# FIELD VISITS

## BAKIO - BERMEO - BILBAO

Life Platform Meeting on Climate Strategic Integrated Projects

**22 April 2026**

URBAN KLIMA 2050

European Commission

Life

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This meeting is organised by ELMEN

# FIELD VISITS

## BAKIO - BERMEO - BILBAO

### Life Platform Meeting on Climate Strategic Integrated Projects

22 April 2026

This document provides an overview of the three field visits organised within the LIFE Platform Meeting on Climate Strategic Integrated Projects. The visits showcase a set of nature-based interventions implemented in Bakio, Bermeo and Bilbao, illustrating different approaches to climate adaptation, urban transformation and ecosystem restoration across the Basque Country.

The three sites represent complementary scales and contexts:

- Bakio – a fluvial restoration project focused on flood-risk reduction and ecological improvement in a coastal municipality exposed to the combined effect of river and coastal flooding.
- Bermeo – the environmental recovery of the Tonpoi coastal area, creating a naturalised cliffside landscape and improving resilience to extreme weather events.
- Bilbao – the transformation of María Díaz de Haro Street into a green corridor, enhancing thermal comfort, connectivity and urban liveability.

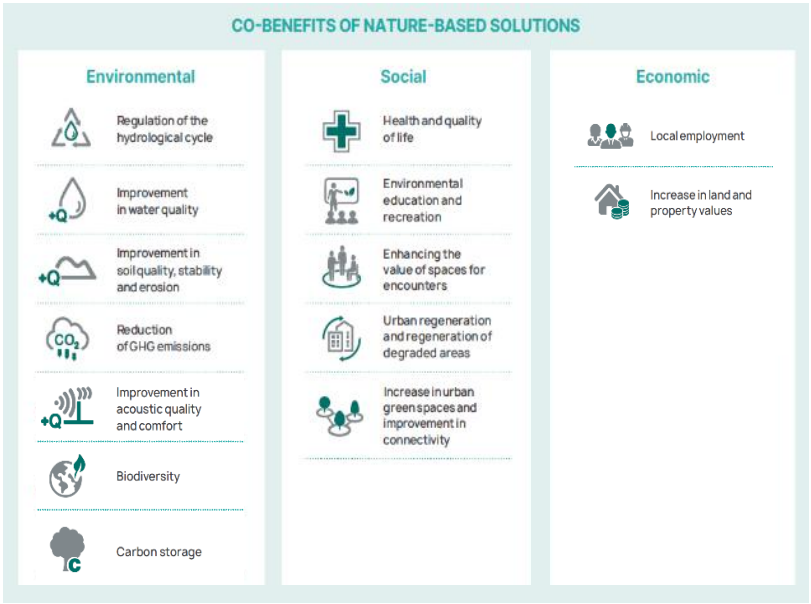
This booklet includes a concise technical factsheet for each intervention, including context, the type of nature-based solution implemented, climate threats addressed, environmental, social and economic co-benefits, related SDGs, governance and agents involved, economic data, success factors and lessons learnt.

In addition, each site includes a specific section: expected reduction of environmental impacts (Bakio), barriers encountered (Bermeo) or increase in green areas (Bilbao).

The following table presents the climate threats used to characterise each intervention:


For every threat, the factsheets indicate the contribution of the project to reducing its effects using a three-level scale:

Similarly, the figure below presents the co-benefits used in this booklet. Their environmental, social and economic contributions are qualitatively rated as high, medium or low, offering a clear visual summary of the wider benefits expected from each project:




Bakio Town Council and Basque Water Agency

Bakea and Solozarre areas, Bakio (Bizkaia)

