



Capacity Building Strategy

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Abbreviations

NBS	Nature-based solutions
SMSCTS	Small and medium-sized cities and towns
UNP	Urban Nature Plan



1. Introduction and rationale

Competency assessment of the existing skills

Capacity Building strategy aims at preparing urban actors, local authorities, urban planners and designers and staff in public green space maintenance in small and medium cities to use Nature-Based Solutions and include bottom-up approaches. This requires ambitious upgrade and development of their competencies. To this end, the Capacity Building Strategy lays the foundations of knowledge transfer and the development of competencies of urban actors. The strategy outlines the necessary knowledge/competencies, and goals, and recommends the specific steps and training to develop the capacity of the target groups. The strategy integrates requirements of the EU Biodiversity Strategy 2030 and enables partners-pilot cities-to develop their own Urban Nature Plans.

Our approach is multidimensional, combining the improvement of *technical capacity* (i.e. concepts, knowledge on urban ecology, NBS etc) with *participatory* (i.e. ability to co-design plans with citizens, inclusive engagement etc.) and *adaptive capacity* (skills to monitor, evaluate, and revise plans based on evidence).

The main **types of capacities in green space management** can be summarised as follows:

- **Human Capacity (Skills/Knowledge):** Involves individual technical skills such as landscape design, GIS analysis for mapping green corridors, arboriculture, participatory planning skills, and ecological knowledge.
- **Organizational Capacity (Tools/Structures):** Focuses on the efficiency of agencies managing green spaces, including operational tools, management structures, maintenance procedures, and financial resources.
- **Institutional Capacity (Policies/Governance):** Refers to the broader enabling environment, including legal frameworks, urban policies, and regulations that protect, incentivize, or mandate green space development.
- **Transformative/Adaptive Capacity:** The ability to adapt green spaces to climate change, integrating nature-based solutions, engaging with unexpected challenges, and fostering long-term, cross-scale collaboration.



- **Relational/Social Capacity:** Involves networking, stakeholder trust, and collaboration between city officials, NGOs, and local communities to maintain public spaces.

Key Aspects of Effective Capacity Building:

- **Technical vs. Functional:** Combining specialized expertise (e.g., forestry) with functional abilities (e.g., project management).
- **Hard vs. Soft:** Pairing tangible tools (systems, policies) with intangible assets (leadership, values, commitment).
- **Participation:** Involving stakeholders from the public, private, and civil society sectors to ensure project longevity.



2. Roadmap

The Capacity Building vision was designed to support the implementation of the following policies:

- EU Biodiversity Strategy for 2030, including the Urban Nature Plans (formerly “Urban Greening Plans”)
- EU Nature Restoration Regulation aims to increase the coverage and biodiversity of urban green spaces and to restore degraded urban ecosystems and enhance nature connectivity
- Integration with the EU Urban Agenda and Greening Cities Partnership efforts to mainstream nature in local governance

The knowledge providers (CREAF, IPOP, AMBIENTE ITALIA, UNIZG FFWT), together with coordinators and cities, designed a tailored roadmap to boost capacity building in partners cities (**Figure 1**). This approach consisted in 6 steps:

1. Establishing a common understanding
2. Training Needs Assessment
3. Co-creation workshops
4. Available data
5. Contextual training
6. Boosting transformation

At each step, two main approaches shaped the capacity building framework:

- (1) background and novelty of the concepts explained and
- (2) relation with Urban Green Plans (i.e. in terms of data/indicators) to enable evidence-based planning.

Transversally, the outputs of A1.1. (Establishing the State-of-the-Art), including the baseline study, cities’ needs (i.e. challenges and opportunities), their context, partner-level baseline situation and pilots’ descriptions were considered when shaping the co-creation activities and training materials.



CAPACITY BUILDING

Roadmap

1

Establishing a common understanding

Explaining concepts, EU policies and experiences to mainstream the inclusive planning and management of different types and categories of urban NBS/GI and criteria for planning such interventions in small and medium cities

2

Training Needs Assessment

Assessing partners' current level of competency, skills or knowledge and their demands; identifying innovative training activities related to urban green planning; understanding new knowledge and competencies needed

3

Co-creation workshops

Co-design workshops around the Nature-Based Solution concept were organized by knowledge providers (in Milano and Barcelona), to support territorial partners to deliver the pilots and boost a first capacity building approach

4

Data - cities context, needs and pilots

Collecting partner level baseline situation for each city. Scoping data gaps and skills, to build on data/indicators training.

5

Contextual training

Understanding the key concepts described in the baseline study: urban biodiversity, participatory process, urban forests and NBS indicators.

6

Boosting transformation

Opportunities to mainstream NBS, at the interface science-practice-policy, are emphasised at each step. Inclusive participatory approaches and opportunities for biodiversity, health, environmental justice, governance and education are also transversally integrated.

Figure 1. Capacity building framework



Step 1: Establishing a common understanding

The *Baseline study* report collected the baseline information on related research, EU projects and definitions of key terms. We aimed to establish a common understanding and shared knowledge, integrating the small and medium sized cities context and their specific needs. This process lied on the understanding of (i) the main categories of urban and peri-urban green infrastructure, (ii) terminology and the key elements of NBS, (iii) strategic steps to improve green planning, (iv) best practices, helping partner cities to better address their planning context. For example, the document defined the key terminology used in further training, such as the concept of Nature-Based Solutions (NBS hereafter). The documents also presented the related urban planning and implementation aspects, with examples of NBS criteria, opportunities and their integration within the urban green planning and EU policies.

A glimpse of terminology and key planning aspects presented in the baseline study is shown below.

Nature-based solutions (NBS) are defined as solutions that are inspired and supported by nature, which are cost-effective, **simultaneously provide environmental, social and economic benefits** and help build resilience. Such solutions bring more, and more diverse, nature and natural features and processes into cities, landscapes and seascapes, through locally adapted, resource-efficient and systemic interventions” (European Commission, 2021; Faivre et al. 2017).

In the past years, the EC has made recommendations to help increase the use of NBS and bring nature back into cities, including a call to action to ‘rewild’ cities (Rewilding Europe, 2020). It also developed a Research & Innovation (R&I) agenda that promotes NBS and their benefits to cities and territories, aiming at improving the implementation capacity and evidence base for deploying NBS and developing corresponding future markets. These recommendations are also expected to **foster an interdisciplinary R&I and stakeholder community** and the exchange of good practices in this field (Faivre et al. 2017).

Inherent in this definition is the idea that NBS must benefit biodiversity and support the delivery of a **range of ecosystem services**. Actions that support biodiversity underpin societal benefits in two ways: they boost the delivery of many ecosystem services in the short term, and they support the health and resilience of ecosystems in the long term, that is, their ability to resist or quickly recover from perturbations.

Recently, various scientific findings acknowledged that NBS should be explicitly designed to provide measurable benefits for biodiversity (Seddon et al. 2021). Similarly, the International Union for Conservation of Nature (IUCN) enforces the inclusion of biodiversity and defines NBS as **“actions to protect, sustainably manage, and restore natural or modified ecosystems,**



that address societal challenges effectively and adaptively, simultaneously providing human well-being and biodiversity benefits”.

Therefore, for interventions to be considered Nature-Based Solutions, they must deliver benefits for nature through **enhancing ecosystem integrity and strengthening biodiversity**. Assessing the biodiversity outcome of NBS interventions requires data collection for baseline assessment and monitoring. This aspect is the focus of Criterion 3 of the [IUCN Global Standard](#) for NBS.

