IT4S
Innovative Technologies for Sustainability

Universitat de Lleida

Green roofs market in Spain

Monitoring and evaluation of impacts of green roofs in Barcelona

"Verd de proximitat BCN" project

VERD BCN
VERD DE PROXIMITAT

Weltkongress Gebäudegrün
World Green Infrastructure Congress WGIC 2023
www.bugg-congress2023.com
Berlin
27 - 29 June 2023

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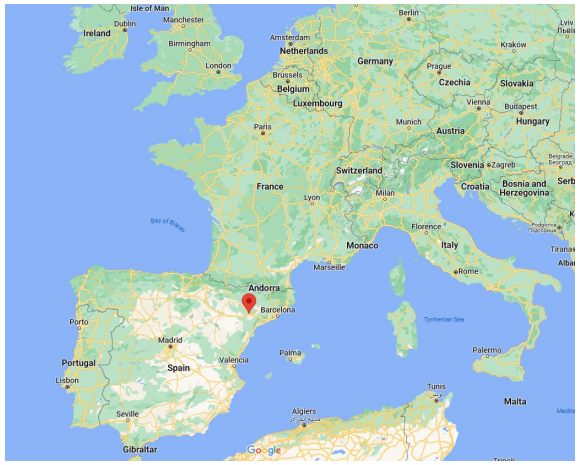
Introduction

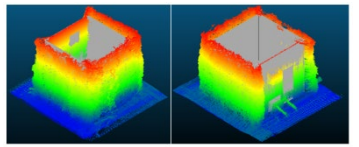
- Institution: University of Lleida (Catalonia, Spain) udl.cat
- Funded in 1300 (723 years), one of oldest in Europe
- Figures:

7 Faculties and Schools
48 Bachelor's Degrees
16 Double Bachelor's Degrees
34 Master's Degrees
14 Doctoral Programs
10.000 Students
425 Permanent Teaching – research staff



Introduction

- Research group: **Innovative Technologies for Sustainability** https://it4s.cat/
- Objective: **Research** and the transfer of knowledge about innovative technologies that **contribute to sustainable development**
    - Buildings - architecture and urban planning
    - Industry (energy – chemistry)
    - Agriculture and landscape



Green roofs market in Spain

- Although promising, the green roofs **market in Spain is growing at a lower rate** than the rest of Europe (no reliable data can be found)