2025 - ongoing

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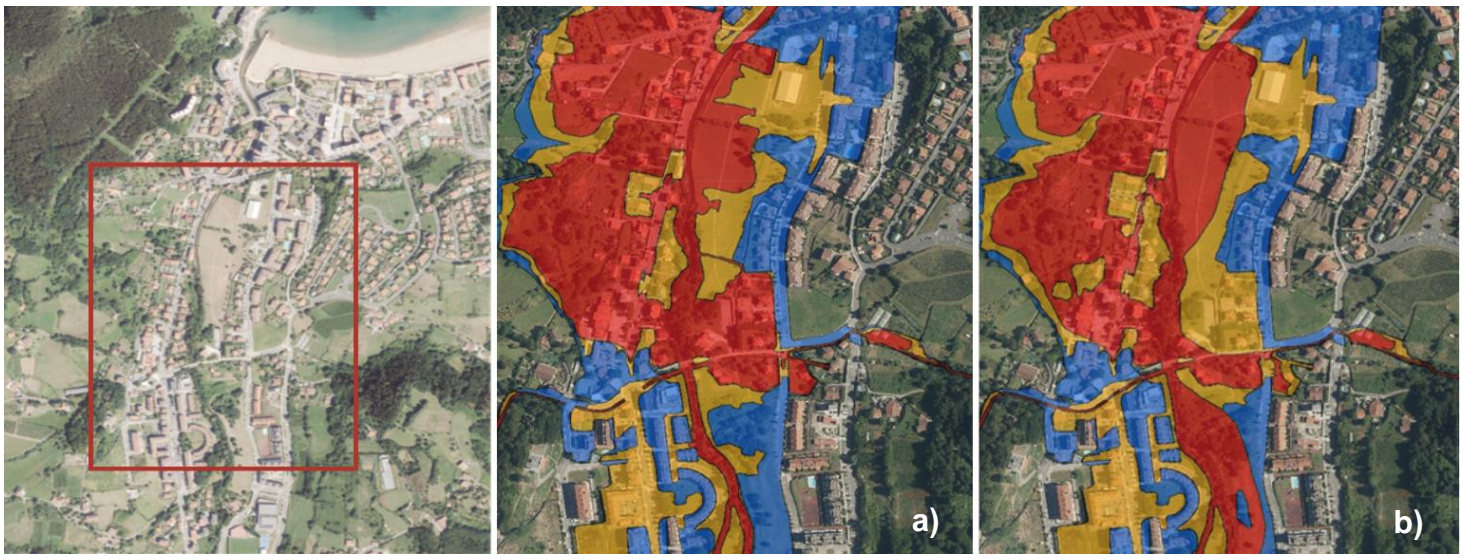
# Flood protection and environmental improvement of the Estepona River in Bakio

The Bakio Town Council and the Basque Water Agency – URA are developing an intervention to reduce flood risk and improve the environmental condition of the Estepona River along its urban stretch. As Bakio faces the combined effect of river flooding and sea-level rise, the project responds to the need to improve the river's performance during flood events and restore its degraded fluvial environment.

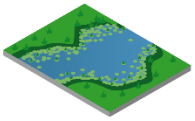
The intervention aims to recover space for the river by redefining the topography, opening new channels, and creating areas in Bakea and Solozarre. The project also removes elements that previously constrained the river's natural dynamics and includes actions on riparian vegetation through the removal of invasive species, the introduction of native plant communities, and the use of bioengineering techniques to stabilize riverbanks and promote ecological restoration.

In addition, the project incorporates public-use and landscape-improvement criteria, creating new recreational areas and pedestrian routes that integrate the river into the municipality's daily life. The intervention will result in a safer, more naturalized, and more accessible river, combining flood protection with the recovery of the fluvial environment.




Flood hazard map of the Estepona River corridor (10, 100 and 500 year return periods): a) current; b) post-intervention.

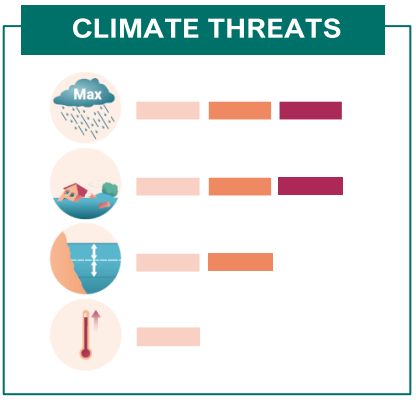
## Type of NBS implemented in the intervention