Recently, important frameworks have been set up to design **cross-scale inclusion of harmonised biodiversity monitoring protocols** (Silva del Pozo et al. 2025). To translate these principles into action, Biodiversa+ proposes the creation of *Thematic Hubs*: expert-driven, cross-scale platforms that coordinate the work of monitoring communities within specific biodiversity domains.

NBS can also build the adaptive capacity of local communities to future stressors **through participatory design, implementation and management of NBS**. Giving local people leadership roles and supporting them to govern their own resources can strengthen their ability to address future climate hazards. Therefore, the strength of the concept of Nature-Based Solutions is its integrated perspective for addressing societal challenges. Actually, nature-Based Solutions operationalize the concept of ecosystem services in real-world situations to promote sustainability more explicitly.

Recently, there is a *broad terminology derived or integrating the Nature-Based Solutions* concept:

- **Nature-Based Solutions literacy** - knowledge related to context NBS, including misconceptions, confusions or lack of mainstreaming of biodiversity, environmental, social and economic benefits. Based on building meaningful data to set up informational landscapes and community's access to various layers of knowledge (including the lack of knowledge) across a territory. A landscape with information is more than just naming the data: it's about understanding other key ecological details, connections and concepts that can help framing and implementing a realistic vision for territorial planning and decision-making (Basnou et al. 2025).
- **Nature-Based Thinking** - a holistic concept, approaching urban inclusive planning. It builds on the three dimensions of ecology, community aspects, and governance context (Randrup et al. 2020).

Nature-based therapy - therapeutic intervention directed by a trained facilitator in an indoor or an outdoor setting that includes exposure to and interaction with nature to enhance individuals' physical and mental health and well-being (<https://greenme-project.eu/glossary/>)



- **Planetary health** – as a holistic concept on human and nature interdependent health (<https://www.uu.nl/en/background/planetary-health-a-holistic-perspective-on-health>)
- **Nature-based learning (NBL):** Although further frameworks to understand and implement NBL are needed, it is clear that trees and forests should be part of teaching. On the other hand, urban forests and urban greening provide excellent opportunities to reconnect with nature and for outdoor learning, especially important also during the post-COVID-19 era. One of the outcomes of this approach is how NBL can contribute to stewardship values or conservation behaviours, or what are the key elements of nature experiences that affect children. One of the issues in environmental psychology relates affordances with urban children's relationships with trees as elements of the landscape that invite to actions, i.e., playing. Recent EU projects of increasing interest in urban areas have already tackled NBL by developing innovative educational packages, with guidelines for both students and teachers –e.g., “City of trees” (<https://www.clearinghouseproject.eu/>).

Storytelling. Storytelling drives systemic change and encourages novel perspectives. Storytelling can have different forms, using arts, games, podcasts etc in oral, written, visual or digital formats. It is a powerful tool of community engagement, and it is based on clear goals and a strong evidence documentation (i.e. stakeholders mapping, understanding the challenges, the background and the needs). It is a two-sided process, so not only about telling your story, but also about listening to people's stories. A wonderful example of the power of storytelling represents the [3+30+300 rule](#), already being used by hundreds of municipalities across the world.

Storytelling is a key resource to project acceptance of new solutions and biodiversity of urban green space by the stakeholders (including citizens), impacts on shifting behaviour to a more sustainable mode by demonstration actions, fosters knowledge, exchange and capacity building. A convincing storytelling needs also clear steps to enhance the impact of the research, plan or policy. [Impact Narrative Tools](#) help to potentiate the contribution of research to social change.

Clear problem understanding and action goals, knowing your target audiences, the communication forms (i.e. clear and attractive visuals) and channels needed, help boosting your message. Arts (for example, photographic exhibitions, art contests, urban sketchers meetings) and informative walks (for example, urban walks like well known ones following Jane Jacobs legacy - Jane's Walks) can provide attractive and innovative tools to boost local storytelling, community engagement and transformation.



Transformative urban green strategies. The notion of ‘urban transformation’ has been gaining ground in science and policy debates. Urban transformations to sustainability and resilience are defined in the 2030 United Nations Sustainable Development Goals (SDGs). A rich research field around questions of urban transformations has started to emerge, combining multiple scientific disciplines, ontologies and methods (Elmqvist et al. 2019). Key to these debates is the aim to put cities on a central stage for accelerating change towards local and global sustainability and resilience. In addition, there is a strong connection between “*transformation*” and “*impact*”. Apart of the environmental and social impact, there are other forms of impacts: cultural, economic, health and well-being, legal or policy impact.

Doing so, polycentric and mosaic governance are in focus, moving urban local actors beyond central planning to involve local communities, citizens and users in the governance of green space, ensuring not only more effective but also more inclusive and just planning and management (Buijs et al. 2019).

Participatory approach to planning and management of Nature-based Solutions

The interest in public participation in the planning and management of urban green spaces has been increasing recently for various reasons. The key drivers behind this trend include: the shift in public governance towards reducing public budgets and engaging the citizens and new stakeholders to enhance efficiency (new public governance); the necessity for local policies to involve the landowners into nature protection and boosting of green space ecosystem services and to boost public trust and acceptance of policy measures; and the growing interest of citizens in urban nature and public spaces, along with their active involvement in the design and maintenance of these areas.

Climate change boosted the **mutual interest of public government and its services and the citizens for collaboration**. The knowing fact that the nature, plants and their ecosystems, are endangered by climate change raised awareness of its importance for the future quality and safety of life in urban environment and triggered ambitious EU research already at the beginning of new millennium mainly calling for more comprehensive and integrative planning and management of urban green space (URGE, 2004; GreenKeys, 2006; Green SURGE 2014). The main point has become **to empower early and sufficient enough collaboration of local actors to protect and engage the potential of local ecosystems in favour of urban nature protection, meeting social needs of local community and ensuring adaptation to climate change**. In this perspective local authorities are getting more **interested to protect and activate the potential all of their green space as well as urban trees** and to thereby **involve local community into new, long-term planning and management strategies and collaborative practice of maintenance**. Doing so, besides public land and public services also private land,



landowners and citizens are becoming part of public policy and practice of planning and management of urban green space and trees.

In this framework public participation as an approach to including the residents and local communities into the processes of spatial planning and designing, constructing and maintenance of urban green space is an important part of the effective, just and inclusive instalment of Nature-Based Solutions (NBS). The increasing need for citizen participation in different phases of planning and maintenance of NBS interventions is closely related to climate change and its effects on urban environment and people's expectations of the decision-makers to act in this regard. Participatory approach is also important for ensuring efficient operation of NBS so involvement of local residents and general public as well as of other relevant actors (landowners, knowledge providers) in the process of planning and constructing NBSs is necessary. This means that it is crucial for the municipality and actors responsible for the instalment of NBS **to involve local community and identify the key stakeholders on time, early enough, and carefully plan out the participation process and methods.**

When it comes to planning participation, it is very important to be clear about the **intentions and goals**, as these will influence the **design and organisation of the participation process** and activities. The scope of participation defines **how much time, people, digital or analogue space and money the participatory process will consume.**

The reasons for public participation are usually diverse, they depend on local circumstances and needs. As mentioned, they range from minimal legal requirements to more practical ideas of building trust between the local authority and civil society or strengthening competencies for maintenance and improving the quality of life and social cohesion. We must not overlook the fact that the level of public participation also depends on the historical, geographical and social factors. This means that in communities with an established practice of participation and a tradition of collaborative work, the time and effort to raise interest of citizens and local actors can take much less time than in cases where the public isn't familiar with active participation.

