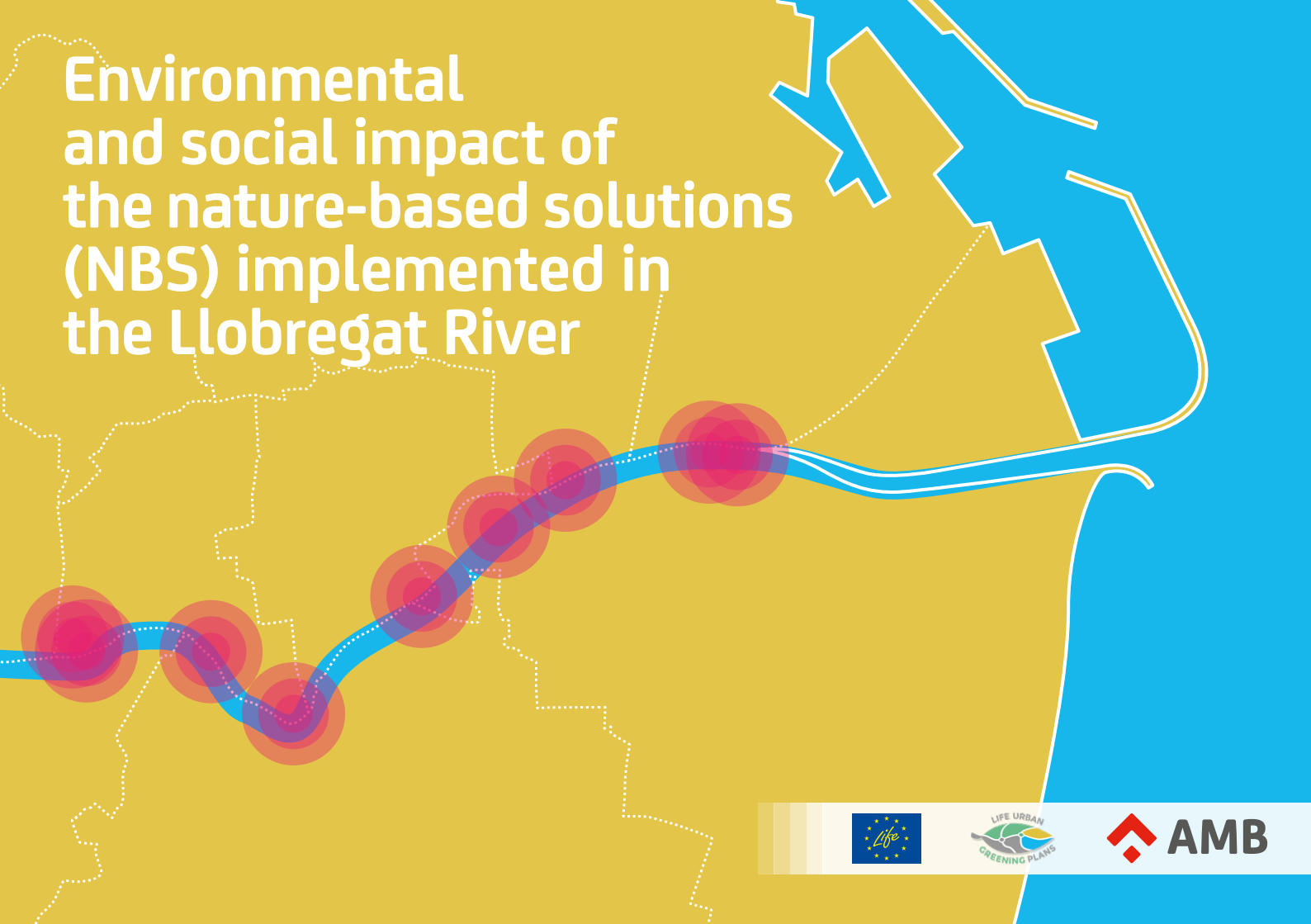


Environmental and social impact of the nature-based solutions (NBS) implemented in the Llobregat River





