Integrating Nature-Based Solutions into Higher Education towards exploiting the transformative potential of Social Economy for a green and inclusive future

WP4 - Development of the Green SE curriculum

Co-creation activities for bringing together SE, NBS stakeholders and local communities to co-design NBS solutions

Responsible partner: Stimmuli for social change

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List of abbreviations:

NBS	Nature-based solutions
SE	Social Economy
HEA	Higher Education Area

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Abstract & keywords

The present module, which is the fifth module of the SEgoesGreen curriculum, focuses on the role of co-creation and effective collaboration among diverse stakeholders during the co-design and deployment of Nature-based Solutions (NBS) within different settings at educational and urban level.

Co-creation of NBS requires the engagement of multiple actors with different levels of knowledge and academic backgrounds to strengthen and apply in an inclusive, reflective and collaborative way the implementation of NBS. Although co-creation as a practice of collaborative product is not a novel concept, evidence shows that there is still a need for making co-creation principles and guidelines more clear, feasible and applicable to a broad range of stakeholders from the non-scientific community (Dushkova & Kuhlicke, 2024) to break the institutional silos and generate societal benefits.

The fifth module was designed with the purpose to **offer useful guidance** and **further inspiration** for co-creation during the NBS co-design and co-implementation phases. It first elaborates on its learning outcomes and target groups to whom is addressed. Next, the module provides useful information about the meaning and principles of co-creation process for NBS activities. In addition, the module displays examples of co-creation pathways which were developed and adopted by a series of EU-funded projects. The module is further enriched with the provision of success stories and real-life examples of NBS-driven and sustainable initiatives from Greece, Poland, UK and Germany, by showcasing the importance and impact of involving diverse stakeholders at different stages (from co-design to co-implementation of NBS activities) and at different levels of engagement. Last but not last the module provides a list of competence-based and participatory activities covering several NBS topics (co-design a green wall, co-create a rain garden, co-building a bee hotel, co-organizing a tree planting initiative at campus) with the aim to inspire a multiplicity of stakeholders (students, educators, ecologists, NBS experts, cooperatives, social entrepreneurs, citizens) as future actors and changemakers of community through sharing ideas, reflecting on a shred goal and gaining new knowledge through a 'learning by doing' approach. These activities aim at increasing their social and ecological awareness through a series of joint hands-on experiences that will contribute to biodiversity protection as well as wellbeing of nature and people's mental and physical health.

The module finishes with a list of useful online resources that offer additional guidance for the co-design and co-creation of NBS practices, the application of several participatory techniques and methods that can be leveraged in a co-creation activity for defining challenges and ideas around an NBS topic.

Keywords: Nature-Based Solutions, co-creation, co-design, collaboration, empathy, community building, engagement, environmental stewardship, green competencies, biodiversity protection, green infrastructure, participatory planning, collective decision-making.

1. Introduction & module objectives

NBS offer a huge potential to address various environmental challenges, but their success and maintenance hinges on inclusive, transparent and meaningful engagement of all stakeholders (Ecological Institute, 2024). Co-creating NBS goes beyond traditional approaches, by enhancing the awareness and knowledge of society and stakeholders regarding NBS, balances interests, benefits and responsibilities between relevant stakeholders and pays attention to user needs.

The main goal of this module is to promote the potential of co-creation process in several NBS educational practices in a creative and experiential way, by giving emphasis on the connectivity of the academic community (students, educators) with SE (Social Economy) professionals, NBS stakeholders and local communities to co-design in a collaborative and inclusive NBS solutions at urban level and mainly at university campus. To achieve this primary goal, the module sets the following sub-objectives:

- To provide a definition and core elements of co-creation in the context of NBS, by stressing on the principles and useful tips during co-design of NBS implementation.
- To offer practical examples of co-creation strategies and pathways developed by other EU-funded projects.
- To present an overview of SEgoesGreen methodology for the co-design phases of the project's local bootcamps, by highlighting the co-creation steps in which students and external stakeholders will be involved towards co-designing and putting into practice a quick prototype of an NBS-driven project they will be co-develop with the aim to generate socio-economic and environmental benefits to their region and local community.
- To display successful case studies of NBS practices and green initiatives across Europe to offer further inspiration from real-life examples that prove even through challenges and complexity in the process the effective collaboration among different stakeholders and citizens' involvement in the NBS production and maintenance, thus favoring the complete co-creation cycle.
- To equip students from SE and Life Science departments with core green competences and environmental awareness, both in technical way that relates to the construction of an NBS project but also regarding the cultivation of communication, critical thinking and problem solving ability in order that they join forces with other stakeholders from the field of NBS and social entrepreneurship to co-design NBS innovative ideas that can provide social, economic and environmental benefits within their campus area and increase the overall wellbeing in the community. The stakeholder engagement and effective collaboration among these stakeholders are enabled by four competence-based activities that this module suggests, covering a variety fo NBS activities, from the co-design of a green wall at campus to co-creating a rain garden, co-building a bee hotel close to a university garden and co-organizing and co-implementing a tree planting initiative to support biodiversity, mitigate climate change, and enhance air and water quality.

2. Learning outcomes & target groups (/beneficiaries)

At this end of this module, it is expected that university students and all involved stakeholders from the academic and non-academic area will be able to:

- Understand better and recognize the key elements of co-creation and its relevance with NSB principles
- Become familiar with good practices and useful tips for an effective NBS co-design process
- Be able to contribute to local NBS initiatives that boost their green skills and ability to act through co-designing and co-implementing activities that help tackle sustainability and biodiversity challenges in the university campus or urban areas.

Regarding the target groups, this module is primarily addressed to students from Social Economy (SE) study programmes but also from Life Science departments in Higher Education Area (HEA) and their educators. In addition, NBS experts, urban planners, policy makers, SE professionals, community experts. Given the module's great emphasis on the collaboration among different stakeholders and the core need to embrace diversity of opinions and inclusive participation, the module's application requires the involvement of NBS experts, sustainability experts, agronomists, water management scientists, community members, representatives of SE organisations, social entrepreneurs where their presence and guidance is particularly crucial in the co-design and co-implementation phases of a co-creation activity.

Understanding co-creation and its connection with nature-based solutions

What co-creation of NBS means?

Co-creation is a key process for the effective design and implementation of an NBS project or activity. The term co-creation is defined in different ways. It first arose from the business world considered as '*the practice of collaborative product or service development: where developers and stakeholders are working together*'. In the context of NBS, co-creation process aims at engaging in a reflective way and bringing together diverse actors with different knowledge, skills, perspectives and scientific backgrounds collaborating with the goal to reinforce and develop the implementation and upscaling processes of NBS (Kabisch et al., 2016).
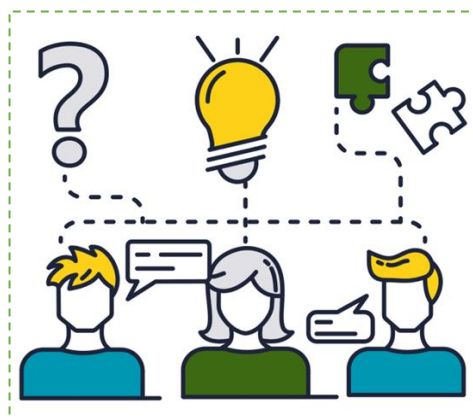
Source of the photo: Canva

Co-creation is also considered as a systematic process of creating new solutions by involving citizens and communities in policy and service development (Mahmoud et al. 2021). The application of participatory methods, which are enabled and fostered by co-governance[1] processes, is an essential dimension of NBS co-developed actions, going beyond traditional approaches. Co-creation as a practice of collaborative product or service development is not a novel concept, however its application in the field of NBS requires

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[1] The term 'co-governance' describes a collaborative approach for designing, implementing, maintaining or monitoring NBS, where the active involvement of the local community (including NGOs, private sector actors) is encouraged to empower individuals to develop a sense of ownership for their local environment and equip them with new capacities and knowledge (Naumann S. et al, 2023).

a certain level of knowledge, expertise and capacity building to ensure a shared understanding and collaborative dialogue. Co-creating NBS is linked to the connectivity of multiple actors (Dushkova & Haase, 2020) and highlights the necessity to join efforts between local authorities, municipalities, and stakeholders to improve the inclusive application of sustainable solutions (Mahmoud & Morello, 2021).

What co-creation is NOT:

• A 'utilitarian' relationship (use of the positive image of the partner without a real project).

• A client/supplier or service provider of relationship.

• A short-term relationship or operation.

• A way of sharing social (NGO) and economic responsibilities.

• Sponsorship or philanthropy.

• A mere co-branding or labelling operation.

• A joint communication or public relations operation.

Co-creation is an open and participative process in every phase of NBS action or practice (from planning to implementation, monitoring and evaluation/ reflection on results and impact) and it is subject to continuous transformation, adaptation and development of additional strategical elements within the whole process (Dushkova & Kuhlicke, 2024). However, each co-creation process, irrespective of the selected NBS type or a specific project, should entail the following **principles**:
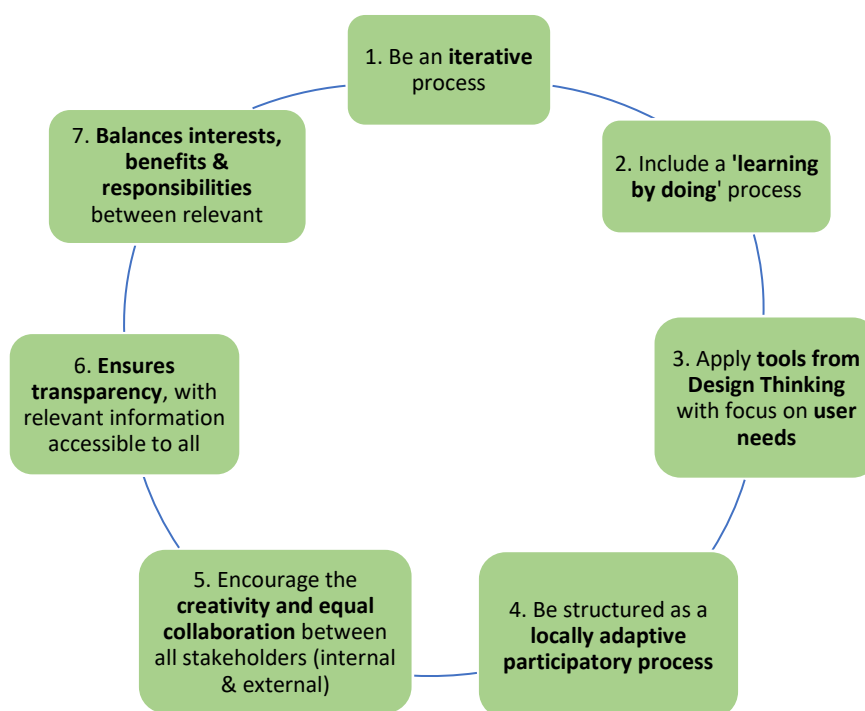

Figure 1.Principles of the co-creation process for NBS activities

Moreover, the connection of co-creation with NBS features is further justified by the following reasons (Mahmoud and Morello):

i. **NBS are living bodies** that often require constant care and maintenance. Given that co-creation particularly relies on the continuous involvement of stakeholders, especially in the operational life of NBS, i.e., for co-maintenance and co-monitoring of solutions in place, sharing responsibility with citizens and stakeholders is critical important.

ii. **NBS are manageable**, practical measures, easily achievable with simple co-construction operations. This allows citizens to be involved in their production and maintenance, thus contributing positively to the co-creation cycle, something that is difficult to achieve in other urban regeneration application contexts where the co-implementation of any solutions by citizens is not feasible at all times.

iii. **NBS are place-based** which renders the co-creation process highly influenced by the context in terms of environmental and climate risks and hazards, as well as social impact. Therefore, co-creation processes become a melting pot of citizens' engagement techniques with environmental analysis baseline information and participatory mapping where community members can help observe and collect data from nature and the local environment they are exploring, to make it work at the ground scale.

