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URWAN

Raising awareness and building understanding about NbS

URWAN Training Kit 1

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Training Kit Nº 1: Raising awareness and building understanding about NBS

- **Target: Urban planning departments, decision-makers, policy bodies**
- **Topics: regulations, finance, governance, case studies**
  - Local / National / EU regulatory tools
  - Financial mechanisms
  - Internal governance & stakeholder coordination
  - Best Practices and Case studies from Mediterranean cities

TK1

Training Kit Nº 2: Policy & Regulatory Framework

- **Target: Urban planning departments, decision-makers, policy bodies**
- **Topics: regulations, finance, governance, case studies**
  - Local / National / EU regulatory tools
  - Financial mechanisms
  - Internal governance & stakeholder coordination
  - Best Practices and Case studies from Mediterranean cities

Training Kit Nº 3: Communicating to Foster Social Acceptance

- **Target: Municipal communication teams, educators, community actors**
- **Topics: public awareness, co-creation, engagement, data**
  - Public engagement and awareness
  - Communicating benefits and impacts of NbS
  - Co-creation methods and participatory tools
  - Data-based storytelling

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Table of Contents - URWAN Training Kit 1

1. Introduction

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1.1. Purpose and Objectives

The purpose of this Training Kit is to **enhance the understanding and appreciation of Nature-Based Solutions (NbS),** their co-benefits, and their contribution to sustainability goals, while highlighting the importance of citizen awareness among technical professionals and policymakers.

The main objective is to support local authorities in the **adaptation and adoption of Nature-Based Solutions (NbS)**, emphasising both the challenges and the benefits associated with these nature-based technologies.

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Purpose and Objectives: the URWAN Focus

The specific purpose is to introduce and expand knowledge of Nature-Based Solutions (NbS), starting from their **concept and definition**.

The main objective is to emphasise the **multiple co-benefits of NbS**, including their environmental, social, and sustainable urban development impacts.

The training focuses explicitly on the **Mediterranean context**, addressing regional challenges and opportunities for the effective implementation of NbS.

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1.2. Target Audience and Relevance

Local authorities: urban planning and land use, mobility and transport, public works and infrastructures, water cycle management, environmental and green infrastructure management.

Relevant to all professionals, particularly those concerned with green space, urban resilience and water use and management (engineers, architects, agronomists, etc.).

It presents **significant interest to Policy makers, CEO's and decision-makers**, regional governments, regulatory bodies, sustainability and biodiversity teams.

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URBAN PLANNING AND LAND USE

MOBILITY AND TRANSPORT

PUBLIC WORKS AND INFRASTRUCTURES

WATER MANAGEMENT

NO NbS APPLICATION ⟷ **NO Resilience + NO Co-Benefits**

PARKS + GARDENS AND OTHER GREEN SPACES

Static conventional management!

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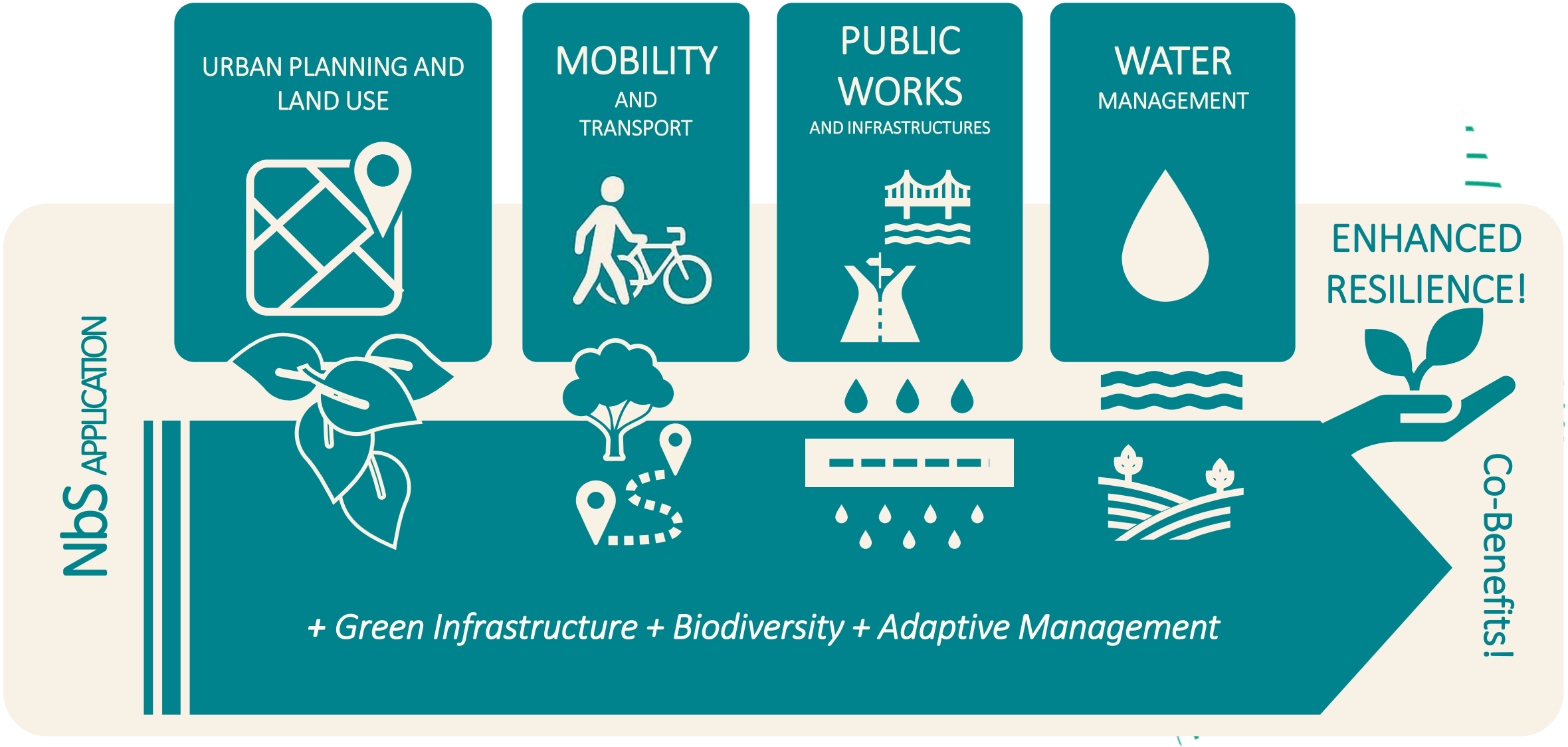

Credit – Natural Base Solutions SL

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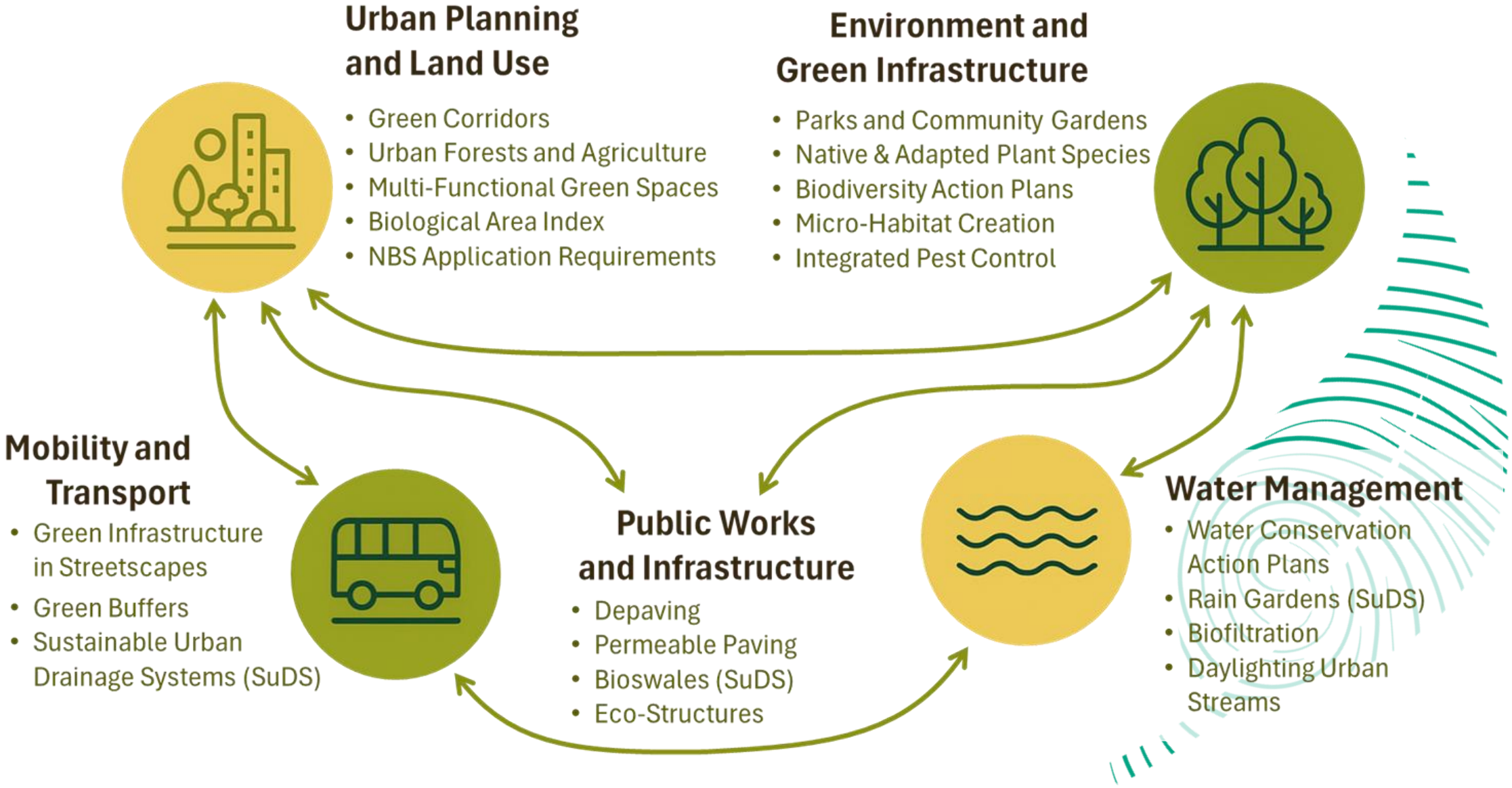
1.2.3. Harnessing NbS in Urban Departments



Credit – Natural Base Solutions SL

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1.3. URWAN Training Kit Structure

- **Target: Urban planning departments, decision-makers, policy bodies**
- **Topics: concept and definition of NbS, Mediterranean urban challenges, green vs grey infrastructure, co-benefits, cost-effectiveness, case-studies**
  - Understanding the concept of NbS - Definitions, principles, and policy frameworks behind Nature-Based Solutions
  - Mediterranean challenges and responses - Flood prevention, water reuse, urban heat island mitigation, biodiversity enhancement
  - Comparing green and grey infrastructures - Functionality, cost-effectiveness, and lifecycle perspectives
  - Co-benefits and sustainability impacts - Environmental, social, and economic advantages of NbS for urban resilience
  - Cost of inaction and long-term value - Evaluating economic and environmental implications of delayed or missing interventions
  - From problem to implementation - URWAN Catalogue of Water-Related NbS
  - Case studies from Mediterranean cities and URWAN project

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1.4. Key Definitions:

See the Glossary of terms for more

NbS: Nature-Based Solutions are actions that use natural processes and ecosystems to address societal challenges — i.e., climate change, water security, and biodiversity loss — while providing multiple environmental, social, and economic co-benefits. NbS enhance resilience by working *with* nature rather than against it, promoting sustainable and regenerative approaches to urban and territorial development.

Green Infrastructure: Green Infrastructure refers to a strategically planned network of natural and semi-natural areas — such as parks, green roofs, wetlands, and urban forests — designed to deliver ecosystem services like water purification, flood regulation, cooling, and recreation. Unlike isolated green elements, GI functions as an interconnected system that complements or replaces grey infrastructure to enhance environmental quality and urban liveability.

Adaptation to climate change: Adaptation to climate change involves adjusting natural or human systems to actual or expected climate impacts, such as extreme rainfall, drought, or rising temperatures. The goal is to reduce vulnerability and increase resilience by integrating adaptive measures — including NbS — into planning, design, and management of urban and territorial environments.

Water management: Water management encompasses the planning, development, distribution, and sustainable use of water resources. It includes both conventional and innovative approaches — such as water reuse, stormwater harvesting, and ecosystem-based treatment — aimed at ensuring water availability, improving quality, and maintaining the natural water cycle within urban and rural systems.

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2. Cities and climate change adaptation

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2. Cities and climate change adaptation

2.1. How climate change impacts cities → 2.2. Role of NbS in adapting to climate change

2.3. Multiple benefits of NbS

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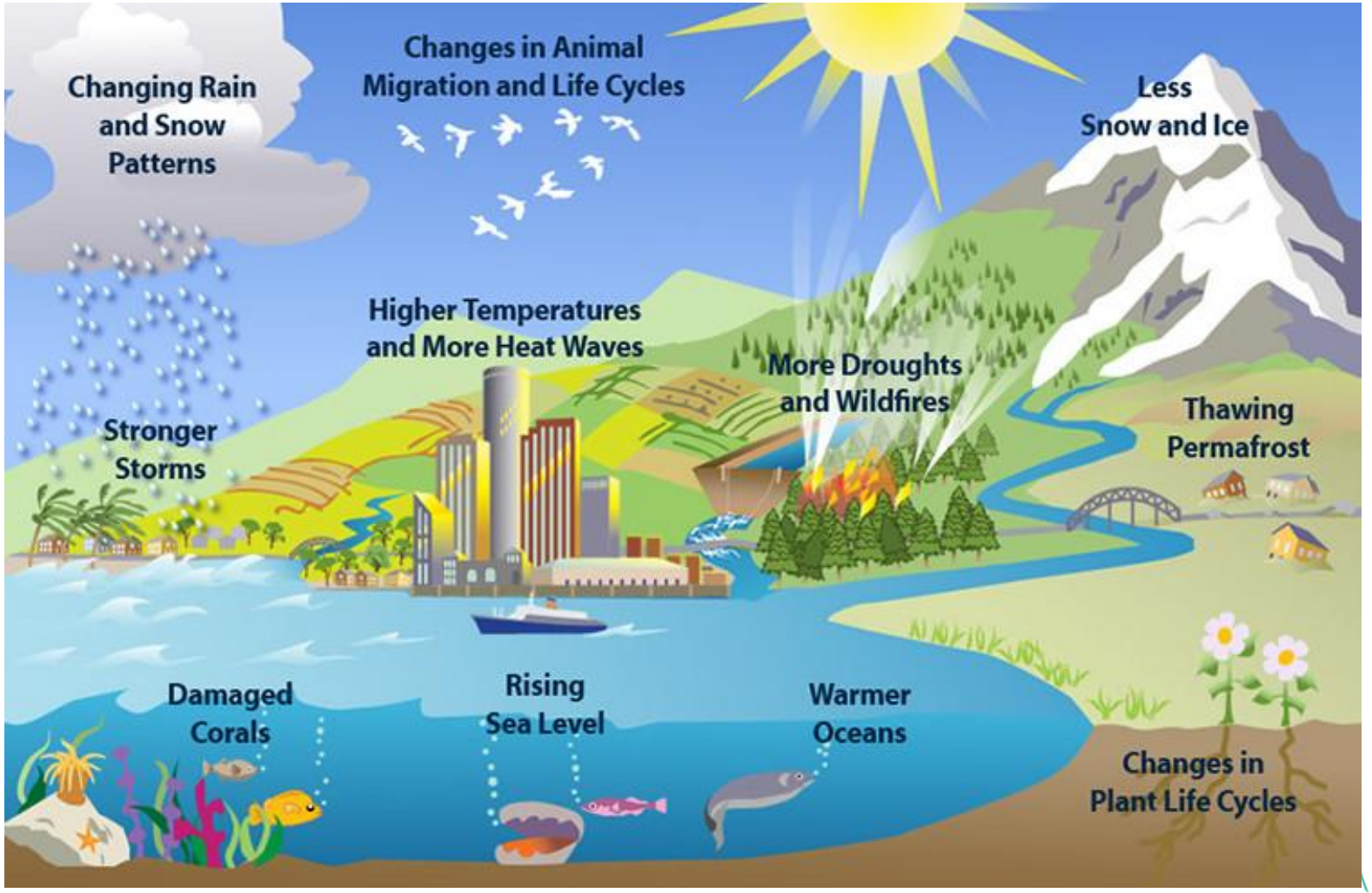
2.1. How climate change impacts cities



Source: https://www.linkedin.com/pulse/7-most-important-effects-climate-change-hardik-gupta-igbc-ap/ (oct 14th 2025)

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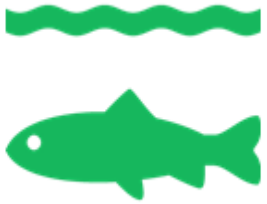
2.1. How climate change impacts cities

Loss of biodiversity

Increase of flood events

Increase of heat islands



Worsening of water quality

Increases of droughts

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2.1. How climate change impacts cities: our focus

Loss of biodiversity

Increase of flood events

More frequent and intense heavy rains and rising sea levels in coastal cities can overwhelm drainage systems and damage property, roads, and critical infrastructure.