In many cities, top-down governance frameworks dominate, often reducing participation to minimal obligatory consultation or only symbolic engagement. Top-down governance approaches however fall short on reaching long-term sustainability goals and deepen the lack of trust among its citizens (Kiss et al. 2022). Citizen participation is thereof crucial for meeting the aspect of longevity and socio-ecological sustainability.

In the UrbanGreenLeap project, *citizen- or public participation* refers to individuals or local community representatives involved in the planning, design, implementation and maintenance of NBS projects or policies. NBS being rather new type of urban green space design is a novelty in practice of planning and



management as well and thereby needs to be meaningfully introduces to professional and general public. While **the interest in participation is evidentially mutual** to both parties it is only to be decided and case by case tailored **how deep and lasting the participation process and activities are going to be.**

The advantages of public participation

There are several advantages to public participation in NBS development phases, which should be critically taken into consideration:

- solutions better tailored to the needs of public by acknowledging diverse needs, perspectives, views and opinions,
- improved information base and quality of solutions,
- better public understanding and acceptance of new solutions and
- raising sense of identification with new solutions and willingness to involve in care taking and maintenance.

If participation process is properly planned and executed, it can strengthen the **sense of belonging**, enhance **social cohesion, equity and inclusion**, deepen **trust** in the local government and **encourage stewardship**. It is important, however, to critically consider the potential, plan the participation process carefully, work with the public to develop solutions that are acceptable for both sides throughout the processes.

The participation can also provide expected **social outcomes** beyond inclusivity, such as:

- knowledge development,
- awareness raising,
- social learning,
- employment,
- decision-making reflexivity,
- changes in attitudes and/or social norms and
- sense of place (Kiss et al. 2022).

Although it is increasingly known that participation brings numerous benefits to local community, it is also accompanied by many doubts and oppositions and **is not yet very popular with all local community leaders and their professional services**. There is different reason for hesitation in those two groups and it is really important that they both get informed about good practices that prove how much they both together with local community can benefit once participation becomes a regular practice of planning and management of urban green space not only of NBS instalment.



Local politics can ask and look around for good practices of participatory budgeting like in Paris which prove in practice how beneficial is the possibility of participation for the growth of public support for local politics in various areas. On the other hand, while participation is welcome from the perspective of managing the scope of work and other benefits it provides to the local community, it has to be seriously considered that for efficient participation public servants and services get also bigger load of work they are not necessary prepared for. Meaning they don't have time and money for it and probably they are also not familiar with and skilled for it. This must be respected when participation is planned so that additional time and money are reserved, additional task force is engaged and also basic education for existing staff can be organised as well. It is important to have in mind that the benefits of participation evidently depend on how much work and time the initiator devote to it.

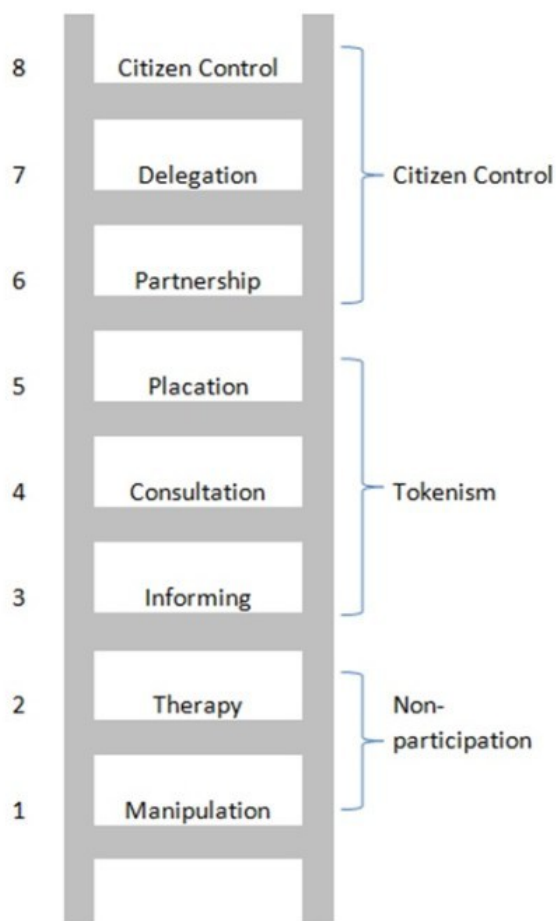
Another fact to keep in mind is that **participation isn't a miracle solution for managing the volume of work and all possible problems** of the professionally and financially underfunded public services in urban green space and trees management and maintenance. Meaning that public participation may not necessarily solve problems and save resources, but it will provide benefits otherwise not being considered efficiently enough like enabling people to have genuine contact and being active in nature, giving residents a sense of usefulness, connecting the local community, developing people's attitude towards the regulation and conservation of urban nature and similar. **The potential of public participation must be critically considered and participation must be carefully planned** and supported, and above all, development of participatory practice must be monitored and, together with the local public, **so that the practical solutions are acceptable to both parties**.

It is thereby very important **to start by creating opportunities for cooperation and encouraging local people to get involved** in designing, constructing and maintenance in a way and where it is most appropriate for them, like close to homes, schools and day care centres. For the development of practice is also helps to create different options for participation like doing it regularly or occasionally, under professional guidance or independently, individually or in a group, etc.

Therefore, there are three important starting points for the development of good practice of public participation in designing, constructing and maintaining the NBS: 1. political will, 2. financial and professional support, and 3. opportunities that enable professional services to open up to new activities and division of work and responsibilities and to enable the public, residents, and civil society organizations to respond to the invitation and find their place in the cooperation processes, develop mutual trust, and ensure other synergistic effects of the work of professional services and the public. Project UrbanGreenLeap is dedicated to support all of the three and help partner cities to experience the benefits of public participation and incorporate it in lasting everyday practice of urban green space planning and management.

Forms of participation

There is a variety of forms of public participation in the phases of NBS interventions. The main question is, what we want from people and how is it going to both benefit the nature and the city or town. Sherry R. Arnstein (1969) introduced the well-known ladder of levels of citizen participation in government decision-making, that paved the way for public participation as we know today. She argues that **the form of participation depends on the initiator and his/their power**. The eight proposed levels are categorized into **3 main types**, which define **the extent to which the public can influence the final decision**. The higher up the ladder, the higher the influence and power of the people.



Sherry R. Arnstein's ladder with eight levels of citizen participation in government decision. Figure by [Katrin Prager](#).

Luyet et al. (2012) later define the **typologies of citizen participation in environmental projects** as follows:

- Empowerment



- Co-Creation
- Collaboration
- Consultation
- Informing

These can be projected along the Arnstein's ladder, with the level of citizen power being a key focus again. 'Empowerment' gives citizens the knowledge and confidence, as well as the greatest degree of control and power in terms of NBS interventions. According to the research of Kiss et al. (2022), **collaboration is the most used form** of citizen participation. Collaboration, as well as informing and consulting, fall into the category of tokenistic level of public participation, whereas empowerment and co-creation pave paths to deeper levels of public participation. However, many NBS initiatives change levels of participation among project phases (Kiss et al. 2022).