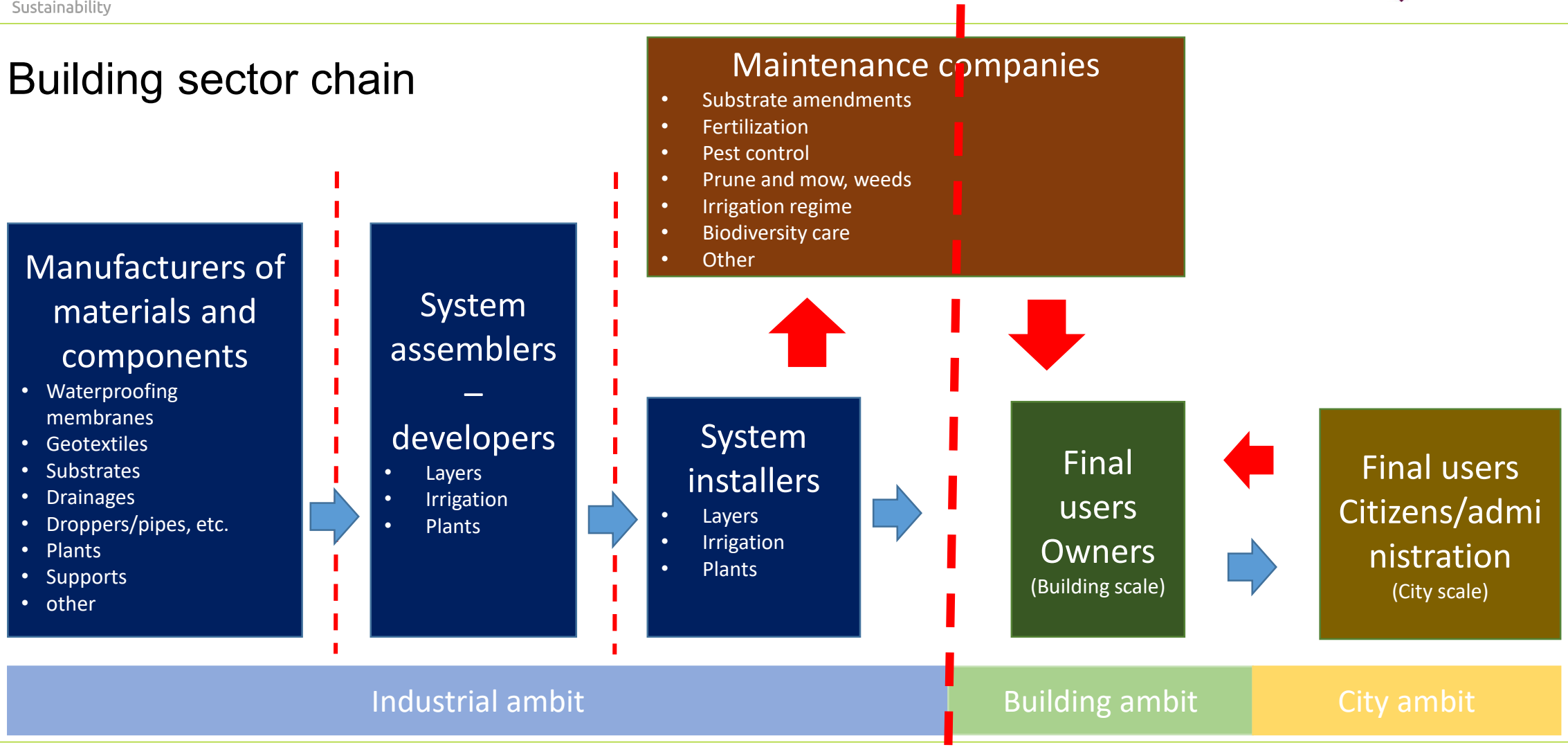
- **Main causes** are:
  - Mediterranean climate
  - Building sector chain
  - Installation and maintenance costs
  - Lack of integration in the urban planning strategy

Green roofs market in Spain

- Mediterranean climate: water dependence, high temperatures and solar radiation

Green roofs market in Spain

- Building sector chain

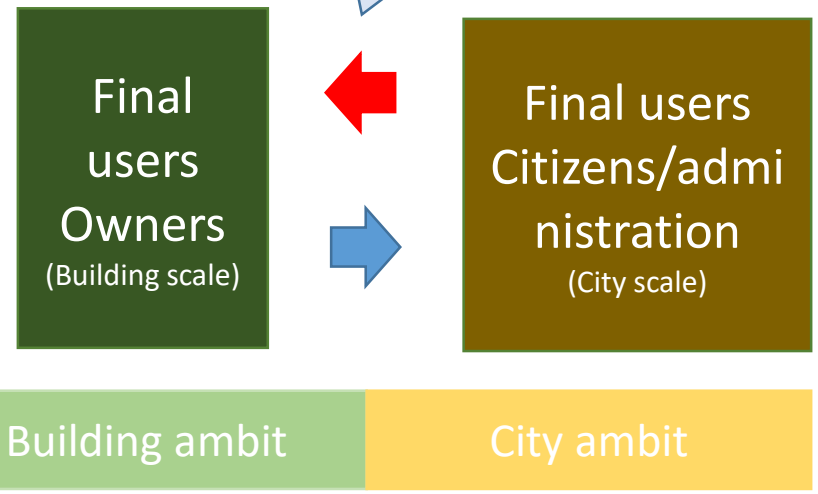


Green roofs market in Spain

- Installation and maintenance costs
  - Lack of monitoring and evaluation of impacts (both, desired and non-desired)
  - In real cases, a cost-benefit analysis is never carried out

- Lack of integration in urban planning strategy
  - Promotion of private green
  - Complement to traditional solutions (parks and urban forests)
  - Incentives to the implementation
  - Incentives for maintenance ¿?

What impacts?
How do we **measure and give economic value to** them?
Which beneficiaries?
Who pays for maintenance?