Increase of heat islands

Rising temperatures intensify the "urban heat island effect," leading to dangerous heatwaves, increased public health risks, and a strain on energy grids.

Worsening of water quality

Increases of droughts

Climate change can worsen droughts and water scarcity, affecting access to clean water for urban populations and straining water resources.

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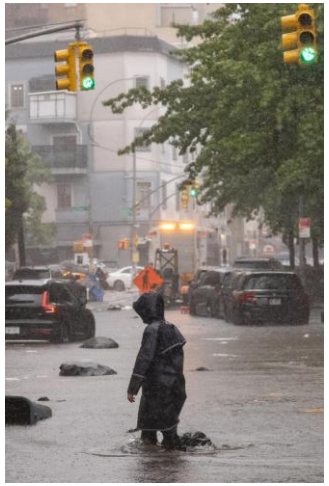
2.1. How climate change impacts cities: our focus

Loss of biodiversity

Increase of flood events



Increase of heat islands

Worsening of water quality

Increases of droughts

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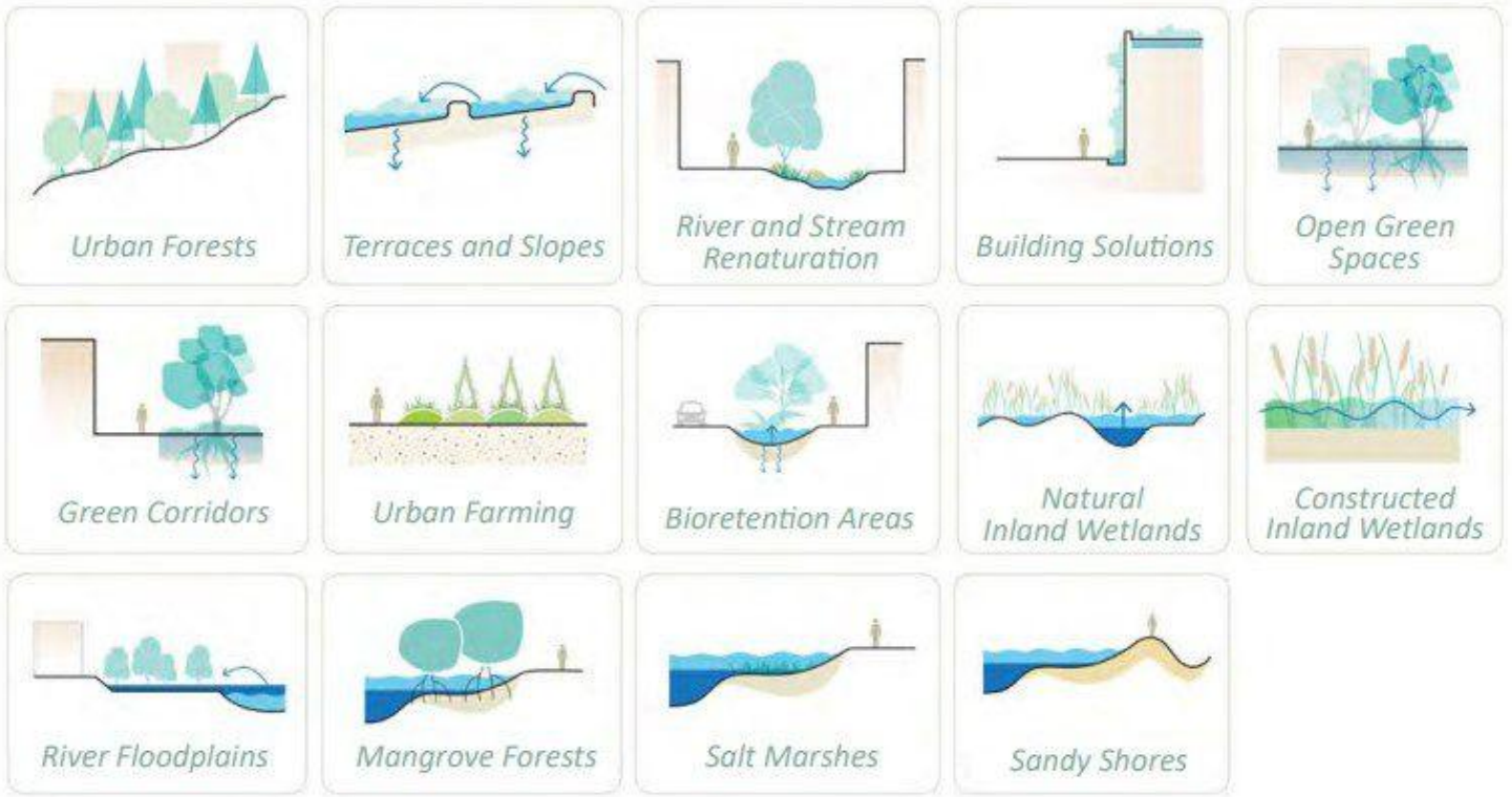
2.2. Role of NbS in adapting to climate change in cities

Nature-based solutions (NbS) enhance urban resilience to climate change by

(1) protecting,
(2) restoring,
(3) sustainably managing ecosystems

to provide climate-adaptive benefits



Source: World Bank, 2021. A Catalogue of Nature-based Solutions for Urban Resilience. Washington, D.C. World Bank Group

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2.2. Role of NbS in adapting to climate change in cities

Nature-based solutions (NbS) enhance urban resilience to climate change by
(1) protecting,
(2) restoring,
(3) sustainably managing ecosystems
to provide climate-adaptive benefits.

- **Natural Protection:** Green spaces, like urban forests, parks, and green roofs, provide shade and cool the air through evapotranspiration, reducing the intense heat in cities.
- **Ecosystem Restoration:** Permeable surfaces, green infrastructure, and wetland restoration can absorb rainwater, reduce runoff, and mitigate the impacts of heavy rainfall in urban contexts.
- **Water Management:** Rainwater harvesting can increase the availability of freshwater and help manage drought conditions.

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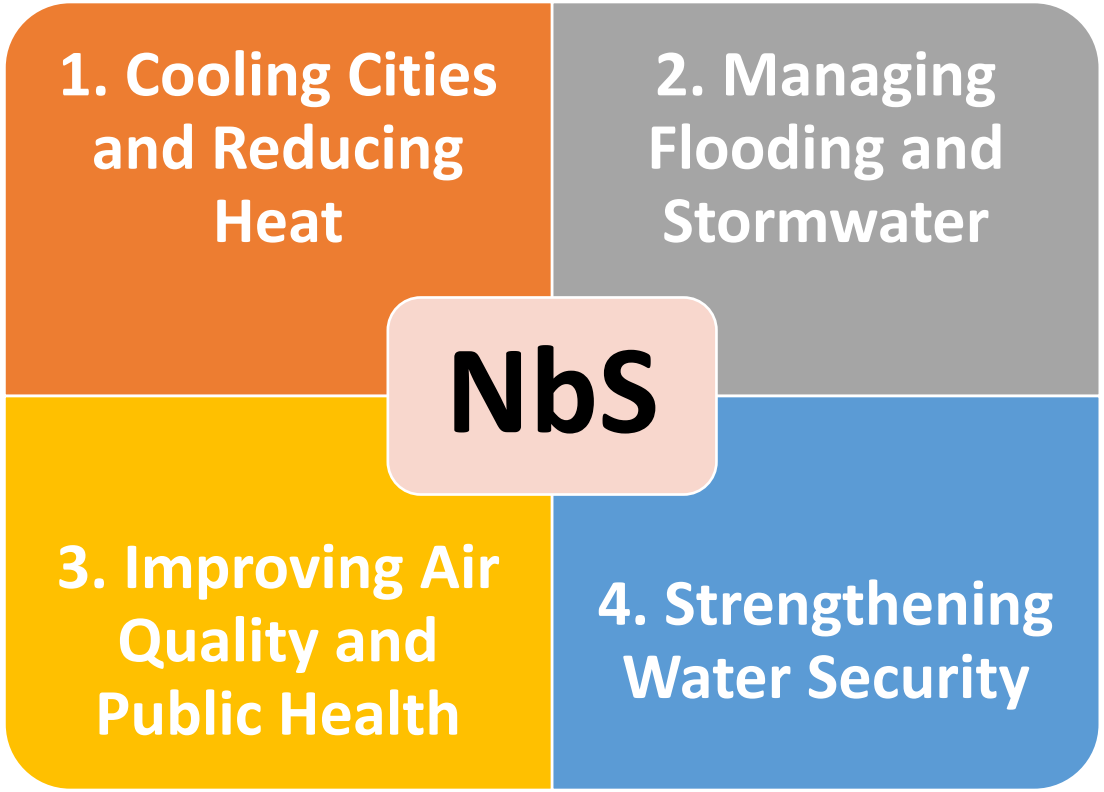
2.2. Role of NbS in adapting to climate change in cities



1. Urban trees, green roofs, and parks lower temperatures through shading and evapotranspiration. These measures reduce the urban heat island effect, improve air quality, and cut energy use for cooling.

2. Rain gardens, permeable pavements, urban wetlands, and green corridors absorb excess rainfall and reduce pressure on drainage systems. They lower flood risks, protect buildings, and recharge groundwater.

3. Green spaces filter pollutants, capture dust, and provide cleaner air. Access to parks and natural areas improves mental health, lowers stress, and promotes healthier lifestyles in crowded cities.

4. Urban wetlands and restored rivers regulate water supply, reduce pollution, and improve stormwater management. These systems ensure safer, more reliable water for growing populations.

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2.3. Multiple benefits of NbS

- NbS can provide long-term environmental, societal and economic benefits. Some of these benefits can go beyond climate adaptation.

Social benefits:

- Improved public health, community well-being, and access to green spaces.

Economic benefits:

- Cost-effective solutions for urban management and new green job opportunities.

Environmental benefits:

- Enhanced biodiversity, improved air and water quality, and restored ecosystems

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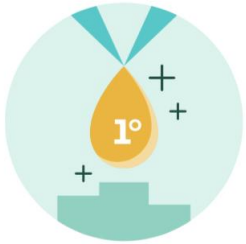
2.3. Multiple benefits of NBS

- NBS can provide long-term environmental, societal and economic benefits. Here are some key benefits **with a focus on water**

WATER QUANTITY

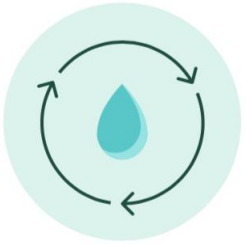
When the solution helps reduce the adverse effects of stormwater.

WATER QUALITY



When the solution contributes to the purification of polluted water.

WATER PROVISION



When the solution provides excess for other uses.

URBAN BIODIVERSITY

When the solution provides a habitat for species than Homo Sapiens.

AESTHETIC

When the solution transforms the urban space, making it more beautiful.

COOLING

When the solution creates an area large enough to be directly used by people.

RECREATION

When the solution creates an area large enough to be directly used by people.

3. NbS vs conventional solutions

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3. NbS vs conventional solutions

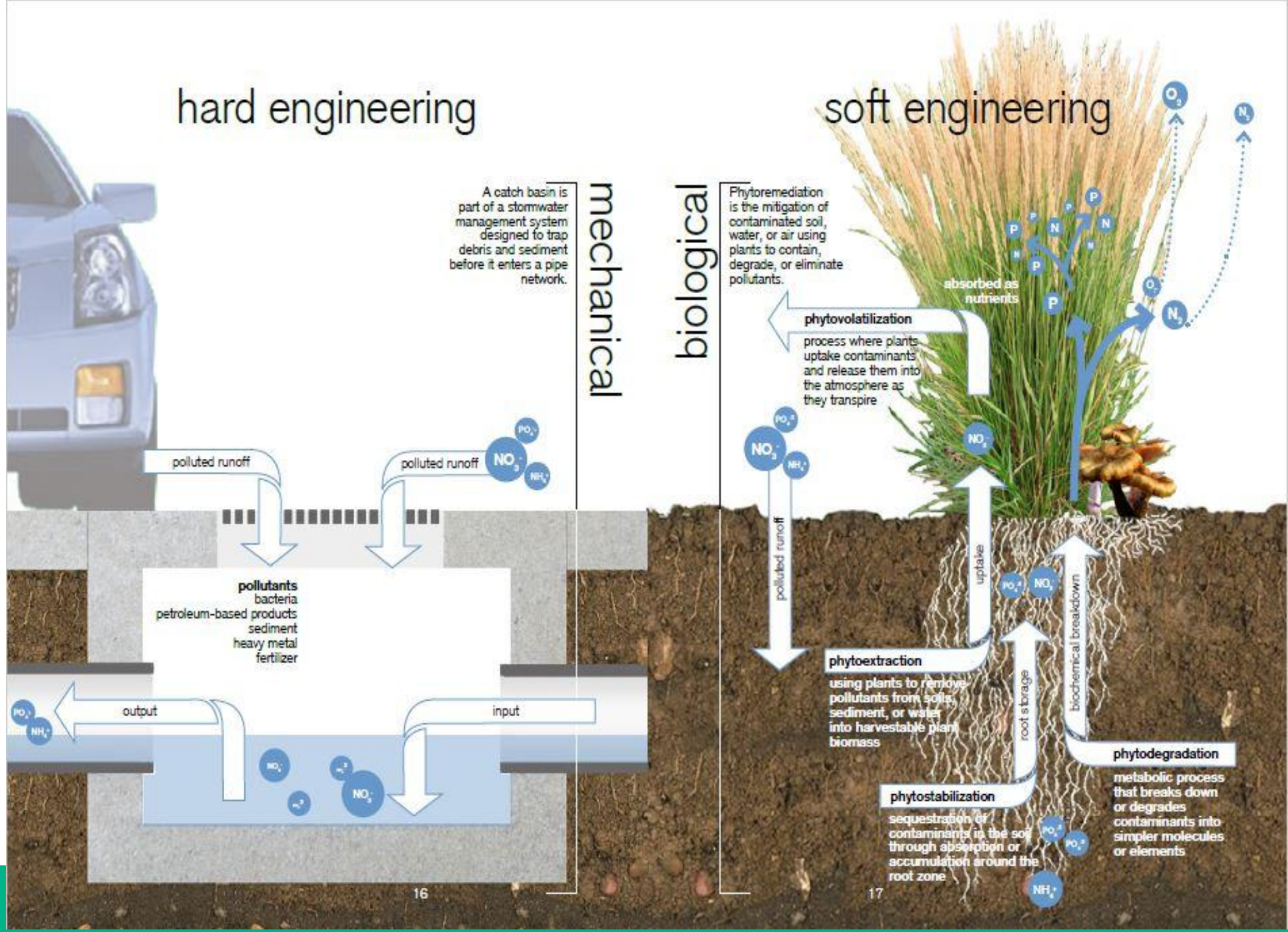
3.1. Dealing with nature may provide several advantages but requires a different attitude

3.2. Understand the needs of «live» matter

3.3. Accept more uncertainty and unpredictability

3.4. Accept the nuisance of co-existence with other species

3.1. Dealing with nature may provide several advantages but requires a different attitude



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3.2. Understand the needs of «living» matter

Designing with nature means recognising that **NbS are living infrastructures; it is essential to understand the fundamental needs of living organisms:**

- **Space for the crown of the trees**: Vegetation requires adequate space for canopy development, allowing proper light interception, evapotranspiration, and shading. Limited canopy space reduces cooling potential and biodiversity value.
- **Soil for the roots**: Roots need sufficient soil volume, depth, and permeability to anchor plants, access water and nutrients, and sustain microbial activity. Compact or sealed soils drastically limit plant growth and resilience.
- **Photosynthesis uses water to produce organic carbon**: through photosynthesis, plants convert water and carbon dioxide into organic matter, releasing oxygen and storing energy. Without a continuous water supply and a healthy soil moisture balance, the entire system becomes stressed and less efficient.
- **Biodiversity and coexistence:** Trees, shrubs, herbs, and microorganisms interact in symbiotic ways — creating stable, self-sustaining ecosystems capable of delivering multiple ecosystem services, from water purification to cooling and carbon sequestration.
- …

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3.3. Accept more uncertainty and unpredictability

To **design an ecosystem** requires a completely different approach than conventional “grey infrastructure” design

The behaviour of an NbS is **less predictable**

Green infrastructure design requires **precautionary** sizing

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3.4. Accept the nuisance of co-existence with other species

One of the main reasons why NbS are used in the urban environment is that they support biodiversity.

But this means that this new ecosystem will be colonised by animals such as insects, reptiles, birds, and small mammals.

Given the size of NbS (generally a few m^2), these new urban inhabitants will not be present in large quantities; however, we have to accept that, besides lovely small birds, we may meet a mouse, a snake, a spider or a wasp.

