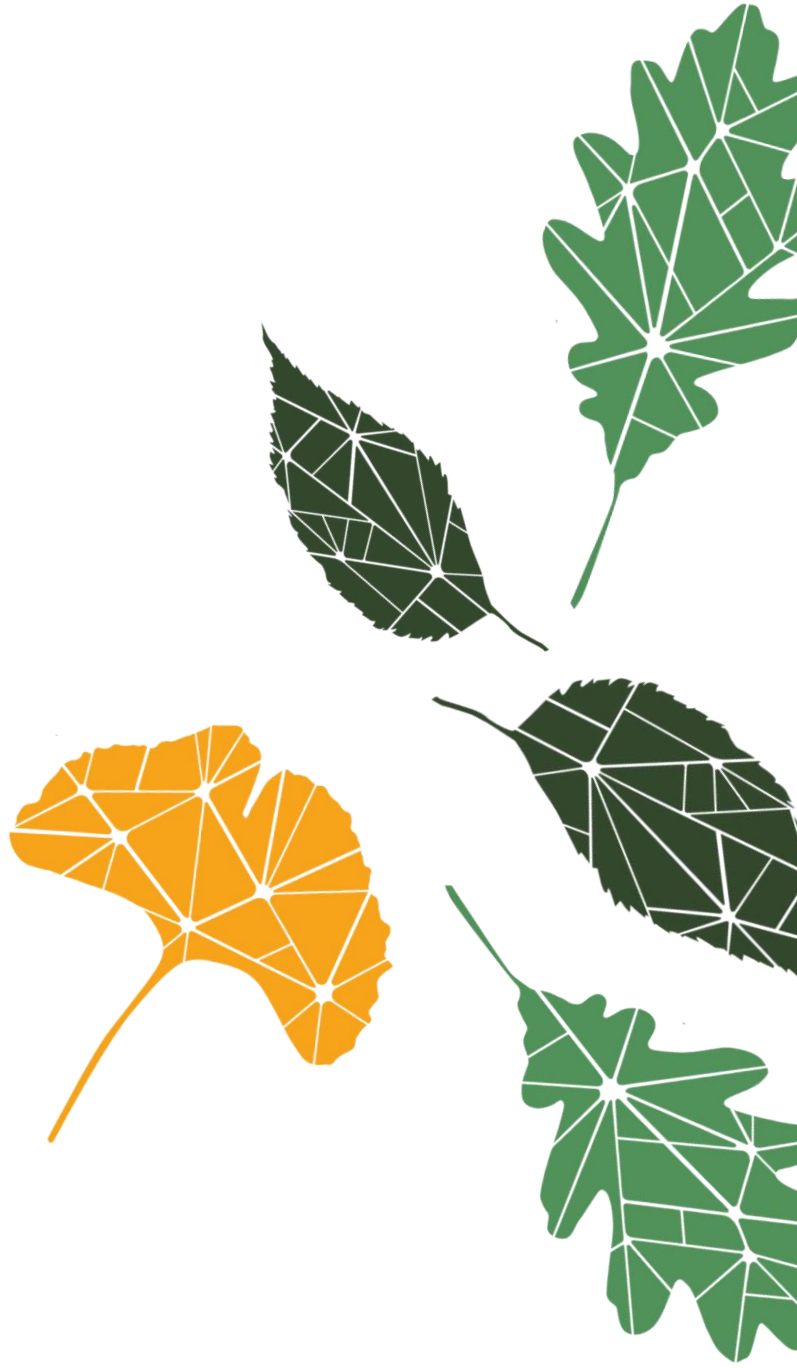
Bogotá's pruning plan, an essential planning and governance instrument

Partial outcomes' Bogotá's pruning plan



Bogota's pruning plan, Partial outcomes

OBJECTIVE 2

Efficiency and economy of processes

- Reduction of requests for pruning procedures from more than 200 to less than 10 per month.

OBJECTIVE 3

Stopping the duplication of treatments carried out and continuous improvement in inter-institutional coordination

- Effect obtained through the precise identification of the treated tree through its SIGAU code and the monitoring carried out by the Environmental Authority.

