



URBAN GreenUP: New strategy for re-naturing cities through Nature-based Solutions



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NATURE BASED SOLUTIONS (NbS)

“Actions that aim to help societies address various environmental, social and economic challenges in a sustainable way. These actions are inspired or copied from nature, using and improving the solutions that have existed so far”

NbS use the complex characteristics and processes existing in nature, Such as the ability to store C and regulate water flow, to mitigate disaster risks, improve human well-being and sustainable, socially inclusive growth.

NbS must be energy and resource efficient, and resistant to change, but to be successful they must adapt to local conditions.



THE NEED TO BRING NATURE BACK TO URBAN ENVIRONMENTS

“Bringing nature back to cities (neglected places, without connected natural environments) in a sustainable and effective way (through Nbs)”

This will promote **sustainable urbanism**, will restore degraded areas, CCA measures and will improve the management of risks associated with Climate Change.

The implementation of **natural water bodies, Natural water treatment plants, green corridors, carbon sinks, vegetal paths, urban farming, SUDs, green walls and roofs, urban green filters, bio-filters systems, aquatic spaces, pollinator modules...** will be a constant that will generate sustainable urbanism and the re-naturalization of our cities.



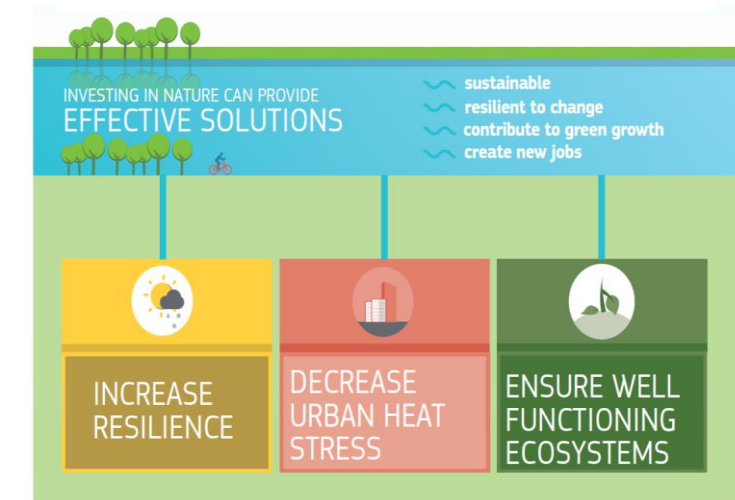
GREEN / BLUE INFRASTRUCTURE (BROWN and/or YELLOW*)

Urban planning framework

- Green infrastructure, associated with vegetation.
- Blue infrastructure, associated with water.
- Brown infrastructure, associated with the ground.
- *Yellow infrastructure.

Structural complexity/ecological coherence Complementarity

*Agricultural employment as SbN in peri-urban areas



Program: HORIZON 2020 - Work Programme 2016 - 2017

Topic: SCC02-2016-2017: Demonstrating innovative nature-based solutions in cities

Name of the coordinating person: Raúl Sánchez

Technical Coordination Team: Esther San José, Silvia Gómez, José Feroso, Raquel Marijuán, Nuria García, Jorge Cavo, Paloma González, Laura Pablos

Administrative Coordination: Daniel Martín

Dates: 1st June 2017 / 31st May 2023

Total eligible costs: €14,811,824.44 (EC contribution: €13,970,642.25)