The Barcelona model (BCN)

- Actions promoted by the Barcelona City Council:
  - 2014_Government measure to promote green roofs
  - 2015_Guide to design, built and maintain green roofs
  - 2017-2019_First Green Roof competition (projects)
  - 2020-2022_Second green roof competition (projects)
  - 2022_Refurbishment actions including building external walls, green roofs and naturalization
  - 2021-Protocol for the implementation of green roofs in municipal buildings (50% roof, minimum of 200 m2)

Balance in 2020:

- 16 actions on green roofs (1.1 ha)
- 27 actions on walls and party walls (0.58 ha)

“Verd de proximitat BCN”

Main objective of “Verd de proximitat BCN” is to design and implement a **plan for monitoring and evaluating the impacts of green roofs in the city of Barcelona**.

- Inclusive and participatory
- Economically viable
- Sustainable over time

“Verd de proximitat BCN”

Pérez Iborra school. Consell de Cent 323. L’eixample. Barcelona *(Arq: Et posem verda)*

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URBASER. Fra Juníper Serra, 74. Sant Andreu. Barcelona

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TEB VERD. *Fernando Pessoa 42. Sant Andreu. Barcelona*

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“Els Terrats d’en Xifré”. Llauder 1. Ciutat Vella. Barcelona

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Selection and definition of specific indicators for green roofs and facades

The 12 societal challenge areas across which methods of indicator determination are grouped are:

1. Climate Resilience
2. Water Management
3. Natural and Climate Hazards
4. Green Space Management
5. Biodiversity Enhancement
6. Air Quality
7. Place Regeneration
8. Knowledge and Social Capacity Building for Sustainable Urban Transformation
9. Participatory Planning and Governance
10. Social Justice and Social Cohesion
11. Health and Wellbeing
12. New Economic Opportunities and Green Jobs

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12 societal challenge areas

Key aspects

Societal Challenge Areas	Key Aspects	
1. Climate Resilience	1.1. Stored carbon	1
	1.2. Energy savings	2
2. Water management	2.2. Use of rainwater	3
	2.2. Use of water	4
3. Natural and Climate Hazards	3.1. Reduction of the Heat Island effect	5
	3.2. Urban runoff control	6
4. Green Space Management	4.1. Provision of Ecosystem Services	7
	4.2. Accesibility	8
	4.3. Percentage of green area	9
	4.4. Maintenance costs	10
5. Biodiversity	5.1. Connectivity	11
	5.2. Species	12
	5.3. Pollinator species	13
6. Air Quality	6.1. Pollution capture	14
	6.2. Ambient smell	15

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7. Place Regeneration	7.1. Perceived quality of space	16
	7.2. Sense of belonging/identity with space	17
	7.3. Materials used	18
	7.4. Viewpoint effect	19
8. Knowledge and Social Capacity Building for Sustainable Urban Transformation	8.1. Participation	20
	8.2. Pro-environmental identity	21
9. Participatory Planning and Governance	9.1. Co-participation	22
	9.2. Diversity of stakeholders	23
10. Social Justice and Social Cohesion	10.1. Social cohesion	24
	10.2. Safety	25
11. Health and Well-being	11.1. Physical activities	26
	11.2. Well-being and happiness	27
	11.3. Acoustic comfort	28
	11.4. Thermal comfort	29
12. New Economic Opportunities and Green Jobs	12.1. Property value	30
	12.2. Job positions	31
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Indicators

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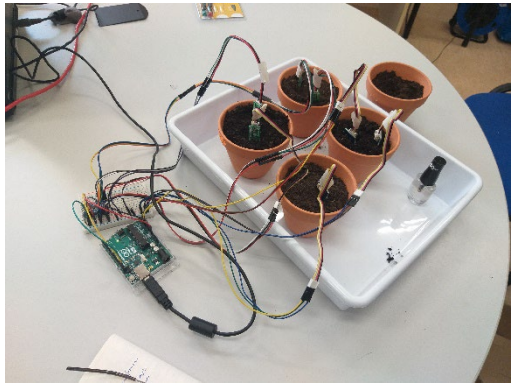
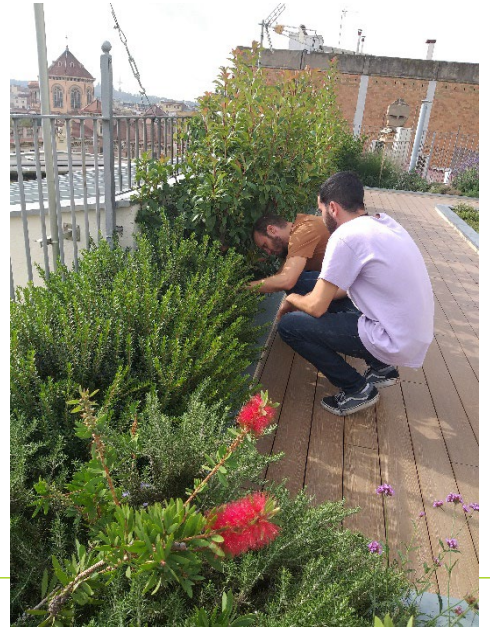
Low cost monitoring