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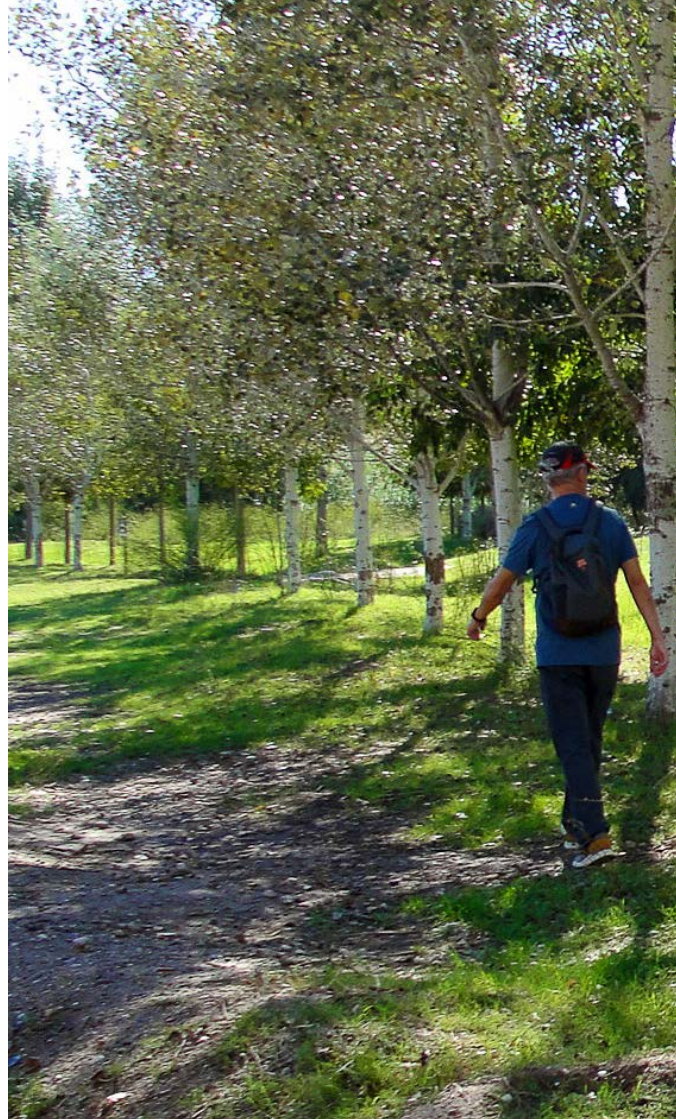
Project

The assessment and study of the environmental and social impact of the nature-based solutions (NBS) implemented in the Llobregat River is part of the **LIFE UrbanGreeningPlans project (2021-2023)**.

LIFE UrbanGreeningPlans aims to provide local policymakers and green space managers with **innovative mechanisms for planning, implementing, improving and managing green infrastructure in (peri-)urban areas**.

24
months

7
partners





Action

Action 4 assesses the efficiency of NBS in increasing biodiversity, improving the landscape, encouraging public use and contributing to overall recovery of the site. The results will be used to **design new urban greening plans**.

OBJECTIVES OF ACTION 4

- Identifying and understanding the NBS implemented in the Llobregat River environment.
- Assessing the social and environmental impact of these solutions.
- Detecting gaps and opportunities regarding the application of NBS in the river environment and surrounding areas.
- Helping define pilot tests for wider use of NBS in metropolitan river environments.
- Creating knowledge and disseminating its benefits.



Scope

The Llobregat River is intensely influenced by human activity, yet it stands out as a backbone for metropolitan green infrastructure. The river area flows alongside a key infrastructure corridor. This pressure resulted in a significant reduction in volume and major artificial shaping of the river area.

However, it is surrounded by numerous areas of great environmental value. It should also be noted that the river space offers opportunities to promote ecological and social connectivity, maintain and enhance biodiversity and strengthen the river as an area providing multiple services.

In this context, the AMB, along with the related municipalities, has been working for years to improve the environment and landscape of this area, seeking a balance between its environmental values and social use. Most of these efforts are channelled through the Action Programme to Improve the Natural and Urban Landscape.



LLOBREGAT RIVER

34 km
long

10.7 km²
of river area

16
municipalities



Selection of NBS

.....
“Solutions that are inspired and supported by nature, which are cost-effective, simultaneously provide environmental, social and economic benefits, and help build resilience.” (European Commission)
.....