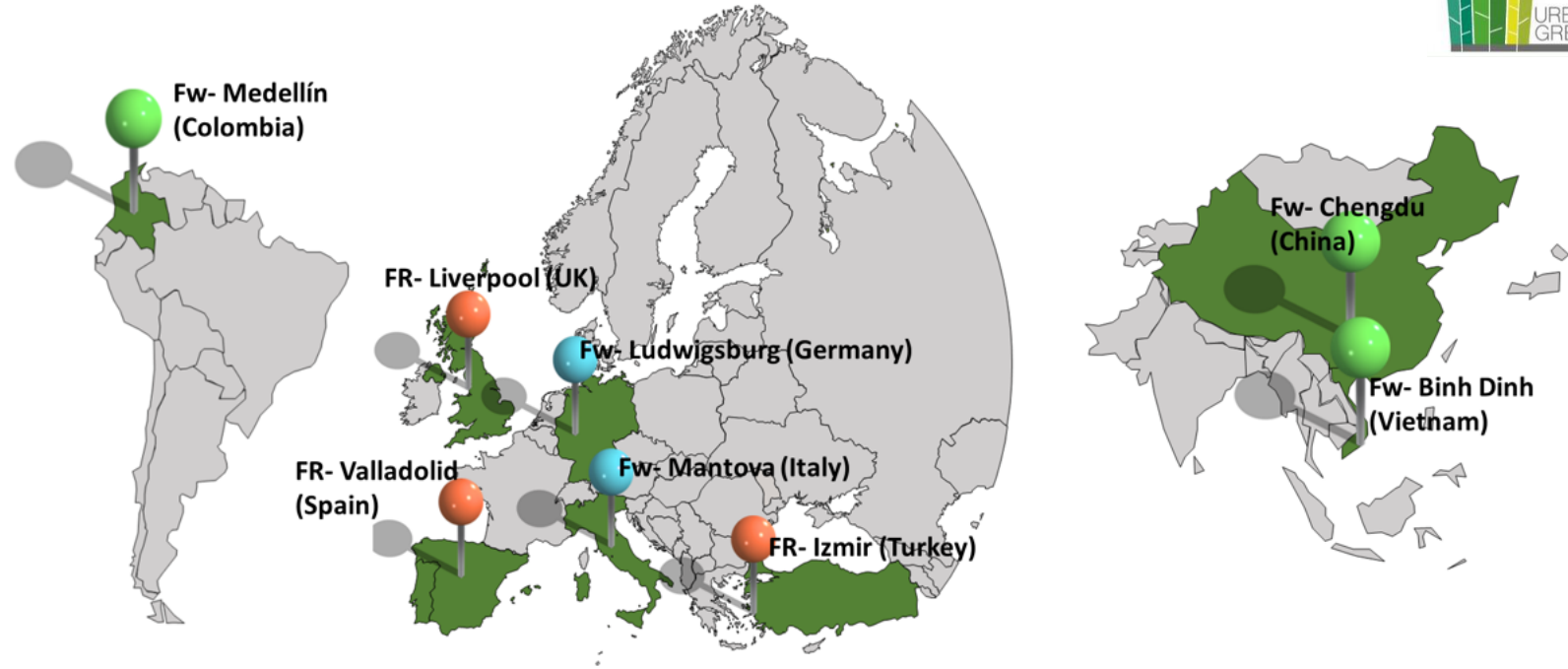
The consortium: 25 partners (municipalities, RTD - Tech. Centers, Universities, large industries, SMEs, Non Profit organizations and public bodies)



FRONT-RUNNER Cities

European FOLLOWER Cities

Non European FOLLOWER Cities



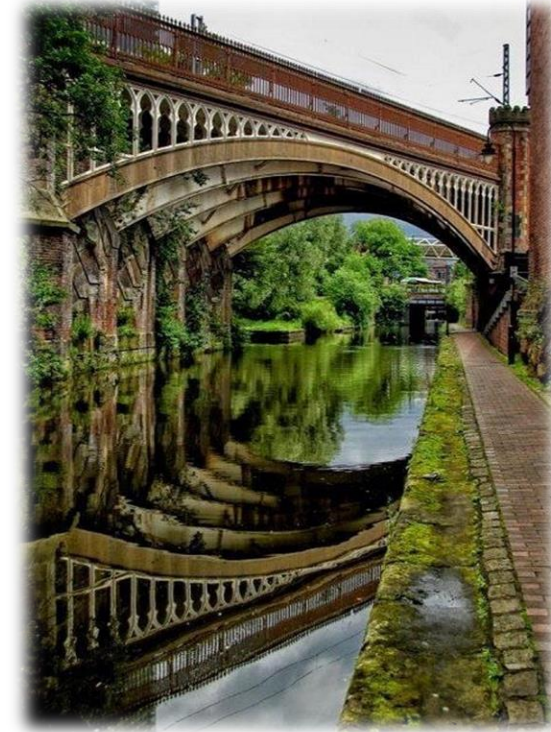
IMPACTS

- New global NBS market, new economic opportunities, products, local green jobs (more than 500 direct jobs)
- Increasing awareness of the benefits of re-naturing cities
- Enhancing stakeholder and citizen participation (processes for co-design, co-development and co-implementation).
- Fostering the creation by 2020 of healthier and greener cities
- Increasing the international cooperation
- Enhancing the implementation of EU environmental policies
- Improving living conditions and biodiversity.