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4. NbS as urban green infrastructures: a new state of mind

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4. NbS as urban green infrastructures: a new state of mind

4.1. Using NbS to cool off - Evapotranspiration requires water

4.2. Using NbS to manage stormwater - Flood management requires space

4.3. Cost effectiveness

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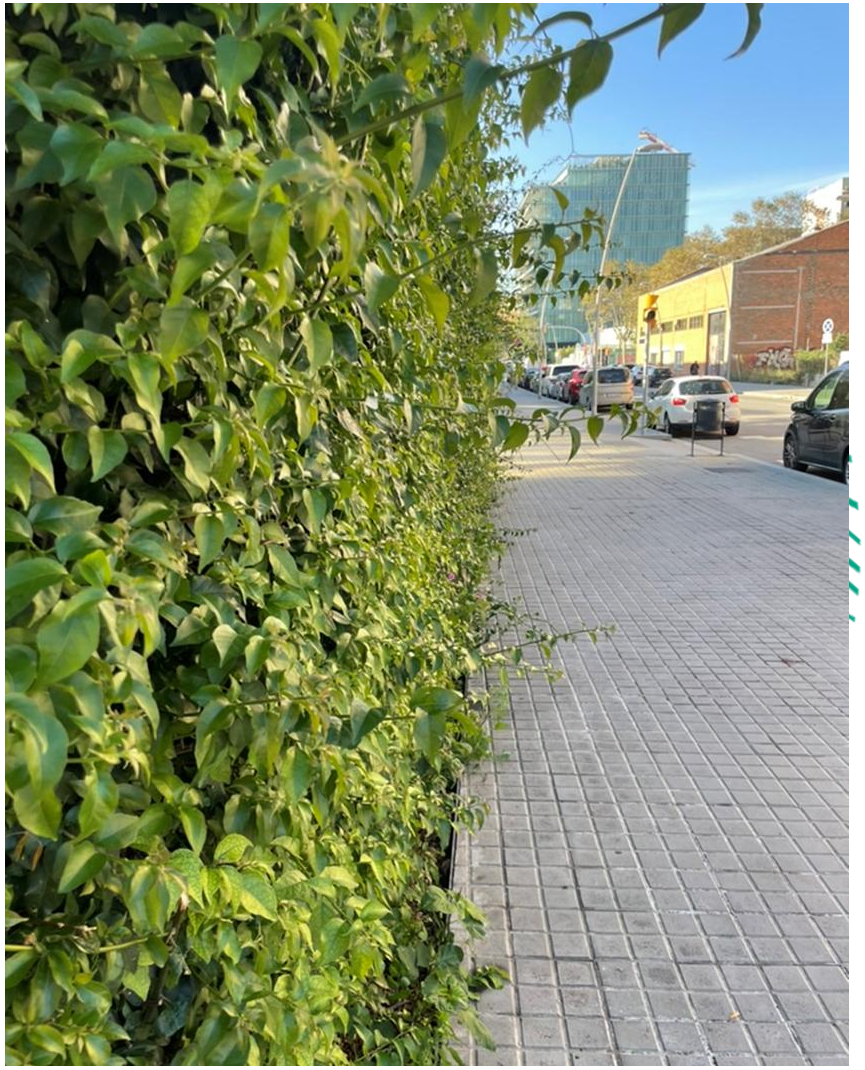
4.1. Using NbS to cool off - Evapotranspiration requires water

- NbS are considered a key solution to improve urban climate conditions
- Green areas are cooler than the built environment thanks to the physical reaction of evapotranspiration occurring in the leaves: liquid water absorbs heat to pass to the gas status
- Using NbS to cool off the urban environment requires water

The guidelines on NbS dedicated to cooling and air quality improvement https://op.europa.eu/en/publication-detail/-/publication/001a9517-d530-11ea-adf7-01aa75ed71a1/language-en



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4.2. Using NbS to manage stormwater - Flood management requires space

- Among the **ecosystem services** provided by **NbS,** the **stormwater regulation** is considered one of the most important.
- The use of NbS for water retention during heavy rains, however, requires a certain **amount of space**.
- **Grey solutions** for stormwater management use **pipelines** and sealed channels to **convey water quickly** to their discharge points.
- **NbS are rougher** compared to pipelines and require more space.

An example of a true sponge city project. Sanya Dong'an Wetland Park, Sanya, Hainan Province, China / Turenscape

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4.3. Cost effectiveness

- Are NbS cheaper or more expensive compared to conventional solutions? Obviously, it depends on many factors, but most of the time:
  - Investment costs (CAPEX) are similar: same order of magnitude, sometimes higher, sometimes lower
  - The time of NbS is still mostly unknown, but reasonably, they could last more than “grey solutions”
  - OPEX are lower if the NbS is sized correctly (precautionary approach)
  - OPEX of NbS may increase due to irrigation; generally, the energy costs of NbS operation are much lower compared to “grey solutions”

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5. Working with nature, the benefits

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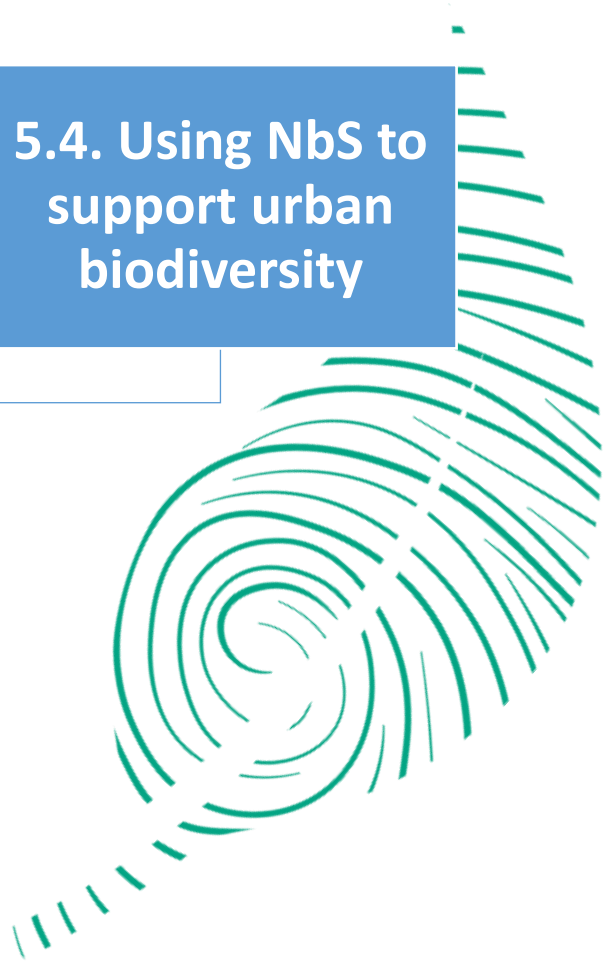
5. Working with nature, the benefits

5.1 Using NbS to manage stormwater → 5.2. Using NbS to treat water → 5.3. Using NbS to provide water → 5.4. Using NbS to support urban biodiversity

4.5 Using NbS for aesthetic → 5.5. Using NbS to regulate microclimate → 5.6. Using NbS to foster recreation



BENEFIT: qualitative evaluation

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WATER QUALITY

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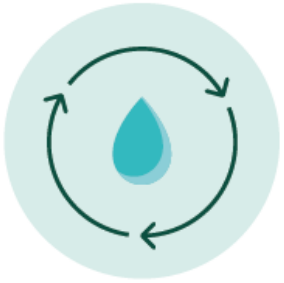
WATER PROVISION



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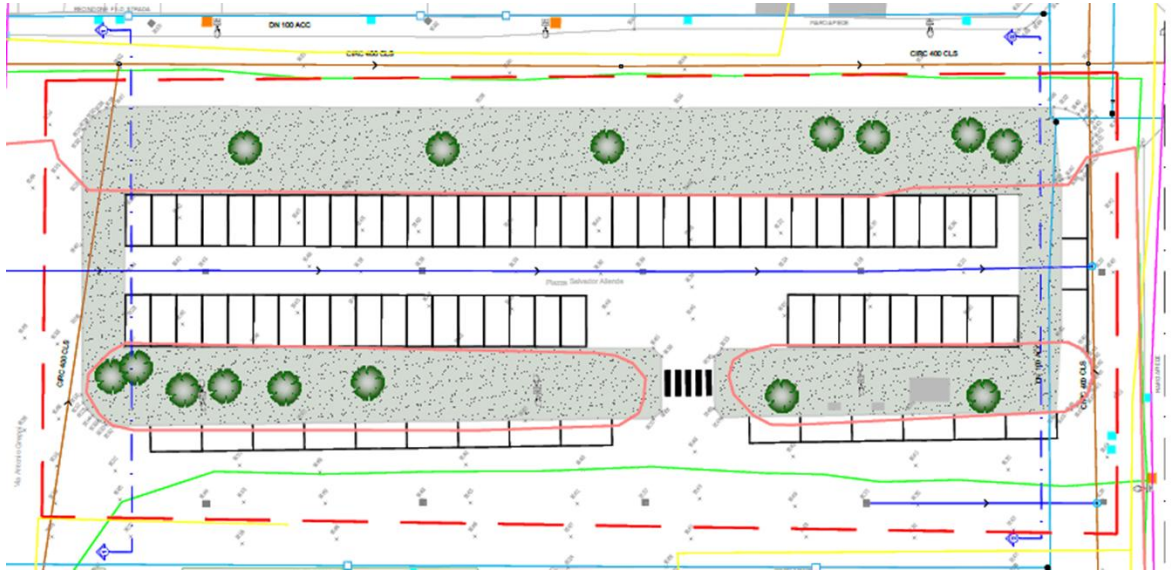
5.1. Using NbS to manage stormwater

- Many different NbS could be used at different scales to **manage stormwater**
- In this training kit, **we focus on urban NbS,** but many others could be used in rural areas and directly on water courses (“Natural Water Retention Measures” https://www.nwrm.eu/)



- The **Ecosystem services** they provide are mainly 2:
  - **water retention and storage**, to delay the peak flow and reduce the risk of flooding
  - **rainwater infiltration** to reduce runoff and recharge groundwater

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5.2. Using NbS to treat water

- **Treatment Wetlands** are NbS used since decades to **purify many different kind of polluted water**, including industrial and domestic wastewater, agriculture runoff, landfill leachate.
- Many urban NbS used primarily for stormwater management– such as *bioretention areas* – are also providing a purification ecosystem service: generally, **the more an NbS include vegetation, the more its purification capacity increases**
- In the rural context, it is nowadays well known that the role of **buffer strips or vegetated ditches is** to control diffuse pollution

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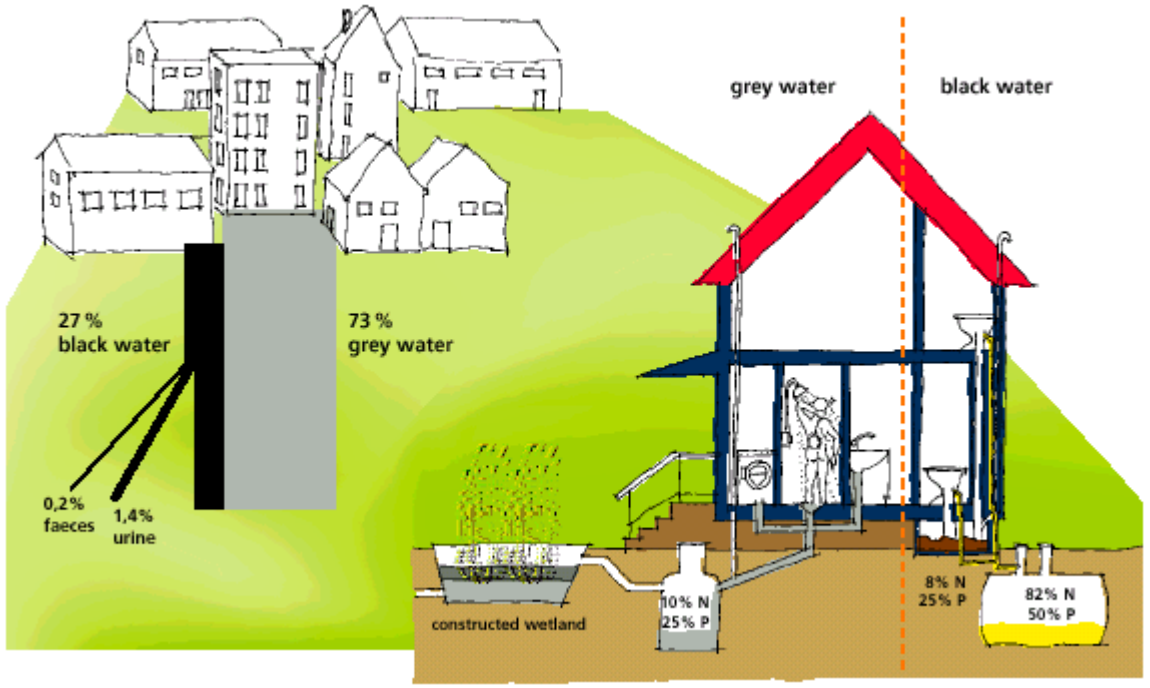
5.3. Using NbS to provide water

- **Urban NbS** can purify polluted water to recycle it
- **Wetlands** or **green walls** are frequently used to **treat grey water and reuse it**



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5.4. Using NbS to support urban biodiversity - solution provides a habitat for species than Homo sapiens

- Vegetated NbS provide habitat for many species of other plants and small animals.
- At the urban scale, a system of multifunctional NbS could create a network of green corridors that larger animals can use to overcome physical barriers, such as roads and railways.

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5.5. Using NbS for aesthetic benefits -

- **NbS** transforms the urban space, making it more beautiful

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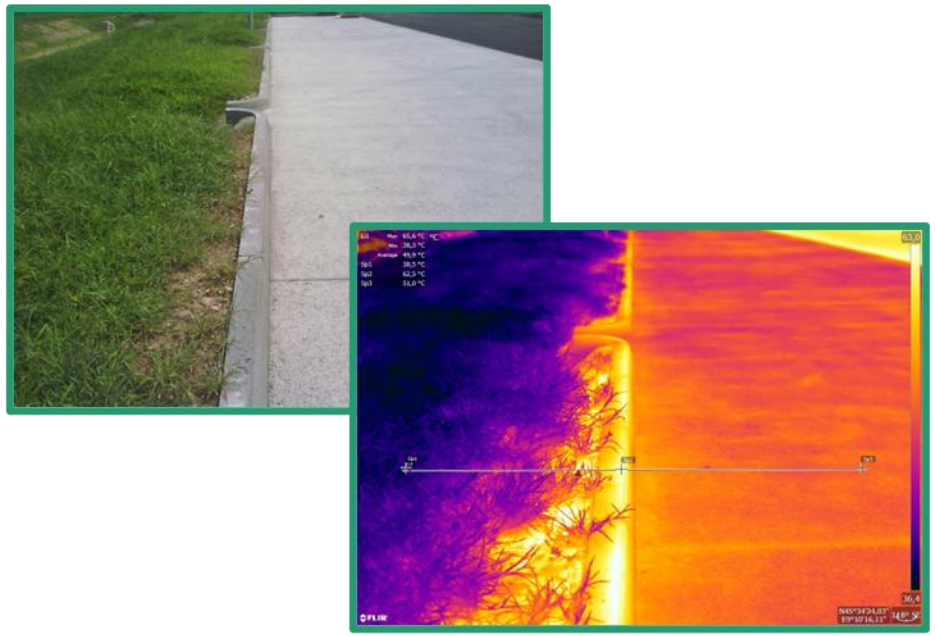
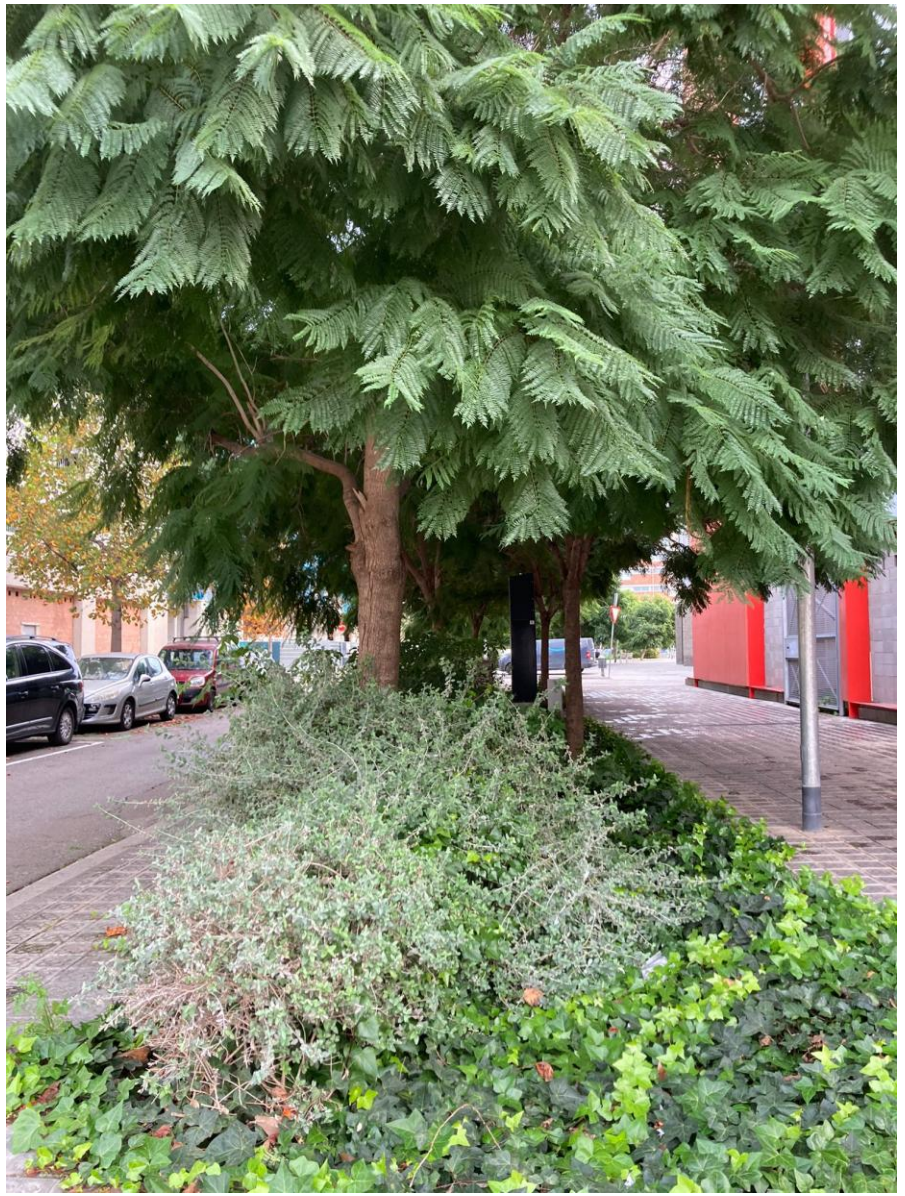
5.6. Using NbS to regulate microclimate

- **NbS** contributes to cooling the urban space.