A study was undertaken of all projects implemented to restore the environment and landscape of the metropolitan section of the river, which have been running since 2009.

SELECTION CRITERIA

- **Broad territorial distribution**
- **Diversity of solutions**
- **Diversity of time horizons**
- **Potential for providing data of interest**
- **Total or partial fulfilment of the initial objectives**

.....
These criteria identified **16 NBS**, from 8 implemented projects and 3 actions. The different NBS are classified into four categories:
.....

Water management (7 NBS)



Renaturing and generating new habitats (6 NBS)

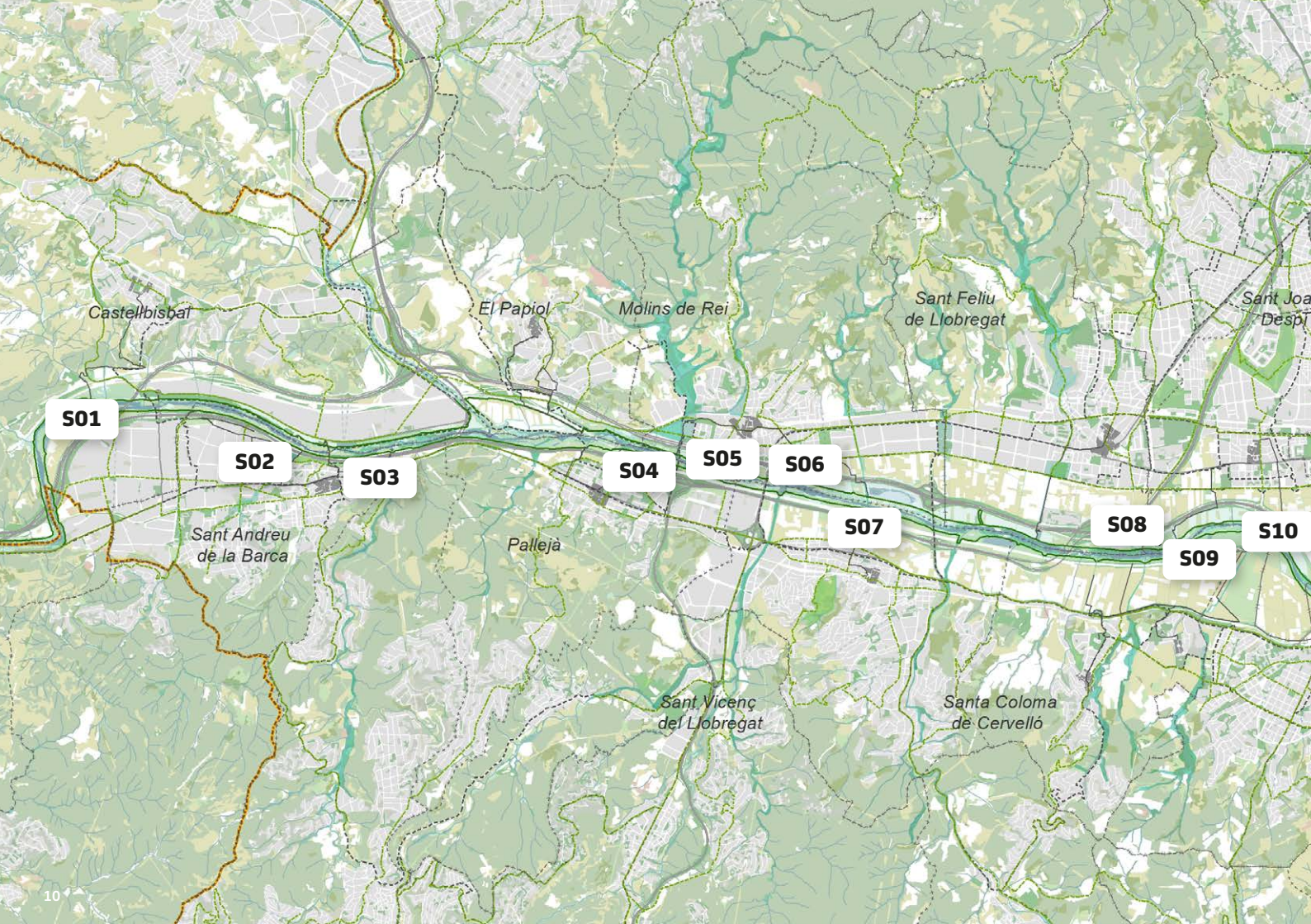


Promoting biodiversity (2 NBS)