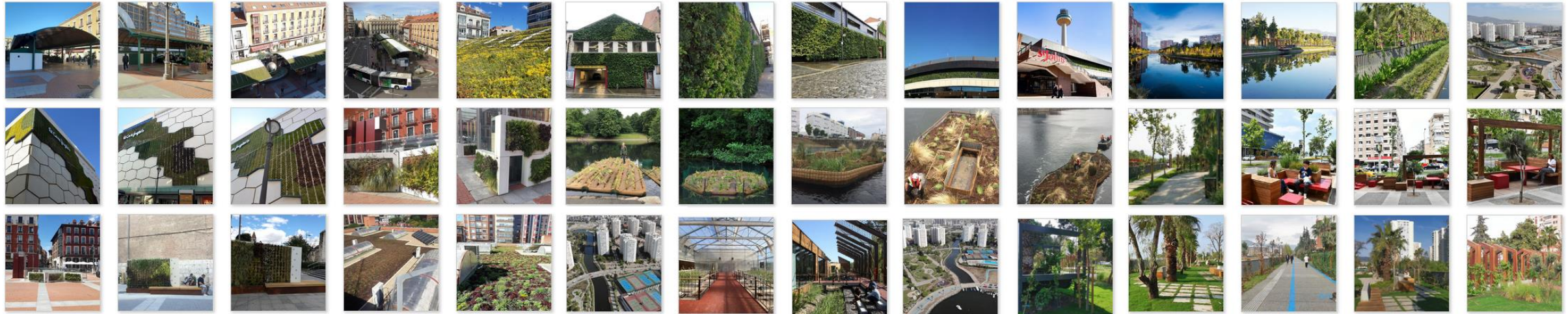
OUTCOMES

- URBAN GreenUP introduces a new concept of Re-naturing Urban Planning (RUP) which incorporates aspects of urban plans directly related to the NBS as part of the Urban Sustainability Plans.
- URBAN GreenUP provided a procedure to support the direct implementation of NBS in order to address the specific risks associated with Climate Change.
- Co-creation and co-development processes will be necessary.













OUTCOMES

NBS implementation



OUTCOMES

NbS Catalogue

-  Climate change mitigation and adaptation
-  Water management
-  Coastal resilience
-  Green space management
-  Participatory planning and governance
-  Air quality
-  Urban regeneration
-  Social justice and social cohesion
-  Public Health and Well-being
-  Potential of economic opportunities and green jobs



Provisioning Services	Regulating	Cultural	Supporting
<ul style="list-style-type: none"> • Food and fiber • Fuel • Genetic resources • Biochemicals, natural medicines, and pharmaceuticals • Ornamental resources • Fresh water 	<ul style="list-style-type: none"> • Air quality maintenance • Climate regulation • Water regulation • Erosion control • Water purification and waste treatment • Regulation of human diseases • Biological control • Pollination • Storm protection 	<ul style="list-style-type: none"> • Cultural diversity • Spiritual and religious values • Knowledge systems • Educational values • Inspiration • Aesthetic values • Social relations • Sense of place • Cultural heritage values • Recreation and ecotourism 	<ul style="list-style-type: none"> • Soil formation • Nutrient cycling • Primary production

- **R=Regional:** It is an urban unit superior to the concept of metropolitan area, with a centre in a large city, which subordinates to it the productive, tertiary, etc. activities of the entire region.
- **M=Metropolitan:** It is an urban region that encompasses a central city (the metropolis) that gives its name to the area and a series of cities that can function as dormitory, industrial, commercial and service cities.
- **U=Urban:** City, town, village without its metropolitan area.
- **S=Street:** Thoroughfare of a population that is generally limited on both sides by blocks or rows of buildings.
- **B=Building:** Type of construction made from solid materials and used to put people and objects up.



OUTCOMES

NbS Catalogue

There are 46 NBS divided into 14 groups according to their category.

Green Route (1 NBS)	Arboreal interventions (5 NBS)	Carbon capture (1 NBS)	SUDs (3 NBS)	Flood actions (4 NBS)	Water treatment (2 NBS)	Green pavements (4 NBS)
Smart soils (3 NBS)	Pollinator (5 NBS)	Vertical GI (5 NBS)	Horizontal GI (5 NBS)	Pollutants filter (2 NBS)	Resting areas (2 NBS)	Urban farming (4 NBS)