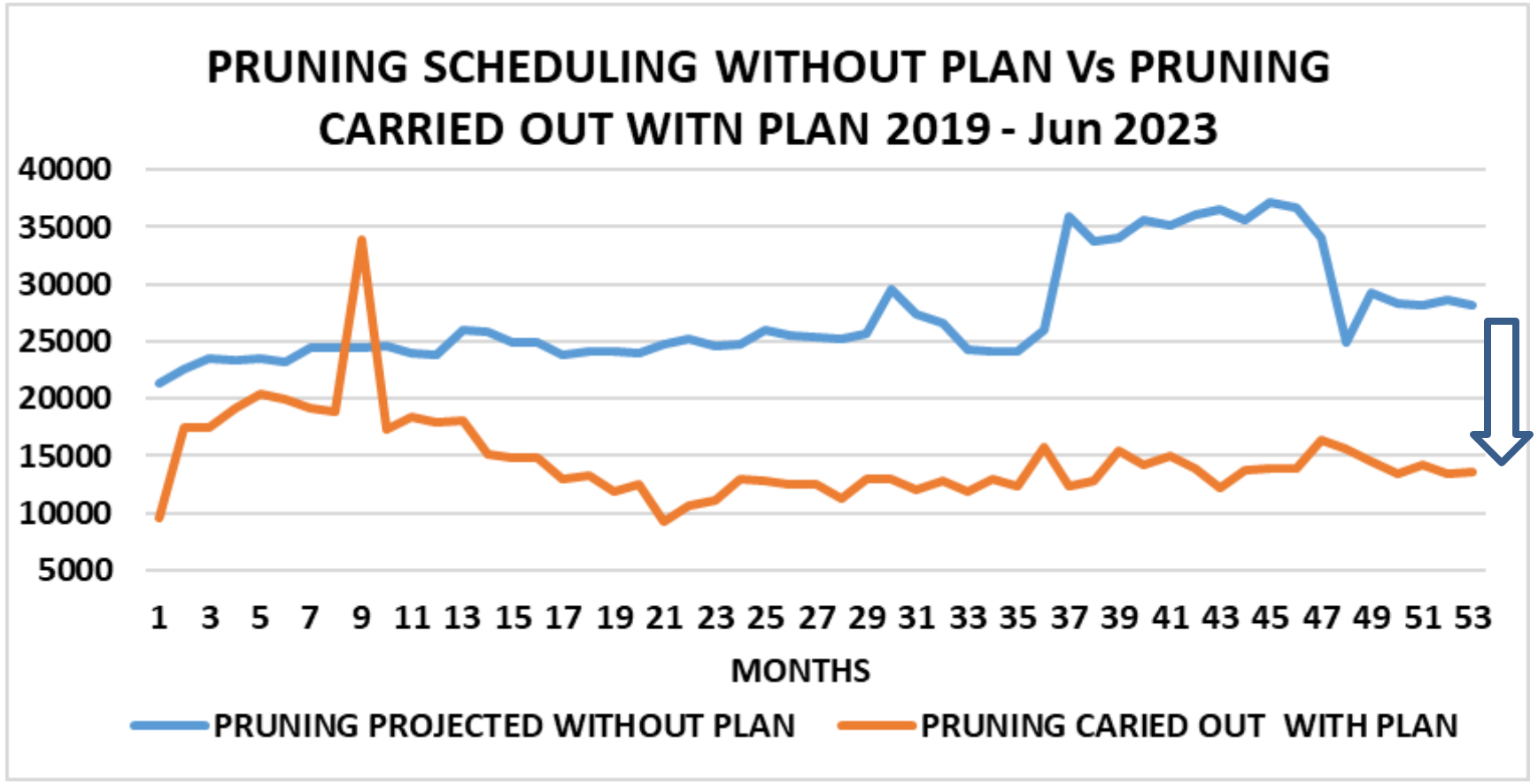
OBJECTIVE 4

The technical need to carry out tree pruning has been prioritized over any other interest (Commercial, Political or Community)

- All pruning have technical support documented both in a database and in technical sheets, which is allowing the generation of the information required to analyze in detail the different aspects of the Pruning Plan for future adjustments.