Promoting the green economy (1 NBS)





Castellbisbat

El Papiol

Molins de Rei

Sant Feliu de Llobregat

Sant Joan Despí

S01

S02

S03

S04

S05

S06

S07

S08

S09

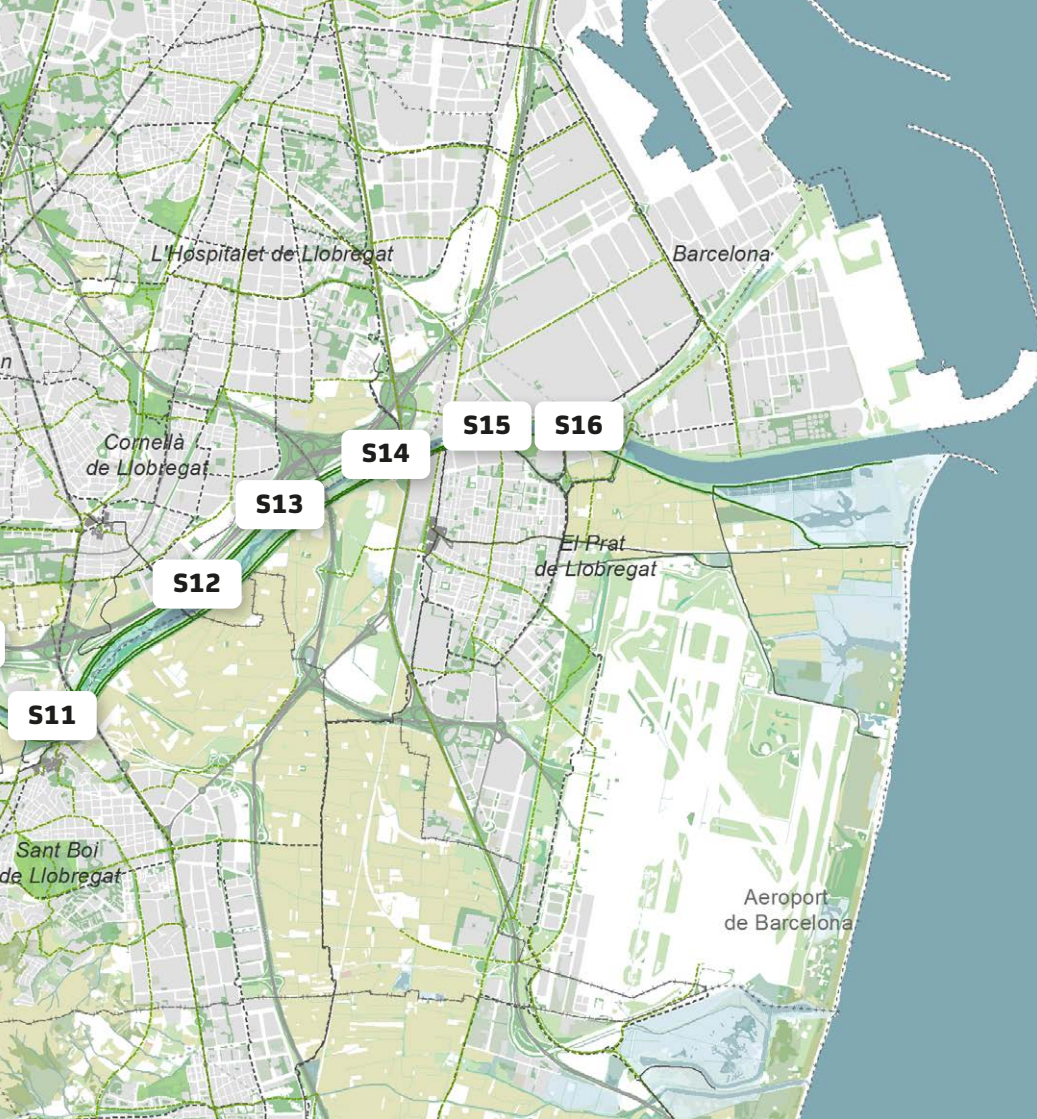
S10

Sant Andreu de la Barca

Palteja

Sant Vicenç del Llobregat

Santa Coloma de Cervelló



- S01** Sustainable urban drainage system (SUDS)
- S02** Demolition of the concrete ditch, turning it into a plant ditch
- S03** Use of spillway water
- S04** Green ditch
- S05** Use of water collected from roads for ponds
- S06** Amphibian pond
- S07** Use of reclaimed water
- S08** Regeneration of barren soil
- S09** Plant-based acoustic screens
- S10** Development of meanders in the Llobregat River
- S11** Vegetation expansion units
- S12** Permeabilisation of compacted soils
- S13** Revegetation of grassland using species with low water requirements
- S14** Plant-based pergolas
- S15** Biodiversity refuges
- S16** Using *Arundo donax* as organic material

THE TWO MAIN
FACTORS THAT THE
DIFFERENT NBS WANT
TO TACKLE

- Water availability
- Field artificialisation

There is a plethora of solutions to **promote river morphodynamics and the recovery of ecosystems.**