Category	NBS	Description	Main Challenge	Ecosystem services provides	Estimated budget and maintenance	Scale of intervention
SUDs	SUDs	SUDS are drainage systems that are considered to be environmentally beneficial, causing minimal or no long-term detrimental damage. They are often regarded as a sequence of management practices, control structures and strategies designed to efficiently and sustainably drain surface water, while minimising pollution and managing the impact on water quality of local water bodies. ⁹		<ol style="list-style-type: none"> 1) Disturbance regulation 2) Water regulation 3) Erosion control and sediment retention 4) Waste treatment 5) Cultural 	<p><i>Budget depending on the final solution implemented (to be checked). Source:www.susdrain.org</i></p> <p>Usually SUDs components are on or near the surface and most can be managed using landscape maintenance techniques. Remedial maintenance: inlet/outlet repair, erosion repairs, reinstatement of edgings, reinstatement following pollution, removal of silt build up.</p>	<p>U</p> <p>S</p> <p>M</p>



OUTCOMES

NbS Selection Tool

Welcome to the Urban GreenUP NBS Selection tool! This tool will recommend NBS for your city, based on your challenges and the capabilities of your organisation. Nominate your priorities in up to three urban areas, then go to the orange 'step two' tab below. Your areas may be suburbs, neighbourhoods, watersheds or just a precinct in which you'd like to use NBS to deal with a challenge. You can nominate one to four challenges for each area. You can also manually edit the weighting of each challenge in the box at the bottom of this sheet. You don't need to do three areas, you can do one or two, and just one or two challenges for each if that's what you prefer. However, **for each challenge, please be sure to select a corresponding level of priority.**

Enter Name For Area 1

Select Challenges	Priority	Comments (Optional)
1	None (please select an option)	
2	None (please select an option)	
3	None (please select an option)	
4	None (please select an option)	

*note: if scoring your challenges as equal priority, all must be assigned equal priority.

Enter Name For Area 2

Select Challenges	Priority	Comments (Optional)
1	None (please select an option)	
2	None (please select an option)	
3	None (please select an option)	
4	None (please select an option)	

Enter Name For Area 3

Select Challenges	Priority	Comments (Optional)
1	None (please select an option)	
2	None (please select an option)	
3	None (please select an option)	
4	None (please select an option)	

Weights (%)

Priority one	50
Priority two	25
Priority three	15
Priority four	10

Now that you've selected up to three areas for NBS advice, and input your priorities, this an optional step where you can nominate up to 5 NBS you're already considering for these areas. The tool will advise on the viability of these NBS, if you wish. **Fill in as much or as little as you want**, then go to the blue step 3 tab below.

(No area name selected in step 1)

In this area, we are already considering the following NBS:	Comments:
(Click to select an NBS from the dropdown menu)	
(Click to select an NBS from the dropdown menu)	
(Click to select an NBS from the dropdown menu)	
(Click to select an NBS from the dropdown menu)	
(Click to select an NBS from the dropdown menu)	

(No area name selected in step 1)

In this area, we are already considering the following NBS:	Comments:
(Click to select an NBS from the dropdown menu)	
(Click to select an NBS from the dropdown menu)	
(Click to select an NBS from the dropdown menu)	
(Click to select an NBS from the dropdown menu)	
(Click to select an NBS from the dropdown menu)	

(No area name selected in step 1)

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(Click to select an NBS from the dropdown menu)	
(Click to select an NBS from the dropdown menu)	
(Click to select an NBS from the dropdown menu)	
(Click to select an NBS from the dropdown menu)	
<div style="border: 1px solid gray; padding: 2px;"> <ul style="list-style-type: none"> SUDs Urban Carbon Sink Urban catchment forestry Urban Garden Biofilter Urban Orchard Urban Trees Vertical Mobile Garden (Click to select an NBS from the dropdown menu) </div>	



OUTCOMES

Deliverables as guidelines

Guideline to city zoning

This guide to city zoning is one strand of a methodology that has been developed through the Urban GreenUP project for the creation of a Renaturing Urban areas Plan (RUP).

Guidelines to tendering process specification

The objective of this report is to provide a guideline for local entities helping with the legal processes associated with the implementation of their Renaturing urban plan (RUP) through nature-based solutions (NBS).

Guidelines for the application of ESA methodology in different contexts

The deliverable 7.3 “Guidelines for the application of the ESA methodology” aims at analysing and provide a comprehensive framework of the methodologies and tools available for the evaluation of the ecosystem services provided by NBS at the urban level.

Guidelines for the use of innovative financial instruments and to design business models to implement NBS

This deliverable aims to provide a clear and a comprehensive framework for the development of business models for NBS that can be used by cities.