With regards to the latter element (citizen engagement) Nunes et al. (2021) support that citizen engagement in the co-creation of NBS results in:

- NBS that are aesthetically, socially, economically and appealing to citizens and stakeholders
- New co-managed urban green spaces where people with common interests or needs can regularly gather and engage;
- Inclusive and multistakeholder governance of co-diagnostic, co-designing, and co-implementation process, relying on a community of stakeholders, by bridging differences through an inclusive and highly attractive narrative.

Benefits of co-design process in NBS initiatives

Co-design is defined as the practice of community engagement that challenges conventional power dynamics, by involving community participants in partnership or collaboration with public bodies. The co-design process has a considerable potential for all involved stakeholders to jointly define the challenges to be dealt with and the objectives they unanimously set up for the selected NBS practice/ project (Basnou et al., 2020). When carried out with care and consideration, co-design allows a diversity of knowledge and experience, both professional and lived, to shape a project from its fundamentals. In this way, it is considered that community ownership is grown and sustained (CLEVER Cities, n.d.).

In order to ensure that the implemented NBS provide as many benefits as possible (environmental, social, economic), the following criteria should be considered for any selected or co-planned NBS project (Dushkova & Kuhlicke, 2024):
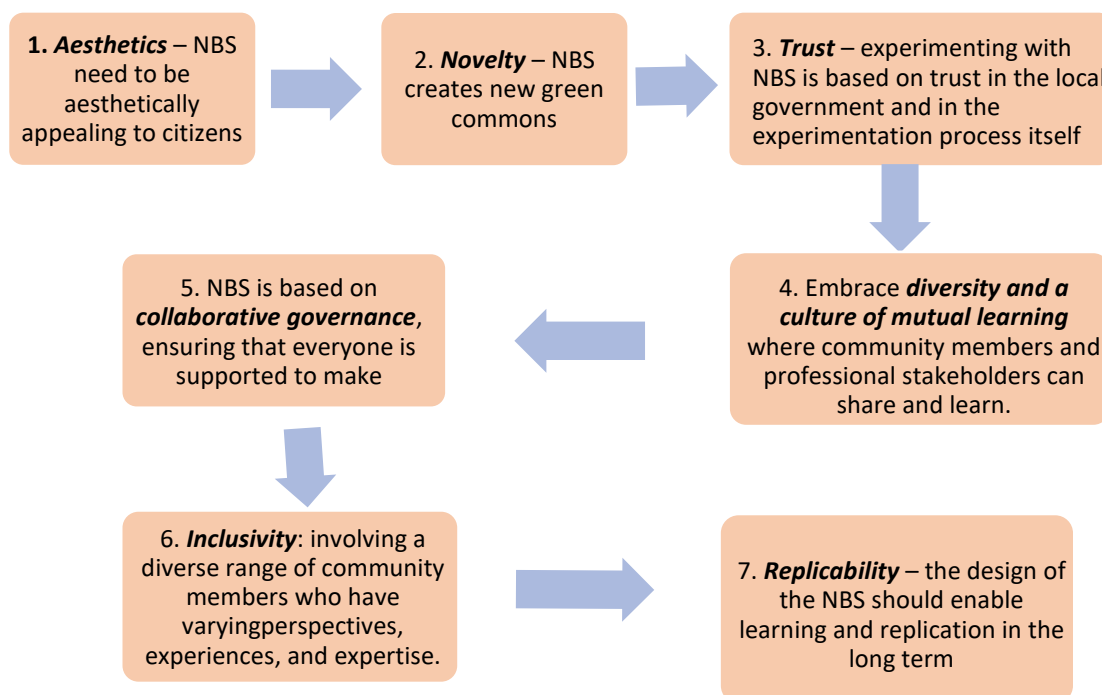

Figure 2.List of necessary co-design principles during NBS implementation

Moreover, the design configurations of different NBS projects should consider the following aspects:

● The **parts of the land that need to be reshaped and the place/ region** where parts of NBS project will be located (landscape approach).
● The design options of NBS should be based on **multifunctionality** in order to achieve multifunctional land use with multiple objectives, including a variety of benefits and co-benefits
● ***Designing with people***: this relates to fostering community participation as well as embedding NBS into government regulations and local planning strategies. Given that community initiatives are participatory processes, they should be based on the transparent communication of potential actions. Although community initiatives are essential for creating bottom-up processes in landscape planning, government policies play also a critical role in the maintenance and operation of NBS as well as ownership and delegation of responsibilities together with the financing' these are critical dimensions which need to be incorporated in the design of the NBS
● Allow ***iteration*** and at best for multiple iterations and refinements to the design of the selected NBS to ensure it can reflect community feedback and priorities (Dushkova & Kuhlicke, 2024).

Tips for a successful NBS co-design

Co-design is a challenging but constant learning process. This part of module 5 offers further guidance through useful tips that can be followed by any co-creation team – within or outside university – which is involved in the co-design process of a NBS project/ activity. Successful co-design requires a set of conditions in place, including time and budget, that are not always available. The nature or type of the NBS can also make co-design to a lower or higher degree relevant.

Good practices and tips for an effective co-design process (Morello et al., 2018)

Culture & values:

Openness and inclusiveness: bringing together diverse actors and relevant stakeholders in decision-making processes and equal consideration of their needs and preferences.

Being experimental and reflective: actively fostering trial and error and learning process.

Co-design venue:

Identify a suitable venue for organizing the events. The place should be easy to access and visible, recognizable and representative of a public institution or a civic association

Relevance and group dynamics among teams: Carefully assess and understand the different levels of relevance among stakeholders in terms of potential contributions to the co-design of the NbS and tailor their engagement strategies, accordingly, including strategies and easy to use tools for the less motivated stakeholders. End-users of NbS – like inhabitants or school/university – are often **key stakeholders** for the co-design process.

Skills, knowledge & awareness:

Bringing expertise in collective intelligence and facilitation can impact positively on students' awareness and inspiration from other existing practices. Hiring an expert or upskilling a project team member in this area can be valuable.

Another critical dimension for an effective co-design relates to **the type of participation tools** they will be chosen. The tools and methods that will support participants who collaborate towards a shared goal for the co-creation of an NBS activity should be consistent with the overall stakeholder engagement strategy and adaptable to the specific needs and goals of the single stakeholders and the whole NbS co-designed project.

Co-creation pathways and co-design frameworks for NBS activities

The co-creation process does not have a one-size fits-all approach. Understanding pathway structure and engagement tools are important to undertake the practical aspects of co-creation facilitation towards implementation, especially that each co-creation process is unique and theoretical frameworks do not necessarily mirror co-creation in reality (Mahmoud & Morello, 2021).

Here are some examples of co-creation pathways developed by EU-funded projects:

1. *The RECONECT 7-step co-creation pathway*
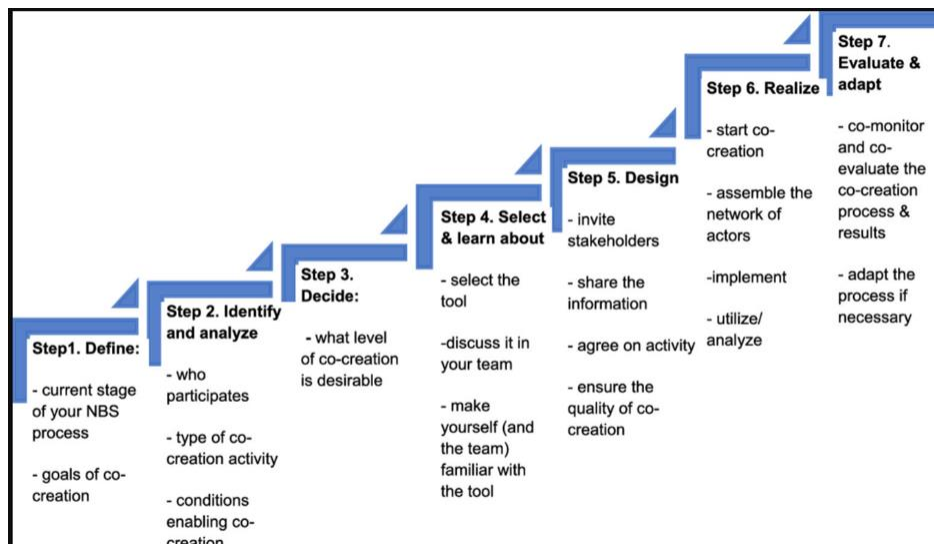
2. *The UNaLab adaptive management cycle*
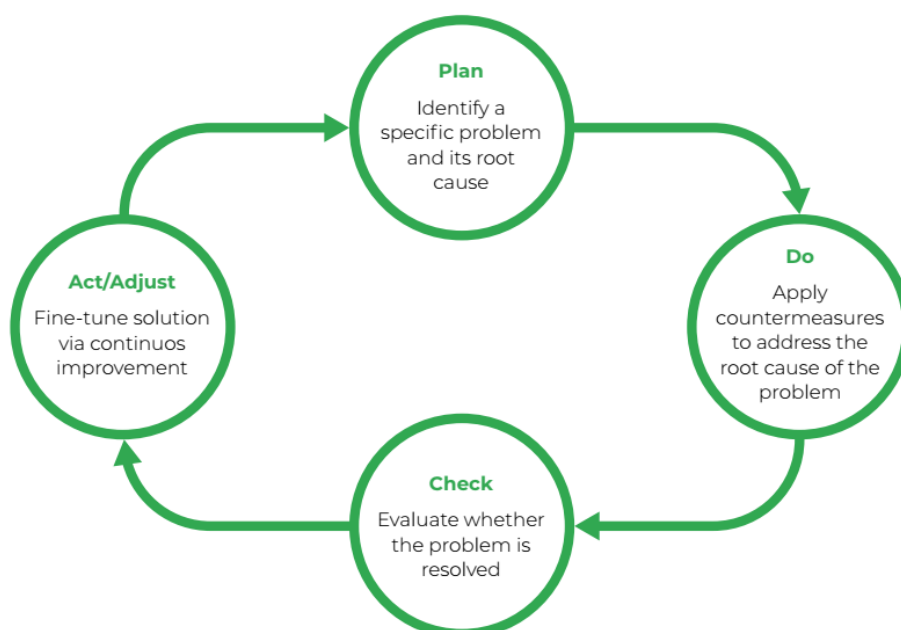
3. CLEVER cities roadmap[2] towards local NBS plans