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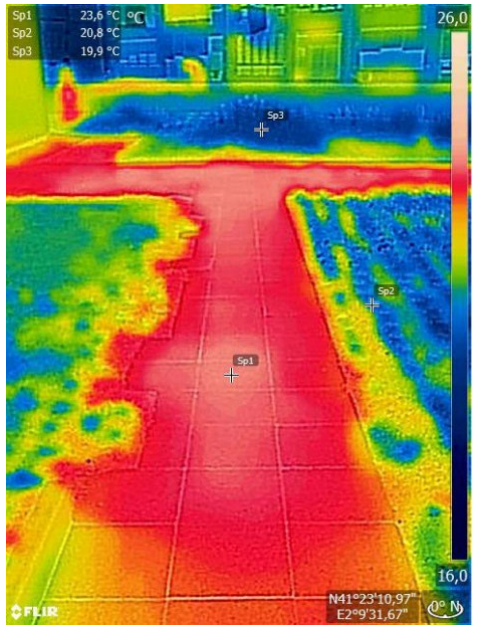

“Verd de proximitat BCN”

Data visualization dashboard

“Verd de proximitat BCN”

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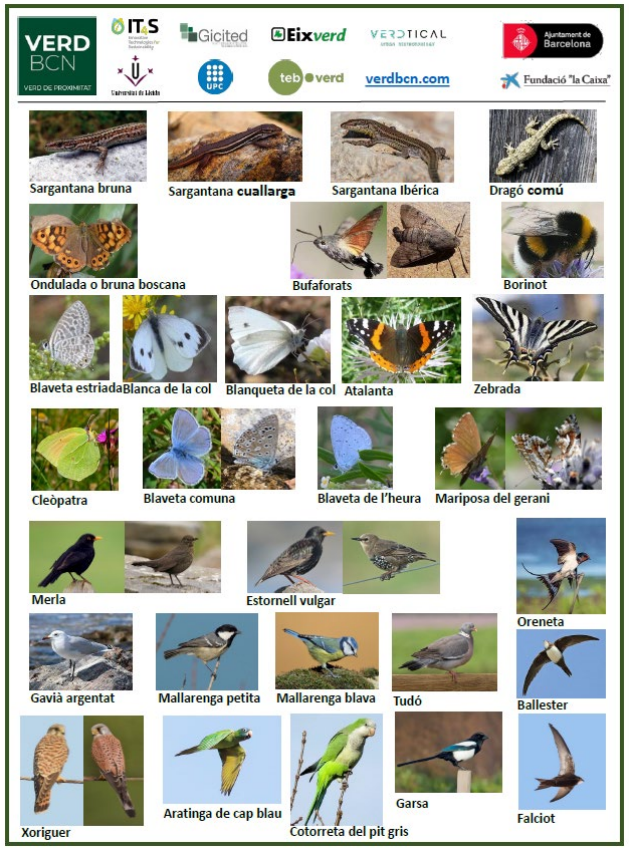
Citizen science monitoring - App



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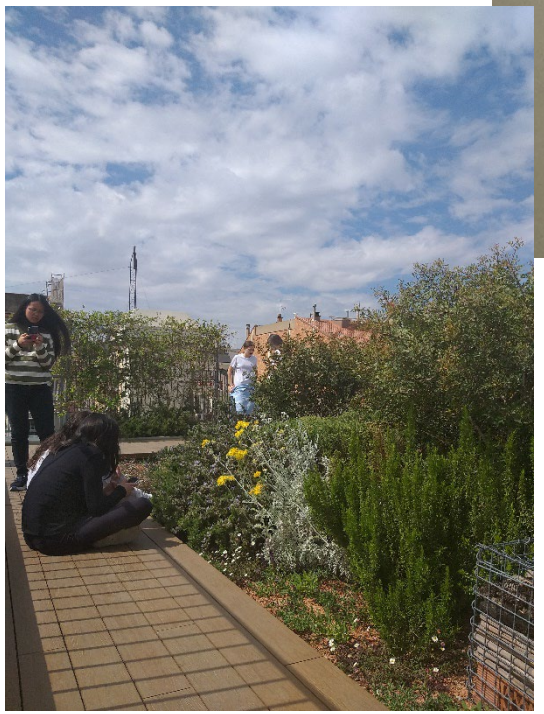
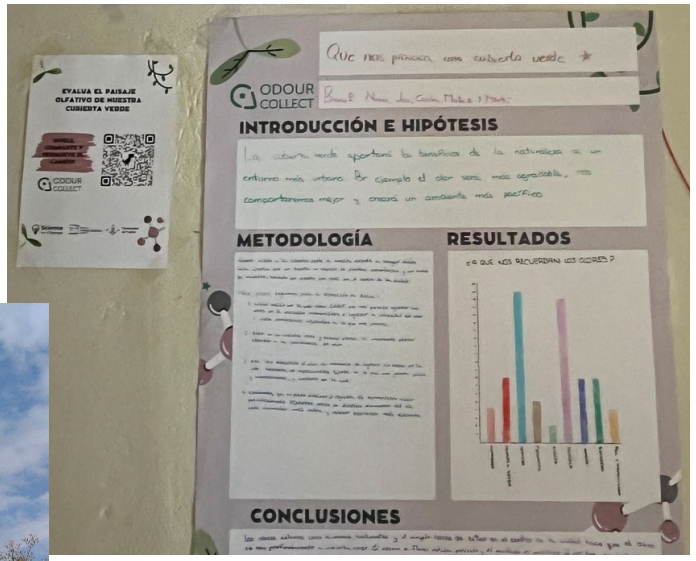
“Verd de proximitat BCN”

Citizen science monitoring - App

Science for Change

Evaluating the green roof “olfactory landscape” by means of olfactory walks





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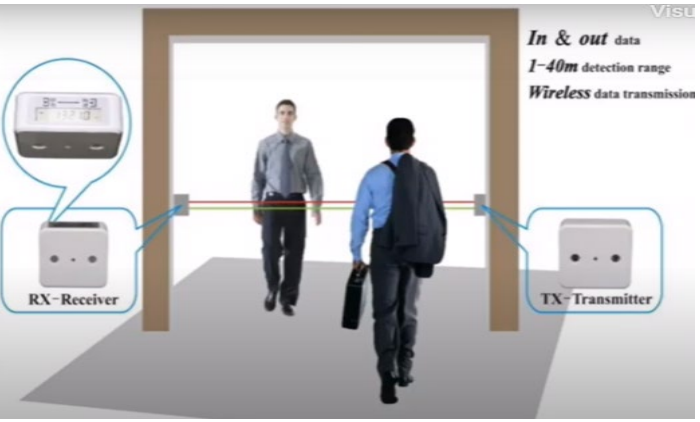
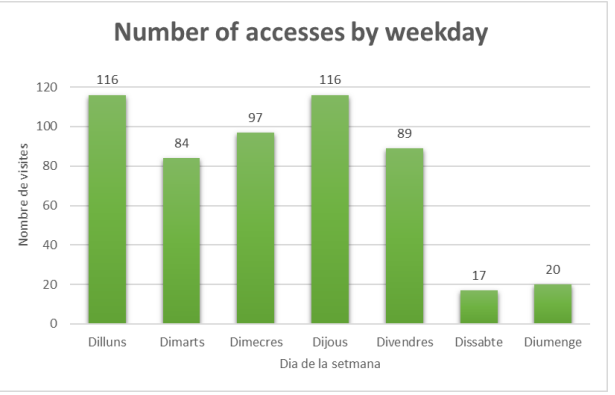
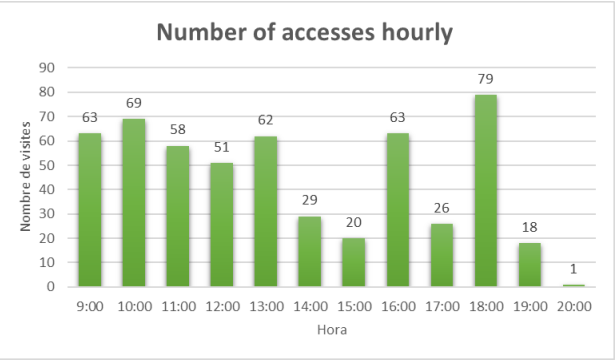
Participation – Total number of accesses







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“Verd de proximitat BCN”

Application to upload the data relating to the amount of food harvested in each green roof

Verd de Proximitat: collites

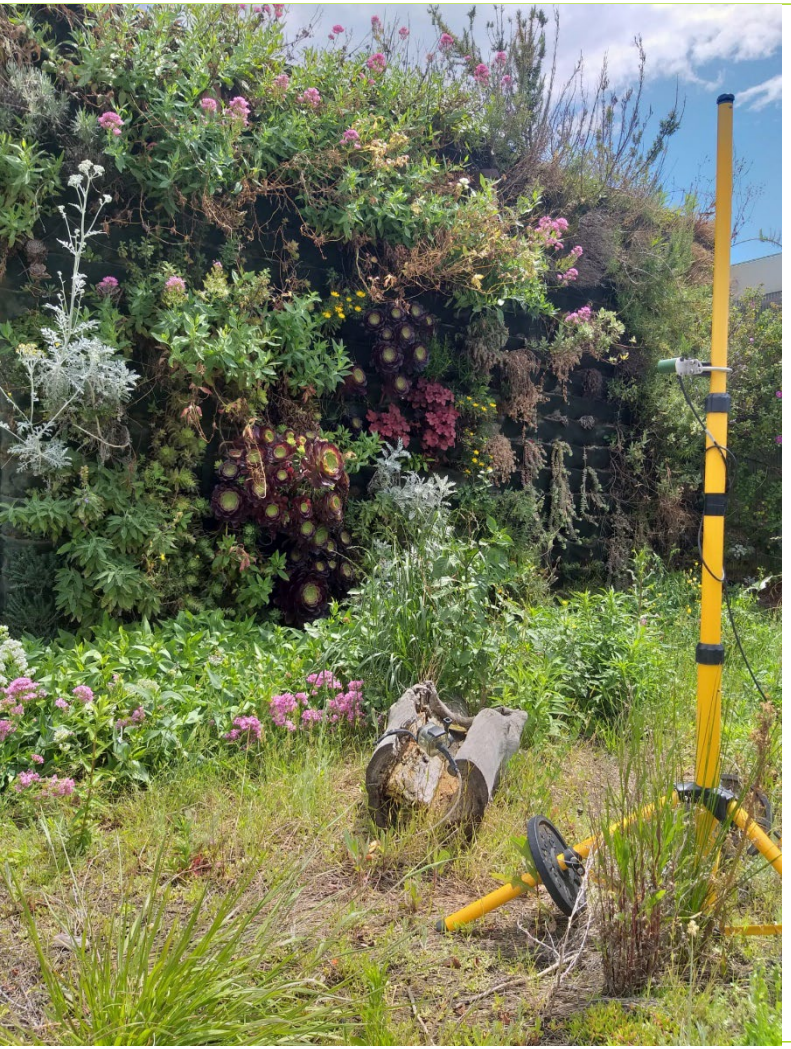
Afegir o editar collita

Per crear/editar una collita:

tria:

(Tornar a verd de proximitat)

Green roofs market in Spain



VERD BCN
VERD DE PROXIMITAT

Plan for monitoring and evaluating the impacts of real cases

GR owners can conduct a **cost-benefit analysis**

Municipal incentive to green infrastructure **maintenance**

“Verd de proximitat BCN”

The "Verd de Proximidat BCN" project has received the support of the **Barcelona City Council** and the **"la Caixa" Foundation”** within the framework of the Barcelona Science Plan 2020-2023

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Thank you for your attention

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