OUTCOMES

Good Practices Kit

To help you in **using NBS to make your city more liveable** and resilient to climate change.



- Select NBS that meet your city's needs and abilities
- Map out the challenges your city faces
- Work in a multidisciplinary team
- Combine project design and delivery where possible
- When too many items divide the tendering process
- Use consultants to help with procurement and works
- Incorporate contingency for budgets and delivery
- Take unforeseen expenditure into account
- Allocate resources for NBS maintenance
- Take outdoor conditions into account
- Request legal authorizations from an early stage
- Invest in citizen communication and engagement
- Indicators should be understandable and attainable



OUTCOMES

Renaturing methodology – Renaturing Urban Plans (RUP)

Integrated methodology for the development of Renaturing Urban Plans (RUP). To help cities worldwide to increase environmental sustainability and to address climate, social and economic challenges via the local implementation of Nature-based solutions (NBS).

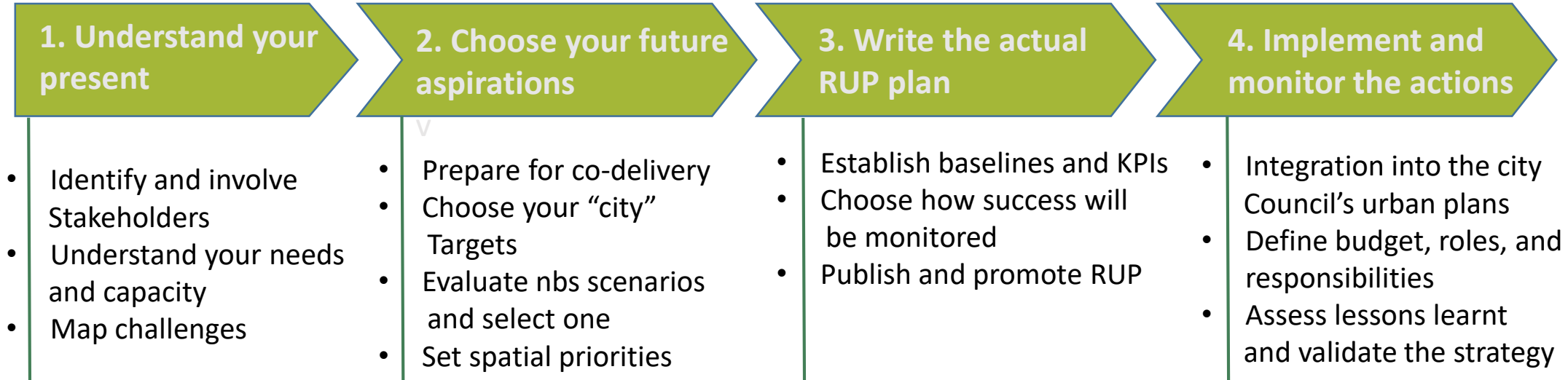
The methodology should be fully integrated in the city's urban planning and land use planning processes. It consists of four steps:

- 1. Understand your present**
- 2. Choose your future aspirations**
- 3. Write the actual RUP plan**
- 4. Implement and monitor the actions**



OUTCOMES

Renaturing methodology – Renaturing Urban Plans (RUP)



OUTCOMES

Collaborative outcomes

- **Tasks forces of NBS projects.**
- **NBS KPIs handbook:** active participation in the EC publications on “Evaluating the impact of nature-based solutions - A handbook for practitioners” & “Evaluating the impact of nature-based solutions - Appendix of methods”
- **Bio-diversity KPIs handbook:** co-leading with University East of London
- **UGU mini – handbook:** final legacy of the Project regarding lessons learnt



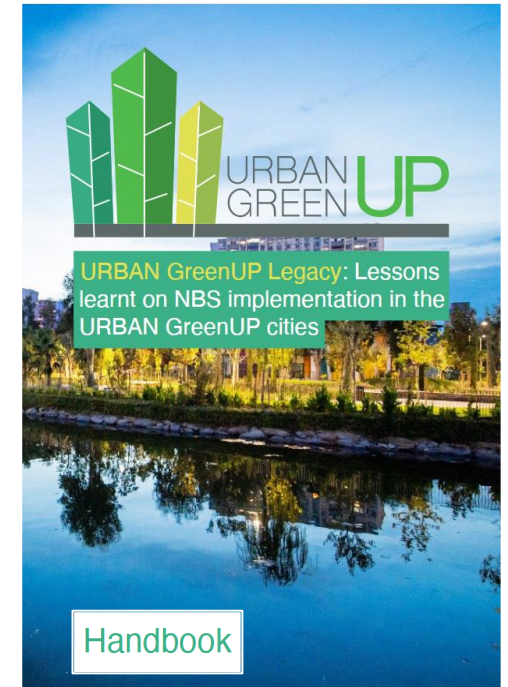
OUTCOMES

Collaborative outcomes

What is the aim of this handbook?