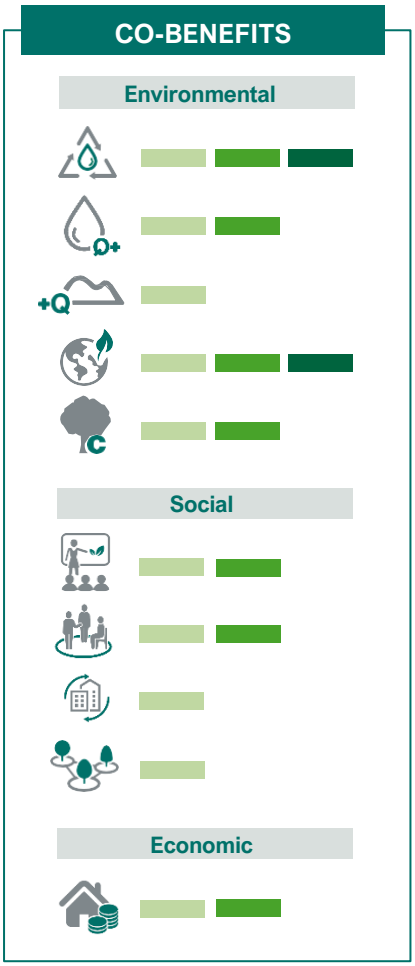


### Wetlands

In the Bakea area, a tidal-influenced inner marsh is created by adjusting the topography, functioning as a natural wetland. This measure allows frequent controlled flooding, improves hydrological and ecological connectivity, and introduces native vegetation adapted to saline and fluvial gradients. The wetland helps retain water during high-flow events and enhances biodiversity.

Illustrative views of the wetland restoration proposed in Bakea.




## Forests / controlled Floodplains

In the Solozarre area, the project creates a floodplain forest and opens a secondary river channel designed to activate during flood events. The terrain is reshaped to give the river additional space to overflow safely, improving its hydraulic performance. Invasive vegetation is removed and replaced with native riparian species, and bioengineering techniques are used to stabilise the riverbanks. These actions support the restoration of natural flow dynamics and provide greater capacity to manage peak flows.

Illustrative views of the floodplain forest proposed in Solozarre.

> *"The project stems from a participatory process in which the town became aware of its disconnection from the natural environment and its vulnerability to flooding."*
>
> **David Gutiérrez-Solana, architectural consultant for the Bakio City Council.**

## Governance

### Agents involved:

- Bakio Town Council
- Basque Water Agency – URA
- Ihobe
- Joint Venture SCIA–IKERLUR
- University of the Basque Country
- Polytechnic University of Catalonia
- Aranzadi Science Society
- Citizens: Residents and users of the area.

## Economic data

### Approximate cost of the intervention: € 2.58 M

### Funding:

**€ 503,970** (LIFE Programme, LIFE IP URBAN KLIMA 2050 project)

## Lessons learnt

- Coordination between projects is essential to improve hydraulic continuity, integrating simultaneous actions such as river restoration, channel widening and the removal of weirs.
- Land and soil management must be addressed at the catchment scale, prioritising on-site reuse and restoring degraded headwaters with surplus materials.
- Considering the full water cycle is critical, including groundwater dynamics monitored through modelling and real-time measurements to avoid unintended impacts.
- Planning and implementation must progress in parallel, aligning river-channel improvements, administrative procedures and technical design.

## Expected reduction of environmental impacts

- Flood-risk reduction **(T=100): from 0.27 M€/year to 0.03 M€/year**, based on ex-ante modelling.
- Improved hydraulic continuity through channel widening under Santa Catalina and recovery of both banks.
- Lower impacts from soil and C&D waste management, prioritising on-site reuse and controlled removal.
- Reduced impact on fauna through adapted construction windows and specific protection measures.

## Succes factors

Functional zoning of the fluvial system (marsh, transition area and floodplain forest) adapted to tidal influence and river dynamics.

Frequent activation of new channels and floodable areas to stabilise hydraulic and ecological processes.

Improved hydraulic continuity, including channel widening under the Santa Catalina bridge and recovery of the left bank.

Use of bioengineering techniques and native vegetation adapted to saline–fluvial gradients.

Habitat improvement through invasive-species removal and creation of diverse riparian and wetland habitats.

Coordination between Bakio Town Council, URA and specialised teams, incorporating input from local citizens.

Scan the QR code to learn more about the intervention being carried out in Bakio through a video:

Bermeo Town Hall

Tonpoi, next to the Tala Park, Bermeo (Bizkaia)

2021-2022

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# Recovery of a natural coastal space along the Tonpoi cliffs in Bermeo following climate criteria

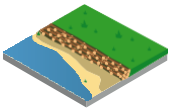
The natural area of Tonpoi is an area of high natural and scenic value as it is located next to the Talape and Tonpoi cliffs, in the vicinity of the San Juan de Gaztelugatxe protected biotope and within the Urdaibai Biosphere Reserve.