Although tokenistic forms dominate citizen participation in a variety of NBS contexts, collaborative, multi-stakeholder engagement does not necessarily lead to improved ecological functions (Kiss et al. 2022). Therefore, to make participation be meaningful, it's important to work with a broader goal of improving the quality of NBS interventions and tailor-made solutions to local specific through building trust and social benefits.

The strongest association between social inclusion through a deeper form of participation and ecological outcomes were observed in community gardens Kiss et al. (2022). The same type of green area however also forms the most tension and conflict (Kotsila et al. 2020), so professional knowledge or mediators are welcome to enable these democratic participatory processes.

Type of public participation	Forms and methods of public participation*
Empowerment	• Capacity development • Workshops • The public leads the design • Advocacy planning
Co-Creation / Co-Deciding	• Citizen science: monitoring, tree maps, "actionable knowledge" • Co-Design Workshops • Co-management • Citizen panels
Collaboration	• Interactive surveys • Public discussion • Focus groups • Meetings • Social media debates



	• Q&A's • Participatory mapping
Consultation	• Interview • Survey • Events (open space) • E- mail feedback
Informing	• Printed materials (flyers, articles in local newspapers, posters in public spaces) • News report • Newsletters • Public presentation • Website and other online information • Field visit with interactions

* Forms and methods can be repeated at several levels and only forms of participation that are representative of a particular type of participation are presented here.

Participatory process

Cities-local urban and green space actors- are supposed to plan the participatory process regarding their “participation culture” and along with the pilot action goals and location. This means cities must clearly define both their ambitions for the participatory process and for the participatory actions. We want to keep in mind that participation is a **two-sided process** working in favour of the interests of the cities as initiators and citizens as participants.

The most general advice for a good practice is to **engage citizens early, continuously, and inclusively** to build trust, legitimacy and consensus.

Then there is a set of simple rules for a good practice of participation in any case:

- start early, be honest and respectful
- announce clearly goals, actions and decision-making rules
- use clear, non-technical language & different communication tools
- enable meaningful participation – build trust
- don't forget the underrepresented and less of a voice (children, youth, elders, disabled, women, socially deprived ...).

Effective participation is important at every stage of NBS development. Fors et al. (2015) and Kiss et al. (2022) both identify 3 key phases:

- Planning and design
- Implementation
- Maintenance and monitoring

Planning and design involve discussing the state of the art, co-defining project goals, deciding on an appropriate location of the NBS intervention, and shaping



visions. Participation can increase acceptance, relevance and ownership of the new design solutions.

Speaking about the acceptability of NBS' as solutions which are radically changing the **structure and images of urban green spaces**, we are taking care that citizens understand why new planting schemes, biodiversity and native plants matter, and **have time to prepare for new images and circumstances** like more fading plants, birds and insects present in their local urban space.

On the other hand, relevance is important for the **transfer of new practice**, while building ownership is important for responsible use, pride and identity and **willingness to participate in maintenance**.

During **implementation** phase, interested citizens may contribute in labour, knowledge, or coordination during the planting and construction process.

Maintenance and monitoring are critical for NBS sustainability and community-based monitoring and stewardship are key tools for fostering long-term social and ecological resilience (Kiss et al. 2022). Successful maintenance requires the maintenance workers to work closely with the citizens and have a good understanding of a common goal, access to resources, like tools, materials and stable funding, and an ongoing communication channels or methods for feedback, adaptation and new incentives for community contributions. Participatory maintenance can take several forms:

- **Community stewardship programs**, where citizens adopt responsibility for specific areas, from weeding, watering to monitoring wildlife.
- Formal **Co-management agreements** can be achieved between municipality and citizen groups defining shared responsibilities, timelines and resources.
- **Training and capacity building** can empower citizens with technical, horticultural, ecological or other needed skills for long-term maintenance.

It's important to not over-rely on volunteer labour without adequate institutional support (Kiss et al. 2022). Therefore, **all relevant actors should be included** in the phases of the NBS implementation.

Planning and monitoring can also be done using **citizen science** – a process of public participation in scientific research, where people actively participate in scientific findings and help with providing data. They could participate in biodiversity observations (eg. submitting sightings of butterflies, birds, bees, ...), recording nature cycles, or simply measuring the air temperature of selected locations in the urban environment. This method is an effective way of achieving the following aims: raising awareness, spreading knowledge, enhancing social learning and enhancing a sense of place.



Expectations and realities of citizen participation

Public participation is often welcomed by EU projects from the aspect of combining public service workload, **lowering the cost of maintenance** and is supposed to be **highly appreciated by the public service providers**, but less by citizens themselves and rarely by the decision-makers. They tend to lean towards the opinion that participation processes should be limited as it prolongs processes and complicates them.

However, there are **several advantages of public participation**, especially in the field of landscape planning, environmental impacts assessment, climate change mitigation, resource management and urban green governance (Kiss et al. 2022). The range of NBS benefits on people depend on the type of NBS intervention.

Kiss et al. (2022) have conducted a paper on analysis of forms and citizen participation in 58 NBS case studies, where results show that the association between public participation in (NBS) interventions and environmental and social sustainability outcomes is not always clear-cut.

Municipality-led governance arrangements dominate (Kiss et al. 2022). However, public participation in municipality-led NBS projects can have a negative impact on sustainability of these projects (Wamsler et al. 2020), **especially if forms of participation are tokenistic**. It can contribute to mistrust and has a significant impact on participatory processes in the future and democracy in general.

The biggest **pitfall in public participation are unrealistic expectations**. If never done before, citizens' interest in public participation **takes time and it is not successful overnight**. It is important to maintain a consistent approach to participation beyond the timeline of a single project. **To achieve this, it's crucial to have political support**. The rigid structure of decision-makers, who dictate how space is used and what it looks like, prevents or hinders deeper engagement, especially in relation to public edible gardens and allotment gardens.

Another downside of public participation is that **municipalities and public utility companies with ample funding often lack interest** in deeper engagement. Therefore, the lack of trust can be deepened. This is another reason that strong political support is important because it is crucial for ensuring necessary financial and human resource support.

Step 2: The Training Needs Assessment

Training Needs Assessment (TNA hereafter) is a systematic process of collection, analysis and interpretation of data on individuals, groups and/or organizational skill gaps (Wright & Geroy 1992, Bashou et al. 2021). The assessment carried out in UrbanGreenLeap had the following specific objectives:



- to better understand partners' current level of competency, skill or knowledge and their demands;
- to identify innovative training activities related to urban green planning and key concepts;
- to understand new knowledge and competencies needed.

This leads to a conclusion that **awareness on a political level should be raised** and that benefits of public participation need a **bold-headed promotion best done by good practice demonstration**.

Additional specific pilot locations and actions were studied to better understand who the actors of participation are, and which methods are to be employed in each case. Speaking about participation there is involvement of **a set of new actors in NBS** implementation, and to efficiently involve citizens, we must address them as well and take care for good coordination and cooperation among them as well.

Following this explanation pilot cities first defined **three groups of relevant participants**:

1. **core municipal working team** - the necessary project collaborators: representatives of mayor's office, UrbanGreenLeap project, spatial and urban planning, public investment and procurement, public water and green infrastructure, parks and green space department and public services ...
2. **outside professional collaborators** – specialists for urban nature and biodiversity, urban floods and heat mitigation, landscape architects, moderators of participation actions, youth workers, street artists, social workers, gardeners, plant providers ...
3. **citizens and local people** – residents, students and school kids, local businesses, landowners. visitors and facility users, gardeners, plant lovers, NGOS's ...