This handbook is **an overview of the URBAN GreenUp** project and its impact on climate change challenges and how it dealt with governance, economic, social, health and environmental aspects in our cities. In it, we want to summarize the results of the project, **focusing on success stories, best practices and lessons learnt.**

This handbook is intended to serve as a **guide for policymakers, businesses, researchers, citizens, and other stakeholders** on how to identify urban challenges and select and implement the best suited NbS for their particular requirements.



Barriers to the implementation of nature-based solutions in our cities

- **Technical:** Technical requirements, adaptation of functionality, durability,
- **Legal:** Regulation, bidding processes (and their times), permits,...
- **Economic:** Financing, maintenance, jobs, financing plans, research and innovation, etc.
- **Social:** Social perception and acceptance, aesthetics, elements of social inclusion/exclusion, ...
- **Political barriers:** Government seasonality.



Lessons Learnt on NbS implementation in our cities

- 1. Renaturing Urban Plans (RUPs) contributed to the generation of governance actions in cities**
 - Make easier the city challenges identification - Climate change.
 - Support local authorities and regulators in the decision-making process.
 - Generate new governance actions regarding renaturing cities.
 - Allow to generate adapted methodologies for renaturing cities.
 - It is an easy instrument to be replicated in other cities.
 - It is necessary cross-departmental approach.



Lessons Learnt on NbS implementation in our cities

- 2. Innovative financial instruments and design of new business models to implement Nature Base Solutions (NBS). Special attention to public / private collaboration.**
 - Public-private collaborations.
 - Extra co-financing with municipal budget.
 - Third party/stakeholder involvement.
 - Legal agreements for ongoing maintenance with hosts of NBS.
 - Streamline Tendering processes.



Lessons Learnt on NbS implementation in our cities

3. Co-creation improved in cities

- Renaturing needs co-creation processes
- It is necessary to involve citizenship in the NBS implementation processes
- Inclusive cities
- Economy generation
- Awareness promotion
- Co-creation contributes to generate a “good press” on NbS.



Lessons Learnt on NbS implementation in our cities

4. Environment. Greenhouse gas emissions reduction. Air quality and water management improvement. Health and well-being.

- Make our cities more Healthy (AQ, WQ, temperature buffering, ...)
- Open new economy opportunities (green jobs, NBs market)
- Make it possible to understand the natural functioning and performance of cities.
 - Nature based Solutions contribute to psychological and physiological positive benefits.
 - Make more inclusive cities.
 - More resilient cities against climate change.
 - Improve the sustainability.
 - Essential role of biodiversity.





VAc29 Green shady structures

Green canopies Santa María St

Green canopies
Green area 145,53 m²



• Fully installed in February 2021.

Selection of species seeded

Biodiversity
(Summer 2021)