Before its recovery, the area was degraded and there was no public access. It was occupied by vegetable gardens and irregular temporary settlements such as shacks, temporary enclosures, fences, invasive vegetation, and even small uncontrolled waste dumps. Given its proximity to the sea and the steepness of the terrain, the area is vulnerable to landslides due to the combined effect of heavy rainfall and extreme wave events, which are becoming more and more frequent, putting users of the plots at risk.

The aim of the intervention was to create a public park through the environmental and social recovery of a degraded coastal environment by applying climate change adaptation criteria. To achieve this, peri-urban green infrastructure was created that occupies an area of 1.4 hectares close to the town centre, providing shaded areas and connecting Aritzatxu beach with the town centre through the Tonpoi cliffs.

General view of the park after the intervention was completed.

## Type of NBS implemented in the intervention



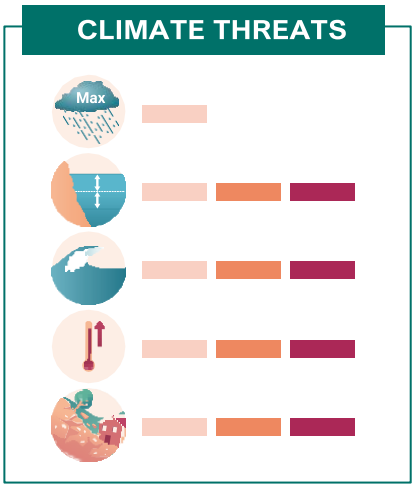
**Renaturalisation / stabilisation of cliffs**

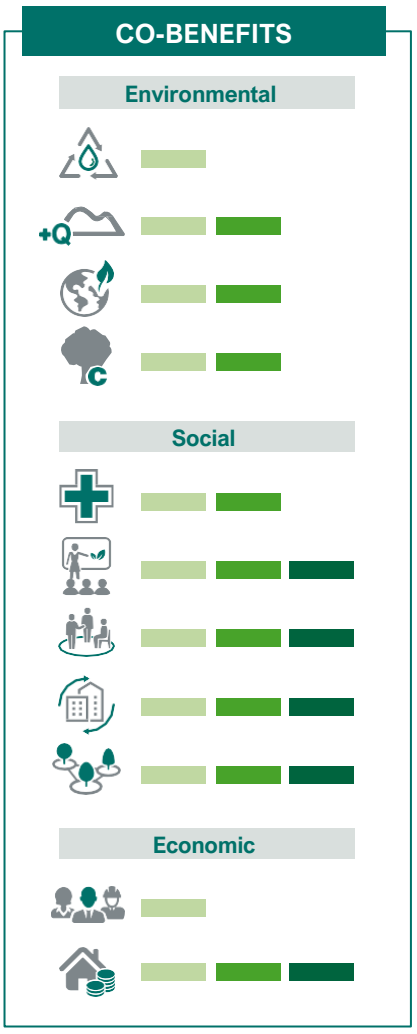
PHASE 1

### Acquisition of plots of land and site preparation

The first phase consisted of land expropriation, demolition of illegal constructions, and site preparation.

Preparation of land and execution of the work.




PHASE 2

## Vegetation planting

Planting of native tree and shrub species, provision of **3 km of footpath** that connects the urban centre with the natural coastal environment, and creation of an area to relax and enjoy the views. A total of **77 trees (0.5 trees per 100 m²)**, mainly holm oaks, have been planted to restore the original Cantabrian holm oak ecosystem of the area: 58 holm oak trees, 6 cork oak trees, 6 Pyrenean oak trees, 3 laurels, 2 pear trees, and 2 medlars. Around **1,500 shrubs (11 specimens per 100 m²)** have also been planted, of different species such as arbutus, blackthorn, buckthorn, privet, dogwood, alder buckthorn, bitter dock and common spindle. In addition, the existing fruit trees and native trees have been respected.

Final state of the area after the vegetation has been planted.

*"With this intervention, beyond environmental recovery, we have created a pedestrian itinerary where the people of Bermeo can exercise in a natural environment that is adapted to climate change and close to the town centre, but away from noise and pollution."*

**Municipal technician of Bermeo Town Council.**

## Governance

### Agents involved:

- Bermeo Town Hall
- Basque Country Coastal Authority
- Ihobe
- Neiker, Basque Institute for Agricultural Research and Development
- Citizens: owners and users of the Tonpoi plots.