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5.7. Using to for foster recreation

- When NbS are large enough, people can directly use them.

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6. Working with nature, the drawbacks

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6. Working with nature, the drawbacks

6.1. Investment costs → **6.2. O&M costs**

6.3. Social acceptability

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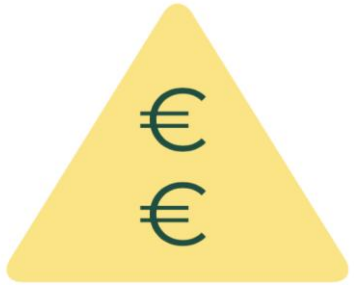
6.1. Investment costs

Estimated for the construction of 1 square meter of

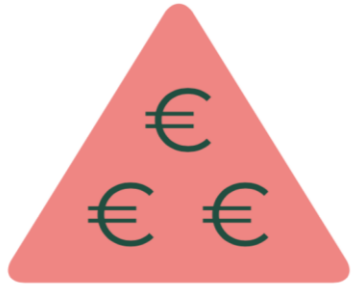
< 100€

Green façade vertical garden	(<100 €/m2)
Green Balcony	(<30 €/m2)
Urban trees	(<30 €/m2)
Urban vegetable garden	(<100 €/m2)
Urban park/green area	(<100 €/m2)
Artificial pond/wetland	(<100 €/m2)



ranging from 100€ to 300€

Green roof	(between 100 and 300 €/m2)
Bioretenion area	(between 100 and 300 €/m2)
Detention basin	(between 30 and 150 €/m2)
Storage pond	(between 100 and 300 €/m2)
Treatment wetlands	(between 100 and 300 €/m2)



> 300€

Living wall vertical garden	(>150 €/m2)
Green Pergola	(>150 €/m2)
Rain garden	(>150 €/m2)
Tree boxes	(>150 €/m2)

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6.1. O&M costs

Estimated for the construction of 1 square meter of NbS.

< 1 m²/year

Green façade vertical garden	(<1 €/mq year)
Urban trees	(<1 €/mq year)
Artificial pond/wetland	(<1 €/mq year)

ranging from 1€ and 5€ m²/year

Green roof	(between 1 and 5 €/ mq year)
Green Balcony	(between 1 and 5 €/ mq year)
Urban park/green area	((between 1 and 5 €/ mq year)
Rain garden	(between 1 and 5 €/ mq year)
Vegtated swale	(between 1 and 5 €/ mq year)
Bioretention area	(between 1 and 5 €/ mq year)
Tree boxes	(between 1 and 5 €/ mq year)

> 5€ m²/year

Living wall vertical garden	(>5 €/mq year)
Green Pergola	(>5 €/mq year)
Urban vegetable garden	(>5 €/mq year)
Water recycling living wall	(>5 €/mq year)

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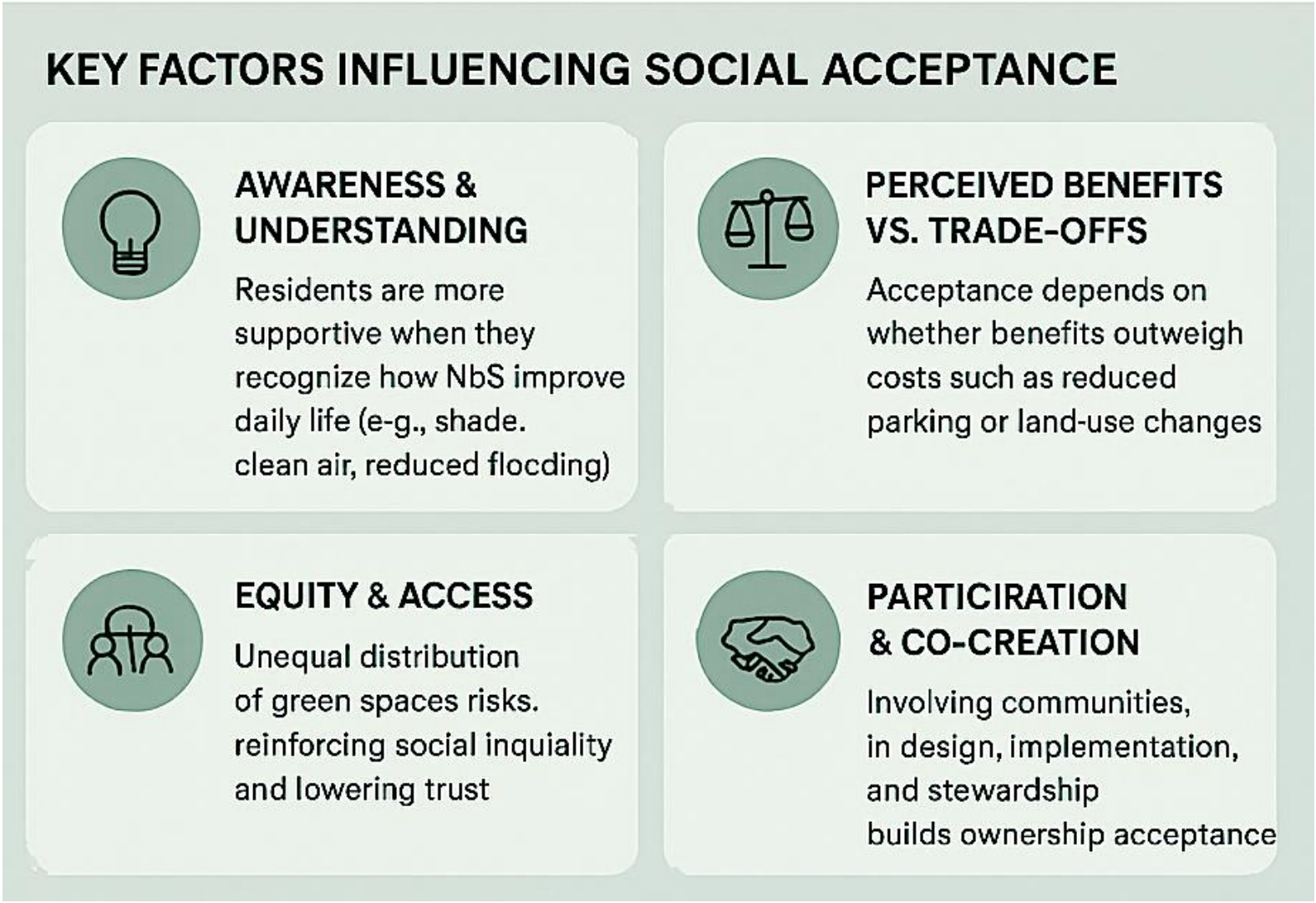
6.3. Social acceptability

NbS in cities are generally well-received, but acceptance depends on:

(1) how well they address local needs,

(2) distribute benefits fairly,

(3) involve communities in their planning and management.



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6.3. Social acceptability: examples of NbS in urban contexts

high

- Green roof
- Living wall vertical garden
- Green façade vertical garden
- Urban trees
- Green pergola
- Urban vegetable garden
- Urban park/green area
- Rain garden
- Bioretention area

medium

- Green Balcony
- Artificial pond/wetland
- Rooftop treating wetland
- Treatment wetlands

low

- None noted

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7. Urban NbS and the urban water cycle

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7. Urban NbS and the urban water cycle

7.1. The URWAN NbS catalogue

7.2. Water "snob" NbS

7.3. Water "smart" NbS

7.1. The URWAN NbS catalogue

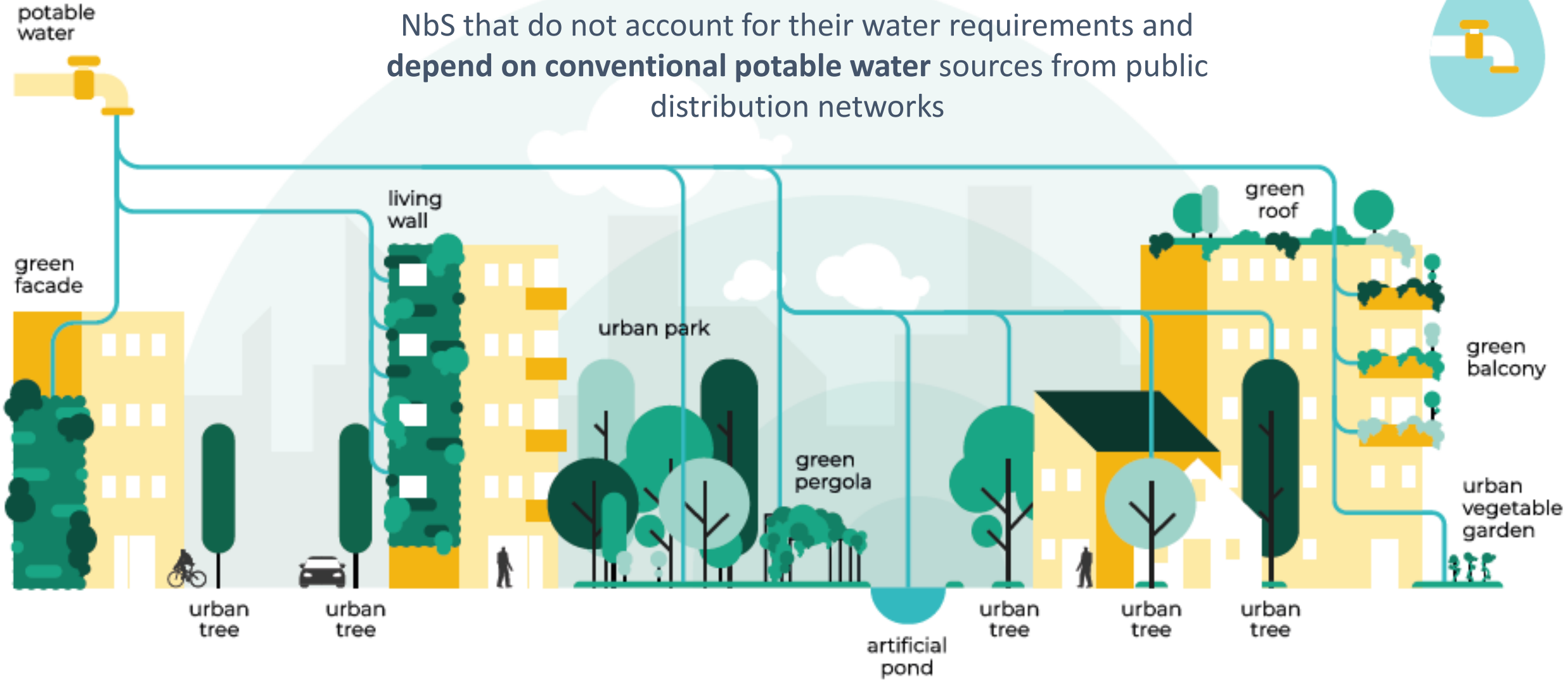
Recognising the **vital link between Nature-Based Solutions and water**, the Catalogue is designed to emphasise these interconnections. It identifies how NbS contribute to multiple **ecosystem services** while also underlining the importance of understanding their **specific water requirements** and maintenance needs.

The catalogue allows users to **easily explore and compare** different NbS options, understanding their **key functions, benefits, and limitations** in relation to local contexts.

The catalogue classifies NbS into two categories: **Water "snob" NbS**, which do not account for their water requirements and **depend on conventional potable water sources** from public distribution networks, and **Water "smart" NbS**, which are designed to **utilise alternative water sources** beyond potable supplies.

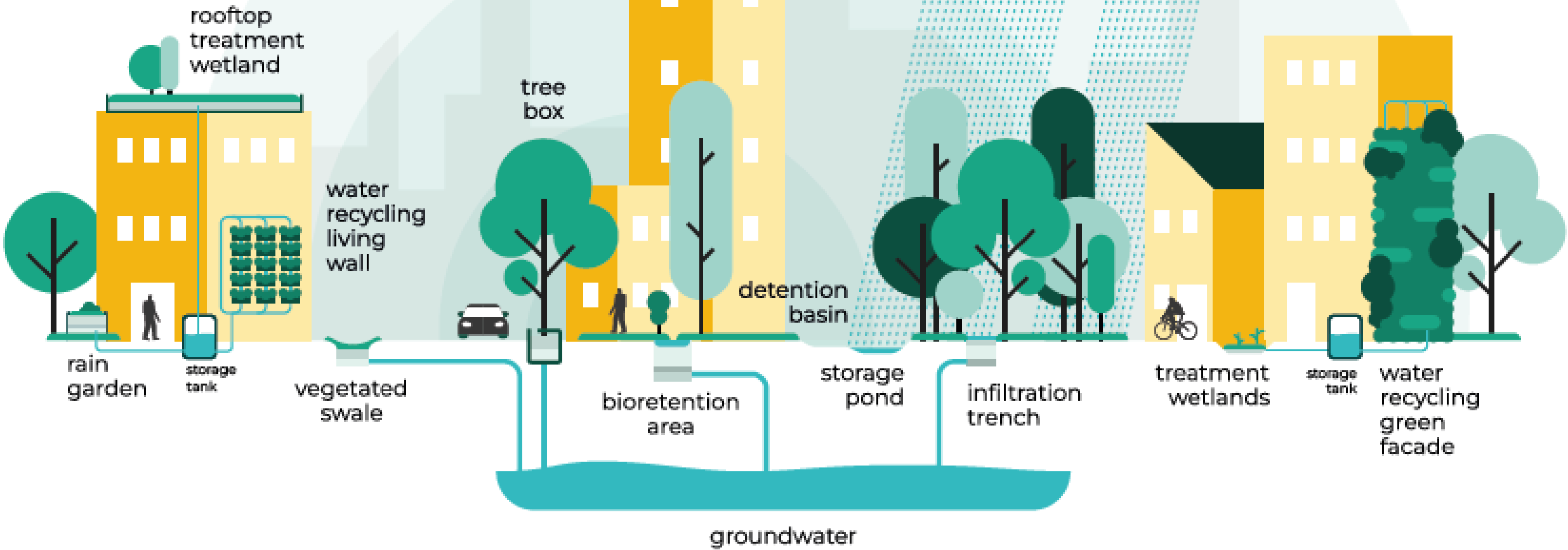
7.2 Water “SNOB” NbS

NbS that do not account for their water requirements and **depend on conventional potable water** sources from public distribution networks



7.3. Water “smart” NbS

NbS that are designed to **utilise alternative water sources** beyond **potable supplies**



STORMWATER

URBAN TREES

water SNOB NBS

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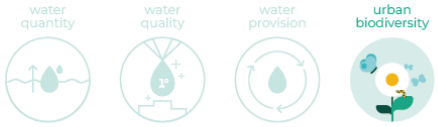

water snob

TREE BOXES

water smart

water SMART NBS

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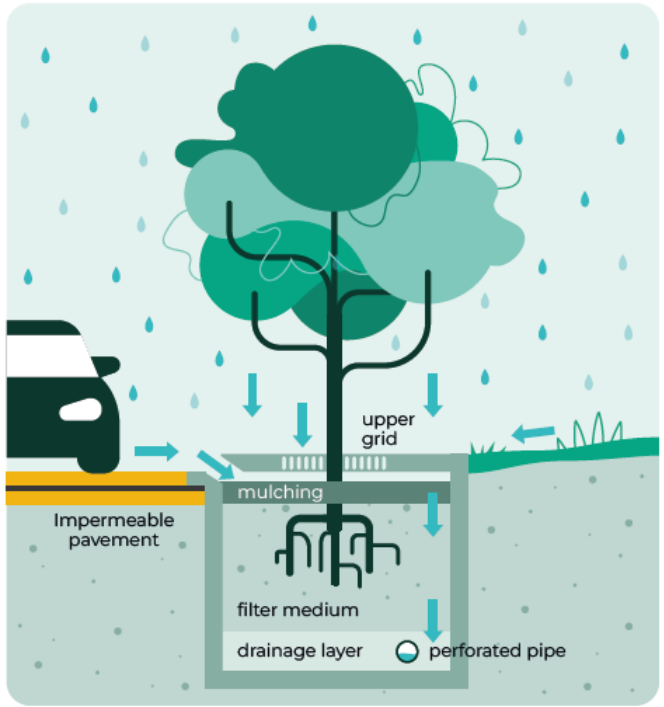