Based on @Veronika Hoffmann, CLEVER Cities

The NBS co-creation pathway in SEgoesGreen bootcamps
In the framework of the SEgoesGreen project, the co-creation activities for the NBS co-design process either addressed at university campus or at urban level will be initiated during the Testing Phase B of the piloting period of the GREEN SE curriculum (under WP4). More specifically, the co-design process is included in the implementation phase of three local bootcamps in the project's pilot countries (Poland, Greece and Cr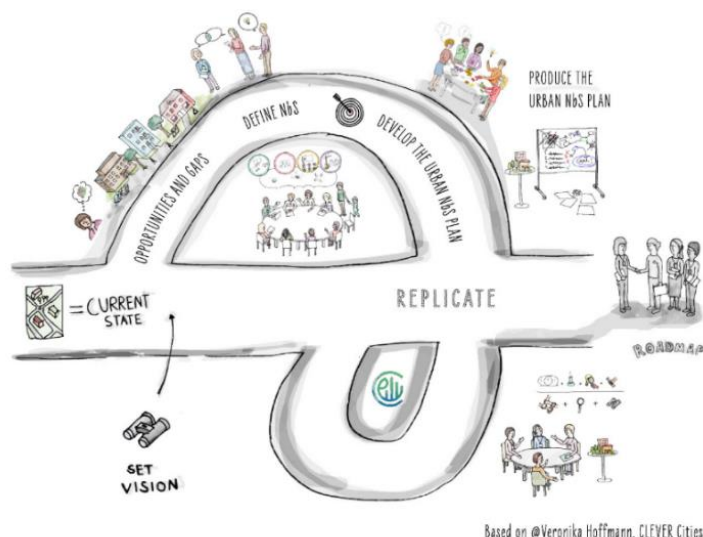oatia), requiring a highly inclusive approach and communication effort by all involved stakeholders. Participants of the three local bootcamps include students who will collaborate with SE stakeholders, urban planners, community members, NBS experts and HEI professors who are familiar or experienced with sustainability, biodiversity and NBS towards co-designing and putting into practice a quick prototype of an NBS-inspired project which can provide (in the long-term) socio-economic and environmental benefits to their region and local community. This muti-stakeholder collaboration is also expected to offer educational benefits to students from SE study programmes and Life Sciences to foster their green awareness and eco-citizenship as they will be offered the opportunity to experience first-hand the application of their co-designed NBS project in a real-life context with the goal to provide environmental and social benefits and help build community resilience in the local urban environments.

Taking inspiration from the previous methodologies that were presented as good practices from other EU-funded projects and drawing at the same time on the steps of the suggested bootcamp methodology of GREEN SE curriculum[3] (*Module 6*), the co-creation activities among students, SE stakeholders and NBS experts begin from the end of Step 3 (ideation workshops) where they will continue to work in groups in order to discuss and agree on the type of NBS they are interested in focusing and further working on in order that they proceed with a quick prototype/design in Step 4 (*Prototyping solutions) and* implement this

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[2] The structure of the illustrated road map is inspired by the international standard "Sustainable development in communities – Management System for Sustainable Development" (ISO 37101). Source:
[3] The bootcamp methodology and its concrete steps are presented in the Annex 1.

prototype in a real-life setting in Step 5 (*Implementation planning*). The co-design phase can be based on the following phases:

1. ***Co-explore specific challenges & setting goals***: after each team in each bootcamp brainstorms and agrees on the type of NBS they want to focus on (during Step 3 - Ideation workshops) and to the specific topic of that type they will dedicate their co-design work, they need to i) clarify their common goals, benefits/ strengths and potential risks of their own selected topic (based on their region's specificities in terms of the landscape, community's needs and potential risks or threats thy need to consider before proceeding to the prototyping sessions) as well as to ii) identify and map environmental, social and economic problems faced by the city that could be addressed with this NBS they will have selected (Spot the problem).

Useful tools: SWOT analysis[4], field work techniques or outdoor activities (like an transect walk or community mapping (to collect data to collect data on hazards, exposures and vulnerabilities, accompanied with observation and collection of information), World Café, 5 Whys exercise, dotmocracy (also known as dot-voting or idea rating, is a selection technique used by those who take part in participatory processes to make decisions about implementation or action), Photovoice (also known as "participatory photography").

2. ***Co-envision & co-design the structure of NBS project:*** this part of co-design regards the prototyping phase of each local bootcamp (Step 4 - Prototyping solutions) where each project team will start brainstorming and designing their ideas in a more concrete way. In this phase, project teams should choose together the best prototype and plan how it can be implemented either within the university campus or in a public space, depending on the addressed topic and type of NBS.

Useful tools: user personas and empathy maps (as they help teams decide on the end users and the people who are affected by the identified challenges/ problems and will be benefited from their project, Idea canvas (for concluding a brainstorming session), scenario planning, NBS Business Model Canvas (a useful first step for individuals or groups in planning the implementation of a NBS project. It helps everyone involved to consider the basic elements required to build a successful long-term sustainable project), Theory of change exercise.

3. ***Co-experimentation:*** the goal of this phase is to outline steps and a clear model/ prototype for starting to implement on site the project/ NBS activity. This phase is linked to Step 5 (Implementation planning).

Useful tools: prototyping testing plan, story boarding, usability testing , A/B tests

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[4] In a SWOT analysis exercise participants can consider the applicable types of NBS and their feasibility.

3. Case studies & real-life examples

A variety of existing collaborative examples based on co-creation and co-design principles have been co-designed around the world combining efforts of different stakeholder groups and active dialogues among them. This module focuses on NBS-related good practices in Poland, Greece, UK and Germany and showcases a list of EU-funded projects that have leveraged co-creation as a pathway to enhance participation, collaboration and interaction among different stakeholders through variety of NBS cases and projects at a real-life context.

Examples of local co-creation processes in practice

1. **Co-creation and citizens engagement in NBS deployment in Wroclaw, Poland**

The city of Wroclaw (Poland) has established a municipal co-creation team with the aim to develop urban climate change adaptation plans and strategies to enhance blue-green infrastructure towards the implementation of urban investments. This project brings together different stakeholders, from policymaking and business environments (such as city departments and organisations that work on water and energy, urban planning department, the Wroclaw Agglomeration Development Agency) to the academic community (like the University of Environmental and Life Sciences), landscape designers, and local residents. A particular example of NBS practice that was co-initiated by the previous multi-stakeholder partnership is the pocket park *'Ptasi Zagajnik'* in Wroclaw (Image 1) which includes paths accompanied by lawns were laid, new sustainable benches, exercise equipment and lighting, providing open space for the community and contributing to the improvement of public health and social interaction (Naumann et al., 2023:25).

Image 1. A co-created pocket park 'Ptasi Zagajnik' in Wroclaw (Poland)

2. **Co-designing a community garden at the Kipling Estate in Bermondsey, London**

Residents of the Kipling Estate in London (UK) have collaborated with researchers from Imperial College and University College London to co-design a garden that meets their needs while also delivering additional benefits for local water management processes (Image 2). The project is part of the NERC-funded Community Water Management for a Liveable London (CAMELLIA), an interdisciplinary, collaborative research project with multiple stakeholders that aims to explore and encourage sustainable water and environmental approaches to new housing in London (UCL Engineering Exchange, 2019).

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Image 2. Ilustration of a co-designed community garden for the roof of Kipling Estate in Bermondsey (London)

3. A food forest connecting a school with community in Thessaloniki[5] (Greece)

The plans for the creation of the first food forest in Thessaloniki, with fruit trees and plants in the urban fabric, is a joint project that was co-designed between the Municipality of Neapolis Sykeon, the Environmental Organization 'Mamagea', the cooperative 'Cob', citizens and residents of the area of Strebeniotis and students (Image 3). The goal of this co-creation initiative was to create the food forest as NBS solution providing multiple environmental, social and economic benefits/ In addition, during the participatory planning process of co-designing the food forest emphasis was also given on the theme of advocacy, social responsibility and the relationships among children, between children and the rest of the community, and the experts. The importance of acting in collaboration with other groups, civil society and experts was considered an imperative in order to establish a green sustainable urban culture in urban area of Thessaloniki that lacks good air quality and green spaces.

Image 3.Illustration of the 1st urban Food Forest in the area of West Thessaloniki (Greece)

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[5] Sources of photos: https://mamagea.gr/news/55_The1sturbanFoodForestinGreecewascreatedinThessaloniki ,
https://dimosneapolis-sykeon.gr/%CE%B5%CE%BD%CE%B7%CE%BC%CE%B5%CF%81%CF%89%CF%83%CE%B7/%CE%BD%CE%B5%CE%B1/6488/%CF%84%CE%B5%CE%BB%CE%B9%CE%BA%CE%B7-%CE%BC%CE%BF%CF%81%CF%86%CE%B7-%CF%80%CE%B1%CE%B9%CF%81%CE%BD%CE%B5%CE%B9-%CE%B2%CF%81%CF%89%CF%83%CE%B9%CE%BC%CE%BF-%CE%B4%CE%B1%CF%83%CE%BF%CF%82-%CE%BD%CE%B5%CE%B1%CF%80%CE%BF%CE%BB%CE%B7-%E2%80%93-%CE%BF%CE%BB%CE%BF%CE%BA%CE%BB%CE%B7%CF%81%CF%89%CE%BD%CE%B5%CF%84%CE%B1%CE%B9-%CF%84%CE%BF%CF%80%CE%BF%CE%B8%CE%B5%CF%84%CE%B7%CF%83%CE%B7-%CE%B5%CE%BE%CE%BF%CF%80%CE%BB%CE%B9%CF%83%CE%BC%CE%BF%CF%85
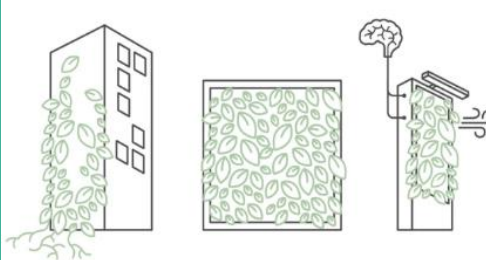
4. **Mobile garden for the elementary school Neugraben in Hamburg, Germany**

This project focused on creating moveable raised beds, seats, and storage containers for the school Neugraben in Hamburg, Germany in order to be used in the schoolyards (Image 4) The restructuring measures was a co-creation process with the active involvement of pupils. The project was realized through a novel collaboration between the local partners of the EU funded project CLEVER Cities, school officials, pupils, and the parents' council. The raised beds and benches were structured through a guided workshop by a local carpenter, with the contribution of the school pupils. In addition, A construction guide was developed so that this project can be easily replicated in other schools, paving the way for making this a widely accepted co-governance model (Naumann et al., 2023: 43).

Image 4.Mobile garden in the elementary school Neugraben in Hamburg, Germany

4. Competence-based activities & ready-to-use lesson plans

<table>
<tr>
<td colspan="2">Activity 1: Co-designing a Green Wall at campus[6]</td>
</tr>
<tr>
<td>Objectives &
Learning Outcomes</td>
<td>The main objective of this lesson plan is to help students reflect through brainstorming on the environmental, aesthetic, socio-economic benefits of green walls (e.g., air purification, insulation, biodiversity, mental well-being) towards improving the quality of the urban environment, mitigating climate risks and promoting the wellbeing of the community.