## Economic data

### Approximate cost of the intervention: € 760,000

### Funding:

- **€ 125,000** (aid programme for local entities that carry out actions that promote sustainable development).
- **€ 300,500** (LIFE Programme, LIFE IP URBAN KLIMA 2050 project)

## Barriers encountered

- Acquisition of the land by Bermeo Town Council. The area was divided into multiple privately owned plots, many of which were unregistered. Identifying and contacting land owners was costly, lengthening the project's procedures and timeframe. In addition, after the owners and users of the plots were made public to provide information on the de-registration process to pass the land to the municipality, several allegations were received and had to be processed before the plot expropriation and eviction process could continue.
- Presence of numerous small uncontrolled landfills in the area.

## Success factors

Recovery of the original ecosystem with minimal actions and respecting the landscape.

Reuse of natural materials present on site or use of locally sourced materials.

Creation of several microhabitat areas (dead wood, pond, etc.) to enhance biodiversity.

Measurements (pre and post action) of soil organic carbon to analyse how the intervention improves soil quality and contributes to improving soil structure, reducing erosion, and making it more resilient to climate change.

Street furniture and street lighting is not used to restore the original natural state of the Tonpoi area.

Scan the QR code to learn more about the intervention implemented in Bermeo through a video:

Bilbao City Council

Maria Díaz de Haro, Bilbao (Bizkaia)

2021-2023

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# Conversion of an urban traffic artery into a green corridor to improve thermal comfort along Maria Diaz de Haro street in Bilbao

The Bilbao City Council proposed to fully transform María Diaz de Haro Street, converting two of its three traffic lanes into a green corridor connecting two existing urban green areas - Doña Casilda Park and Ametzola Park. The entire road design has been completed, and at the date this document is published the first phase of the work, the section from Simón Bolívar to Autonomía Street, has also been finished.

The intervention aims to renaturalise a road that is almost 1 km long and 25 metres wide. The first phase of the project covers an area of around 9,000 $m^2$, a large part of which will be used for new pedestrian and green areas. Motorised traffic lanes are therefore removed, widening the pavements and creating a large central space in the form of a green corridor where a children's play area is also installed. The project has been able to completely revitalise this important urban artery of the city from the pedestrian, recreational, and commercial point of view.

María Díaz de Haro green corridor after the intervention was completed.

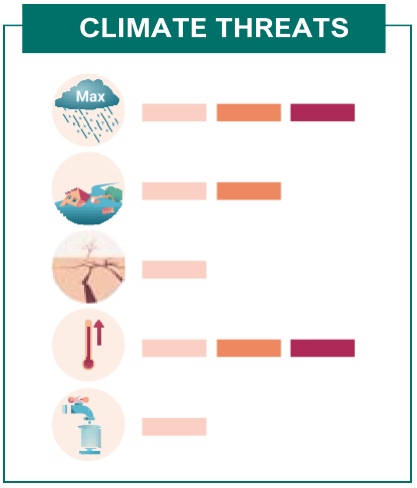
## Type of NBS implemented in the intervention

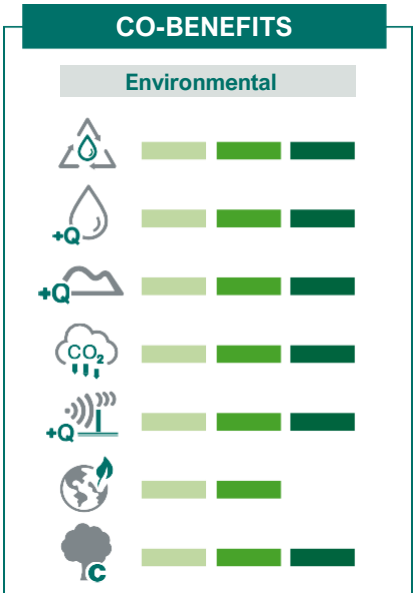
### Renaturalisation of linear infrastructure for soft traffic

The first phase of the project covers a surface area of nearly 9,000 m², of which more than **6,000 m² are destined for new pedestrian and green areas**. To this end, two of the three motorised traffic lanes are removed, widening the **pavements to 4.5 metres** and creating a large central space as a green corridor.