Mainly, solutions that **take advantage of surface water from various sources** (spillways, overflows, etc.) and lead it to vegetation or generate retention areas (e.g. ponds), as well as the **use of regenerated water.**

The **use of *Arundo donax*** as an organic material is intended to respond to a very common and specific problem in the territory, the proliferation of invasive species.





Regenerated water use system through **canals**
in the meander of San Juan Despí, 2011

Benefits

A variety of parameters have been used to assess the different benefits:

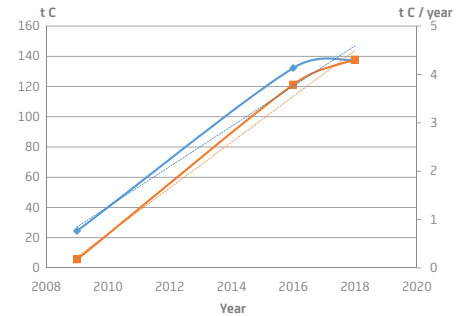
- Technical parameters
- Publications/press
- Social media

In more than 80% of the NBS analysed, maintenance is the most decisive factor in achieving the initial objectives.

EVOLUTION OF CARBON SEQUESTRATION

Revegetation of grassland using species with low water requirements (S13)

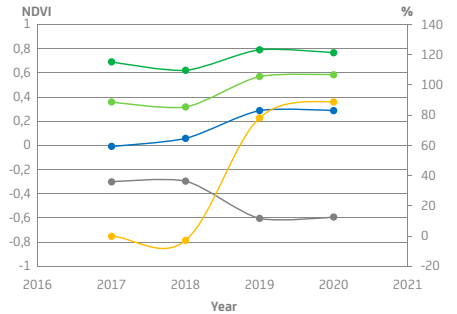
- Carbon stock capacity (t C)
- Carbon sink capacity (t C / year)



EVOLUTION OF HABITATS

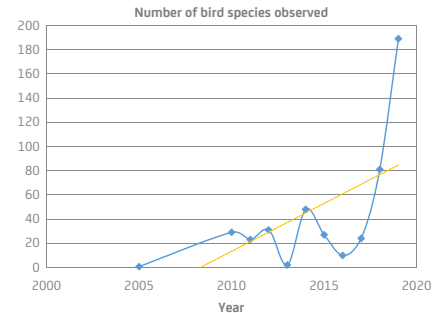
Use of spillway water (S03)

- NDVI max.
- NDVI avg.
- NDVI min.
- CV (%)
- Average variation from 2017 (%)