GREYWATER

LIVING WALL

water SNOB NBS

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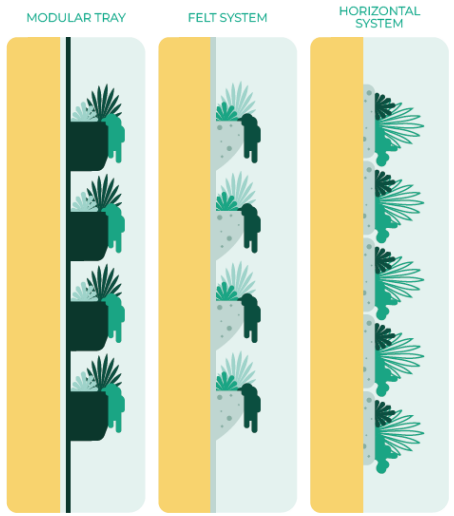

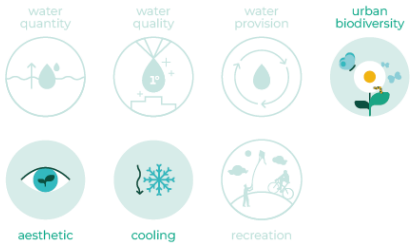

water snob

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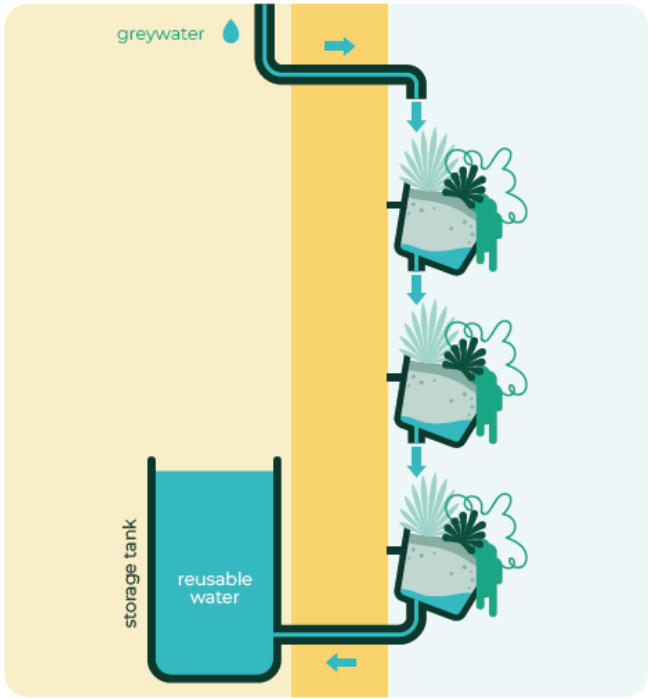
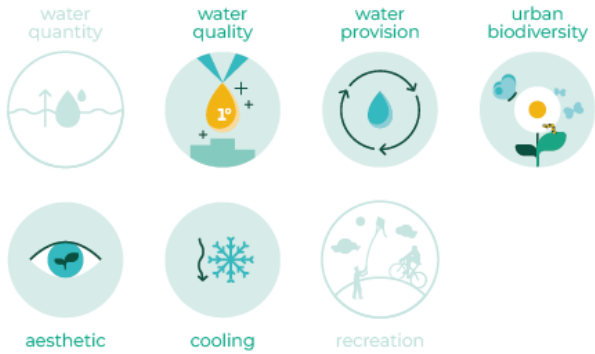
WATER RECYCLING LIVING WALL

water SMART NBS

water smart





GREYWATER

GREEN FAÇADE

water SNOB NBS

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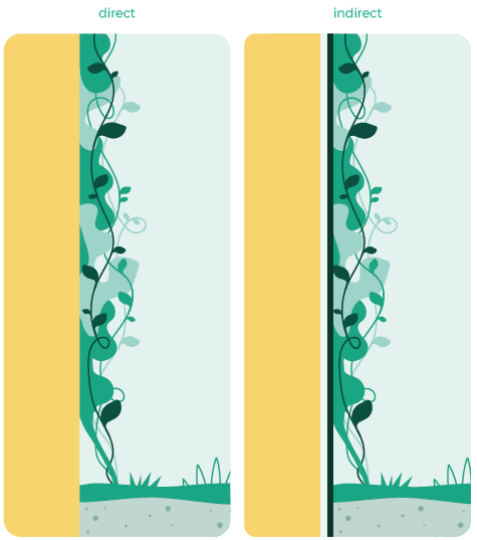

water snob

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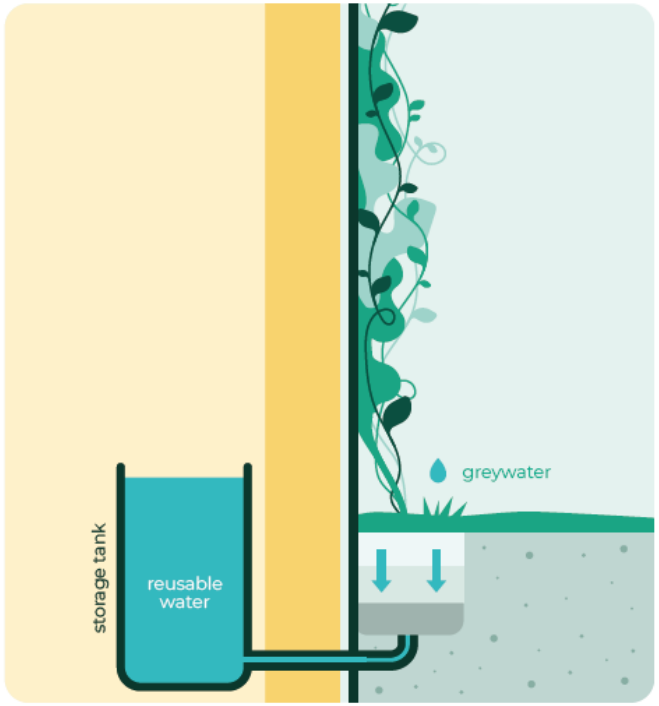
WATER RECYCLING GREEN FAÇADE

water SMART NBS

water smart



STORMWATER

ARTIFICIAL POND / WETLAND

water SNOB NBS

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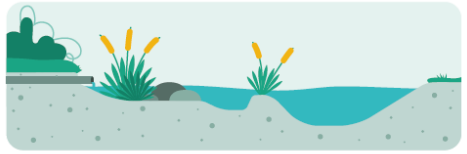

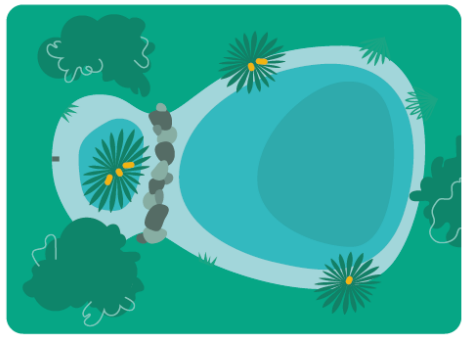

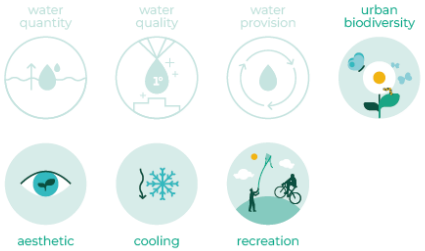

water snob

DETENTION BASIN

water SMART NBS

water smart

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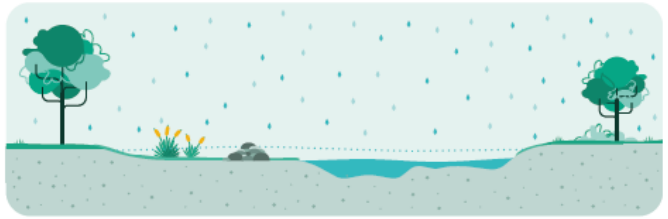

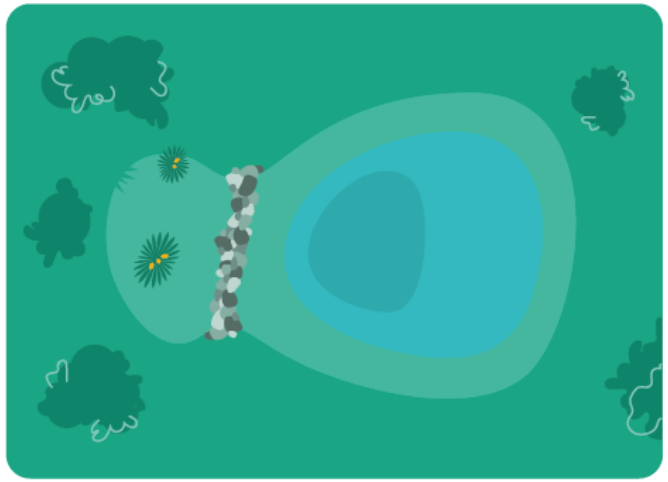

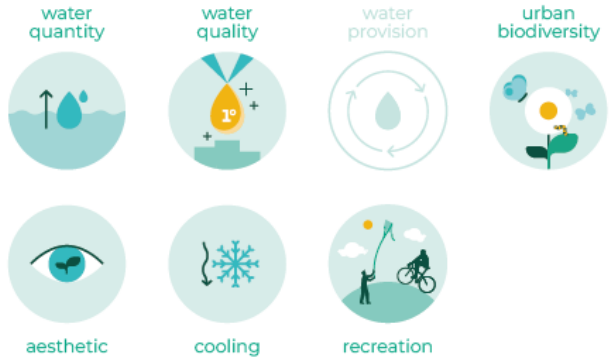

STORMWATER/WASTEWATER

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ARTIFICIAL POND / WETLAND

water SNOB NBS

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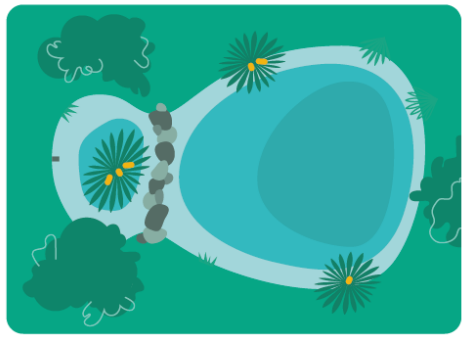

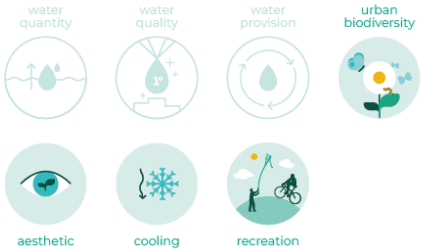

water snob

TREATMENT WETLANDS

water SMART NBS

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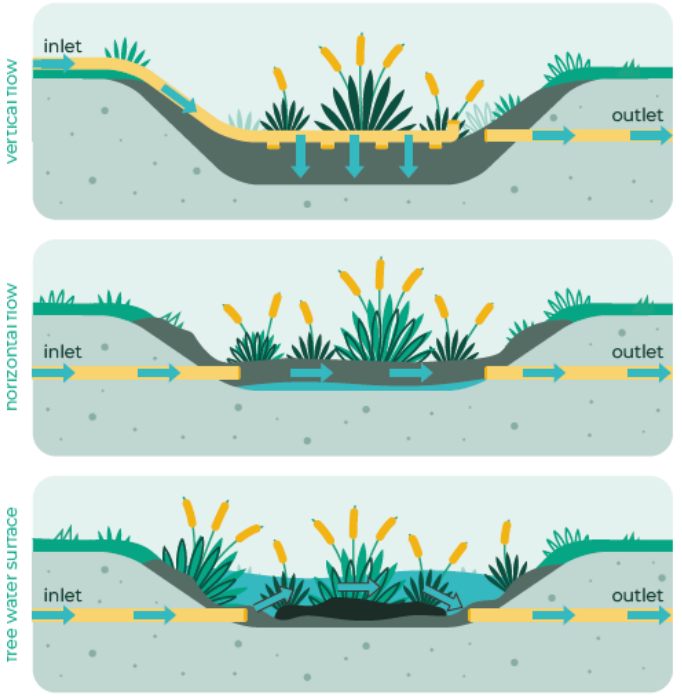
water smart

SEWER MINING



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8. Case Studies and Best Practices

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8. Case Studies and Best Practices

8.1. Best Practice: the urban adaptation pathway

8.2. Case studies from URWAN pilots (Rome, Cuba, Larnaka)

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8.1. Best Practice: the urban adaptation pathway

- **The case of "Viale Matteotti in Bovisio Masciago (Milan)"**
  - The Municipality wanted to build a new cycling path along one of the main urban roads
  - They also want to reduce the speed of vehicles
  - Through the realisation of several small infiltration trenches and bioretention areas (with or without trees) , they created a greener, cooler, low traffic road, mostly disconnected by the sewer and infiltrating rainfall to recharge groundwater

IRIDRA S.r.l.