Bogota's pruning plan, General statistics

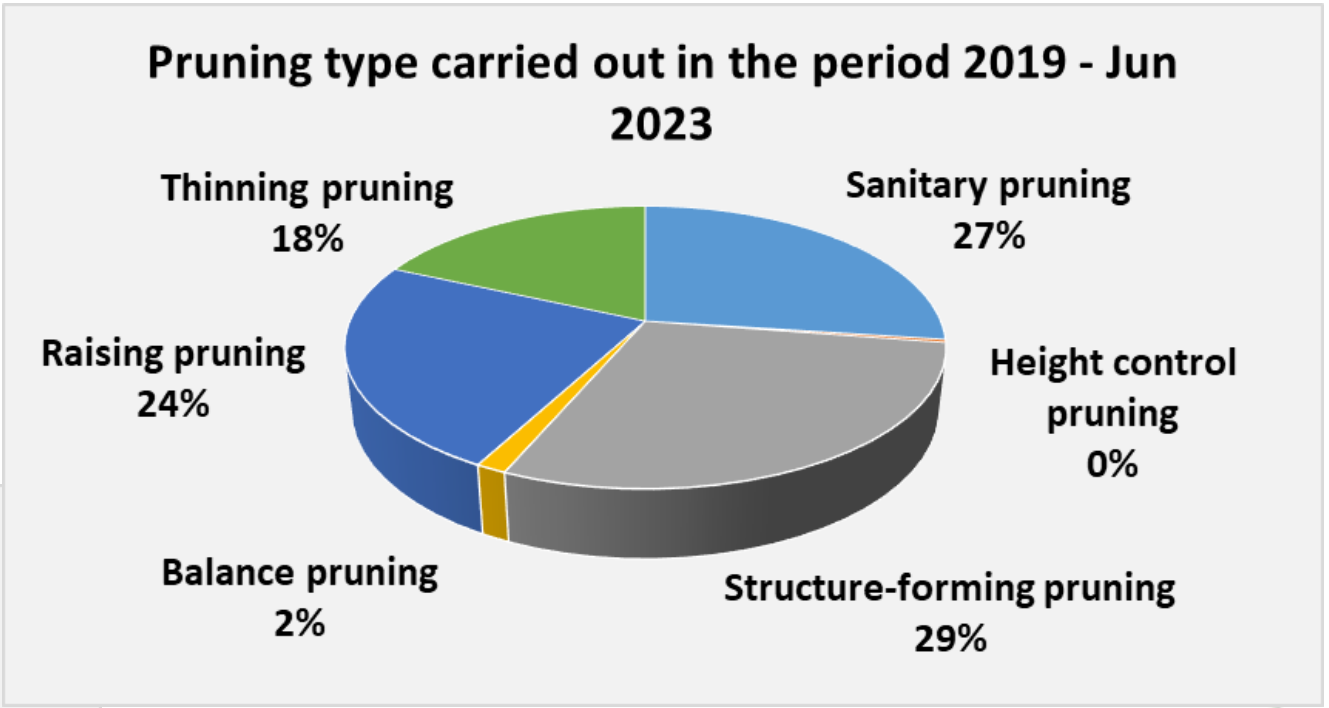
- In the reported period, 655.949 interventions were carried out
- 527.744 trees have been pruned, representing 44,38% of the urban tree census
- 19,54% of the urban tree census, which corresponds to 128.205 trees, has already received the second pruning.