Salvia officinalis



Gypsophila repens



Aubrieta hybrida



Arabis alpina ssp. caucasica



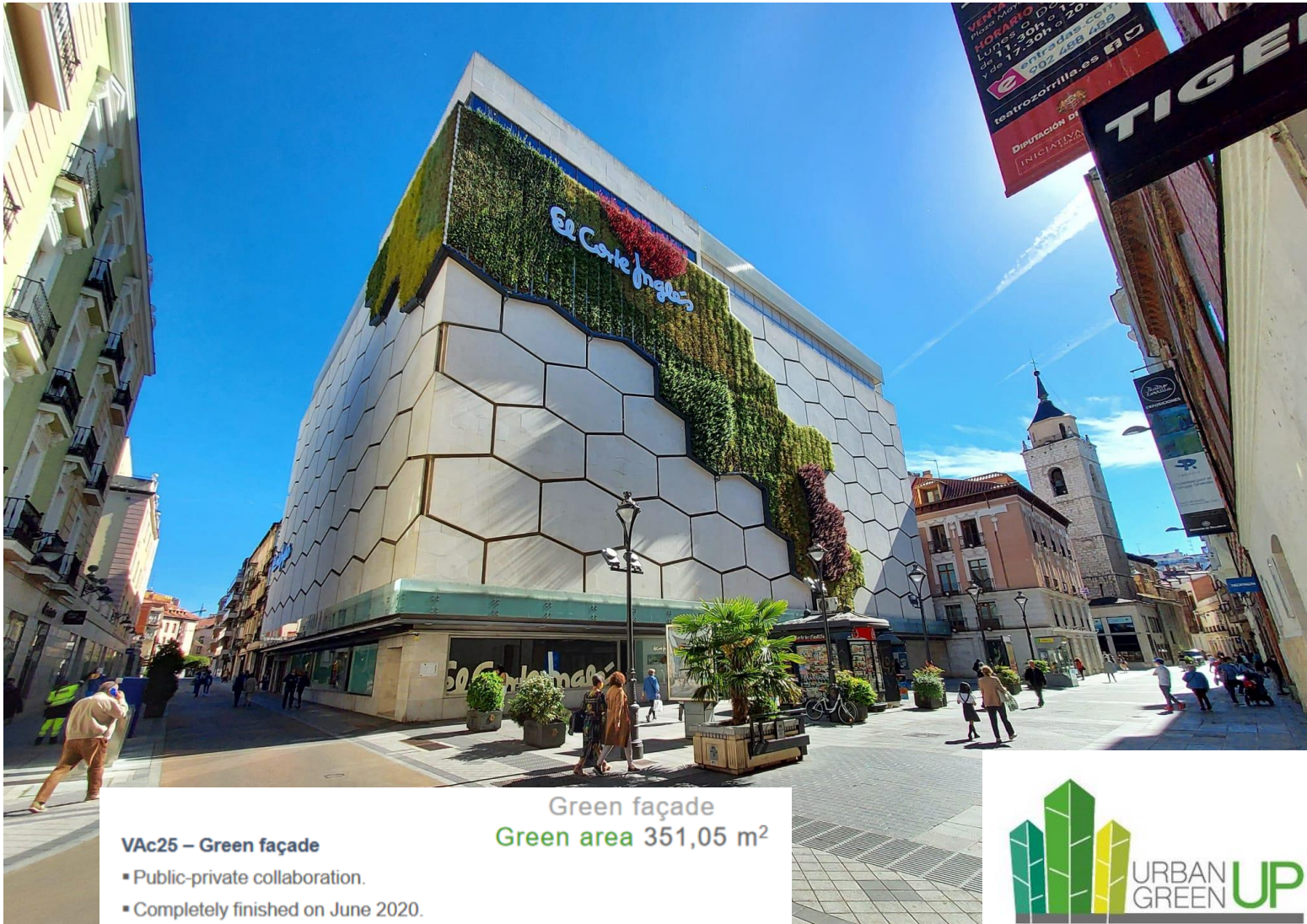
Cymbalaria muralis

GREEN SHADY STRUCTURES

- plant component
- Innovation
- Shadow and aesthetic element
- Temperature reduction Frost reduction Biodiversity

CONDITIONINGS/BARRIERS

- Technical requirements (complexity of anchors)
- City Council Permits Vs Neighbours
- Tendering times
- Complex maintenance Social acceptance



GREEN FACADE OF EL CORTE INGLÉS

- Plant component
- Demonstrative NBS
- Biodiversity
- Improved air quality
- Heat island effect reduction
- Public-private collaboration

CONDITIONINGS/BARRIERS:

- Technical requirements
(building structure)
- Bidding times*
- Maintenance

VAc25 – Green façade

- Public-private collaboration.
- Completely finished on June 2020.

Green façade
Green area 351,05 m²



LAc 4 Urban Catchment Forestry (SuDs)



20 trees *Metasequoia*
Planted in silva cells *glyptostrobooides*
Total length of SuDs run 174.9m
Area of permeable paving 579.25m²
Total catchment area of 765m²
Average volume of soil/tree 18.5m³
Includes soil sensors

Expected benefits:

- Slow the flow
- Reduce final discharge volume
- Improve discharge water quality
- Add shade/cooling/biodiversity
- Filter trees for air quality

Urban catchment forestry (SUDs)

20 trees (*Metaasequoia* spp.)