Once they defined the specific participatory human ecosystem, the partner cities moved to next step of planning about the preparatory activity process. They started planning and deciding what kind of participation is in their case interest, who and how is going to be involved, and they begin to prepare their own **case-based participatory process**.

At this point, cities started to consider the project goals, timeline and budget to plan the **participatory process as realistically as possible**, maybe breaking the on-site activities into more phases or finding additional budget.

Summary of training needs (TNA) results: what key skills and capacities are missing?

The TNA survey was designed by knowledge providers, to reach the key stakeholders, and decision-makers among UrbanGreenLeap partners. The target



audience was represented by decision makers, planners, policy makers from the partner cities.

The survey was designed to take about 10 minutes to complete. The TNA was structured into three parts, representing (1) Background, (2) Cross-cutting skills and (3) Training needs. It included 14 questions, including a few open-ended questions. The open-ended questions were designed to help us get the respondents perspective in their own words, instead of just including pre-defined answer options.

The survey was disseminated for partners from May to September 2025. The survey was created and distributed using the EU Survey platform. According to its structure, the survey was included in the category of recommended small surveys (below 25 questions), with a fast loading time for end users.

TNA was answered by 12 partners, with a large number of answers from Slovenia. Other answers were received from Croatia, Greece, Italy and North Macedonia.

Bellow, some key findings which helped to deliver learning objectives and the structure of Capacity building sessions (i.e. NBS indicators and Biodiversity Strategy for 2030).

In relation to urban indicators, the cities indicated that only 16% are easy to measure in their city (**Figure 2**). Therefore, the training will focus on indicators which:

- Respond to existing skills, demand and resources
- Provide long-term data collection that can be easily integrated into health studies and policies
- Inclusive
- Provide meaningful data for all
- Adapted to socio-environmental and decision-making context
- Transversal
- Creative (cities were free to propose and develop new indicators, if needed)

(following Basnou et al. 2025).

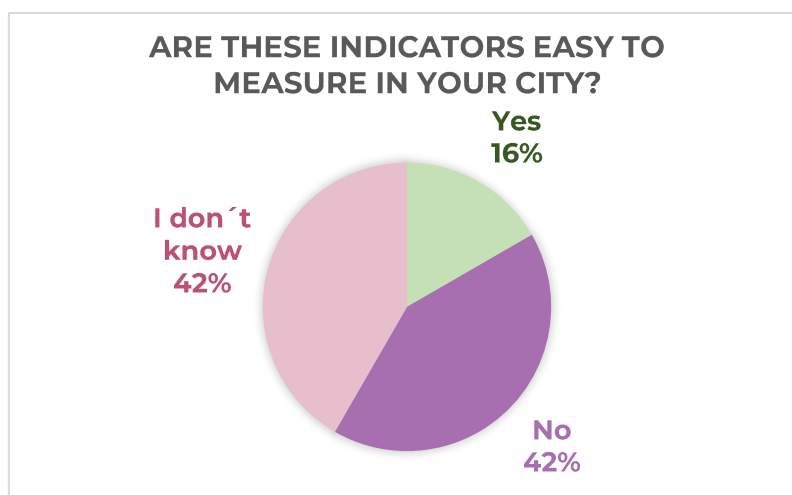


Figure 2. Knowledge on indicators and metrics

On population groups insufficiently targeted by urban green planning and policies, most of the answers showed that elderly and low-income groups are less included (**Figure 3**). In line with these results, the cities were trained and encouraged to design various forms of public participation, to enforce inclusive urban planning. Each lesson included transversal objectives to enforce this part. Moreover, a chapter on participation was integrated in the Baseline study.



Figure 3. Population groups and urban green planning policies

According to the interest related to specific training (see **Figure 4**), the training sessions will include specific presentations on Nature-Based Solutions and encourage sharing experiences with co-design sessions. Where possible, specific examples of best practice were integrated in key notes or field trips (i.e. Biodiversity



Atlas of Barcelona as an example of best practice, indicators of urban biodiversity, data quality etc).

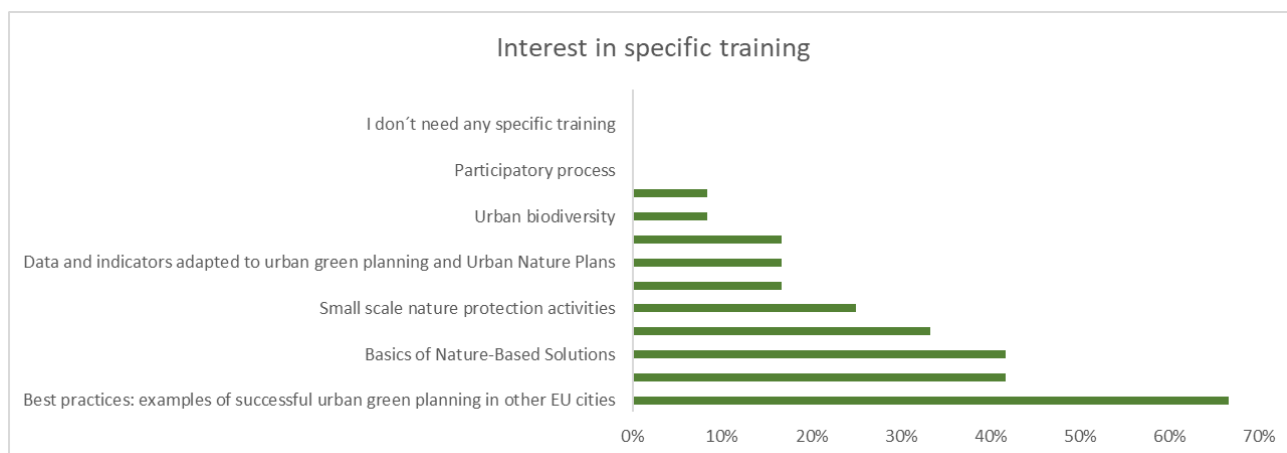


Figure 4. Training needs

To sum up, the following gaps were clustered from the TNA results: inclusive participation, monitoring & indicators, adaptive management, policy translation.

Step 3. Co-design workshop

In parallel, [co-design sessions](#) (i.e. Milano, 2025 and Barcelona, 2026) empowered partners to align concept, relate and share knowledge and discovery, following a route to enable them to:

- Discover the context (general knowledge) - learning from the messages we are getting (I didn't know this/Others were not aware/Unknown to all), implementing and making decisions based on the shared discovery (to be later enforced by TNA results and training).
- Begin to understand the planning context and the existing knowledge, but also to boost training and urban green planning

The Dynamics of the co-design session is presented in **Box 1**.

Box 1. Co-design framework to align concepts and advance towards a common understanding across UrbanGreenLeap cities



Co-designing urban green with the cities

Milano, September 2025

Led by **CREAF**, co-designed with **Knowledge providers**

Goals

- Facilitate collaborative thinking and aligning concepts around how different urban vegetation typologies perform under different scenarios.
- Identify strengths (roses), emerging opportunities (buds) and limitations (thorns)

Materials

- Sticky notes for vegetation typologies
- Scenario boards (heat wave, drought, flood, air pollution etc.) *
- Vegetation types board **
- Blank layout

Session Overview

Duration: 60-90 min

Step-by-step agenda

- **Step 1.** Set the Stage (5 min)

Welcome and explain the purpose of the session

Introduce the scenario themes

- **Step 2.** Breakout Exploration by Scenario (20 min)

Split into small groups, each working with one environment scenario

Provide 2-3 vegetation types

One large RTB canvas per scenario/group

Encourage discussion on biodiversity, ecological function, maintenance, social perception etc.