Students are also expected to develop their practical, critical thinking and communication skills while co-designing and planning the structure of their project along with NBS experts.</td>
</tr>
<tr>
<td>NBS topic(s) – if applicable</td>
<td>Green urban areas/infrastructure (Type 3 of NBS)</td>
</tr>
<tr>
<td>Recommended age of students (specify the range of students who can take part in this activity)</td>
<td>It is an activity suitable for both undergraduate and postgraduate students</td>
</tr>
<tr>
<td>Skills (21st century, green competences) that the activity promotes</td>
<td>This activity blends environmental awareness with design thinking and collaborative skills. It is also aimed at boosting students' creativity and critical thinking.</td>
</tr>
</table>

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[6] Source of the photo: https://www.naava.io/editorial/what-are-green-walls

Necessary materials/ resources	For the brainstorming and co-design process:
	Whiteboard/flipchart for brainstorming and sketching, markers, sticky notes, useful source with plant catalogues or images of green wall plants and their benefits for air quality and people's health (p.7): https://www.ambius.co.uk/assets/content/files/greenwall-brochure.pdf , design tools (e.g., grid paper, rulers, or digital design tools like Canva or SketchUp), laptops/tablets for research or online mapping, materials for mock-ups (paper, scissors, tape), list of plants for green walls: https://www.plantdelights.com/collections/living-wall?srsltid=AfmBOoqAT6RdEgp3UTiZ-DMGorjFaWrCLmnHyBM5OKRHb6G4FNEJKsWB, post-it notes for group brainstorming, example case studies of green walls (photos or short videos)
	For the installation process[7] (Days 3 & 4):
	Screws, Nails, or Fasteners: To secure frames, planters, and other components.
	Level: To ensure the installation is straight.
	Power Drill: For creating holes and mounting support brackets.
	Measuring Tape: To measure and plan out space before installation.
	Cutting Tools: For trimming plants, planting bags, or cutting the frame.
	Additional tools:
	Lighting (if indoors or low-light area): Grow lights for areas with insufficient natural sunlight.
	Fertilizer: If the green wall requires additional nutrients to support healthy plant growth.
	Maintenance Tools: Pruners, gloves, or plant feed depending on your green wall's plant types.

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[7] A detailed list of materials for installing a green wall is presented in Annex 2 (*Activity 2*).

Location/Venue	A room in a university department and a wall or surface where it is feasible to install the green wall (either indoors or outdoors)
Duration (including the preparation and application time)	**3-4 days in total** **Day 1** (195-200 minutes, including the field visit & a break of 15 minutes) **Day 2** (purchase of materials and organization of a green wall's installation) **Day 3** (3 hours/ 180 minutes) **Day 4** (5-6 hours, depending on the green wall's size and preferably working with sunlight)
Instructions/ How to apply the activity the /lesson plan	**Day 1** (200 minutes maximum) **Step 1: Conceptualizing Green Walls and their benefits** (20 minutes) The participants are divided into 4 or 5 groups (maximum, especially for a total group of 20-30 students) and first reflect on what the green wall means for them, by writing in post-it notes or in a Flipchart their ideas along with the environmental, social and economic benefits of green walls for their campus (e.g., air purification, insulation, biodiversity, mental well-being). Definition of green walls[8] (for facilitators): The term 'green walls' (also known as a living wall or vertical garden) incorporates all kinds of vegetated wall surfaces. There are three major system categories that fall under this term: green facades, living walls, and retaining living walls.

[8] Source of green walls definition: Green Roofs for Health Cities. (2024). ABOUT GREEN WALLS. https://www.greenroofs.org/about-green-walls

Benefits of green walls[9]:

Inspiring videos/online sources for the beginning of the 1st session (before the brainstorming in groups): https://www.youtube.com/watch?v=R9fJ0Rt2Hpw https://urbinat.eu/nbs/pdf-download-green-walls/

> Improve the overall sense of well-being and boost productivity amongst students
>
> Create a better place for students to learn by reducing the noise
>
> Improve biodiversity and boost the institution's image
>
> Students can explore and learn about nature with a hands-on approach

Step 2: Configuring the elements of the green wall & Co-Design Process (60 minutes – with the involvement of a field visit it could last approximately 2 hours/ 120 minutes)

Similarly, in small groups (5-6 people maximum in each group) participants will envision the design of a green wall within their university space (could be a building façade, inside a cafeteria, or in an open common area), by being inspired by a local NBS demonstration site of a green wall. The teams can use sticky notes or whiteboards (like Miro, Jamboard) to brainstorm and configure the initial elements of their green wall, considering the following criteria:

- ▪ i) **Plant selection**: What types of plants are suitable for vertical growing? What plants would suit the local climate?

Useful tip: for the selection of plants styles need to do some research with the support and consultation of some experts (horticulturists, NBS experts to water management and green infrastructure) and considering the local environmental conditions. Teams may also need time to identify species that will thrive in the specific location (sunlight, temperature, humidity) where they will co-develop their green wall.

- ▪ ii) **Water management**: How will the plants be watered? (e.g., integrated irrigation system, self-watering planters).

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[9] Source: Living Walls UK. (n.d.). Living Walls for Schools & Universities. https://www.livingwallsuk.co.uk/living-walls-schools-universities/

▪ iii) **Social space considerations**: How can the design enhance community space or learning areas?

▪ iv) **Sustainability**: How will the green wall contribute to sustainability? (this is optional as they will discuss the benefits in the previous step)

Check also out **the 5 key green wall considerations** that will impact on its climbing plants: **light, shade, wind, temperature and rainfall**. Further information is included here: https://green-walls.co.uk/blog/5-key-considerations-when-designing-a-green-wall/

Before moving to the next phase (the co-design part) facilitators can co-organize with students and NBS/sustainability experts a field visit where they can explore and observe a real-life project of a green wall which is placed in another university (in the same city/ location) and then come back and map gaps, problems and needs of tehri own location.

The next phase is related to the process in which students, in groups, create a rough sketch of their green wall design. They should focus on the following parts:

● **Layout** (if it is a horizontal or vertical wall).

Tips for a vertical garden:

- Very delicate plants and succulents are certainly not a good choice for the vertical garden.
- The green wall is a perfect place for plants of the arum family and vines which will create a nice and durable base for the composition. **Philodendrons, scindapsus, as well as cissuses** are especially recommended plants.

Source: https://4naturesystem.com/en/blog/bid-34-potted-flowers-popular-plants-green-wall

Philodendrons[10]

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[10] Link for philodendron: https://www.britannica.com/plant/Philodendron

Scindapsus[11]

Cissus[12]

- **Plant placement**: students, with the support of organizers, facilitators and NBS experts, can organize as a group a short walk around the campus in order to observe and record in which place there is high need for constructing a green wall.

Potential features like irrigation systems, seating, or educational signage could also be considered in this mapping activity. The NBS experts or invited stakeholders familiar with sustainability and plants will be actively involved in this step providing ideas and tips to students.

- **Responsibilities and division of tasks for the organization of teams and installation of the green wall**: the groups should discuss their roles (e.g., who will be responsible for site preparation, tree planting or placement of plants in the wall, watering, and follow-up care), during the experimentation process before and during the co-construction of the green wall.

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[11] Link for Scindapsus: https://en.wikipedia.org/wiki/Scindapsus
[12] Link for Cissus: https://en.wikipedia.org/wiki/Cissus

- **Necessary resources and budget plan**: for the budget details and resource-related elements it is suggested that participants consulting, apart from the list of materials previously displayed, the NBS Business Model Canvas (https://connectingnature.eu/sites/default/files/downloads/NBC-BMC-Booklet-Final-%28for-circulation%29.pdf p.7)

Note: between steps 2 and 3 the groups make a break of **10-15** minutes for stretching and decompression.

Step 3: Group Presentations and Feedback (40 minutes in total)

Each group presents their green wall concept to the class, explaining: i) the rationale behind their design choices (e.g., why certain plants were selected, why specific features were included), ii) how their design fits the needs of the university campus or space they're designing for. The presentation can be conducted orally or can be accompanied by a summary of key points in a ppt template.

Day 2: Purchase of all necessary materials & monitoring of the location where the green wall will be installed

During the 2nd day the duration varies, but a suggested duration is counted to half a day, including purchasing the material and any potentially needed custom-building elements as also arranging for plumbing or water systems and review the steps that need to be followed for the installation day.

Day 3 (3 hours/ 180 minutes)

The day for the real-life implementation of the co-designed projects has come. This is the actual installation phase. It includes mounting the wall structure, setting up the irrigation system, and placing plants. The timeframe will vary based on the complexity of the system and the size of the wall. Small projects may take less time, while larger ones could take longer.

In Day 3 teams will focus on the preparation of the structural components of tehri green wall, consisting of the following elements:

1. **Mounting Frame/Structure**: Build or purchase a structure to hold the plants in place. This can be a frame with pockets, trays, or panels.
2. **Irrigation System**: Plan and install a water system to keep the plants hydrated. This could include a drip irrigation system or hydroponic setup.

	Support Layers: Depending on the system, teams may need to add a layer for drainage or protection, like a mesh or geotextile fabric.
	Day 4: **Installation of a green wall** (5-6 hours, depending on the green wall's size and preferably working with sunlight)
	For installing their green wall, teams should follow the steps below:
	1. **Assemble the Structure**: Secure the mounting system to the wall (whether permanent or adjustable). This may involve drilling or using adhesive mounting systems, depending on the type of wall and structure.
	2. **Set up the Irrigation System**: If using an irrigation system, run the tubing to the appropriate places for the water flow. Ensure that the system provides even coverage for the plants.
	3. **Place Plants**: Add plants into the pockets or trays. Ensure that each plant is properly positioned to receive enough light and is securely placed.
	At the end of the activity, each team will reflect on their experience by being offered space and opportunity for constructive feedback from other groups. Facilitator can encourage team members to share their opinion with questions such as:
	• *What do you like about this design?*
	• *What could be improved in terms of plant selection or sustainability?*
	• *What challenges did you encounter during the co-design and installation process? What aspects of the green wall design were the most important for ensuring sustainability and usability of the green wall?*
Involved stakeholders (apart from students/ educators)	Urban designers/ planners, architects, students from SE and Life Science departments, landscape gardeners, agronomists, horticulturists
Reflection moments / assessment method	Open discussion, group presentation, online evaluation form (for SEgoesGreen bootcamp)
Useful Tips	3. **Leverage Technology:**

	If possible, use digital design tools (e.g., Google Draw, Canva, SketchUp) to help students visualize their designs better. These tools can be particularly useful for a more polished design presentation.
	You could also bring in virtual tours or videos of existing green walls to inspire students.
	4. **Provide Time for Reflection:**
	The facilitators can ask follow-up questions like, *"What did you learn about working in a co-design setting?"* and "*How would your design be improved in the future to further promote sustainability and maintenance of the project on your campus?*"
	You could even invite a guest speaker from the field of urban landscaping or sustainability to provide expert input during the co-design session.
	5. **Encourage the Diversity of Ideas**: There's no "wrong" way to approach the design. Emphasize the value of diverse approaches and encourage a non-judgmental environment where all students feel comfortable sharing.
	6. When **selecting the plants for your green wall**, choose flowers that do not require too much space and attention. A basic rule that you need to have in mind is to select plant species that are as easy to grow as possible and do not require a large amount of space. Therefore, pay attention to the root balls of a plant – it cannot be too large and overgrown.