LAc 16 Floating Ecosystem Demo A

- Range of above water features and planting
- Under water habitat features
- Observations by binoculars/camera
- Access island by boat
- Many visitors
- Global interest



**FLOATING ECOSYSTEMS
/FLOATING GARDENS /FLOTING
ISLAND**





PARKLETS





2.4 meters wide and 1 km long bicycle route
3 meters wide and 3 kms long pedestrian route

**CYCLING AND
PEDESTRIAN ROUTE
IN GREEN CORRIDOR
/ GREEN PAVIMENT /
FILTERING PAVIMENT**





GREEN BOULEVARD / WATER MANAGEMENT



Monitoring and tracking of the green infrastructures implemented, as a means of controlling their functionality

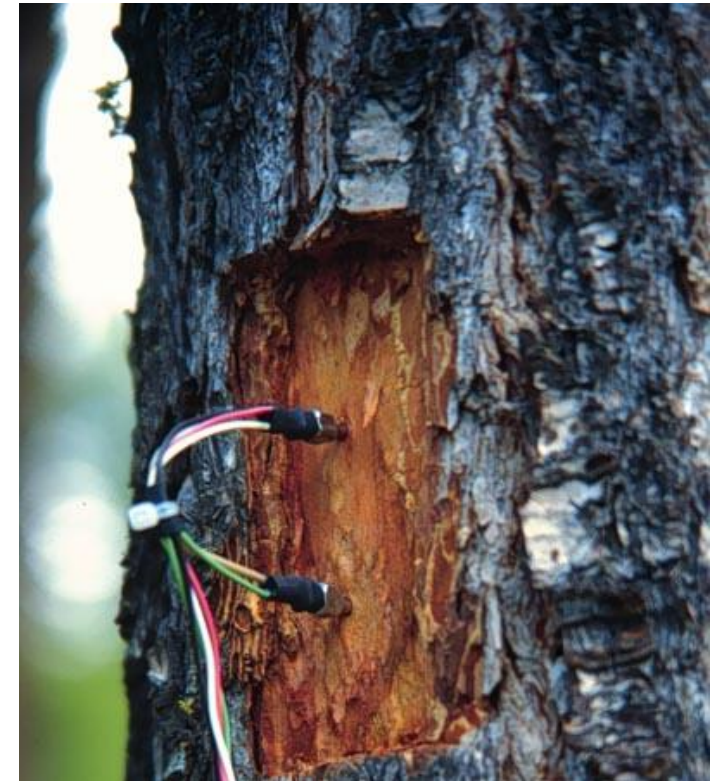
THE IMPORTANCE OF DATA COLLECTION - monitoring

- | How do NBS work?
- | How do NBS influence on city challenges?
- | Are they effective?
- | How much?

**Monitoring
program**

**Key
Performance
Indicators**

*Robust system of indicators that evaluates
the effectiveness of the NBS
[Ecosystem services] facing city challenges*





Adaptación y mitigación del cambio climático



Resiliencia costera



Calidad del aire



Gestión de zonas verdes



Gobierno y planeamiento participativos

Valladolid

Liverpool

Izmir



Oportunidades económicas y empleo verde



Salud pública y bienestar



Justicia y cohesión social



Regeneración urbana



Gestión del agua

DATA COLLECTION



- | Sensors and Apps
- | GIS data (Copernicus, LIDAR, ...)
- | Statistics and surveys
- | Direct observation
- | Physicochemical analysis
- * Digitization

KPI CALCULATION





Evaluating the impact of nature-based solutions - A handbook for practitioners

- Evaluating the impact of nature-based solutions - Appendix of methods



- **IUCN Global Standard for Nature-based Solutions.**
<https://portals.iucn.org/library/sites/library/files/documents/2020-020-En.pdf>
- **Evaluating the impact of nature-based solutions. A handbook for practitioners**
<https://op.europa.eu/en/publication-detail/-/publication/d7d496b5-ad4e-11eb-9767-01aa75ed71a1>
- **Evaluating the impact of nature-based solutions. Appendix of methods.**
<https://op.europa.eu/en/publication-detail/-/publication/6da29d54-ad4e-11eb-9767-01aa75ed71a1>
- **Nature-Based Solutions Observatory.** <http://sbn.conama.org/web/index.php>
- **Catálogo de NBS – URBAN GreenUP Project.**
<https://www.urbangreenup.eu/resources/deliverables/deliverables-overview/d1-1---nbs-catalogue.kl>
- **URBAN GreenUP Handbook.**
<https://www.urbangreenup.eu/resources/mini-handbook/mini-handbook.kl>



URBAN GreenUP – Greening transformation

CARTIF





THANK YOU

[TECHNOLOGY
CENTRE]

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