- **Step 3.** Gallery walk or Share-Out (30 min)

Each group presents the key insights from their scenarios

Other participants add ideas with sticky notes



Which vegetation typologies performed well across different scenarios

Main take away around:

- What's working well
- What has potential/innovative
- Challenges (cities context)

*UrbanGreenLeap – Scenario boards

Scenario 1: Urban Heat Island and Heatwave

- Your city experiments 10 days of > 35° C temperatures
- There is a high citizens discomfort, especially among the most vulnerable population and energy use speaks
- High mortality among recent tree plantings

Scenario 2: Flooding

- 2 hours of intense rain overwhelm sewers and streets
- The river is flooding the nearby buildings
- Water is contaminated

Scenario 3: Air Pollution Spike

- During a restauration action, soil from a playground and urban garden was found contaminated with heavy metals, as a consequence of past land-use
- As a consequence of quick urban sprawl, the city needs more space for crops and 0 km food

Scenario 4: Drought with water restrictions

- As a consequence of 4 weeks without rain, city restricts irrigation for all types of green infrastructure
- Plants begin wilting and dying

** UrbanGreenLeap – vegetation types board

- | | |
|----------------------------|--------------------------------|
| • Agricultural land | • Shrubs |
| • Butterfly gardens | • Single trees |
| • Floodplains | • Therapeutic gardens |
| • Flower beds | • Trees with green pits |



- **Forests**
- **Grasslands**
- **Green roofs**
- **Green schoolyards**
- **Green walls**
- **Rain gardens**
- **Scented gardens**
- **Trees with large canopies**
- **Urban gardens**
- **Urban meadows**
- **Urban parks**
- **Wetlands**

The main findings of the co-design sessions showed that:

NBS implementation can be challenging and various potential pitfalls of NBS and Urban Green Planning can appear:

- Poor or sparse data on local biodiversity
- Over-emphasis on tree planting rather than a wide range of NBS (i.e. prioritizing quantity over quality)
- Maintenance of green spaces
- Failure to ensure benefits for biodiversity
- Insufficient knowledge on species traits, air pollution consequences at various scales or flood risk mitigation
- Not involving local people in urban nature monitoring, planning or decision-making process
- Lack of skills
- No system in place for financing and maintaining NBS (long-term view)
- Nature policies are not linked to a department



Step 4. Data – cities context, needs and pilots

The *Partner-level baseline documents* (**Figure 5**) established a first solid base for understanding cities context and challenges, in terms of skills, data, training needs or adaptation to global change.

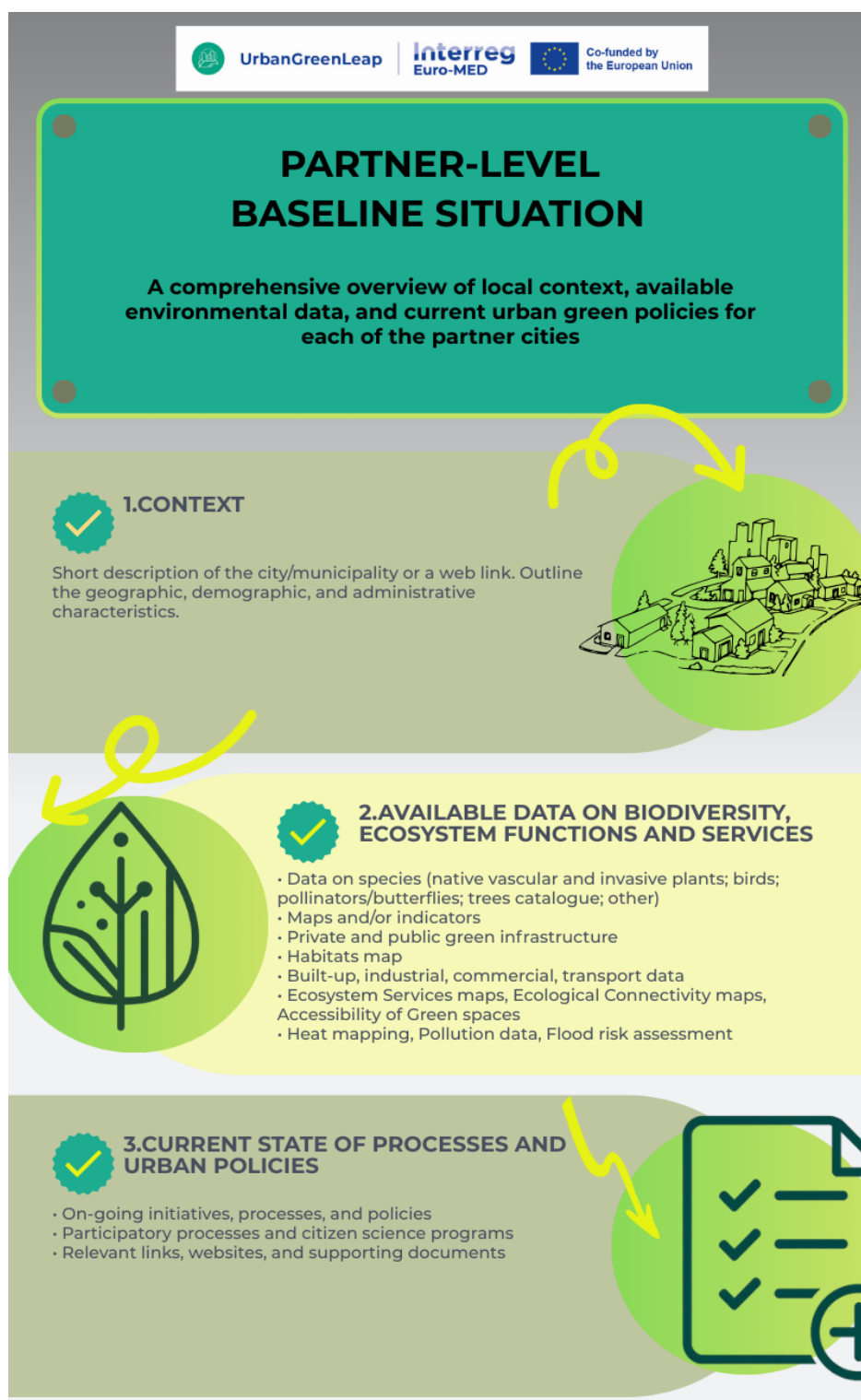


Figure 5. Organizing data: an overview of partner-level baseline documents



Step 5. Contextual training

This step describes the training goals and summarises the training script.

Goals and learning objectives

The training session “Building impact through data: from baseline collection to planning and pilot design” was delivered in Barcelona on February 17th, 2026. The training focused on strengthening the capacity of partner cities to use data effectively for the development of Urban Nature Plans (hereinafter UNPs) and the planning and design of Nature-based Solutions (hereinafter NbS) demonstrations/ investments.

The session aimed to demonstrate how baseline data collection and spatial analysis can support evidence-based decision-making, allowing cities to better diagnose environmental challenges, prioritize interventions, and measure the impact of urban nature actions.