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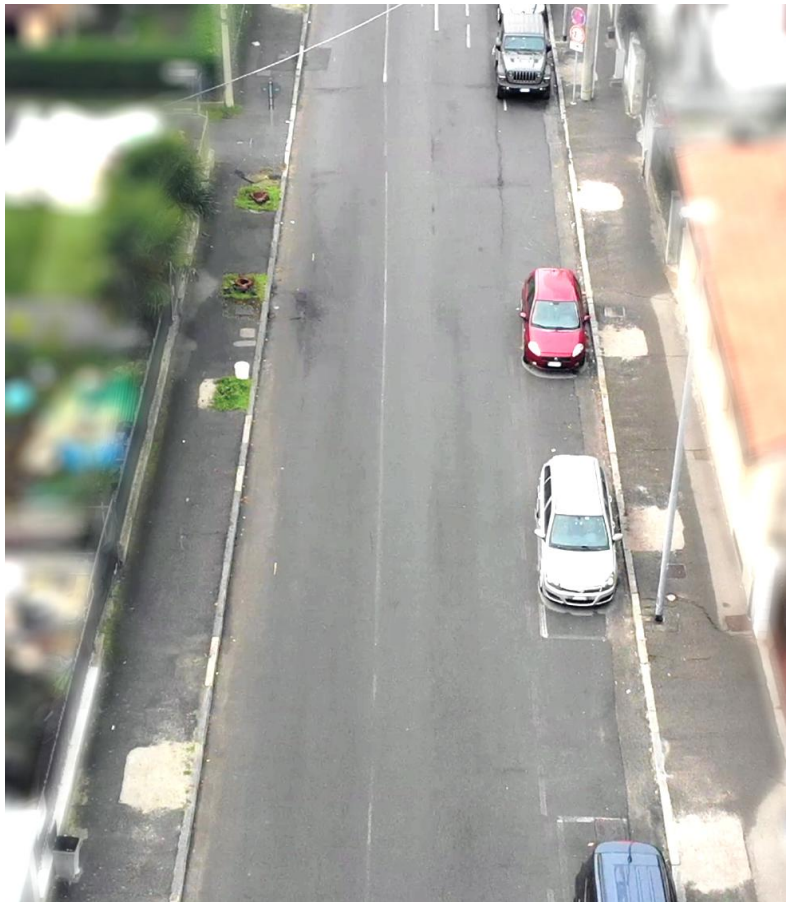
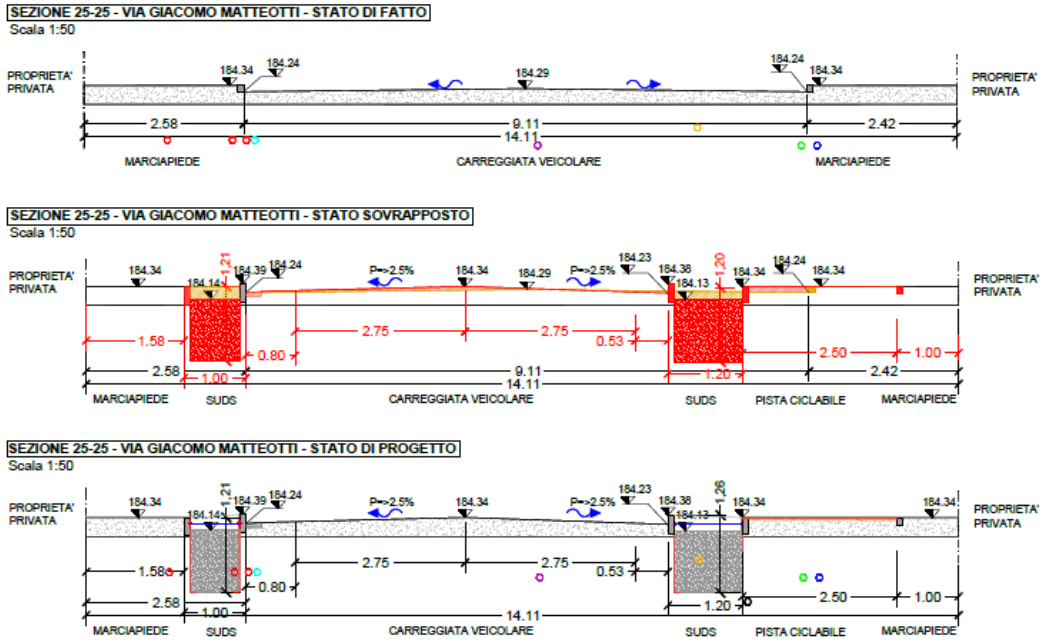
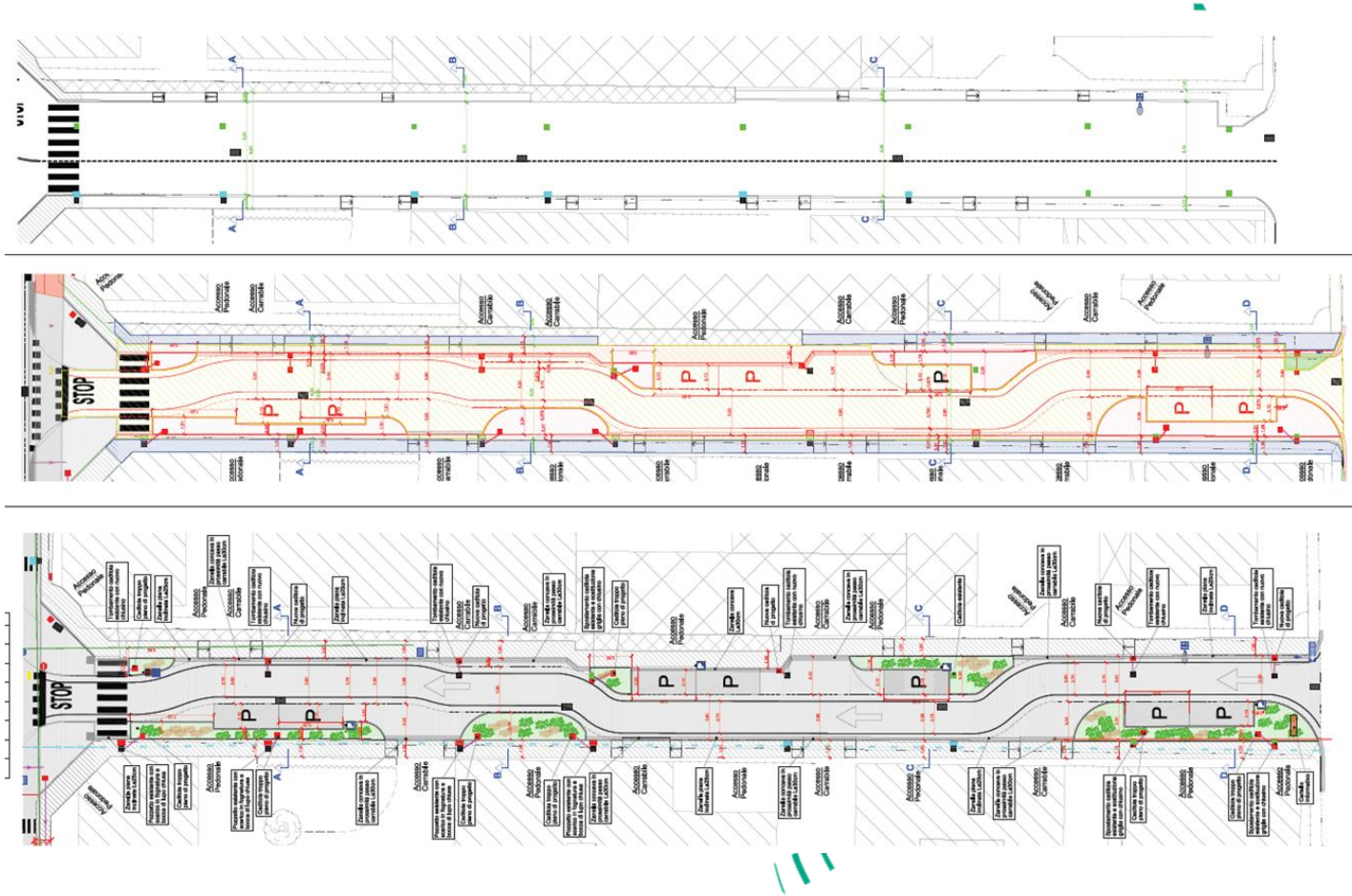
Viale Matteotti, Bovisio Masciago (MB): Bioretention area along a road
Works ended in April 2023



Viale Matteotti: Design (sections and planimetry)





Viale Matteotti: Pictures from summer 2024

Viale Matteotti: How the system works on a rainy day

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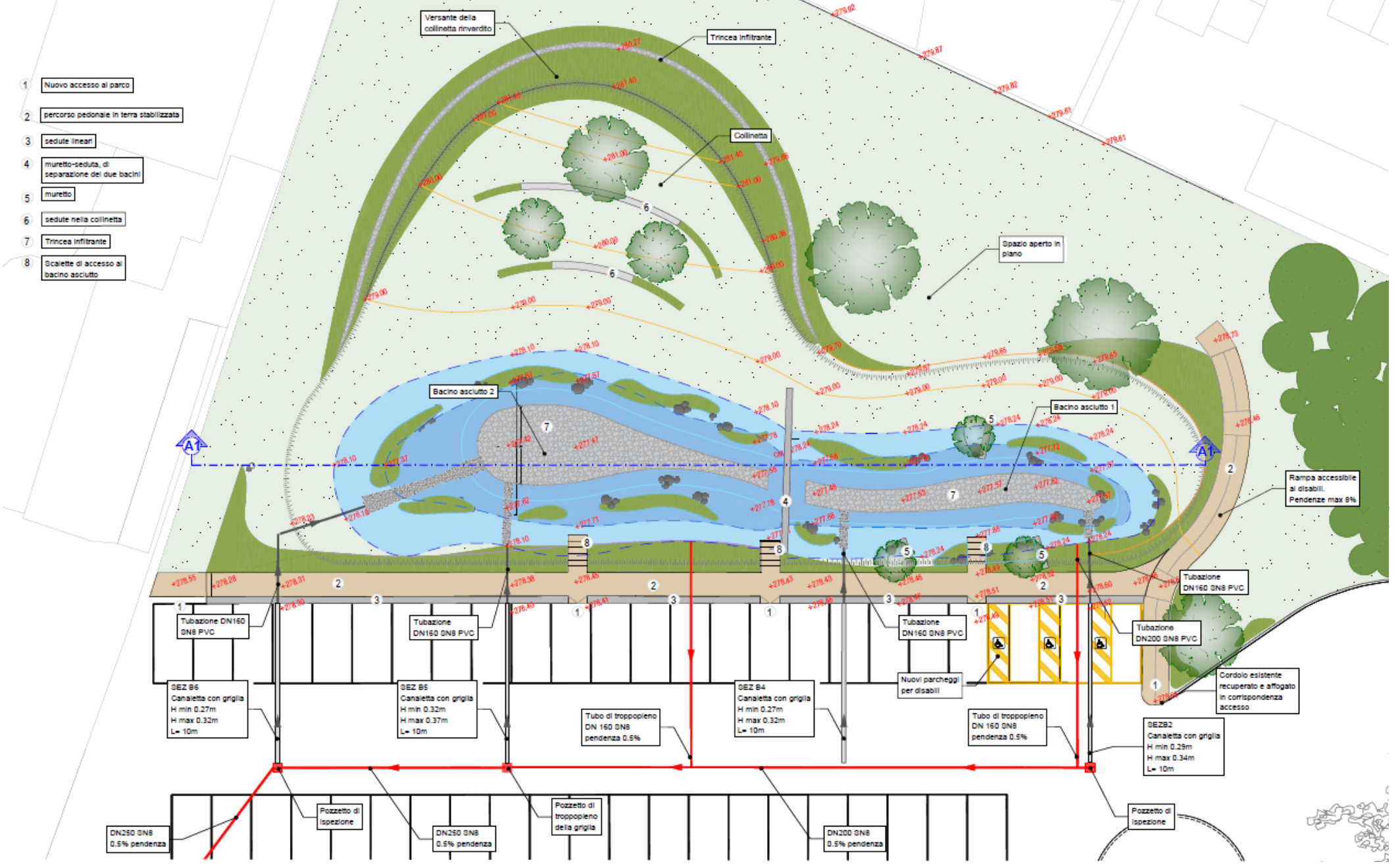
8.1. Best Practice: the urban adaptation pathway

- **The case of Carvico (BG): transform a garden into a multifunctional green area**.
  - In front of the church, there was a parking site with a small garden
  - The garden has been reorganised by earthmoving to make it multifunctional
  - A large detention pond has been realised to store water during rain events and then infiltrate to recharge the groundwater
  - The area could still be used for recreation, but it offers a new ecosystem service that was not provided before

IRIDRA S.r.l.

S. Martino, Carvico (BG): The existing situation

S. Martino, Carvico (BG): Planimetry of the project



S. Martino, Carvico (BG): The detention basin has just been realised (November 2024)

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8.2. Case studies from URWAN pilots

Rome, IT

Regenerating a school entrance while reducing potable water consumption.

Alternative water resources:

Rainwater from the roofs and the parking area

Solutions:

(i) **Raingarden** to collect rainwater from roofs and paved areas, (ii) **Two bioretention areas**, (iii) **De-paving** of surfaces, (iv) **Storage tank** for water reuse

Cuba, PT

Regenerating a public building space and the surrounding urban area

Alternative water resources:

(i) **Rainwater** from the roofs and the parking area, (ii) **Blackwater** from the nearby sewage network

Solutions:

(i) **Raingarden** collects rain from roofs and paved areas, (ii) **Constructed wetland** to treat the blackwater, (iii) **Storage tank** for water reuse, (iv) **Extensive green roof**, v) **pergola**

Larnaka, CY

Regenerating a public and tourist area while reducing potable water consumption.

Alternative water resources:

Greywater collected from showers and hand basins

Solutions:

(i) **Water recycling living wall**, (ii) **Storage tank** to allow for water reuse, (iii) **infiltration trench**

Transforming buildings and public facilities in water producers

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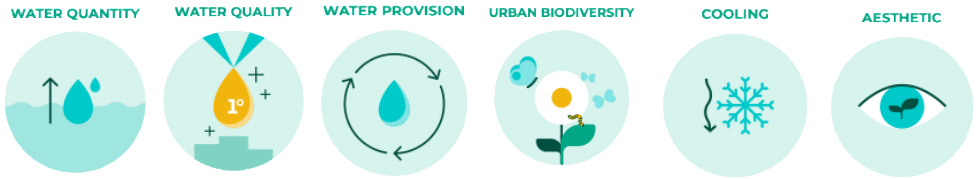
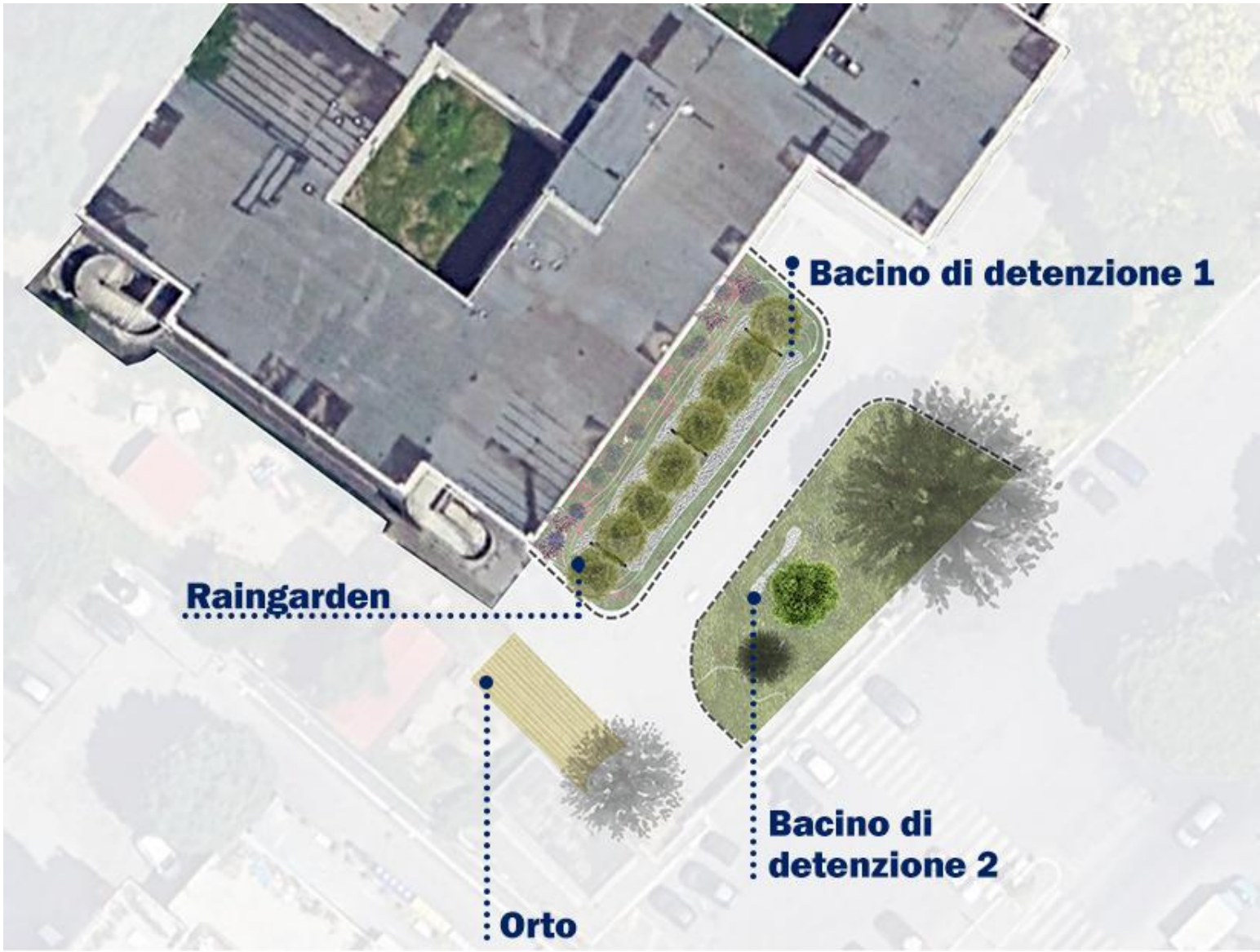
Rome, District Council IX, IT

Elementary school

The investment addresses the impacts of **resource consumption**, **high temperatures, biodiversity loss**, **soil sealing**, and vulnerability to extreme climate events, such as **heatwaves**, **flash floods**, and heavy precipitation.
It aims to **reduce potable water use** and increase the availability of non-conventional water resources for greening and irrigation, helping to cool the area during the summer.





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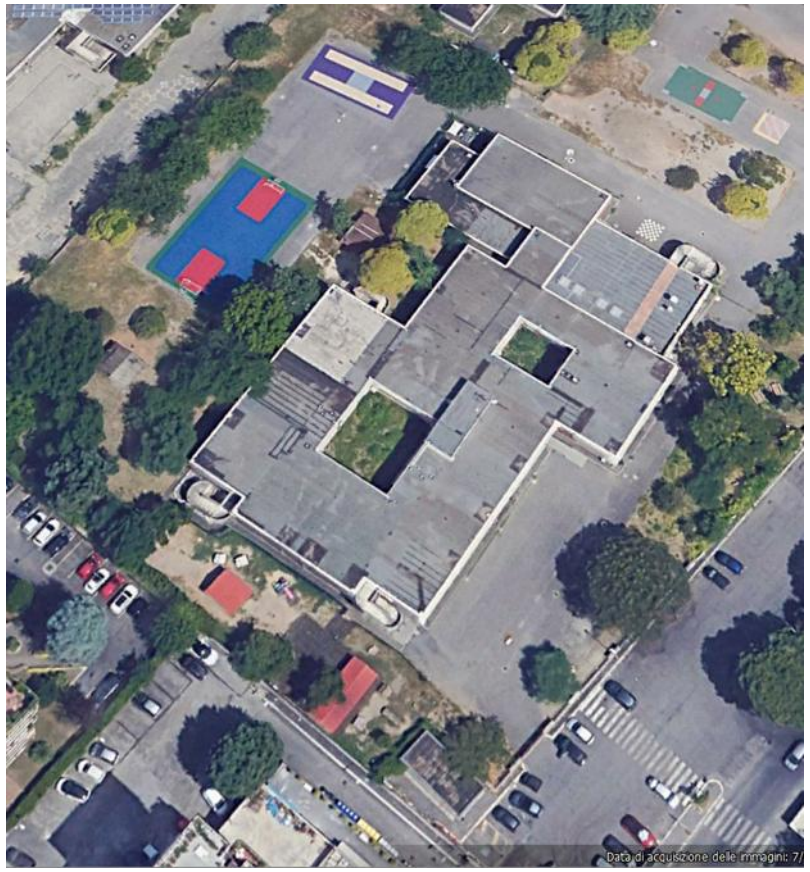

Rome
State of the play

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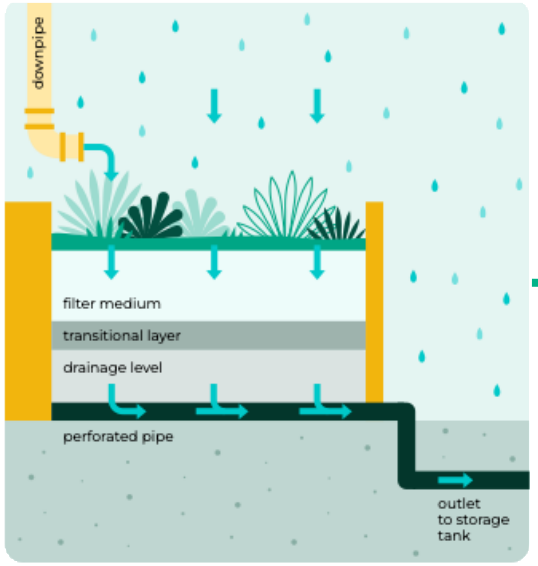
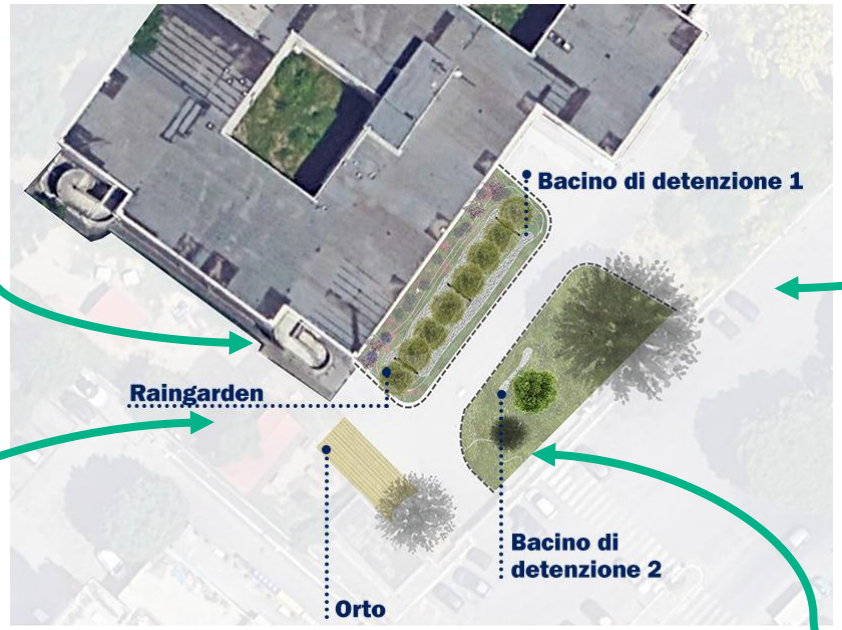
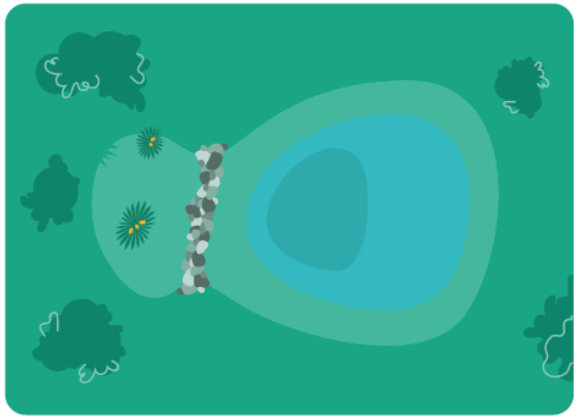
The new school entrance

Alternative water resources:

Rainwater from roofs and paved areas







Solutions:

(i) **Raingarden** of **25 m²** to collect rainwater from roofs and paved areas, (ii) **Two detention basin** of **15 m³** , (iii) **De-paving** of **200 m²** of surfaces, (iv) **Storage tank** of **20 m³** for water reuse in **urban vegetable garden** of **50 m³** the school

NbS Smart → NbS Snob

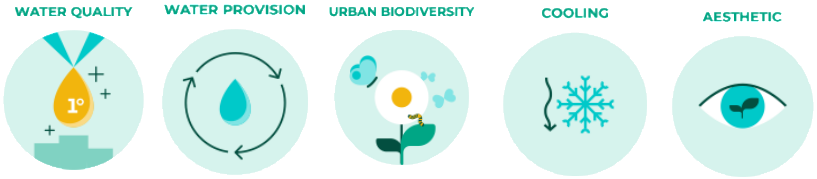
130 – 200 m³/year harvested rainwater available

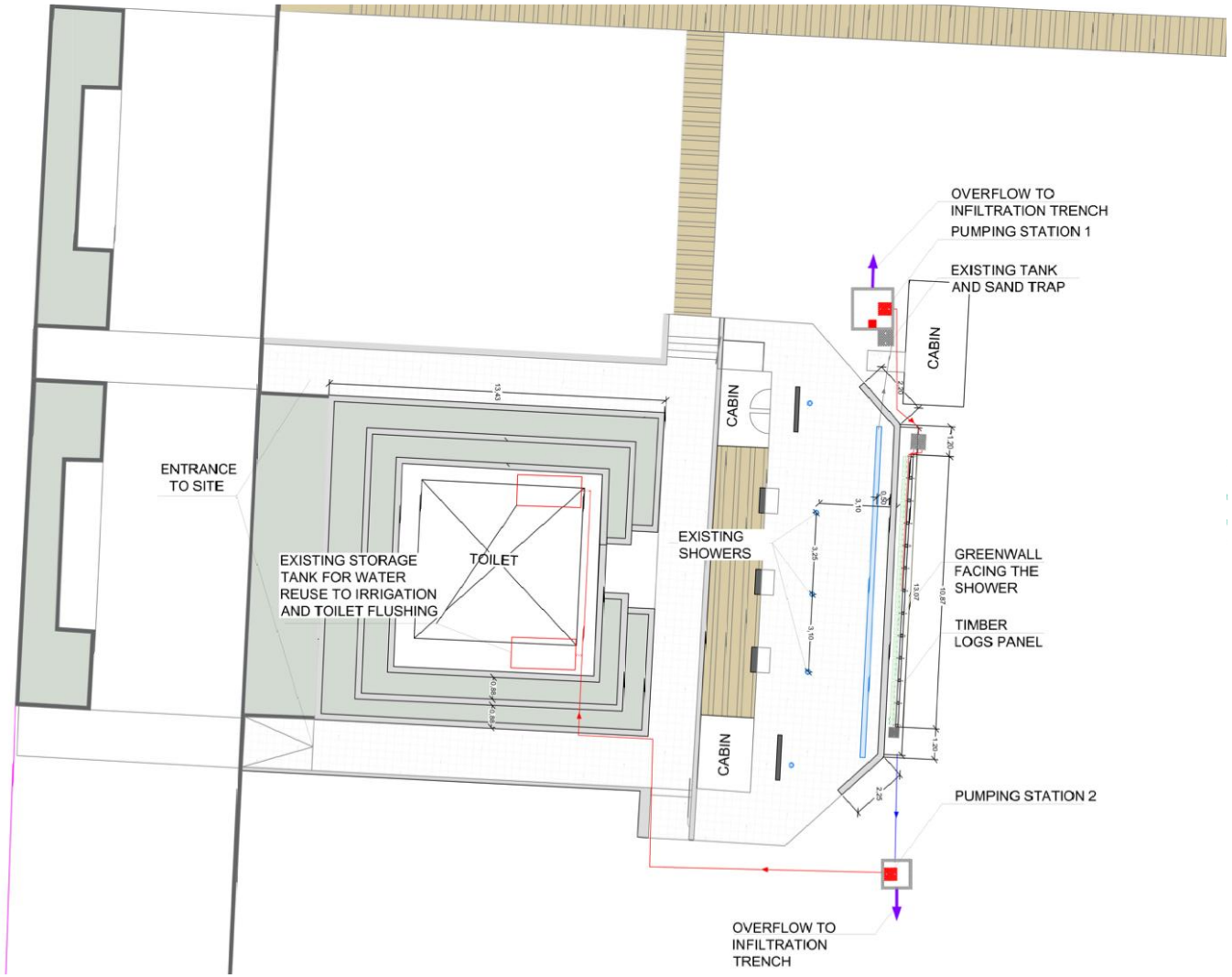
About **45 days of irrigation demands** of the vegetable garden accumulated by the storage tank

Larnaka, CY

beach **shower and toilet** facilities

The investment aims to contribute to **regenerating a public and tourist area while reducing potable water consumption**.
The pilot interventions will increase the availability of non-conventional water resources for greening and irrigation and help regulate the local climate. During the beach season, locals and tourists use a significant amount of high-quality potable water for showers; the investment will collect greywater from these showers for reuse.





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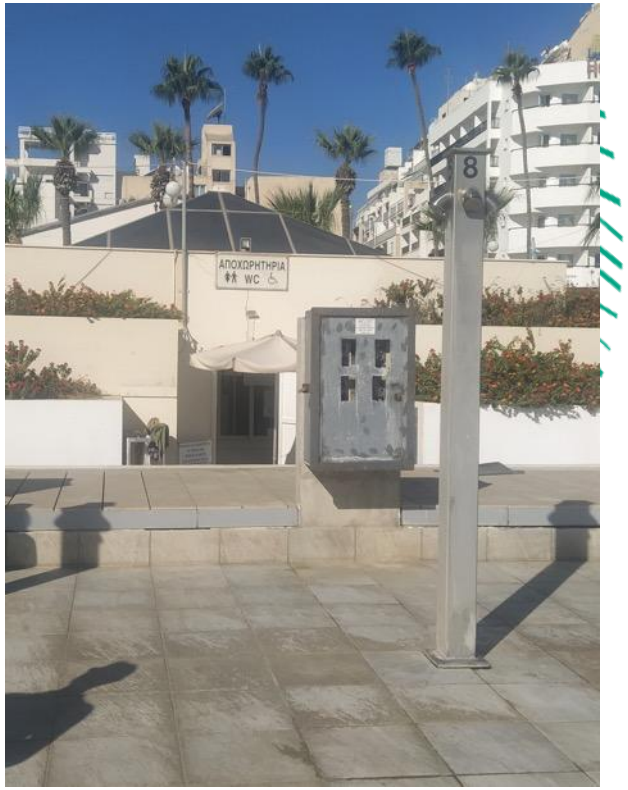
Larnaka

State of the play



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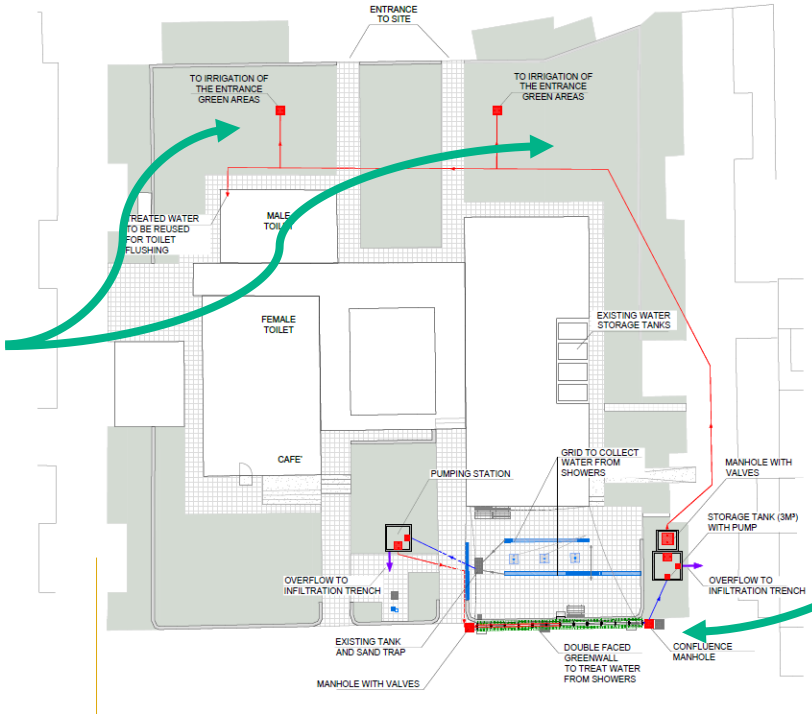
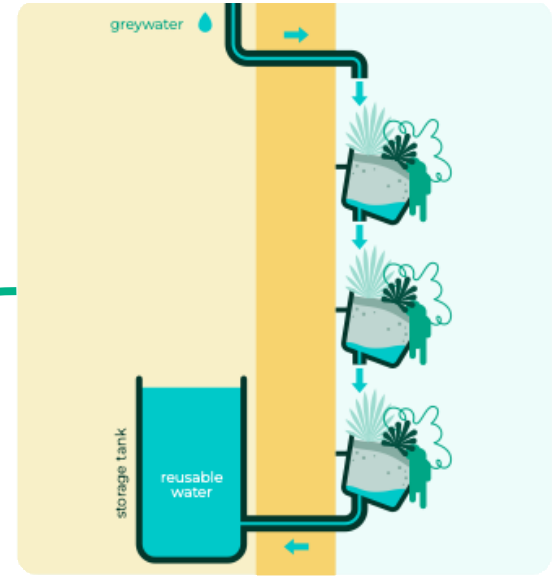
The renovated multipurpose facility

Alternative water resources:

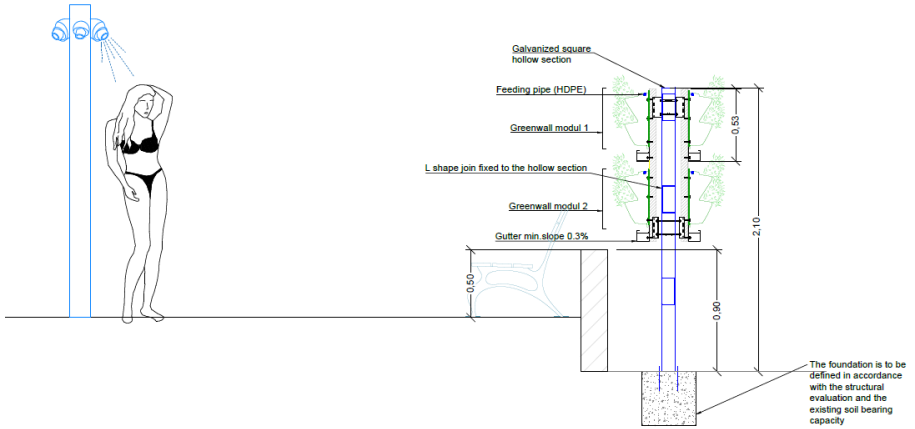
Greywater collected from showers and hand basins





Solutions:

(i) **Water recycling living wall** of **35 m²** treating **2 m³/d** greywater from showers, (ii) **Storage tank** of **3 m³** for collecting treated greywater to be reused in irrigation of existing green areas



NbS Smart → NbS Snob

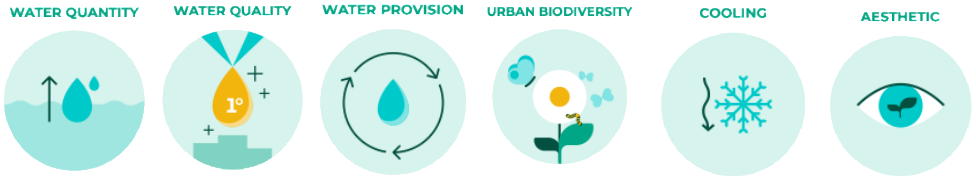
Up to **200 m² of green area** could be irrigated daily by treated greywater in summer season