Activity 2: Transforming university campus into a green 'oasis' through a co-designed rain garden	

Objectives, Competencies & Learning Outcomes	The main objective of this activity is to explore the benefits of a rain garden in managing stormwater and enhancing biodiversity through a 'learning by doing' approach. Students will learn how to design a simple rain garden considering local soil, plant types, and water flow by reflecting in parallel to the environmental and social benefits (e.g., reducing flooding, improving water quality, and supporting local wildlife). The learning outcomes of this activity are listed below: ● Students will further understand the benefits of rain gardens in managing stormwater and enhancing biodiversity. ● Students will learn how to design a simple rain garden considering local soil, plant types, and water flow. ● Students will practise their creativity and collaboration skills while brainstorming on their prototype and implementing in a real -life context their rain garden in a specific location of their campus or local community.
NBS topic(s) – if applicable	Type 3 (green infrastructure)
Recommended age of students (specify the range of students who can take part in this activity)	Undergraduate and postgraduate students (it is adaptable to several age groups)
Skills (21ˢᵗ century, green competences) that the activity promotes	Teamwork, collaboration, problem solving, environmental stewardship
Necessary materials/ resources	A2 papers and post-it notes for brainstorming A digital tool (Mentimeter or Slido) for interaction with students at the beginning to express their ideas and understanding about rain gardens.

	Maps/Diagrams of the site or area for the rain garden
	Markers for sketching the design
	Shovels, hand trowels, and gardening tools
	Plants suitable for a rain garden (e.g., native, water-tolerant plants)
	Soil, compost, and mulch for planting
	Measuring tools (optional, to mark contours and areas)
	Watering cans or rain barrels (for irrigation)
	Rocks, gravel, or stones (for drainage)
	Tinkercad (free digital prototype platform for 3D design, electronics and coding): https://www.tinkercad.com/
	A guide about rain gardens (for facilitators): https://raingardens.info/wp-content/uploads/2012/07/UKRainGarden-Guide.pdf
	Open Street map (as online mapping tool): https://www.openstreetmap.org/#map=15/40.59998/22.96842
Location/Venue	It is a physical activity – Step 1 can also be conducted online or following a university course. The site assessment, preparatory steps (e.g. buy the materials, initial design) and implementation (construct the initial prototype of a rain garden) should be conducted outside, in a natural environment.
Duration (including the preparation and application time)	**3 days** **Day 1**: 90 minutes **Day 2** (open – depends on each team – it is a preparatory phase for buying the material and a final review of the checklist of the implementation plan – approx. 3 hours is an indicative duration). **Day 3**: between 2 and 3 hours
Instructions/ How to apply the activity the /lesson plan	This activity can be applied in 2 days through the following steps: Day 1 (90 minutes) **Step 1**: **Understanding the value of rain gardens** (15 minutes)

Facilitators (pilot partners with the support of an expert or a professor familiar with this topic) introduce the concept of rain gardens and why they are important in managing stormwater. A simple short online activity (in a form of short quiz or cloud exercise through Mentimeter) can be conducted before presenting any definition by asking students and involved stakeholders thinking of '*what a rain garden means to them*' by replying online with 2-3 words. Then an open discussion can follow by sharing opinions and perspectives on how they understand the concept of rain garden. If possible, the environmental benefits of rain garden can also be discussed.

Definition of a rain garden*:

> 'A garden of native shrubs, perennials, and flowers planted in a small depression, which is generally formed on a natural slope. It is designed to temporarily hold and soak in rainwater runoff that flows from roofs, driveways, patios or lawns'.

*Short video about rain gardens that can be displayed during a local bootcamp or training with students: https://www.youtube.com/watch?v=3frkqNjScpk

Benefits of rain gardens[13]:

> Enhance water quality by filtering out pollutants
>
> Aesthetically pleasing
>
> Preserves native vegetation
>
> Provides localized stormwater and flood control
>
> Attracts beneficial birds, butterflies and insects

Step 2: Identifying ideal locations for rain gardens (35 minutes)

Next, in 2 or 3 groups of 5-6 people maximum students should explore the characteristics of suitable rain garden sites (e.g., near downspouts, in low-lying areas, and where there's good soil drainage).

It is recommended that students go out to the area designated for the rain garden and start exploring observe the landscape (consider slope, drainage patterns, and water flow areas) to identify the suitable location

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[13] Source for the definition & benefits of a rain garden: Goundwater foundation. (2022). All About Rain Gardens. https://groundwater.org/rain-gardens/

through a short walk the area to get a feel of the space and review the site analysis data such as sun availability, slope, and existing landscape features. Next, they can go back to the classroom and discuss what was observed and where, according to their collected data, water naturally collects or where runoff might be a problem.

Useful tip: Rain gardens should be placed **at least 10 feet away from building foundations** and should not be located where water ponds for an extended period of time.[14]

Step 3. Brainstorm design criteria (such as the goals and objectives) for the rain garden (40 minutes)

With the location of the rain garden determined, participants continue at this point by brainstorming in groups (maximum 4 or 5 groups of 5 participants each group) and defining the criteria that will structure their custom-made rain garden. The process involves creating a shape (size) for the garden and determining a layout for the plants.

Ask participants to sketch their ideas on paper, a whiteboard or a flipchart for 20 minutes, considering the following questions:

    i)   Where should the garden be placed in relation to water flow (e.g., near a downspout or low spot)?

    ii)   What shape and size should the garden be?

Note: The size of the garden is dependent upon the amount of water draining into the garden (i.e., the drainage area), the soil type, slope, and distance from a downspout (if applicable). The type of soil probably has the greatest influence on the size of the garden. Basically, sandy soils that drain quickly can handle smaller and deeper rain gardens. Clay soils that drain slowly require larger and shallower gardens. The guiding principle for size is to ensure water drains within 6 to 12 hours after a rainfall.

    iii)   What kind of materials will the rain garden consist of?

Note: Consider materials like mulch, stones, and soil types for proper drainage.

    iv)   What types of plants would be best (native, water-loving, and drought-tolerant species)?

Guidance for selecting plants – key parameters:

It depends on the location and person responsible for maintenance, you can design rain gardens that are low maintenance, high in habitat value, or have an aesthetic focus.
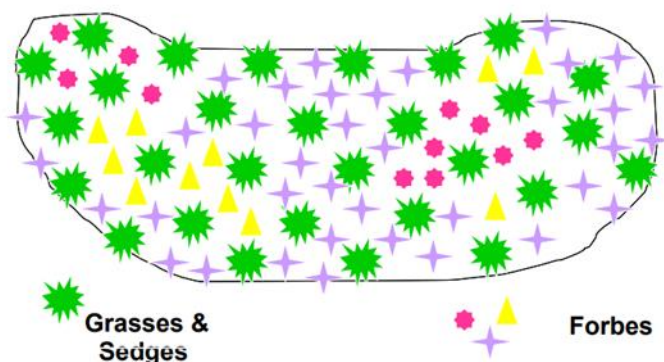
There are several methods for laying out a planting plan on paper. Each method has pros and cons. Choose the method that will work for the purpose and timeframe of the activity given student ages, time, interest and subject applicability. Usual techniques include:

v) using graph paper where one square represents one plant, drawing circles/ shapes indicating individual plants, or drawing shapes to indicate groups of plants.

vi) another option is to divide the plants by height and draw zones for tall, medium, or short plants. Within each identified zone, students locate and plant the appropriate species on planting day.

Tools for sketching: Canva, Sketchpad (Free online drawing application)

Afre the brainstorming session, each team presents their design plan and once all groups display their idea they should focus on the best features of each design, by first listening carefully the feedback of the other participants. Each team should note their favourite feature on a "Post-it" and apply them on the final planting plan. They can group the "Post-its" as well with similar desired features on each plan. Finally, each team summarizes the best elements to incorporate into each master design for the real-life experimentation of the project.

Useful source for inspiration*:

Sample rain garden planting plan. Plan drawn by Susan Kilmer.

*grasses= green herbs,

(p.3 there are more steps for selection and location of plants)

Day 2 (preparatory phase) - between 2 and 3 hours

The 2nd day is suggested as preparation phase for the purchase of all materials and a short group coordination meeting for reviewing the steps and setting up the starting hour of the implementation phase.

Day 3 (Steps 4 and 5)

In Day 3 (last day) participants will be involved in Step 4 (Implementing the Rain Garden) and Step 5 (reflection after co-experimenting with the constriction of the rain garden).

The implementation process can be performed as follows:

1.   **Preparing the Site** (20-30 minutes):

o   Mark the garden's area on the ground (use string, stakes, or spray paint).

o   Dig out the area to create a shallow depression, ensuring the water can collect and filter through the soil.

o   Add compost and good-quality soil to improve water absorption.

2.   **Adding Drainage Materials** (15-20 minutes):

o   Add a layer of gravel or stones at the bottom of the depression for improved drainage.

o   Include larger rocks around the edges to help direct water into the garden.

3.   **Planting** (20-30 minutes):

o   Plant the selected native plants (such as native grasses, ferns, or flowering plants) that are suited to wet conditions.

o   Ensure to plant in clusters and allow enough space for the plants to grow.

o   Add a layer of mulch around the plants to keep the moisture in and reduce weeds.

Useful tips:

Be aware of each plant's ultimate height and spread at maturity. This is most important when planting shrubs or trees. Space shrubs 3 to 6 feet

apart depending upon their mature size. Spacing varies for trees; in a woodland planting space trees about 5 – 10 feet apart; for open grown trees space plants 20 or more feet apart.

Inspirational source:
https://arboretum.wisc.edu/content/uploads/2015/04/RGS-3-2_Designing-a-Rain-Garden.pdf

4.   **Watering** (20 minutes):

o   Water the newly planted rain garden to ensure the soil settles around the roots.

o   If possible, demonstrate using a rain barrel or set up a water diversion system to show how the garden will collect runoff.

Useful tip: it is important to take some photos before and after the construction of the rain garden so that groups can comparatively assess the immediate outcome of their intervention.

Step 5: Reflection and Discussion* (25 minutes)

*could take place the same day of the implementation activity (as follow-up)

Objective: **Reflect on the process and discuss the next steps.**

1.   **Group Reflection** (10-15 minutes):

o   Have participants share what they learned and any challenges faced during the activity.

o   Discuss how the rain garden will benefit the environment and the neighborhood.

2.   **Maintenance Plan** (5 minutes):

o   Briefly explain how to care for the rain garden over time, including periodic weeding, mulching, and monitoring plant health.

o   Encourage participants to consider how they can maintain the garden as a group or involve the community.

Conclusion (5 minutes)

•   Wrap-up: Thank participants for their contributions and emphasize the value of community-driven environmental projects.

	• Actionable Next Steps: If possible, discuss how the garden could be expanded or how it can serve as an example for other neighbourhoods.
Involved stakeholders (apart from students/ educators)	Water management experts/ professors from engineering studies, biodiversity experts, students, community members, agricultural scientists
Reflection moments / assessment method	For this activity organizers can use the activity 'I LIKE, I WISH, WHAT IF', a simple tool for receiving quick feedback and can gather general impressions on a workshop or a problem area in a city. **Suggested duration**: 20 minutes Process: in a big wall facilitators place 3 separate sequential, in vertical form, A1 or A0 papers by naming the 1st paper as '*I liked*….', the 2nd paper as '**I *wish…..*'** and the 3rd paper as '***What if…?***' In "I Like…" statements, the user is encouraged to communicate the aspects that he or she liked about the prototype they co-designed with stakeholders/ experts. In "I Wish…" statements, users are prompted to share ideas of how the prototype can be changed or improved so as to deal with some concerns or current (unsolved) issues. This is a way for organizers to collect negative feedback and constructive criticism. Finally, in "What If…" statements, the participants can express new suggestions/ideas that might not be direct linked to the prototype. This offers a new opportunity for further possibilities teams can then explore in future iterations of prototypes in their campus areas or scaling of their NBS project at urban level. The facilitator(s) asks from participants to write in sticky notes their ideas for all 3 types of the previous statements (10 minutes) and next place their notes in the three statement categories in the wall by sharing their opinion and reflections on the co-creation activity they were involved in (10 minutes). **Links:** https://public-media.interaction-design.org/pdf/I-Like-I-Wish-What-If.pdf (guidelines for the activity) Brief presentation of the activity: https://unalab.eu/sites/default/files/2021-06/Co-creation%20Cards.pdf (p.4)

Useful Tips	✓ Involve the Community: If this is being done in a larger neighborhood setting, encourage local involvement for future stages, like planting or maintenance. ✓ Create a Simple Map: Have a basic visual of the site with the garden's location to help participants understand the layout. ✓ Emphasize Sustainability: Encourage participants to use local, sustainable materials and consider the long-term environmental impact of their choices. **Role of stakeholders**: keep in mind to encourage also NBS experts as participants (from designers or citizens' approach), not only as advisors or coaches, to ensure inclusivity and diversity in the shared opinions and design plans throughout the process.

Activity 3: Bee the Change - Co-creating a bee-hotel for revitalising campus biodiversity	
Objectives, Competencies & Learning Outcomes	In a world where biodiversity is at high risk, especially in industrial and urban areas, bees play a crucial role in maintaining the health of our ecosystems. Bee hotels are considered to offer a practical and sustainable solution to support bee populations and promote biodiversity. Through this co-creation activity, the main goal is to inspire and actively engage students in the co-design and collaborative construction of a bee hotel in their university campus. They will gain multiple benefits that are summarized in the following points: 1. **Sustainability and Conservation Awareness** ● Students will contribute to campus biodiversity initiatives and raise awareness about the importance of pollinators. ● They will be given the opportunity to reflect on how the creation of a bee hotel fits into broader sustainability efforts on campus and in their local community. They will articulate in parallel the significance of providing safe habitats for pollinators and the impact of this activity on environmental conservation. 2. **Community Engagement & environmental stewardship**

	● Students will share knowledge and collaboratively co-create a functional and sustainable bee hotel with other stakeholders such as biodiversity experts, citizens or members of local beekeeping initiatives, practising at the same time their teamwork, communication, and problem-solving skills and addressing challenges during the construction process. ● Students will gain insight into the connection between campus landscapes, local flora, and pollinator health. Therefore, they are expected to develop an appreciation for local ecosystems and how human actions can positively or negatively affect the environment. These objectives and outcomes not only emphasize the hands-on, creative aspects of the project but also focus on broader environmental and educational goals that encourage sustainable practices and students' ecological awareness.
NBS topic(s) – if applicable	Urban biodiversity protection, native pollinator conservation, health of local ecosystem
Recommended age of students	Both undergraduate and post-graduate students can participate
Skills (21st century skills, green competences) promoted by the activity	Collaboration, environmental awareness, problem-solving, eco-citizenship promotion
Necessary materials/ resources **(online & offline if it is a physical ctivity)**	**Material Sourcing:** ● **Wood:** Scrap wood or untreated pine (preferably reclaimed wood). For a basic structure, 4-6 pieces of 1"x6" boards, cut to around 18" in length, will be enough. ● **Bamboo or Wooden Dowels:** To create nesting tubes. Bamboo poles (cut into 4-6" lengths) or wooden dowels (3-10mm diameter). ● **Logs:** A small log (around 8-10" in diameter) for drilling chambers. ● **Natural materials:** Pinecones, twigs, straw, and leaves for insulation and decoration. ● **Drill and Bits:** A power drill and bits of varying sizes (3mm, 6mm, and 10mm) for making holes in the wood or bamboo. ● **Screws/Nails**: To hold everything together. ● **Wire or String**: For hanging if necessary.

	● **Roofing Material:** A small piece of corrugated plastic, metal, or wood to protect the hotel from rain.
Location/Venue	It is a physical activity combining brainstorming sessions in a interior or exterior creative laboratory, materials' supply in local market or in a Mall, and constriction of a co-designed prototype in an outdoor place.
Duration (including the preparation and application time)	4 days Day 1: 2 hours and 30 minutes (maximum, including steps 1 and 2) Day 2: about 2 hours Day 3: no specific duration – depends on each country/location/ number of materials that each organizing team needs to purchase Day 4: 2,5 – 3 hours (including the construction of the bee hotel in a real-life setting and the reflection session at the end)
Instructions/ How to apply the activity the /lesson plan	**Day 1: Introduction to Bee Hotels & nature exploration** (maximum 2 hours) **Step 1: Understanding bee hotels and their impact to sustainability** (1 hour/ 60 minutes) The 1st part of the activity kicks-off with an introduction to the meaning of a bee hotel and their benefits and contribution to the conservation of native pollinators. Before presenting to participants any definition, you can start the 1st session in a different and more engaging way by first asking participants what a 'bee hotel' means for them, by sharing their opinion through a word cloud or a short multiple choice quiz through Mentimeter or Slido (10 minutes) Next, organizers can present the **definition of a bee hotel** and their **key benefits** through a ppt presentation or invite, if possible, a guest who is familiar with bee hotels and similar sustainability practices to talk about his/her experience and their contribution to biodiversity protection (max. 50 minutes).

Definition of a bee hotel:

> Bee hotels are also known as 'bee houses' or 'insect hotels'. They consist of various materials and structures designed to mimic natural nesting sites. These can include hollow tubes, drilled wooden blocks, or bundles of hollow plant stems. Different size cavities can be used to accommodate different species of solitary bees.

Benefits of a bee hotel (Youngsteadt & Favre, 2022):

> Bee hotels provide several benefits, as follows:
>
> - They serve as a practical and sustainable solution to support bee populations and promote biodiversity.
> - By placing a bee hotel in a university garden or open space, we can help combat the challenges bees face, such as habitat loss and pesticide exposure.
> - Bee hotels are also incorporated into some citizen science projects and create an opportunity to assist with research on bee ecology and behavior.

Note for facilitators: you can enrich the presentation by showing examples of various types of bee hotels through images or videos of various types of bee hotels (e.g., feature bee hotel, bee hotel with green roof, wooden box-based). Images of different types of bee hotels are displayed in Annex 2.

Step 2: Outdoor walking with nature exploration (40-60 minutes)

Before students begin to work on their prototype of the bee hotel, it is important to observe and map some elements from the natural environment. A short walk or filed visit can be organized nearby university. Students, with the active involvement of ecologist, NBS or biodiversity experts and other stakeholders, walk around campus to observe:

- ❖ Areas with abundant wildflowers or flowering plants.
- ❖ Areas with less foot traffic to minimize disruption to the bees.
- ❖ Locations with sunlight (morning or late afternoon sun is best) and protection from harsh winds.

In addition, they need to take note of potential materials on campus (e.g., wood piles, bamboo, fallen logs) that could be repurposed.

Day 1 finishes with an overview of participants' feedback and insights form the on-site observation and with a short introduction fo the 2nd day's topics and of -creation steps.

Day 2: Brainstorming on bee hotel's parts & design (approximately 2 hours and 30 minutes)

Step 1 (60 minutes)

The 2nd day starts with a brainstorming session in groups (5 maximum for a total number of 20-30 students). Students discuss and share ideas on the design of their bee hotel specifically on its size, shape, location and necessary materials (kind of materials commonly used in bee hotel construction[15]) They also need to define their vision: *Are they going to making a simple structure or a more creative, elaborate design?*

After their initial brainstorming each groups present their initial planning (by highlighting the type of bee hotel they will focus on to avoid overlapping issues among teams), by exchanging ideas and useful feedback that each team will consider during sketching process.

Step 2: *Let's experiment with a quick prototype***!** (60 minutes)

At this point, the same groups of Step 1 continue with co-designing a sketch that will serve as the basis of their bee hotel's construction. Each group creates a simple design of a bee hotel (it can be based on a traditional box design or a more organic form like a log). The sketching can last about 30 minutes and teams should focus on the following design elements:

- ❖ Structure: Decide whether to use a rectangular wooden box, cylindrical tubes (e.g., bamboo), or a hollow log as the main body of the hotel.
- ❖ Chambers: Ensure the chambers are the correct size for different bee species (around 3mm-10mm in diameter for solitary bees). The depth should be between 4 to 6 inches.
- ❖ Waterproofing: Consider adding a roof or overhang to protect the hotel from rain.
- ❖ Ventilation: Small holes or gaps should be included in the design to ensure proper air circulation.

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[15] Wood, bamboo, pine cones, and natural twigs are ideal as type of material on which the bee hotel construction will be based.

❖ Sustainability: Use as many repurposed materials as possible to make the construction process environmentally friendly.

Next, each group presents their ideas and collectively vote on one design to move forward with. The option(s) with the most dots at the end of voting "win." To distinguish positive and negative elements of a quick prototype participants can be given green sticky notes for 'pros' and red sticky notes for 'cons' of a suggested idea[16].

For the last 30 minutes, each team return to their table and reflect with the stakeholders on the parts that their final idea needs refinement and make a summary and a checklist of the materials that are needed for the construction.

Day 3: Sourcing Materials & get ready for the real-life project

This day is dedicated to the purchase of materials and organization each team for gathering the materials, from campus resources (e.g., scrap wood, bamboo from landscaping, fallen logs, old crates, etc.) to visiting local hardware stores to fill in gaps for specific materials.

Day 4: Bee Hotel Placement & Construction (around 3 hours and 30 minutes, including the final reflection part)

Step-by-step construction guidance:

1. **Prepare the Base/Frame:**

If using wood, cut 4-6 pieces of wood to create the frame of the hotel. You can create a box shape by cutting four pieces of wood for the sides and one for the back. Ensure that the height and width are around 18 x 12 inches to provide enough space.

2. **Drill Holes in the Base/Frame:**

In the wooden back panel, drill holes of varying sizes (3mm, 6mm, and 10mm). Drill holes that are 4-6" deep to create chambers for solitary bees. For a more rustic look, consider attaching bamboo poles or dowels to the frame instead of drilling directly into the wood.

3. **Assemble the Structure:**

Use nails or screws to secure the frame together. Ensure it is stable and securely fastened. If using logs or branches, attach them vertically or horizontally to the base to provide additional nesting spaces.

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[16] Inspired by the following exercise, *Dotmocracy*: https://participedia.net/method/dotmocracy

	4. Roofing and Protection: Attach a slanted roof or overhang to the top of the hotel to protect it from rain. This could be a small piece of corrugated metal, plastic, or scrap wood. **5. Finishing Touches:** Add natural materials like pinecones, straw, or leaves to the interior for insulation. Optionally, add a decorative sign or label that explains the purpose of the bee hotel. **Closing Discussion (30 minutes):** ❖ Reflect on the process: *What worked well, and what could be improved for future and larger bee hotel installations?* ❖ Discuss the importance of monitoring the hotel to see if bees are using it, and brainstorm ideas for maintaining it (e.g., cleaning out the old nesting tubes at the end of each season). Useful links- inspirational sources for bee hotels: https://greensuburb.com/what-are-bee-hotels-and-how-do-they-work/, https://conservationvolunteers.com.au/how-bee-hotels-can-help-nature-in-cities-to-flourish/
Involved stakeholders (apart from students/ educators)	Biodiversity experts, members from beekeeping local initiatives, ecologists/ environmentalists, urban ecology specialists, beekeepers
Reflection moments / assessment method	At the end pf the activity, as follow-up step of the bee hotel construction, participants (students, sustainability experts, etc) will reflect together one experiencing by discussing what worked well and what could be improved for future installations. This can be organized through a 15-20 minutes activity, by giving students colored post its (in different colours) and asking them to write how they felt with this activity, the benefits they gained, the weak points and ideas on they can sustainably maintain the be hotel in the future. At the end, they place the post-its in a '*Memory wall*' in 4 categories (one for benefits, one for their feelings, one for the weak points (for improvement) and one for future mentoring of the hotel) and share their opinion.

	Note for organizers: Keep in mind to share, following the above activity, the evaluation forms, one with students, one with involved stakeholders and one with participating educators.
Useful Tips[17] 	✓ *Use nature hardwood*: bee hotels often work best when simulating the natural environment, so be careful when choosing the materials by using untreated wood, bamboo, or hollow stems to create nesting spaces for solitary bees. ✓ *Choose the right location:* The key to the effectiveness of bee hotels lies in their placement and maintenance. They are ideally positioned in **sunny locations** and preferably facing southeast or south. It is crucial to place the hotel in an open space where there are flowering plants offering loads of nectar/ pollen. Avoid shady areas and position the hotel in a sunny spot, sheltered from strong winds and rain. Also, place the hotel 3-5 feet off the ground, either on a tree, a post, or mounted to a fence. This keeps the hotel safe from predators. ✓ *Surround your hotel with flowers*: plant native wildflowers close to the bee hotel installation and avoid the pesticide and /or herbicide use. Ensure the bee hotel is placed in a quiet spot, ideally close to a garden or flowerbed that provides nectar and pollen for the bees. By providing safe spaces for bees, we can help ensure their survival and, in turn, the health of our ecosystems!

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[17] Source of image in useful tips: Canva

Activity 4: Combatting climate change & environmental degradation though a tree planting initiative![18]	

Objectives, Competencies & Learning Outcomes	Planting trees offers numerous benefits for both the environment and our well-being. By adding trees to our landscapes, we can contribute to environmental conservation, create shade and cooling, provide habitat for wildlife, prevent soil erosion, and enhance the aesthetics of our properties.
	Participants will gain several benefits of this tree planting activity, such as:
	● Be involved in hands-on experience in planting and caring for trees.
	● Improve their understanding of the importance of trees in supporting biodiversity, mitigating climate change, and enhancing air and water quality.
	● Reflect on the ethical considerations involved in environmental stewardship and develop a deeper respect for nature.
	● Develop a sense of responsibility and ownership toward their local community and environment.
NBS topic(s) – if applicable	Related to biodiversity and environmental conservation
Recommended age of students	Undergraduate and postgraduate students
Skills (21st century skills, green competences) promoted by the activity	Participants will understand the importance of working together to achieve a common goal and will experience the value of collective action. They will also practise hands-on problem-solving by addressing challenges that may arise during the planting process.

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[18] Source of image: https://www.freepik.com/free-vector/flat-design-tree-planting-illustration_20832664.htm#fromView=search&page=1&position=9&uuid=b0e4199f-cf59-4004-ad6c-1db86ac1641b&query=tree+planting

Necessary materials/ resources	1. **Tree Saplings:**
	Choose native or drought-resistant species suited to your local climate.
	Useful tip: Ensure enough saplings are available for the number of participants and the area you plan to plant.
	2. **Soil: High-quality, well-draining soil that suits the tree species.**
	Teams may also need soil amendments like compost to improve soil health.
	3. **Mulch** ●It helps retain moisture, suppress weeds, and protect young trees from temperature extremes. ●Materials can include wood chips, straw, or leaves. 4. **Compost** ●Adds nutrients to the soil, improving tree growth. ●You can use a mix of organic compost or local composting materials. 5. **Shovels:** ● Essential for digging holes to plant the saplings.
	Useful tip: Make sure there are enough shovels for volunteers, especially for a large group.
	6. **Watering Cans/Hoses:**
	They are useful for watering newly planted trees, ensuring they get adequate moisture.
	7. **Tree Guards:**
	Protect saplings from pests, animals, or environmental damage. These can be plastic or mesh guards, or even homemade ones like wire fencing.
	8. **Stakes & Ties:**
	They help support saplings and keep them upright while they establish roots.
	Useful tip: Use stakes that are suitable for the tree size and environment.
	9. **Gloves**
	Gardening gloves to protect participants' hands from soil and debris. It si suggested that the organizers provide enough pairs for each participant, especially those who will be involved in the planting processes.

	10.**Rakes & Hoes** For leveling the soil after digging the holes and spreading mulch. 11.**Signage/Labels** They are helpful for labelling the trees with the species or the name of the person or group who planted it. These can be wooden or plastic tags attached to the trees. 12.**Buckets or Tubs** They are useful for mixing soil, compost, or collecting plant material or waste during the planting process.
Location/Venue	Physical activity that can be carried out in the initial steps (brainstorming and ideation) inside a university classroom or in a laboratory and outside for the sessions including the materials sourcing and planting process.
Duration (including the preparation and application time)	3 days (as a small-scale activity) Day 1 (2 hours) Day 2 (An estimated duration: 3-4 hours including materials' purchase and division of roles and review of the planting steps). Day 3 (for plating process and reflection): 3 hours and 30 minutes
Instructions/ How to apply the activity the /lesson plan	**Day 1: Raise awareness for tree planting & select the site location** (2 hours maximum) Step 1: The activity kicks off with a summary of the activity's goals and learning outcomes and is also complemented with an educational session where students with stakeholders make groups (5 teams maximum) and start brainstorming on the benefits of a tree planting activity (20 minutes). Facilitators can show the following image to groups for inspiration[19]:

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[19] https://www.perthtreesdirect.com.au/post/the-benefits-of-planting-trees

ENVIRONMENTAL BENEFITS
of Planting a Tree

Reducing Climate Change — Purifying Air — Cooling Down the Streets

Natural Air Conditioning — Saving Water — Preventing Water Pollution

Providing Shelters for Wildlife — Renewable Energy Source — Reinforcing Soil

Erosion Control

Step 2: Following the initial brainstorming, teams will continue with the steps of defining and choose the right location for their tree planting initiative. In this session a walk around the university campus or an urban park nearby can help participants observe and reflect on tree species that are native to their area and suited to the local climate and soil conditions (35 minutes).

Useful app to identify plants and tree species: iNaturalist

Before moving to the last part (Step 3) it is a good time to make a break for allowing teams to relax.

Step 3: For the last hour, the same groups, as previously, will focus on choosing the location that is more appropriate according to the participatory mapping they did in Step 2, by ensuring that the planting site is suitable for the tree species you are planting.

Useful tips for all teams:

- ✔ Look for areas with enough sunlight, space for roots to grow, and proper soil conditions
- ✔ Ensure there is proper space between trees to avoid overcrowding as they grow.
- ✔ Check for any underground infrastructure (e.g., cables, pipes) to avoid damage when planting.

Day 2: this intermediate day is dedicated to purchasing all materials needed of the activity and organize the implementation process, including the division of tasks in each team (for planting, watering, mulching, etc.).

Day 3 (3 hours and 30 minutes, including the reflection at the end of the activity)

Step 1: Set up and review

Teams start collecting all their materials (saplings, soil, compost, watering cans, gardening tools, gloves, shovels, signage, etc.). It is important to refresh the planting site – by ensuring all materials are available and ready for the day – and to review the progress of the previous day and make a plan for the remaining planting tasks.

Step 2: Hole Digging and Site Preparation

Mark the Planting Spots

- Use stakes or chalk to mark the spots where each tree will be planted. Ensure there is enough space for the roots to grow and that the trees are not too close to each other.
- Ensure the spacing follows the guidelines for the species you're planting (e.g., 4–6 feet apart for small trees, up to 20 feet for larger species).

Digging the Planting Hole

- Dig a hole that is 2–3 times wider than the root ball of the tree to allow the roots to spread easily.
- The hole should be the same depth as the root ball but not deeper. If the hole is too deep, it may cause the tree to settle too low, which could lead to root rot.
- Loosen the sides of the hole to allow the roots to grow out easily.

Step 3: Planting the Trees

Prepare the Tree Sapling

- Gently remove the sapling from its container. Be careful not to damage the roots.
- If the tree has been in a pot for a while, gently shake or loosen the roots to encourage them to spread out rather than remain root-bound.

Step 4: Place the Tree in the Hole

- Position the tree in the center of the hole. Ensure that the root ball is level with the surrounding soil or slightly above ground level.
- Avoid planting the tree too deeply – the top of the root ball should be exposed to air, especially for young trees.
- Check to ensure that the tree is straight and properly positioned.

Step 5: Fill the Hole with Soil

- Begin filling the hole with a mix of native soil and compost. Add soil around the roots, gently pressing down to remove any air pockets.
- Water the tree as you fill in the hole, ensuring that the soil settles evenly.
- Leave a slight basin around the base of the tree for water retention.

Step 6: Mulching and Watering

Mulch Around the Tree

- Spread a 2–3 inch layer of mulch (such as wood chips, straw, or leaves) around the base of the tree. This helps retain moisture and suppress weeds.
- Avoid piling mulch directly against the tree trunk, as this can lead to rot.

Step 7: Watering the Tree

- Water the tree thoroughly immediately after planting. Aim for deep watering to ensure the roots get hydrated.
- Check the soil moisture regularly and ensure the tree receives consistent watering during the first few weeks.

Useful tips for planting process:

- ✓ Begin the tree planting process in stages. Participants in each team can take turns planting trees, with a guide to show them how to properly plant the saplings.

- ✓ Each tree could be planted with a tag with the name of each group responsible for planting it, creating a sense of shared ownership, responsibility and collaboration for protecting the environment.

	✔️ Take photos before and after the tree planting process to be able to recognize the aesthetic, spatial and environmental benefits.
Involved stakeholders	Students, gardeners, ecologists, agricultural scientists/ agronomists
Reflection moments / assessment method	At the end of the activity organizers with the support of facilitators will dedicate around 30 minutes to ask participants to think of 3 benefits and 3 challenges during their experience. Thy will write them in sticky notes and place them in a wall or big flipchart. As follow-wup phase teams can also express ideas on how they suggest maintaining the health of trees.
Useful Tips	✔️ Consider water access. *How will you be watering the tree? Can your hose reach this location?* ✔️ Space the tree at least 15 feet away from any structures or planned structures so that its roots and branches can grow without harming infrastructure, such as power lines, sidewalks, and underground pipes. ✔️ It is important for teams of this activity to understand the regional climate and plan accordingly. This will give new trees time to grow strong roots before facing winter or summer temperature extremes. Inspiration by the following guide: https://cdn.shopify.com/s/files/1/0326/7189/files/Choosing_the_Right_Tree_to_Plant_in_Your_Yard.pdf?v=1695912723

5. Further resources

Online resources:

- https://dl.designresearchsociety.org/cgi/viewcontent.cgi?article=2895&context=drs-conference-papers (This paper highlights different methods for fostering meaningful and effective interaction through co-design. Understanding each other and building trust among stakeholders is needed to develop long-term relationships, which requires time and multiple forms of engagement. Some of the suggested activities can be used during the SEgoesGreen or similar boot camp at the initial stages of the training for establishing connection and trust between the different stakeholders who are going to collaborate for an NBS project/ activity).
- https://clickup.com/blog/how-to-use-5-whys/ the '5 Whys' technique – it can be used during the root cause analysis and collaborative problem-solving.
- https://charlestownri.gov/vertical/Sites/%7BDF68A5B8-A4F3-47A1-AE87-B411E21C6E1C%7D/uploads/URI_Rain_Garden_Service_Project_Manual_for_Students.pdf   (This manual is intended to assist groups in the planning, design, installation, and advertisement of a rain garden in their community) & https://raingardens.info/wp-content/uploads/2012/07/UKRainGarden-Guide.pdf
- https://princetonhydro.com/how-to-build-a-rain-garden-in-10-steps/, https://www.lawnstarter.com/blog/landscaping/how-to-design-a-rain-garden/ 🡪 Steps to co-design a rain garden
- Build a 'Bee hotel' with recycled materials: https://www.pacificbeachcoalition.org/diy-bee-house-recycle/ & https://www.wildlifetrusts.org/actions/how-make-bee-hotel (additional source)
- https://www.adaptationcommunity.net/wp-content/uploads/2024/04/Implementation-Guideline-Green-walls-and-green-roofs.pdf & https://urbinat.eu/nbs/pdf-download-green-walls/ (implementation guides for green / living walls)
- Co-creation & empowerment guide (in the context of Clever cities project): https://clever-guidance.clevercities.eu/how-co-create-nbs
- Co-creation in practice: learning from CLEVER cities' cases: https://clever-guidance.clevercities.eu/co-creation-practice-learning-clever-cities
- Guidelines for green walls: https://www.adaptationcommunity.net/wp-content/uploads/2024/04/Implementation-Guideline-Green-walls-and-green-roofs.pdf
- Super Barrio BCN: is a Digital Enabler that was developed by IAAC within the framework of the URBiNAT project for implementation in Porto, Nantes and Sofia. It is a video game tool/platform for the participatory design of public space. Link: https://urbinat.eu/super-barrio/
- Idea canvas tool (for co-design the plan of an NBS project): https://www.dinker.in/wp-content/uploads/2019/11/idea-canvas-board.pdf

6. References

Chapter 4 (*Understanding co-creation*):

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Mahmoud, I., & Morello, E. (2021). Co-creation Pathway for Urban Nature-Based Solutions : Testing a Shared-Governance Approach in Three Cities and Nine Action Labs. In A. Bisello et al. (Ed.), Smart and Sustainable Planning for Cities and Regions (pp. 259–276). Springer International Publishing. https://doi.org/10.1007/978-3-030-57764-3 & https://link.springer.com/chapter/10.1007/978-3-030-57764-3_17

Nunes, N., Björner, E., Hilding-Hamann K., E. (2021). Guidelines for Citizen Engagement and the Co-Creation of Nature-Based Solutions: Living Knowledge in the URBiNAT Project. Sustainability 2021, 13(23), 13378; https://doi.org/10.3390/su132313378 & https://www.mdpi.com/2071-1050/13/23/13378

Morello, E; Mahmoud, I; Gulyurtlu, S (2018). CLEVER Cities Guidance on co-creating nature-based solutions: PART II - Running CLEVER Action Labs in 16 Steps. Deliverable 1.1.6, CLEVER Cities, H2020 grant no. 776604. https://clevercities.eu/fileadmin/user_upload/Resources/D1.1_Theme_6_Running_CALs_in_16_steps_FPM_12.2018.pdf

Youngsteadt, E., Favre, M. (2022). What is a Bee Hotel? https://content.ces.ncsu.edu/how-to-manage-a-successful-bee-hotel/what-is-a-bee-hotel

Chapter 5 *(Case studies – good practices):*

Naumann, S., Burgos Cuevas, N., Davies, C., Bradley, S., Mahmoud. I.H., Arlati, A. (2023). Harnessing the power of collaboration for nature-based solutions: New ideas and insights for local decision-makers. Publications Office of the European Union, 2020, https://data.europa.eu/doi/10.2777/954370

UCL Engineering Exchange (2019). Co-designing a community garden. https://www.ucl.ac.uk/engineering-exchange/research-projects/2021/dec/co-designing-community-garden

Annexes

Annex 1: SEgoesGreen bootcamp phases

Step 1 - INTRODUCTION AND INSPIRATION
Step 2 - PROBLEM FRAMING
Step 3 - IDEATION WORKSHOPS
Step 4. PROTOTYPING SOLUTIONS
Step 5. IMPLEMENTATION PLANNING

Annex 2: Templates and handouts of bootcamp's exercises (introductory, ideation & co-design sessions)

1. **Activity 1**: **Co-designing a Green Wall at campus**:
● Plant catalogues or images of green wall plants: https://www.ambius.co.uk/assets/content/files/greenwall-brochure.pdf
● List of plants for green walls: https://www.plantdelights.com/collections/living-wall?srsltid=AfmBOoqAT6RdEgp3UTiZ-DMGorjFaWrCLmnHyBM5OKRHb6G4FNEJKsWB
● Inspiring videos/online sources for the beginning of the 1st session: https://www.youtube.com/watch?v=R9fJ0Rt2Hpw, https://urbinat.eu/nbs/pdf-download-green-walls/
● 5 key green wall principles for climbing plants: https://green-walls.co.uk/blog/5-key-considerations-when-designing-a-green-wall/

Inspiring images for green walls:

Green façade on the Caixa Forum (socio-cultural centre) in Madrid[20]

Living wall at Trinity Business School on Pearse street Dublin[21]

List of materials for a green wall's installation:

1. **Support Structure**:
Steel Frame or Mounting System: To provide a sturdy frame for the green wall. This can be custom-made or pre-manufactured, depending on the size and location.
Trellis or Wire Mesh: Used for securing plants and providing support as they grow vertically.
2. **Planter System**:
   ● Modular Planter Trays or Panels: These are pre-made trays or panels that hold the plants and their growing medium. Common options are pocket systems, felt-based systems, or hydroponic systems.
   ● Vertical Growing Bags/Pockets: Made from felt or fabric, these hold plants in place and allow roots to spread, ideal for smaller installations.
3. **Irrigation System**:
   ● Drip Irrigation or Watering System: To ensure the plants receive adequate moisture. Automated systems are often best for ease of maintenance.

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[20] Source of image: https://urbangreenbluegrids.com/measures/green-facades/
[21] Source of image: https://livingwalls.ie/projects/trinity-college-business-school/

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> - Water Reservoir/Water Tank: For water storage, especially in large installations, to ensure a consistent water supply. Water Pump (for hydroponic systems): If using a hydroponic system, a pump circulates water and nutrients to the plants.
>
> 4. **Growing Medium**:
>
> Soil or Hydroponic Medium: For plant roots to grow. Soil is traditional, but for larger, self-sustaining green walls, hydroponic or soilless media like coco coir or a nutrient-rich blend may be used.
>
> 5. Plants:
> - Plant Selection: Choose plants based on climate, maintenance, and aesthetic goals. Popular options include ferns, moss, succulents, ivy, and flowering plants.
> - Planting Soil (if needed): Depending on the plant types chosen, you may need specific soils or additives.
>
> 6. Waterproofing & Protection:
> - Waterproof Membrane: To protect the wall and building structure from water damage.
> - Waterproofing Paint/Sealant: For extra protection against moisture.
> - Drip Mats or Catch Basins: To prevent water runoff that could damage the wall or floor.

2. **Activity 2**: **Transforming university campus into a green 'oasis' through a co-designed rain garden**
- Digital prototype platforms: Tinkercad (https://www.tinkercad.com/)
- Guide about rain gardens (for facilitators): https://raingardens.info/wp-content/uploads/2012/07/UKRainGarden-Guide.pdf
- Open Street map, link here: https://www.openstreetmap.org/#map=15/40.59998/22.96842 (for steps 2 and 3)
- Selection & location of plants: https://arboretum.wisc.edu/content/uploads/2015/04/RGS-3-2_Designing-a-Rain-Garden.pdf (p.3)

- **Sample rain garden planting plan**:
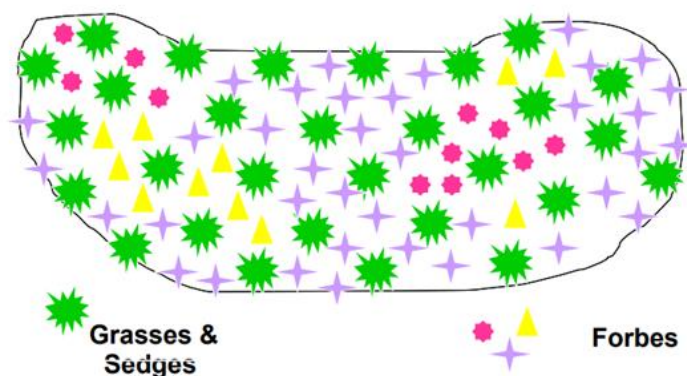
Sample rain garden planting plan. Plan drawn by Susan Kilmer.

Additional sources for rain garden:

- https://charlestownri.gov/vertical/Sites/%7BDF68A5B8-A4F3-47A1-AE87-B411E21C6E1C%7D/uploads/URI_Rain_Garden_Service_Project_Manual_for_Students.pdf
- https://raingardens.info/wp-content/uploads/2012/07/UKRainGarden-Guide.pdf

Inspiring images for rain gardens:

Ashby Grove rain garden, north London[22]

Rain garden at the campus entrance of Gdańsk University of Technology[23]

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[22] Source of image: https://raingardens.info/wp-content/uploads/2012/07/UKRainGarden-Guide.pdf

[23] Source of image: https://networknature.eu/innovative-nature-based-solutions-resilient-cities-exploring-future-water-treatment-nbs-poland-and

3. **Activity 3: Bee the Change - Co-creating a bee-hotel for revitalising campus biodiversity**
   ● Useful guide with do's and don'ts for building a bee hotel:

https://img1.wsimg.com/blobby/go/9e410b57-db1b-48a0-be09-f29889c6ed68/Bee%20Hotel%201%20Pager.pdf.pdf

   ● Examples of different types of bee hotels[24]:

A wooden bee hotel

A feature bee hotel

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[24] Source: https://www.gardenersworld.com/plants/nine-bee-hotel-ideas/

A small bee hotel with green roof