- **Goals:** by the end of the training, the partners will be able to understand the key concepts described in the Base line study, be prepared to roll-up of Urban Nature Plans and integration of key indicators
-
- General learning objectives
 - To understand and apply some of the key concepts (i.e. described in baseline study)
 - To build an urban biodiversity data base and understand its benefits
 - To design an inclusive and transformative participatory approach
 - To design, plan and implement nature-based solutions (i.e. urban forests)
 - To define realistic and meaningful data/indicators for urban green planning
 - To understand why, where, when and how to act in terms of inclusive urban green planning from a multidimensional perspective (i.e. which indicators to use to monitor the effectiveness of a plan; which species to plant to adapt to global change; which ecosystem services are provided by urban forests and how to enhance them; how to boost public trust and engage citizens; how to protect and empower urban nature etc.)
 - To boost cities engagement and continuous learning

Structure and criteria

The training session consisted of four main blocks of approximately one hour each, focussed on the following key concepts for urban green planning:

- (1) Urban biodiversity, led by CREAM



- (2) Participatory process, led by IPoP
- (3) Urban Forests as Strategic Nature-Based Solutions, led by UNIZG FFWT
- (4) Building impact through data: from baseline collection to planning and pilot design, led by Ambiente Italia S.r.l.

In order to make the training dynamic and engaging, the trainees were encouraged to use, whenever possible, clear references/links and include innovative materials and tools in their presentations (videos, other existing training material or management tools, podcasts, case studies etc). The complex concepts were agreed to be introduced, when necessary, but they were explained using friendly approaches. Each trainee had the liberty of structuring the training objectives and the structure of the presentation according to their own expertise and training experiences.

All training sessions were built with a clear science-policy-practice focus and tailored to cities needs and pilots.

Summarised description of the training sessions

Session 1: Urban biodiversity (Authors: Corina Basnou, Shichun Ma, Sandra Calduch and Joan Pino, CREAM, Spain)

Objectives

- To understand the definition and concept of urban biodiversity
- To build realistic and meaningful tools for urban biodiversity monitoring (i.e. biodiversity atlas) and understand their benefits
- To integrate the vision on urban biodiversity into cross-sectorial approach in cities
-

Biodiversity means the variety within and between organisms of an ecological system. Biodiversity encompasses genetic diversity, species diversity and ecosystem diversity, including functional diversity, which reflects differences in the biological traits of species. Some projects mention a 4th level, the cultural biodiversity and therefore this session briefly mentioned related concepts, such as the extinction of “biodiversity and cultural literacy”). Biodiversity is a key element, the basis of ecosystem processes, functions and services.

Urban biodiversity refers to the variety and variability of living organisms found in urban environments, including their habitats, and the ecological interactions among them within cities. Urban biodiversity is a subcomponent of broader



biodiversity, focused specifically on the human-dominated landscapes of cities and metropolitan regions. Local vs broad scale, urban vs peri-urban - landscape factors (such as landscape context, landscape configuration, dynamics and history) are also important determinants of the urban biodiversity. Fragmentation (urban areas disconnected to rural areas - i.e. the concept of agro-sylvo-pastoral landscape) drives biodiversity loss. Therefore, a major recommendation provided by research findings emphasizes the need to preserve natural remnants from urbanization impacts.

The presentation gave insight on key aspects of measuring biodiversity, beyond species richness. Biodiversity encapsulates many different aspects of biological organization and information. For example, phylogenetic diversity is important, since there is evidence that greater phylogenetic diversity leads to a higher ecosystem stability. Scientists study phylogeny to understand the evolutionary history of species and their relationships. Taxonomy for example, which is the science of classifying organisms, relies on phylogeny to reflect the natural relationships among living things.

The importance of species abundance or traits when sampling flora or fauna are highlighted. Knowledge of species traits (data available in open database, such as Biodiversity Atlas of Barcelona) is closely related to ecosystem functions and services and it is fundamental for urban green planning (i.e. canopy size, plant high or leaf morphology).

A brief introduction on challenges/drivers of biodiversity loss was followed by some key aspects from recent research on challenges related to pollution and health safety thresholds, especially in the case of heavy metals pollutants and their bioaccumulation and soil persistence. Various aspects of monitoring biodiversity and the use of plants as bioindicators was highlighted. Key role of plants/urban gardens as bioindicators of air quality (e.g. heavy metals monitoring on leaves chard) was mentioned. The first part of the presentation recalled the need to include all these aspects for biodiversity planning strategies in cities (traits, flora & fauna diversity, pollution & human health, ...).

Within cities we find a very particular nature: “nature in a small pot” (J. Pino). Studies showed that urbanization is able to globally decrease plant diversity by fostering common species with “urban-adapted” trait states, by limiting rare species with traits less suitable for urban environments, and by decreasing phylogenetic diversity. Research also provided evidence that seminatural areas within cities, e.g. protected areas, parks, and even gardens, can protect species with traits less suitable for the typical urban built-up environment. Therefore, a mix of semi-natural habitats and typical urban-industrial habitats within a city (if the latter are allowed for spontaneous vegetation) should permit both semi-natural and typical urban floristic elements and thus enable functional and phylogenetic diversification.

But how can we take advantage of this particular urban nature, while trying to restore and maintain local biodiversity and its ecological functions as most as



possible? To respond to this question, the training also showed examples of enhancing urban biodiversity hotspots, such as urban gardens or tree pits (i.e. where spontaneous plants benefits key fauna like pollinators). Cities can harbour high biodiversity, including endangered species that sometimes live only in these urban habitats.

In the same line, the last part of the training session focussed on how public geodata based on species inventories in cities can help mainstreaming urban green planning and management.

When planning biodiversity strategies, first we can ask ourselves which species live in our garden or city and then try to organize databases with all this information. In that way, we can understand the importance of evidence-based for planning, such as the Biodiversity Atlas of Barcelona (implemented in 2019). Along with the specific field sampling designed for urban flora and fauna, citizen science projects fed the data available in the open Biodiversity Atlas of Barcelona (such as https://ubms.creaf.cat/en/for_butterflies).

In the end, Session 1 showed how this data is integrated in ongoing research (i.e. as part of two PhDs thesis in CREA/UAB), highlighting *practical examples* of the benefits of accessible, high quality, georeferenced data on urban biodiversity, with focus on *Trees Smellscape in Barcelona*. The PhD student talked about the importance of smell in urban planning. Smell is associated with emotions, memory & stress. Her recent research on urban trees traits led to the development on the first scented trees interactive species explorer in Barcelona, free open use, based on data from the Biodiversity Atlas of Barcelona. Results revealed some gaps in inclusive urban green planning. There is a lack of scented trees near schools and hospitals.

As an ancillary information, the training on Urban biodiversity also provided material describing the newest concept related to “[3-30-300 rule](#)”, as an example of storytelling and successful narrative to mainstreaming urban forests (and urban green in general) and boost impact in cities.

Main takeaway

- **Biodiversity needs a cross-sectorial approach in cities.** Urban policies should move towards cross-sectional approaches that coordinate planning for biodiversity and green spaces with sectors such as health, education, urban planning and design.
- Balancing green space supply and green space pressure is possible, when cities enforce their (place-based) capacities in green space management and planning and learn from successful case studies



Session 2. Participatory process (Maja Simoneti and Urška Didovič, IPoP, Slovenia)

The training session covered the following main points:

- introducing new typologies and imaginaries of public green spaces and greened areas/buildings
- new collaborators – specialists for: biodiversity, urban water management, urban heat mitigation, public health and well-being, social equality and cohesion
- potentials, needs and interests for participation

Transversally, the key drivers for successful participation and new participatory practices have been highlighted.