Approximately **50 trees** of four different medium-large size species, as well as shrubs and grass (approximately 10 different species) are planted to create the linear space along the green corridor, forming different plant strata.

Photographs with the interventions described (in the middle and at the bottom).



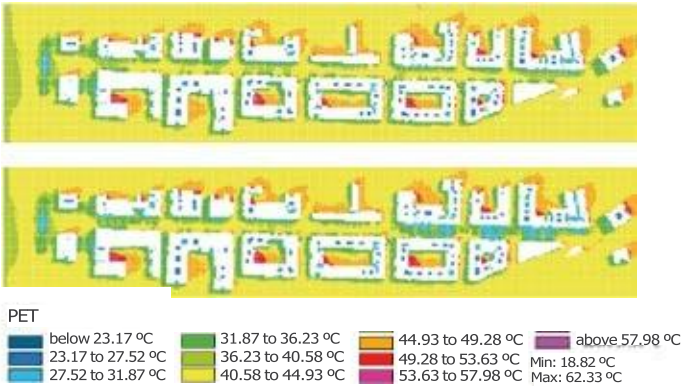

## Urban Sustainable Drainage System (SUDS)

Storage cells are arranged at the lowest points of each street section to allow water to infiltrate into the ground and reduce the risk of rainwater flooding. This system also helps to reduce the impact of heavy rainfall events on the stormwater network, as only the excess water overflowing from the cells is discharged into the network.

Structural soil has been incorporated in the tree surrounds, based on granular material specially treated with gels and other materials. The soil favours the optimal development of the tree roots, helping to ensure the availability of water, air, organic matter and nutrients. This avoids damage to street furniture and paving when the root system of the planted specimens grows. At the same time, the designed structure can temporarily store surface runoff.

## Micro-scale thermal modelling

Thermal modelling at micro-scale level has been used to analyse the effectiveness of the solutions adopted. The improvement in thermal comfort experienced in the street is analysed by comparing the situation before and after the works were carried out and all the elements of shading, green areas, etc. were incorporated. The study also took into account the climatic variable, analysing the results under different climate scenarios.




Effect of vegetation and materials used in the intervention on the thermal comfort indicator PET (Physiological Equivalent Temperature).

*"The street will become a green corridor and a natural extension of the Doña Casilda Park up to where it meets the Ametzola Park. It will be an entirely harmonious, sustainable place, with wide spaces to take a walk, well-looked after vegetation, and children's playgrounds."*

**Juan Mari Aburto, Mayor of the City of Bilbao.**

## Governance

**Agents involved:**

- Bilbao City Council:
  - Mobility and Sustainability Department
  - Works, Urban Planning and Strategic Projects Department
  - Services and Quality of Life Department
- Ihobe

## Economic data

**Approximate cost of the intervention:**
**€ 3 M**

**Funding: € 16,200**
(Local Climate Eco-innovation, 2021) for micro-scale thermal modelling.

## Succes factors

Collaborative and interdisciplinary work flow between the different city council departments and the agents involved.

Consultation and assessment of available information on the vulnerability and risk of Basque municipalities to climate change, and thermal analysis of the city to address the challenge of thermal adaptation on a city scale from a general urban planning point of view.

## Lessons learnt

- The ability of NBS to provide shade is one of the elements that determines their potential to provide thermal comfort. How the shade behaves on the street must be considered when designing NBS, trying to ensure that the shadow is cast on the areas intended to be used and walked through.
- Wind is another key element in thermal comfort. The prevailing wind channels should be identified and NBS should not be placed in areas that would obstruct the wind flow and prevent aeration.
- The following should be taken into account when selecting tree and shrub species: their potential to provide thermal comfort, their native character, their contribution to urban biodiversity, and their maintenance requirements (pruning, water consumption, etc.).

## Increase in green areas

- Increase in estimated $CO_2$ **absorption capacity by 39%.**
- **80% of the surface** of the action area **improves the adaptability to heat stress:** following the intervention, more than 40% of the surface is in a low range of moderate heat stress for the hours of the day most exposed to discomfort (from 9h to 14h) in typical summer days with hot weather.
- Thermal improvement ranging between **0 and 2 ºC**, with 13% of the area improving by more than 2 ºC.

Scan the QR code to learn more about the work being carried out in Bilbao through a video: