TREES FOR LIVE. A TOOL FOR BUILDING UP THE GREEN INFRASTRUCTURE OF BARCELONA



Montse Rivero June 2019



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## Framework

#### Citizen Commitment to Sustainability 2012-2022

"Objective 1. Biodiversity: From urban green areas to the renaturalisation of the city

#### Barcelona's commitment to the climate 2030:

"Reduce greenhouse gas emission 45% by 2030 and increase the city's green areas of 1 m<sup>2</sup>/inhabitant by 2030, as an adaptation objective"

#### Barcelona Climate Plan works on 4 main aspects:

Mitigation, Adaptation and Resilience, Climate Justice and Promoting citizen action







## What do we mean by Green Infrastructure?

- Infrastructure: a set of elements, especially materials, that are fundamental for the development of a human activity
- Green urban Infrastructure: a set of public and private green areas, natural spaces, trees, vegetable gardens, etc. which have natural, agricultural or garden vegetation that provides ecosystem services
- A multiscale and multifunctional concept that places our natural assets as one of a variety of urban infrastructures among all others



Green infrastructure. Source: www.biodiversity.europa.eu (translation: own elaboration)

The areas may be natural, fluvial, coastal, agricultural, woodland, parks and gardens, vegetable gardens, tree-lined streets, vegetation in streets and squares. They may be in residential areas and facilities, green walls, plants on balconies, terraces, courtyards, etc.



What do we have?

1.143 ha of public green areas240.000 trees in urban areas1.698 ha in Collserola Park

7 m<sup>2</sup>/inhabitant

17,62 m<sup>2</sup>/inhabitant



Source: Barcelona Regional



1.866 ha vegetation cover (public and private)1.597 ha vegetation cover in Collserola Park

21,6 m<sup>2</sup>/inhabitant

11,6 m<sup>2</sup>/inhabitant

#### What do we have?



Schematic representation of the capture of green coverage through flights with multi-spectral sensors (NDVI).

Source: Barcelona Regional





# What services does the green urban infrastructure offer and contributes to?











#### **Barcelona Green Infrastructure and Biodiversity Plan: objectives**

- ✓ Preserving and enhancing the natural heritage of the city and preventing species and habitats from disappearing
- ✓ Achieving the maximum amount of green infrastructure and ensuring its connectivity
- ✓ Obtaining the maximum number of social and environmental services from green infrastructure and biodiversity
- ✓ Making progress in educating society to place greater value on green infrastructure and biodiversity
- ✓ **Making** the city more resilient in the face of future challenges such as climate change





#### 1. Preserving the city's natural heritage

- **1.1** To develop biodiversity preservation protocols for areas of major interest and to implement associated guidelines.
- **1.2** To implement preventive and corrective measures for activities in public spaces that may have an impact on biodiversity.
- **1.3** To identify and implement measures to preserve biodiversity in private gardens and other areas of special interest.
- **1.4** To consolidate vertebrate conservation programmes.
- **1.5** To prepare action plans for the conservation of special interest flora and fauna and to implement associated guidelines.
- **1.6** To launch measures to control exotic, invasive flora.
- **1.7** To prevent and control invasive and excessive animal populations.



Orchid (Himantoglossum robertianum)

Mediterranean Tree Frog (Hyla meridionalis)

Peregrine falcon (Falco peregrinus)



#### 2. Planning green infrastructure to ensure connectivity and strike a balance in distribution

**2.1** To identify the city's green infrastructure.

**2.2** To boost projects in the city outskirts and metropolitan area for connecting green infrastructure and preserving biodiversity.

2.3 1.7 To implement the green corridor network project





## **3.** Designing the city and its green spaces taking into account environmental services and integrating criteria to enhance biodiversity

- **3.1** To develop a Green Infrastructure and Biodiversity Charter.
- **3.2** To make ground in public areas permeable.
- **3.3** To diversify street tree species.
- **3.4** To incorporate efficient landscaping criteria in areas with limited water resources and maintenance.
- **3.5** To adapt coastal vegetation to environmental conditions.



Sustainable Urban Drainage System

Vegetation adapted to the marine coast. Nova Mar Bella



# 4. Creating new spaces for nature and increasing the presence of green infrastructure and biodiversity

**4.1** To organise and create a network of local nature reserves by restoring sites of natural interest.

- 4.2 To create new green spaces in the city.
- **4.3** To increase biomass in the city by increasing the number of trees and shrubs in parks, gardens and public spaces.

**4.4** To enrich existing green infrastructure and to enhance its habitat function.

- 4.5 To promote silence in parks so people can enjoy soundscapes.
- **4.6** To promote green decks, rooftops, walls and courtyards.
- **4.7** To create green spaces in temporarily unused plots.
- **4.8** To promote organic agriculture in urban and peri-urban areas.
- **4.9** To create seasonal gardens in urban squares.

**4.10** To provide more soil space for street trees.



INDIVERSITAT



5. Managing parks and gardens and other green spaces with sustainability and efficiency criteria, fostering biodiversity



**5.1** To improve the management of green spaces and street trees.

5.2 To prepare park dossiers.

**5.3** To develop a park and garden rehabilitation programme following rationalisation criteria.

**5.4** To optimise irrigation carried out in green areas.

**5.5** To implement a biodiversity-friendly pest, disease and weed management programme.

**5.6** To replace high water consumption lawns with warm climate cespitosa plants and carpeting plants.

**5.7** To develop a protocol of action for greenery management in the event of weather-related incidents.

Spontaneous flora in tree pits



# 6. Preserving and enhancing the value of cultural heritage, especially in historical gardens

- **6.1** To prepare management plans for historical and themed parks and gardens.
- 6.2 To review local and national heritage listings so that they include all relevant historical gardens.
- 6.3 To designate Montjuïc as the benchmark of Barcelona's landscaped heritage.
- **6.4** To develop a plan for the preservation of Barcelona's distinguishing tree species.

6.5 To preserve and promote Barcelona's trees of local interest.



Strategic framework of the historic gardens of Barcelona



# 7. Improving knowledge for the management and conservation of green infrastructure and biodiversity

**7.1** To undertake monitoring on the state and development of natural heritage by implementing a database and system of indicators on green infrastructure and biodiversity.

- 7.2 To prepare and update the map of green infrastructure and biodiversity.
- 7.3 To extend and pursue studies on the environmental benefits associated with green infrastructure and biodiversity.
- 7.4 To gain greater applied knowledge about the effects of green infrastructure on health.
- **7.5** To encourage research on the effects of climate change on natural heritage.
- 7.6 To determine the water demand needed to ensure the quality of vegetation.
- 7.7 To seek out and test new plant species in cooperation with research institutions and centres.
- **7.8** To gain greater knowledge of the impact of the city on global biodiversity.



Socio-environmental services of urban green spaces. Source: Barcelona Regional



## 8. Spreading knowledge of green infrastructure and biodiversity and their values, fostering training

**8.1** To develop and implement a communication strategy on green infrastructure and biodiversity.

**8.2** To promote green spaces as settings for education and knowledge.

**8.3** To set up and provide a green infrastructure and biodiversity interpretation centre in Barcelona.

**8.4** To foster the Parc del Laberint Training Centre as a platform for promoting gardens and landscaping.

**8.5** To promote BioBlitz-style citizen initiatives for build collective knowledge in a festive mood.

**8.6** To raise awareness about the value of biodiversity among professionals.

**8.7** To create resources for and provide support to schools.

**8.8** To educate citizens in managing conflicts in coexisting with animals based on conservation criteria.



Atlas of Barcelona's Nesting Birds



Communication strategy on green infrastructure and biodiversity



## 9. Fostering green spaces as places for health and enjoyment as well as promoting citizen involvement in their creation and in the conservation of biodiversity

**9.1** To prepare and implement a plan on social uses of green spaces in Barcelona.

**9.2** To increase and improve the number of recreational and health facilities offered in parks.

**9.3** To improve and diversify children's playgrounds by involving schools, associations and the community.

**9.4** To promote private greenery by encouraging landscaped vegetable gardens, balconies, terraces, roofs, decks, walls and courtyards.

9.5 To open private green spaces for public use.

**9.6** To set up a volunteer programme for the conservation, information and dissemination of green infrastructure and biodiversity.

**9.7** To design and implement a programme of accessible neighbourhood-run flower and vegetable gardens.

**9.8** To organise idea contests related to green infrastructure and biodiversity open to various groups.



Plaça del Sol



## **10.** Strengthening local leadership, networking and the commitment to the conservation of green infrastructure and biodiversity

**10.1** To turn Barcelona into a green benchmark.

**10.2** To actively take part in city networks and with the foremost bodies committed to addressing biodiversity issues.

**10.3** To strengthen cooperation with the network of institutions and work hand in hand with the authorities involved.

**10.4** To foster networking with organisations and secure their commitment to biodiversity.

**10.5** To engage economic stakeholders in sponsorship programmes for the conservation of green infrastructure and biodiversity.

**10.6** To promote a land stewardship system as a tool for nature conservation.

**10.7** To make progress towards an environmentally friendly procurement policy.

Valoració de l'aplicació del Manifest en defensa del verd i la biodiversitat als diferents programes electorals 2019 Grup de Treball Verd i Biodiversitat - Barcelona+Sostenible	Barcelona En Comú	JUNTSPER Catalunya	Valls	an, ERC	PS <b>C</b>	P	<mark>.≅cup</mark>
· Plansi estratègies ·							
Incrementar el verd urbà	1	ø	ø	1	1	2	1
Continuar la implementació del Pla del Verd i la Biodiversitat	1	2	1	1	2	2	1
Promoure espais verds multifuncionals amb finalitat de cohesió social	1	1	1	2	2	2	1
Vetllar perquè l'Institut Municipal de Parcs i Jardins segueixi les línies del Pla del Verd i la Biodiversitat	2	1	2	2	2	2	1
Fomentar l'educació i la comunicació ambiental	2	2	2	2	2	2	2
Eliminar l'ús de tractaments químics de síntesi en jardineria	1	2	2	2	2	2	1
Impulsar el monitoratge i seguiment de fauna i flora	1	2	×	2	2	2	2
Realitzar un control de la fauna, d'animals de companyia i del comerç d'animals	1	2	1	2	2	2	1
· Econòmic i financer ·							
Crear mecanismes fiscals per a la protecció i promoció del verd i de la biodiversitat (ecotaxes, IBI)	×	2	×	2	2	×	ø
Reduir els impostos a les empreses que fomenten i protegeixen el verd i la biodiversitat	2	2	2	2	2	2	2
Subvencionar iniciatives que augmentin el verd a la ciutat	2	2	2	2	ø	×	2
· Legislació i normativa							
Protegir els espais verds públics i privats	1	×	×	2	2	×	2
Potenciar el verd en la legislació urbanística	2	2	1	1	2	2	~
Incorporar el verd i la biodiversitat en la normativa d'edificació i obra pública	1	2	2	2	×	×	×
·Governança i gestió ciutadana ·							
Implicar a la ciutadania en la gestió del verd i la biodiversitat	1	2	2	2	2	2	1
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# STIMULUS PROGRAMME FOR THE CITY'S

## **URBAN GREEN INFRASTRUCTURE**





## The Stimulus Programme for the city's urban green Infraestructure. Goals and programme

#### **MAIN GOALS**

- To increase the city's green infrastructure in benefit of the general public's health
- To improve the city's green infrastructure in order to develope more services
- Public involvement in increasing green areas and biodiversity



#### MAIN LINES OF THE PROGRAMME

LINE 1. INCREASING THE GI LINE 2. IMPROVING THE EXISTING GI LINE 3. CORRESPONSABILITY OF THE GENERAL PUBLIC IN INCREASING AND IMPROVING THE GI LINE 4. STUDYING, PLANNING AND MONITORING THE GI





1.1. Creating new public parks and gardens



"Urban Canopy" Plaça de les Glòries



**1.2.** Recovering city block interiors in built-up areas in order to gain new public green areas



Interior d'illa Corcega



**1.3.** Installing temporary gardens in empty building sites





Naturalitzem Barcelona #naturaurbana

#### Line 1. Increasing the green infrastructure

**1.4.** Interventions in roadways to increase green features

70 interventions 8,24 ha

#### ONEM AS AL IFRN SITUACIÓ EXISTENT PROPOSTA DE FUTUR (RECREACIÓ VIRTUAL)



Cristóbal de Moura







**1.5.** Greening rooftops, terraces and courtyards



Green roof in the Museu Ciències Naturals- Forum



1.6. Greening walls and dividing walls



27 interventions 0,58 ha



**Rector Oliveras** 



2.1. Naturalising green areas

#### Habitats:

- ✓ Creating new, diversified land and aquatic habitats.
- Enhances vegetation mosaics and diversity of environments
- Improving vegetation structure in order to produce various well-represented strata: trees, bushes, herbaceous plants, climbers
- ✓ Increasing biomass (having bigger, more mature trees)
- ✓ Improving soil (more fertile soils)
- ✓ Increasing connectivity between green areas
- Landscaping by copying nature and adapting it to urbanenvironment conditions
- ✓ Contributes to a landscape that gives identity
- ✓ Valuing the natural succession of Mediterranean vegetation

#### Species:

- ✓ More native / adapted species
- ✓ Greater diversification of flora
- ✓ Greater presence of friendly flora
- Conservation of flora and fauna that is protected
- More species that offer nectar and pollen, that present late fructification and provide nutrition for butterflies



2.1. Naturalising green areas

#### How are we doing it?

- ✓ Transforming lawns into natural meadows or grassland
- Sowing meadows with flowers that are interesting for biodiversity
- ✓ Planting bushes with flowers that attract fauna.
- Creating areas of special interest for biodiversity
- Enriching the borders of vegetable gardens with plants that enhances biodiversity
- Planting stands of fruit bushes and trees in lawns
- Eliminating invasive plants
- Creating ponds that can self-regulate with their own biota



Lasiommata megera (Wall Brown butterfly)



#### Installing structures to provide biodiversity shelters:

insect hotels, dry-stone spirals with aromatic plants, rockeries, muddy areas for swallows, wooden pyramid, nesting towers or boxes for bats, nests for hedgehogs, leaving dried-up trees standing



#### **2.1.** Naturalising green areas



Planted meadow in Montjuïc



**2.2.** Increasing the city's biomass, especially in terms of trees and bushes in parks, gardens and public areas , favouring their growth







2.3. Preserving and improving biodiversity in urban sites



**2.4.** Conserving and improving natural and semi-natural areas, especially open ones



Natural meadowland in Montjuïc



**2.5**. Favouring structures for the shelter, feeding and reproduction of urban fauna: fauna corridors, beehives, insect hotels, nests, boundary walls, promontories, etc.



Installation of nesting towers for bats

Bio-trunk Installation in the Petra Kelly Gardens, Montjuïc



2.6. Naturalising ornamental ponds



Mossèn Cinto Verdaguer Garden


# Line 2. Improving the existing green infrastructure

**2.7**. Taking care of natural water present in the urban environment: channels, springs, groundwater, etc.





# Line 2. Improving the existing green infrastructure

**2.8.** Extending Sustainable Urban Drainage Systems (SUDS), as a solution for regulating water based on natural processes.





## Line 2. Improving the existing green infrastructure

**2.9.** Promoting and strengthening public management of green areas



Strategic plan for the management of green spaces and biodiversity in barcelona



# BARCELONA: Mirades Al Verd

Mirem a tres nivells, micro, meso i macro, per viure i fer créixer el verd



Traveling exhibition "Mirades al verd"



**3.1.** To promote the general public's corresponsability and shared responsibility in conserving and increasing green infrastructure in parks, gardens and other green areas of the city.



Allotments in Sagrada Família

Naturalized pond. El Bosc School



**3.2**. To promote urban responsibility in the expansion and conservation of the city's green infrastructure, through the city's social and community organisations



Land stewardship in La Foixarda, Montjuïc



**3.3**. Promoting ecological agriculture in urban and peri-urban areas and sites





**3.4.** Fostering privately-owned green areas through the promotion of vegetable gardens, and gardening on balconies, terraces, roof terraces, rooftops, walls and courtyards





**3.5**. Fostering the opening of non-municipal green areas to the public



Teatre Nacional Catalunya Gardens



3.6. Disseminating knowledge about urban nature and the value of conserving it



# GOOD GARDENING PRACTICES IN BARCELONA: Conserving and improving Biodiversity



barcelona.cat/ecologiaurbana twitter.com/BCN\_Ecologia #controlplagues





Bioblitz 2016, Montjuïc



**4.1.** Planning Barcelona's green infrastructure as a system, including the green corridor network, taking social-environmental services into account





**4.2.** Reviewing the areas recognised by planning as leisure areas with potential for increasing the percentage of plant life and permeable areas





**4.3**. Completing the study of ecosystem services in Barcelona's green areas for the whole city.

Published the study of socio-environmental services of the green spaces of Barcelona



Average valuation of the services for each green space Source: Barcelona Regional



4.4. Creating an information system on green infrastructure, green areas and biodiversity



# 3- TREES FOR LIFE. MASTER PLAN FOR BARCELONA'S TREES 2017-2037



# **TREES FOR LIFE**

Master Plan for Barcelona's Trees 2017 - 2037









### The Master Plan for Barcelona's Trees

Is a strategic municipal document that defines the vision, goals, strategic lines and initiatives behind the planning, management and conservation of the city's tree population, public and private, according to their bio-geographical and urban features.







### **GOVERNMENT MEASURE**





Source: Courtesy of Thomas Elmqvist



### **UFORE – Tree inventory**

UFORE is a programme designed by the US Department of Forestry and Agriculture. It works by using a sample of the territory, which allows researchers to quantify and evaluate urban forest structures and their environmental benefits.

It has been calculated that there are over **1,4 million trees** within Barcelona's municipal boundaries, according to the study "Ecological Services of Urban Green Areas in Barcelona", produced by CREAF using UFORE

All the trees within municipal boundaries, including the Collserola range. large tree biomass provides first-class environmental services and constitutes a natural heritage site of great value.





### **UFORE – Tree inventory**

# MANAGEMENT OF Barcelona's trees



Managed by the Collserola Natural Park Consortium Managed by the Municipal Institute of Parks and Gardens

#### Others :

Barcelona Metropolitan Area (parks), public bodies (Generalitat regional government of Catalonia, Barcelona provincial council...), entities and institutions (universities, hospitals...), city council (cemeteries, schools, sports facilities, BSM...) and private entities

# TREE COVER In the city







According to this study, the most common trees in the Barcelona municipal area (including the Serra de Collserola) are the holm oak (Quercus ilex) with 313,372 individuals (22.1% of the total population), Aleppo pines (Pinus halepensis) with 290,525 individuals (20.5%), plane trees (Platanus × acerifolia) with 93,212 individuals (6.6%) and stone pines (Pinus pinea) with 69,749 (4.9%).

The same study shows that the most common trees inside the built-up area of Barcelona are plane trees (Platanus × acerifolia), with 18,744 individuals (8.8% of the urban population), the Monterey cypress (*Cupressus macrocarpa*) with 15,620 individuals (7.4%), privets (Ligustrum lucidum), with 13,668 trees (6.4%) and the European nettle tree (Celtis australis), with 11,715 individuals (5.5%).



# Objectives

- 1. Having a tree population that forms a real green infrastructure, achieving the maximum value and connectivity with its surroundings (urban and natural).
- 2. Getting the maximum environmental, social and economic services from the tree population.
- 3. Having a tree population that is biodiverse, in good condition, protected, safe and which provides the city with identity, through the most efficient and sustainable management possible.
- 4. Having a tree population that is adapted, resilient and which can be used as a tool for adapting to climate change.
- 5. To achieve good coexistence between the general public and trees, and encourage society to value trees more.





# Challenges for 2037:

- 1. Increasing the city's tree cover by 5%, so that 30% of the city's surface area is covered by trees.
- 2. Ensuring that within urban areas, 40% of tree species are adapted to climate change, as opposed to the current 30%.
- 3. Achieve a biodiverse tree heritage in which no single tree species accounts for more than 15% of the total population within the urban area.
- 4. Provide the general public with all the information on the characteristics and services that every tree in urban areas provides, by means of interactive technologies that foster knowledge and citizen collaboration.
- 5. To ensure that in all Barcelona primary schools, the children appreciate and can identify the trees in their neighbourhood.





#### TREE HERITAGE AND BIODIVERSITY

# LINE 1. Conserving the tree population, making it more sustainable and turning it into a biodiverse habitat

Action 1.1 – Getting to know Barcelona's tree heritage and producing a complete inventory

Action 1.2 – Balancing out the abundance of all species of trees and palm trees in the city

Action 1.3 – Strengthening the tree population as part of an ecosystem with native fauna and flora.

Action 1.4 – Planning the replacement of trees















## LINE 2. Increasing knowledge about trees and their values and services

Action 2.1 – Studying the tree population's functions, values, services and disservices

- Action 2.2 Assigning an economic value to the benefits of the tree population
- **Action 2.3** Studying the effects of climate change on the urban microclimate and its impact on trees
- **Action 2.4** Studying how to tackle the scarcity of natural resources in the tree population's management
- Action 2.5 Minimising environmental impact on tree management







### LINE 2. Increasing knowledge about trees and their values and services

Action 2.6 – Improving training for specialist personnel regarding the tree population and fostering ways of collaborating with other Municipal departments.

Action 2.7 – Creating knowledge and experienceexchange networks with other national and international cities

Action 2.8 – Seeking and applying new methods for controlling and monitoring the physiological state of trees (infra-red, drones, sensors, etc.)

Action 2.9 – Selecting tree species with an eye to the future (resistance to urban environment, size and shape, flowering)





#### COMMUNICATION AND PARTICIPATION

# LINE 3. Inform the general public about the services and disservices provided by trees, encouraging them to participate in their conservation

**Action 3.1** – Producing and applying a communication strategy for the tree population

**Action 3.2** – Promoting educational projects on the tree population in education centres and for the general public

Action 3.3 – Promoting and supporting projects for involving the general public

Action 3.4 – Using new technologies to inform people about the city's tree heritage





### PLANNING AND CONNECTIVITY

# LINE 4. Planning the tree population as a more powerful, more interconnected green infrastructure, which can provide more services

Action 4.1 – Increasing the city's tree body of trees by planting more trees and bushes and improving the quality of existing trees

Action 4.2 – Including the value of the tree population in planning

Action 4.3 – Connecting the tree population with urban and natural environments

Action 4.4 – Reviewing the planning and design criteria for tree planting in city projects

Action 4.5 – Ensuring that each tree species is provided with the best possible agronomic conditions in the urban environment





### PRESERVATION AND PROTECTION

LINE 5. Preserving the tree population and its heritage and identity values, ensuring its protection

Action 5.1 – Producing a plan for preserving heritage tree species in Barcelona

Action 5.2 – Improving and informing the general public about trees of local interest in Barcelona

Action 5.3 – Applying more efficient physical protection systems for trees

**Action 5.4** – Ensuring the protection of trees during construction work

**Action 5.5** – Reviewing the evaluation and economic compensation criteria for trees and transplanting

**Action 5.6** – Organising and reviewing technical and regulatory documents concerning trees and their protection





# LINE 6. Caring for the health of the trees, considering biodiversity and the general public

Action 6.1 – Applying integrated control of pests and diseases

**Action 6.2** – Promoting and informing the general public about the value of beneficial plants, fostering the growth of spontaneous vegetation

Action 6.3 – Seeking alternatives to herbicides for the control of spontaneous vegetation

Action 6.4 – Applying the strategy to combat and control the red palm weevil





# LINE 7. Working towards a good supply and appropriate planting of trees



Action 7.1 – Ensuring the long-term supply of trees

PLANT MATERIAL AND **PLANTING** 

Action 7.2 – Purchasing high-quality trees

Action 7.3 – Improving tree planting

Action 7.4 – Rethinking tree nurseries

Palmera (Phoenix sp)



# LINE 8. Pruning as little as possible while ensuring people's safety and tree growth

Action 8.1 – Reviewing and unifying pruning criteria for trees

Action 8.2 – Pruning young trees to shape them

- Action 8.3 Improving risk evaluation for trees and palm trees
- Action 8.4 Finding new uses for plant residue









# LINE 9. Providing trees with a greater volume and higher quality of soil, developing strategies that make urban surfaces more permeable