Special emphasis was made upon: the importance of empowering early and assuring meaningful collaboration; raising awareness about biodiversity loss and NBS, bringing new appearances of green spaces; meeting social needs of local community and ensuring adaptation to climate change; long-term planning and management strategies and collaborative practice of maintenance and ownership of public green spaces.

The training described the types and methods of participation, raising awareness upon the strengths and weaknesses of each method. Special emphasis was made upon knowing the target audience (i.e. comprising diverse mixture of • groups • interests • roles & positions • languages! • powers • responsibilities) and tailoring the methodology according to participants and interests.

Realistic expectations, equality of participants, publicity of professional activities, respect/trust/consideration will assure a robust participatory approach for long-term effects.

Success factors and barriers in participatory process were further detailed, with a first approach tailored on cities pilots to design the further steps for successful participatory approaches.

The training reinforced concepts presented in the previous Baseline study (D1.1.1.) and highlighted the advantages of public participation in NBS development phases, which should be critically taken into consideration:

- solutions better tailored to the needs of public by acknowledging diverse needs, perspectives, views and opinions
- improved information base and quality of solutions
- better public understanding and acceptance of new solutions and
- raising sense of identification with new solutions and willingness to involve in care taking and maintenance.



Moreover, if participation process is properly planned and executed, it can strengthen the sense of belonging, enhance social cohesion, equity and inclusion, deepen trust in the local government and encourage stewardship. It is important, however, to critically consider the potential, plan the participation process carefully, work with the public to develop solutions that are acceptable for both sides throughout the processes.

The participation can also provide expected social outcomes beyond inclusivity, such as: knowledge development, awareness raising, social learning, employment, decision-making reflexivity, changes in attitudes and/or social norms and sense of place.

Main takeaway

A successful participatory approach to implement NBS should meet social needs of local community and ensure adaptation to climate change.

Session 3. Urban Forests as Strategic Nature-Based Solutions (Vinko Paulić and Iva Šikić-Vargašević, UNIZG FFWT, Croatia)

Urban forests serve as essential components of green infrastructure in cities. They include forests in peri-urban zones, city parks and urban forests, smaller parks and gardens, street trees and all other areas with woody vegetation in cities. They function as long-term assets that improve environmental quality, support public health, and help cities adapt to climate change. As urbanization accelerates across Europe, where more than three-quarters of the population already lives in urban areas, the role of urban forests in supporting sustainable development becomes even more important.

Urban forests face a number of environmental pressures that reduce their resilience. Increasing temperatures and the rising frequency of heatwaves create challenging growing conditions for many tree species. Heavy rainfall events and sealed surfaces increase runoff and soil erosion, while pollution further stresses trees and reduces their capacity to provide ecosystem services. Limited rooting space in compacted urban soils also restricts tree growth, leading to shorter life spans and reduced functional benefits. Emergence of new pests and diseases coupling with loss of biodiversity in urban areas further emphasizes the need for proactive management and long-term planning of urban forest resources.

Despite these pressures, urban forests serve as highly effective nature-based solutions which tackle many of these environmental issues. They reduce urban heat island effects by providing shade and cooling through evapotranspiration, which results in significant reduction of temperatures in densely built areas. Trees also improve stormwater management by intercepting rainfall, improving soil infiltration, and reducing runoff volumes. In addition, increasing tree canopy cover



contributes to better air quality by reducing particulate matter and pollutants concentrations. These benefits as a result support public health, reduce infrastructure costs, and strengthen overall climate resilience.

To support informed decision-making, city professionals rely on several key indicators of urban forest performance. These, among others, include the total number of urban trees, overall tree canopy cover and the accessibility of green spaces for residents. Recommended standards include reaching 30 percent of canopy cover, providing at least nine square meters of green space per person, and ensuring that residents have access to green areas within a short walking distance. Tree inventories and geographic information systems play an important role in monitoring resources, identifying priority areas, and guiding investment decisions.

Looking ahead, cities must incorporate climate-adaptive planning with appropriate species selection into their urban forest strategies. Selecting resilient species that tolerate drought, heat, or periodic waterlogging will improve long-term performance and reduce maintenance risks. Enhancing biodiversity through diverse species mixtures, preserving habitat trees, and integrating conservation measures strengthens ecological stability and supports urban wildlife.

Urban forests are strategic assets that contribute to healthier, more resilient, and more livable cities. By embedding urban forests into planning policies and prioritizing long-term management, cities can ensure that they continue to deliver essential ecosystem services for future generations.

Session 4. Building impact through data: from baseline collection to planning and pilot design (Iliriana Sejdullahu, Ambiente Italia srl.)

Objectives

The training addressed three main objectives:

- **Understanding the importance of baseline data** for evidence-based urban nature planning aligned with EU policy frameworks.
- **Learning what types of data cities need** and how to use them to design Urban Nature Plans and pilot actions.
- **Demonstrating a practical example of NbS spatial mapping**, showing how GIS-based data can support planning and decision-making.

A key premise of the training was that cities often operate under constraints such as limited GIS expertise, uneven data availability, and limited monitoring resources. Therefore, the proposed methodology (for more see D. 2.1.1. Methodology for the collection or beta data) emphasized flexible and accessible data approaches that can work across different administrative and technical contexts.



Data-driven approach to Urban Nature Planning

The training highlighted that data is not only used for reporting but forms the backbone of the entire planning cycle, linking:

Baseline data → Analysis → Planning → Pilot design → Impact → Monitoring.

A robust baseline for urban nature planning combines four complementary sources:

- Remote sensing and GIS datasets
- Field surveys to assess urban ecosystems
- Citizen science contributions supporting biodiversity observations
- Administrative and municipal operational data such as land-use plans.

Application and practical example

The training illustrated how this approach supports **Urban Nature Plan** development, particularly through baseline analysis and the definition of **indicators and targets** such as green space coverage, tree canopy, biodiversity indicators and accessibility to green areas.

A practical case study from the Metropolitan City of Milan demonstrated how GIS-based mapping can identify existing green infrastructure, classify publicly accessible green areas and integrate multiple spatial datasets. The methodology supports decision-making by identifying priority areas for intervention and potential locations for new Nature-based Solutions.

The example also introduced a visual mapping platform that allows cities to analyse green space accessibility, assess ecological connectivity and communicate urban nature initiatives with citizens and stakeholders.

Key messages and importance for cities

- **Reliable baseline data is essential** for effective urban nature planning.
- **Spatial analysis helps cities prioritize interventions and justify investments.**
- **Integrating multiple data sources improves the understanding of urban ecosystems.**
- **Mapping and visualization tools support planning, monitoring and communication.**



By adopting a structured data-driven approach, cities can plan and design more targeted NbS pilots, align local actions with European policy objectives, and better demonstrate the environmental and social impact of urban nature interventions.

Step 6. Boosting transformation

This step is planned as a **transversal and continuous approach** across the whole project, lasting beyond WPI or UrbanGreenLeap work plan. Continuous monitoring (cities will be trained to apply NBS key indicators, adjust strategies based on evidence and feedback) and institutionalization of learning as a continuous process (i.e. maintaining continuous knowledge exchange, establishing solid networks or enforcing collaboration with research/academia) are key pillars of this part.

This part also includes frameworks to engage stakeholders (coordinated and designed by IPOPOP), further methodologies for indicators led by other knowledge providers or networking and learning from thematic Green Leaving Areas Mission.



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