INCREASE IN BIODIVERSITY

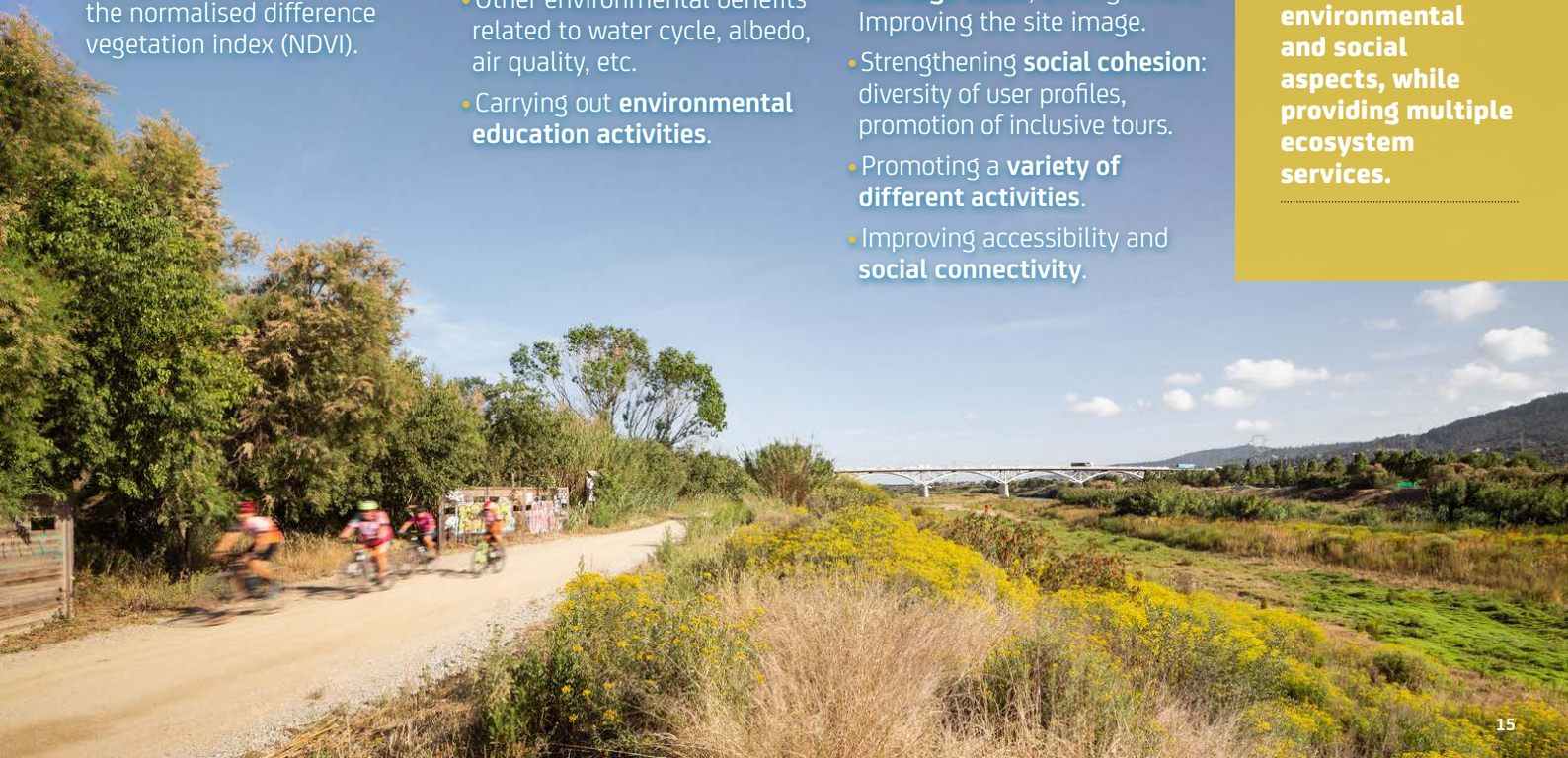
Amphibian pond (S06)



GRADATION, FROM THE MOST ENVIRONMENTAL TO THE MOST SOCIAL BENEFITS

- Encouraging the **creation of new habitats** and improving the extent and quality of plant cover. Benefits associated with increasing the vigorousness of vegetation, calculated from the normalised difference vegetation index (NDVI).
- Increasing **climate regulation service**: carbon sink and stock. Benefit associated with increased carbon absorption.
- Fostering **biodiversity**.
- Other environmental benefits related to water cycle, albedo, air quality, etc.
- Carrying out **environmental education activities**.
- Increasing **health and wellbeing**. Strengthening local **green infrastructure**.
- Reinforcing **site identification and identity, enhancing its heritage value**, among others. Improving the site image.
- Strengthening **social cohesion**: diversity of user profiles, promotion of inclusive tours.
- Promoting a **variety of different activities**.
- Improving accessibility and **social connectivity**.