Action 9.1 – Trying out and applying new types of soil and permeable surfacing
 Action 9.2 – Improving the quality of soil in new plantings
 Action 9.3 – Improving soil quality for existing trees
 Action 9.4 – Resolving the compatibility between tree wells and accessibility
 Action 9.5 – Designing new tree wells and surfacing, rationalising services



# LINE 10. The sustainable management of irrigation water, while obtaining maximum services

- Action 10.1 Adjusting the amount and frequency of watering to each species
- Action 10.2 Applying the most efficient irrigation technologies
- Action 10.3 Prioritising the use of alternatives to drinking water
- Action 10.4 Making use of run-off water in parks and woodland areas, and also for street trees

Action 10.5 – Seeking appropriate alternative resources for future water availability.









**i-Tree** is a set of free tools built on science that quantifies the benefits and values of trees around the world









Source: Master Plan for Barcelona's Trees



STATUS	ALTERATIONS	INDICES OF RISK	FUTURE PERSPECTIVES
Normal	Slightest disturbance	Risk free	Normal
Altered	Serious disturbance	Present or undetermined	Normal
Decadence	Symptoms of senescence	Present or undetermined	Low





Palm trees: trunk height	Up to 4 m	Between 4 and 8 m	Between 8 to 15 m	Over 15 m or unusual size

Source: Street Tree Management in Barcelona





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		iTreelD	138789	
		Scientific name	Celtis australis	A.
		DBH (cm)	120	
		Height (m)	12.5	
		Height to live top (m)	12.5	
		Height to live crown		/ 🔍
		<ul> <li>base (m)</li> </ul>	4.5	
		Crown width N-S (m)	7	
		Crown width E-W (m)	7	
	444	Percent crown missing	50% - 55%	100
	ATTAUDA DE CAR	• ••• Dieback	53%	
	CARRIA	• Latitude	41.3922899	
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Calderón Argelich, A. MSc Thesis (2018) Jenks natural breaks classification method





# **TOTAL RESULTS: BARCELONA 2015**

SERVICES	INDICATORS	RESULTS
Air filtration	Air pollution removal	29,67 tons/year
Mitigation of surface runoff	Avoided runoff	53.500 tons/year
Urban temperature regulation	Transpiration	865.000 m³/year
Global climatic regulation	Carbon capture and storage	5.311 tons/year 274.600 tons
Air quality problems (impact)	VOCs emissions	10,7 tons/year



# thank you! mrivero@bcn.cat



# LINKS

## Citizen Commitment to Sustainability 2012-2022

https://ajuntament.barcelona.cat/ecologiaurbana/sites/default/files/CitizenCommitmentSustainability.pdf

## Barcelona's commitment to the climate 2030

http://eldigital.barcelona.cat/wp-content/uploads/2016/10/Barcelona-Commitement-to-Climate-1.pdf

#### **Climate plan**

http://lameva.barcelona.cat/barcelona-pel-clima/sites/default/files/documents/eng\_climate\_plan\_def.pdf

#### Barcelona green infrastructure and biodiversity plan 2013-2020

https://ajuntament.barcelona.cat/ecologiaurbana/sites/default/files/Barcelona%20green%20infrastructure%20and %20biodiversity%20plan%202020.pdf

#### Summary "Barcelona green infrastructure and biodiversity plan 2013-2020"

https://ajuntament.barcelona.cat/ecologiaurbana/sites/default/files/Barcelona%20green%20infrastructure%20and %20biodiversity%20plan%202020%20%28Summary%29.pdf

#### Stimulus programme for the city's urban green infrastructure 2017

https://bcnroc.ajuntament.barcelona.cat/jspui/bitstream/11703/104928/1/eng\_Mesura%20de%20govern%20incre ment%20verd\_08\_06\_2017.pdf

#### Trees for life. Master Plan for Barcelona's Trees 2017-2037

https://ajuntament.barcelona.cat/ecologiaurbana/sites/default/files/Pla-director-arbrat-barcelona-ENG.pdf

#### **Street Tree Management in Barcelona**

https://ajuntament.barcelona.cat/ecologiaurbana/sites/default/files/Streettreemanagmentbcn\_eng.pdf