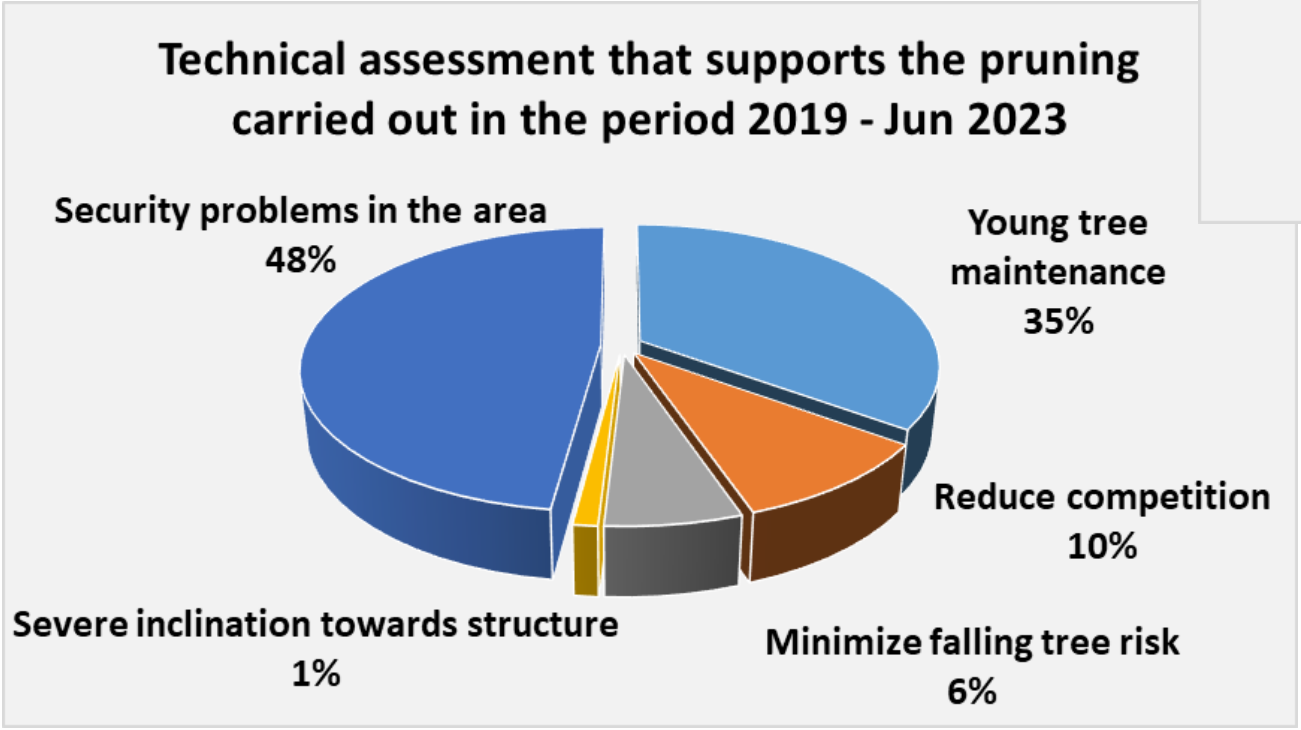


- Pruning plan has a progress of 66.19%
- Pruning has been reduced by 41.5%

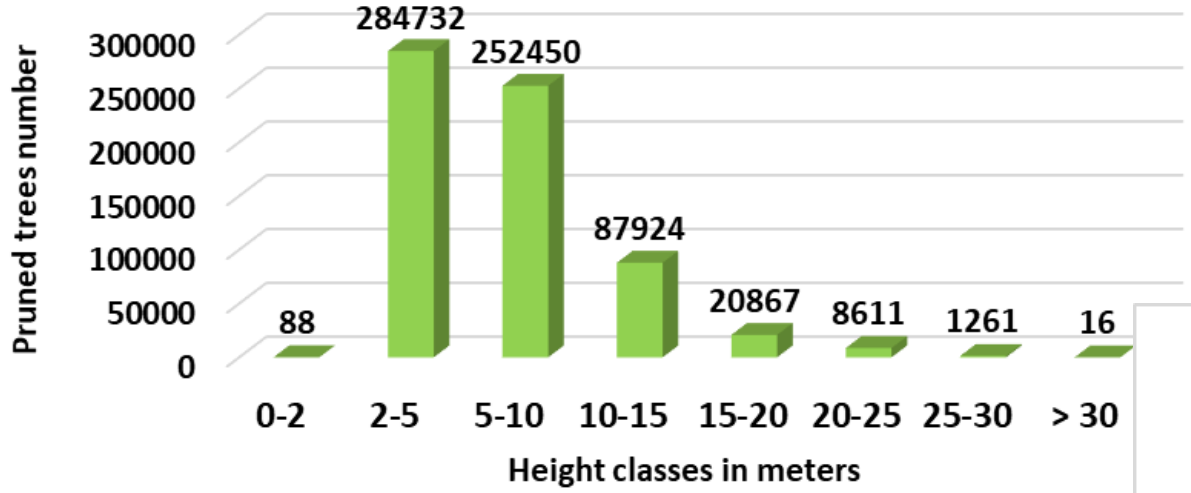
Bogota's pruning plan, General statistics

CONTROL OF TECHNICAL CONCEPTUALIZATION, SUPPORT FOR APPLIED PRUNING

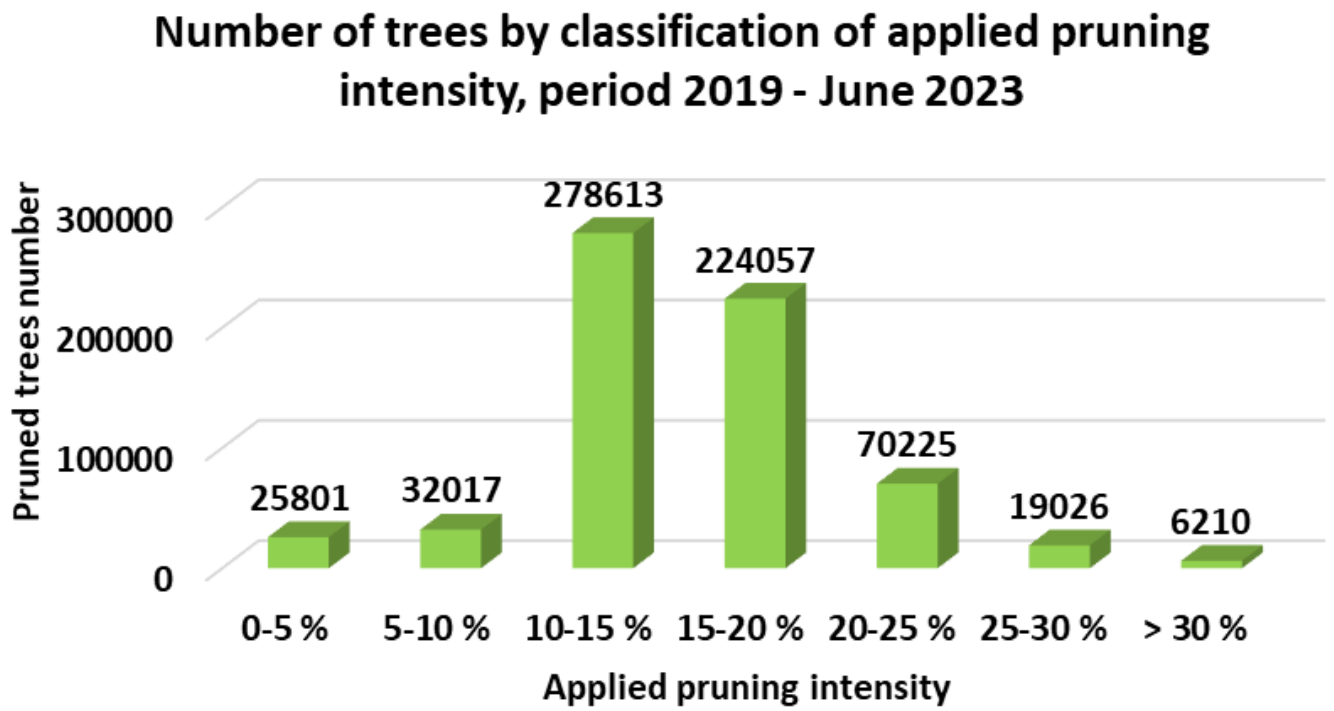




Bogota's pruning plan, General statistics



APPLIED PRUNING INTENSITY CONTROL



COMUNICADO 14 - 2020 Poda de Árboles

Thank you

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Food and Agriculture Organization of the United Nations

CEUs

Session 1.1: Elysium: Creating the policy and legal framework to support the role of urban forests as public health infrastructure

PP-23-3555

World Forum on Urban Forests