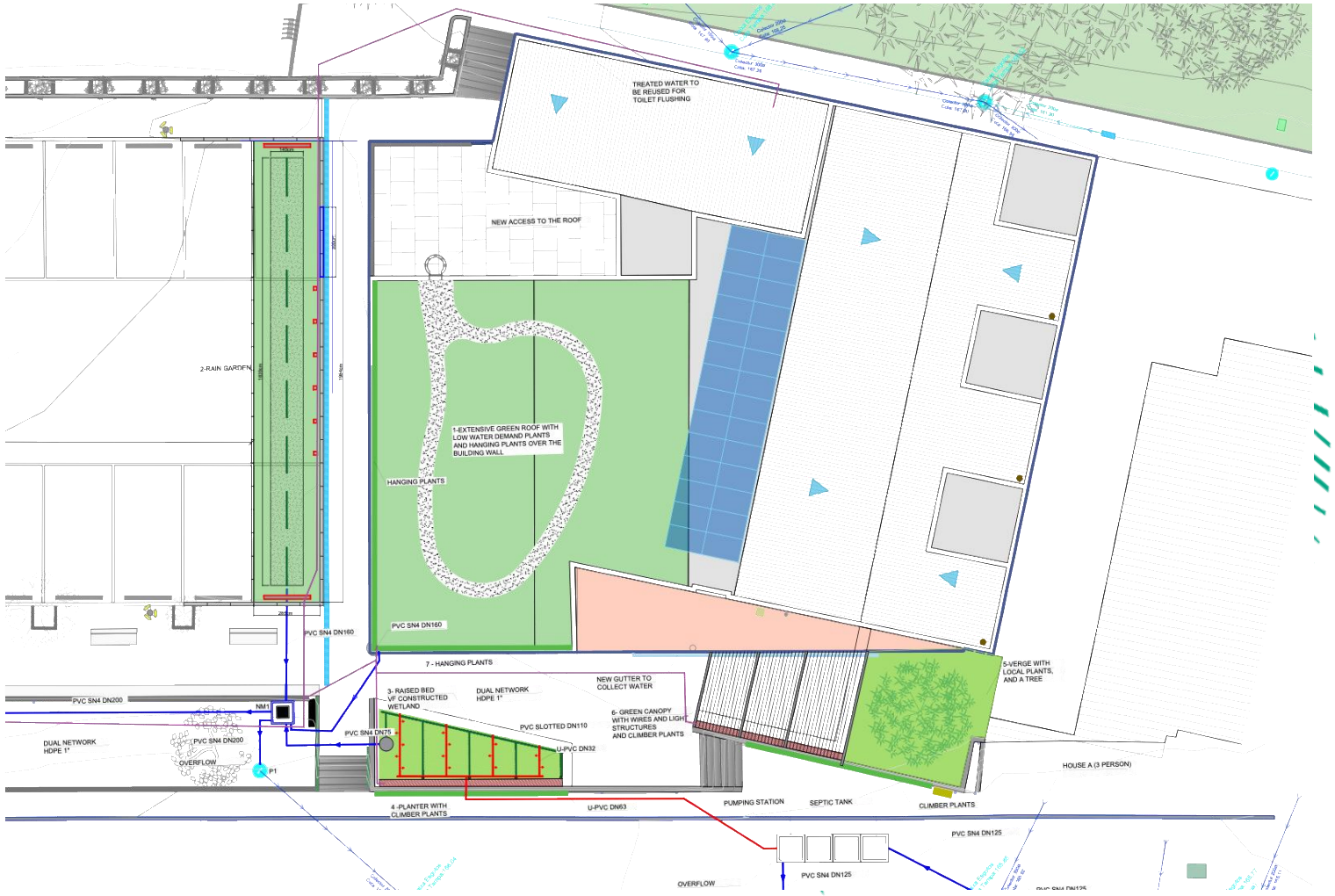
> **100 m³** of potable water saved during summer

Cuba, PT

Public building

The investment aims to make tangible improvements to a public building and to **regenerate the surrounding urban area** through a multifunctional solution that integrates water management and climate change adaptation.
In addition to enhancing the specific urban space, the pilot project is essential for fostering citizen engagement and serving as a platform for demonstration, communication, and dissemination.





URWAN | Interreg Euro-MED | Co-funded by the European Union

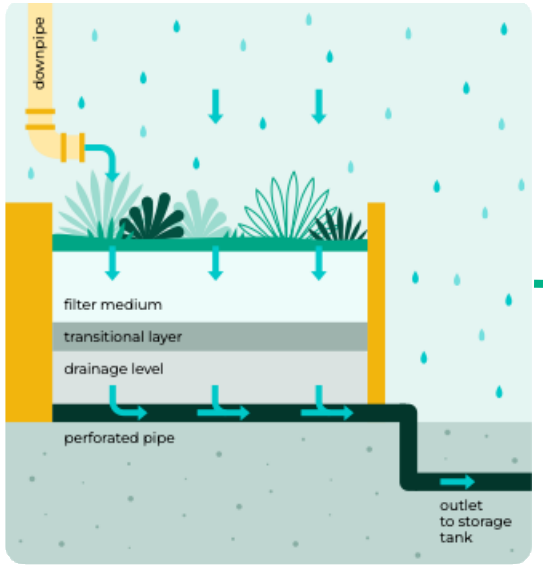
Cuba, PT
State of the play

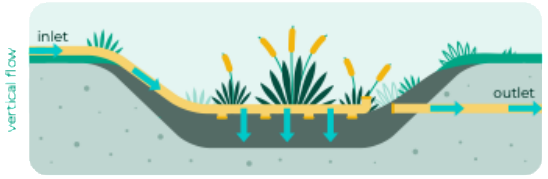
URWAN | Interreg Euro-MED | Co-funded by the European Union

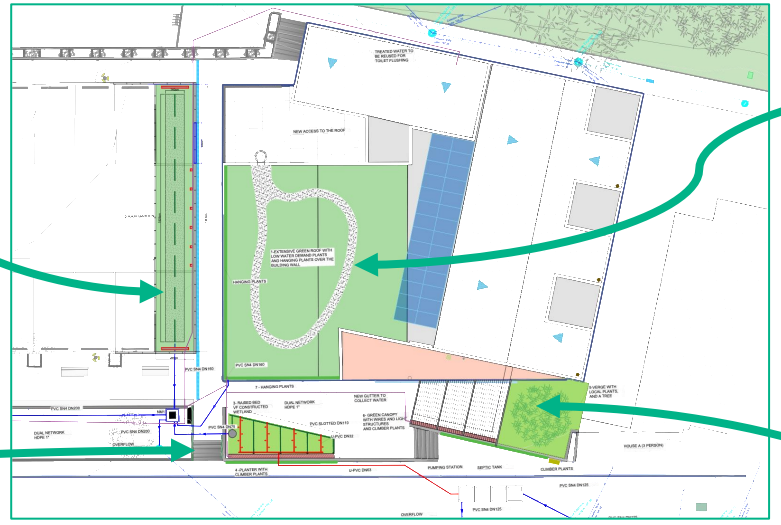
The regenerated building

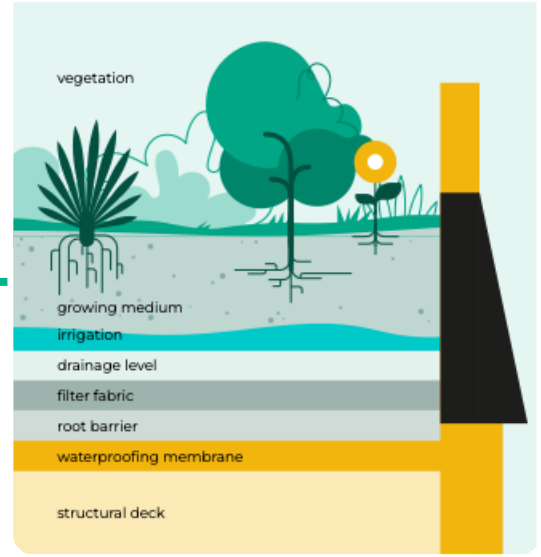
Alternative water resources:

(i) **Rainwater** from the roofs and the parking area, (ii) **Blackwater** from the nearby sewage network (**SEWER MINING**)









Solutions:

(i) **Raingarden** of **60 m²** collects rain from roofs and paved areas of **500 m²**, (ii) **Vertical subsurface flow constructed wetland** of **16 m²** to treat **1 m³/d** of blackwater, (iii) **Storage tank** of **30 m³** for water reuse, (iv) **Extensive green roof** of **200 m²**, (v) **pergola** of **10 m²**

NbS Smart → NbS Snob

NbS smart + storage sufficient for compensating the demand of toilet flushing, green roof and pergola irrigation equal to **250 m³/year**

	Toilet flushing	Green roof Irrigation	Green parking irrigation	Total irrigation	Total
	m3/month	m3/month	m3/month	m3/month	m3/month
JANUARY	3,0	0,3	0,6	0,9	3,9
FEBRUARY	2,2	0,6	1,2	1,8	4,1
MARCH	3,0	1,7	3,2	4,9	7,9
APRIL	2,2	6,6	12,4	19,0	21,2
MAY	2,2	10,6	20,1	30,7	33,0
JUNE	4,6	11,5	21,8	33,3	37,9
JULY	2,3	12,3	23,3	35,6	37,9
AUGUST	2,4	13,4	25,3	38,6	41,0
SEPTEMBER	2,0	10,4	19,7	30,1	32,1
OCTOBER	3,0	7,5	14,2	21,7	24,7
NOVEMBER	3,8	0,6	1,2	1,8	5,7
DECEMBER	2,1	0,3	0,6	0,9	3,0

9. Lessons Learned and Transferable Insights

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9. Lessons Learned and Transferable Insights

9.1. Lessons Learned

9.2. Transferable Insights

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9.2. Lessons Learned

Designing with nature requires flexibility and systemic thinking.
NbS are living infrastructures: they need time to stabilise, space to grow, and continuous adaptation. Integrating hydrological, ecological, and social aspects from the very beginning avoids underperformance and ensures long-term resilience.

Water-smart design maximises efficiency.
The URWAN pilots show that considering local water sources (rainwater, greywater, or sewer mining) can drastically reduce potable water consumption while maintaining vegetation health and ecosystem functionality.

Multifunctionality enhances value.
NbS that combine climate adaptation, biodiversity enhancement, and public use deliver stronger, more visible benefits—strengthening political and social acceptance.

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9.2. Transferable Insights

Replicability depends on context-aware adaptation. Technical solutions must be tailored to local climate, infrastructure, and governance conditions. The URWAN Catalogue provides a flexible reference to guide replication.

Cross-department collaboration is essential. Effective NbS implementation requires cooperation among planning, environment, and water departments, breaking the traditional silos of urban management.

Evidence-based communication builds trust. Quantifying co-benefits—such as reduced flooding, cooling effects, and water savings—helps decision-makers and citizens understand the real value of NbS and supports scaling up at regional and Mediterranean levels.

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10. End of training: Resources

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Resources: URWAN NbS Enabler Pack

In order to promote the transfer of the knowledge, learnings and products developed by the project to other Mediterranean **local authorities**, the project will produce **a ready-to-use NbS Enabler Pack** that will include:

- The **NbS URWAN Catalogue**
- The **StartPark** Methodology and Roadmap
- NbS design and implementation **checklists** to facilitate the mainstreaming of NbS in municipal action.
- A set of **Recommendations** about the optimal implementation and maintenance of NbS as well as the engagement of the community in the process.:

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Resources: online platform and guidelines

The European Union has produced a lot of materials on NbS

- https://research-and-innovation.ec.europa.eu/research-area/environment/nature-based-solutions_en is the EU NbS main page

- https://rea.ec.europa.eu/funding-and-grants/horizon-europe-cluster-6-food-bioeconomy-natural-resources-agriculture-and-environment/nature-based-solutions_en is the main page of the specific cluster on NbS under Horizon 2020 and Horizon Europe, the European Commission research and innovation funding programme

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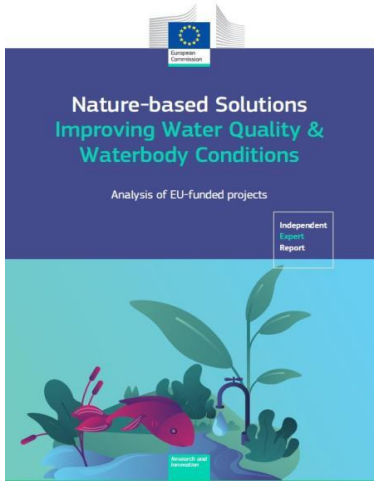
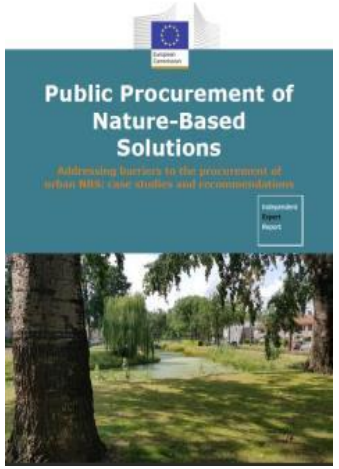
Resources: online platform and guidelines

Several EU guidelines on NbS are also available on the EU platform





https://op.europa.eu/en/web/general-publications/publications

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Resources: online platform and guidelines for urban NbS

Besides the URWAN NbS Catalogue (focused on the relationship between NbS and water), several NbS catalogues have been developed by EU projects. Among them, we can mention the following, which are specific to the urban environment:

- URBINAT: a catalogue of Nature-Based Solutions that citizens can co-select and co-create according to their needs, aspirations, and local environmental conditions.

URBiNAT

- Nature4cities: a platform divided into three groups of tools covering functionalities for the creation, assessment and implementation of NbS projects.

NATURE 4 CITIES

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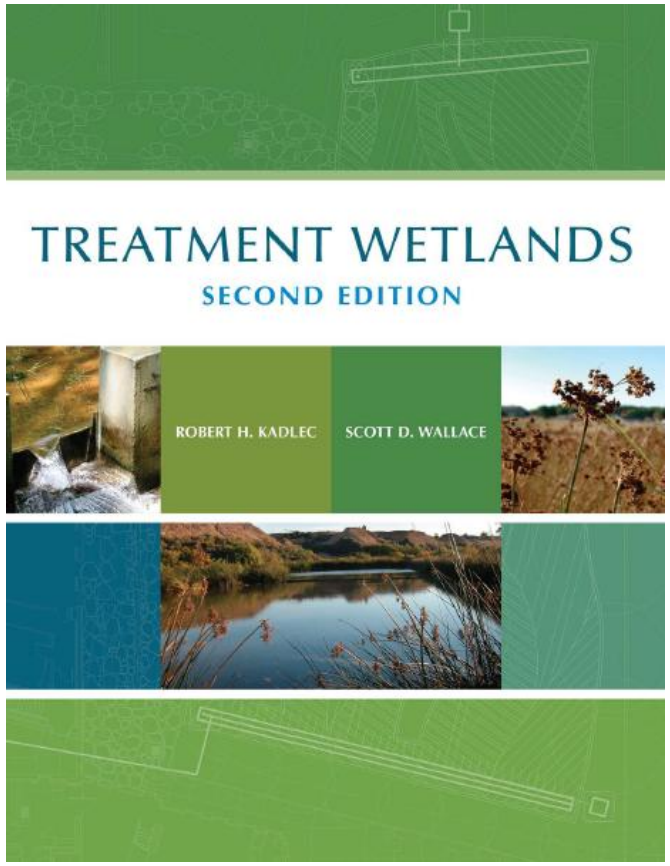
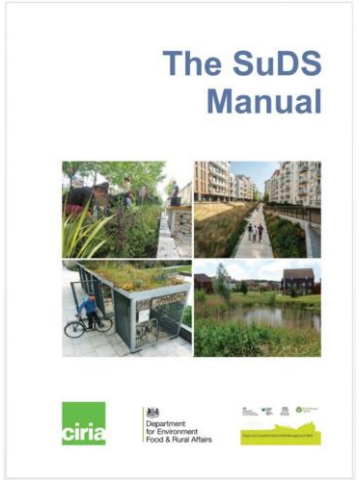
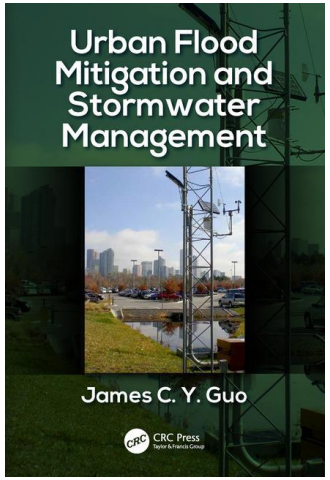
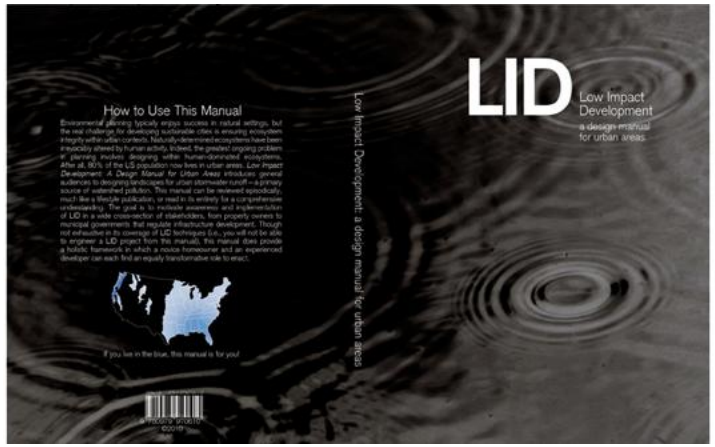
Resources: Technical guidelines

Among the technical guidelines and handbooks to support engineers, architects and other designers, we may mention the following:









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Thank you for your kind attention