.....
All the solutions evaluated bring benefits from both environmental and social aspects, while providing multiple ecosystem services.
.....



Development

The development of NBS is generally good. Even in cases where they have not developed as expected (low survival rates of implanted vegetation, poor functioning of wetlands, etc.); its implementation has provided an **improvement over the previous situation, both environmentally and socially.**

In some solutions, design, implementation and management have been successfully combined, as in the example of the use of *Arundo donax*. This NBS converts the problem into part of the solution and encourages use of resources and **experimentation** in the region, while promoting the **circular economy** and closing the circle by **converting waste** into a by-product.

OTHER KEY ISSUES FOR FUTURE IMPLEMENTATIONS

- Explicit adoption of NBS, including planning, design, management, follow-up and monitoring.
- Expansion of the NBS range.
- An approach based on the enhancement of prioritised ecosystem services.
- Experimentation, combined with acquired experience and knowledge of the region and its context.
- Relocation of certain NBS to other areas.



NBS and selected projects

| NBS | Related project | Municipalities | Execution | |
|--|--|---|--|------|
| Water management and new habitats generation | Sustainable urban drainage system (SUDS) (S01) | Recovery of the river environment | Sant Andreu de la Barca/Corbera de Llobregat | 2019 |
| | Demolition of the concrete ditch, turning it into a plant ditch (S02) | Recovery of the river environment | Sant Andreu de la Barca/Corbera de Llobregat | 2019 |
| | Use of spillway water (S03) | Maintenance work on the Llobregat River path, 1st Phase | Molins de Rei | 2015 |
| | Green ditch (S04) | Second phase of improvements to the Llobregat River path | Molins de Rei | 2020 |
| | Use of water collected from roads for ponds (S05) | Project for the environmental and landscape recovery of the Llobregat River area in its middle metropolitan section | Diversos | 2009 |
| | Amphibian pond (S06) | Amphibian pond and actions to promote biodiversity | Sant Joan Despí | 2018 |
| | Use of reclaimed water (S07) | Environmental recovery of the Llobregat River area in the Baix Llobregat region, Section 2 | Sant Joan Despí | 2011 |

| NBS | Related project | Municipalities | Execution | |
|-------------------------------|--|--|----------------------|------|
| Renaturation | Regeneration of barren soil (S08) | Regulation of motorised access to the Llobregat River service road between the picnic area and the Pegueres Stream | Castellbisbal | 2019 |
| | Plant-based acoustic screens (S09) | Landscape improvement project for the Llobregat River picnic area | Sant Joan Despí | 2019 |
| | Development of meanders in the Llobregat River (S10) | Environmental recovery of the Llobregat River area in the Baix Llobregat region, Section 2 | Diversos | 2011 |
| | Vegetation expansion units (S11) | Environmental recovery of the Llobregat River area in the Baix Llobregat region, Section 2 | Diversos | 2011 |
| | Permeabilisation of compacted soils (S12) | Environmental recovery of the Llobregat River area in the Baix Llobregat region, Section 2 | Diversos | 2011 |
| | Revegetation of grassland using species with low water requirements (S13) | Llobregat River Recreational Park | El Prat de Llobregat | 2011 |
| Promotion of biodiversity | Plant-based pergolas (S14) | Llobregat River Recreational Park | El Prat de Llobregat | 2011 |
| | Biodiversity refuges (S15) | Landscape improvement project for the Llobregat River picnic area | Sant Joan Despí | 2019 |
| Promotion of circular economy | Using <i>Arundo donax</i> as organic material (S16) | Actions involved in the maintenance of the Llobregat River | Molins de Rei | 2020 |

LIFE UrbanGreeningPlans

Barcelona, February 2023

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AMB, Green Infrastructure Service

www.amb.cat/es/web/territori/espais-fluvials

Legal deposit: B 5982-2023

