GrowGreen nature-based solutions co-design guide

Bipolaire, November 2022

CO-DESIGN GUIDE

Grow Green

GROWGREEN, A PARTNERSHIP FOR GREENER CITIES TO INCREASE LIVEABILITY, SUSTAINABILITY AND BUSINESS OPPORTUNITIES

0
INTRODUCTION

Conceptual approach

This guide is developed for practitioners responsible for the design and implementation of Naturebased Solutions (NbS) projects. It will provide a comprehensive guidance tool to develop climate adaptation projects based on NbS. The design and implementation of NbS is considered as a collaborative effort in which scientists, experts, policy makers, practitioners, citizens and other stakeholders work together on the planning and implementation of NbS.

There are lots of tools and resources available that can sometimes be overwhelming and complicated. This guide will help the reader to understand a co-design process for NbS and provide further reading materials, tools and case studies that illustrate how the GG Co-design process has been implemented by GrowGreen partners.

The aim of the guide is to help delivering successful NbS projects in order to have better cities for people and for the environment, ensuring it is done collaboratively and it is economically, technically, environmentally and socially acceptable. The guide is accompanied by a digital tool, that helps keep track of the process steps. **Link here**.

Why use the guide?

• Understand and explain the process to deliver a successful NbS co-designed project.

• Develop NbS projects making sure it is done collaboratively.

• Deepen your knowledge on tools and reading material on co-design process of Nbs.

• Provide Case Study examples to show real cases.

How to use the guide: structure and content

It is a fact that municipalities that are going to implement NbS in the urban space do not always start from the same point and not always can follow a standarized lineal process. That is why, this guide has been thought as a multiple entry point path, which is non-linear and it is interlinked, as it happens with co-design processes in the real life. The main objective of this manual is to guide the process through questions and alternative pathways, making sure all the important milestones have been achieved.

The GrowGreen Co-design Guide is developed based on the assumption that citizen and stakeholder engagement is not just one step to be taken, but a necessary transversal aspect of the planning process.

The guide is structured in **3 main sections**, which are three phases to be covered during the process of co-design of an NbSproject. Each one of the sections is highlighted in a different color to help the reader navigate through the Handbook and identify the phase easily, as each one is composed by a series of questions and Case Study examples. As it is not a lineal process, but a multi-entry point the guide can be used without a specific order. There is a **Summary Sheet** to help the reader keep track of the steps completed. The Handbook is a support to use the digital tool that can be found **here**.

The process described in this guide to deliver a co-designed NbSproject is tailored to Nature-based Solutions specific characteristics. For this reason, the criteria and examples described are specific for NbSprojects.

Similarly to the Geen Cities Framework (GCF), the GG Co-design process is conceived following the phases:

Planning. NbS project design > Diagnosis, collection of spatial data, policies, strategies, participated diagnostic, etc.; Definition of Project Goals; Assess impact of design alternatives; Collaborative decision on final design.

Mobilizing. Implementation of the NbS project > Financial Assessment; Identify financing mechanisms.

Evaluating. Implementation of the NbS project > Monitoring of the project.

The GrowGreen Co-design Guide, although following a similar structure to the GCF, offers the possibility to have an entry point from any of the pillars above instead of following a standardized lineal structure that should be followed if a Municipality found herself with a blank paper. It provides an organic and iterative process instead of a lineal one.

These three differentiated phases are **non-lineal** and independent. However, there is one aspect to fulfil at all stages: the **collaboration among stakeholders**. NbS projects need to be designed collaboratively with the city's stakeholders, to get technical and social support, and thus to create better design decisions based on data, and on technical, political and social opinion.

¿Why co-designing NbS projects?

In practice, like with other urban interventions, the design of NbS projects does not necessarily take place in a participatory and inclusive manner. However, including a diversity of stakeholders contributes to better projects which meet the needs and requirements of the local community, and the results are supported and socially accepted. Including different voices means that diverse types of knowledge (including local and experiential knowledge) are included in the planning and implementation process of NbS. It is important to make sure that all social categories are represented: women, children, elderly people, different minorities, etc. and empowered during the process so that the **ownership** of the delivered projects is shared among all stakeholders.
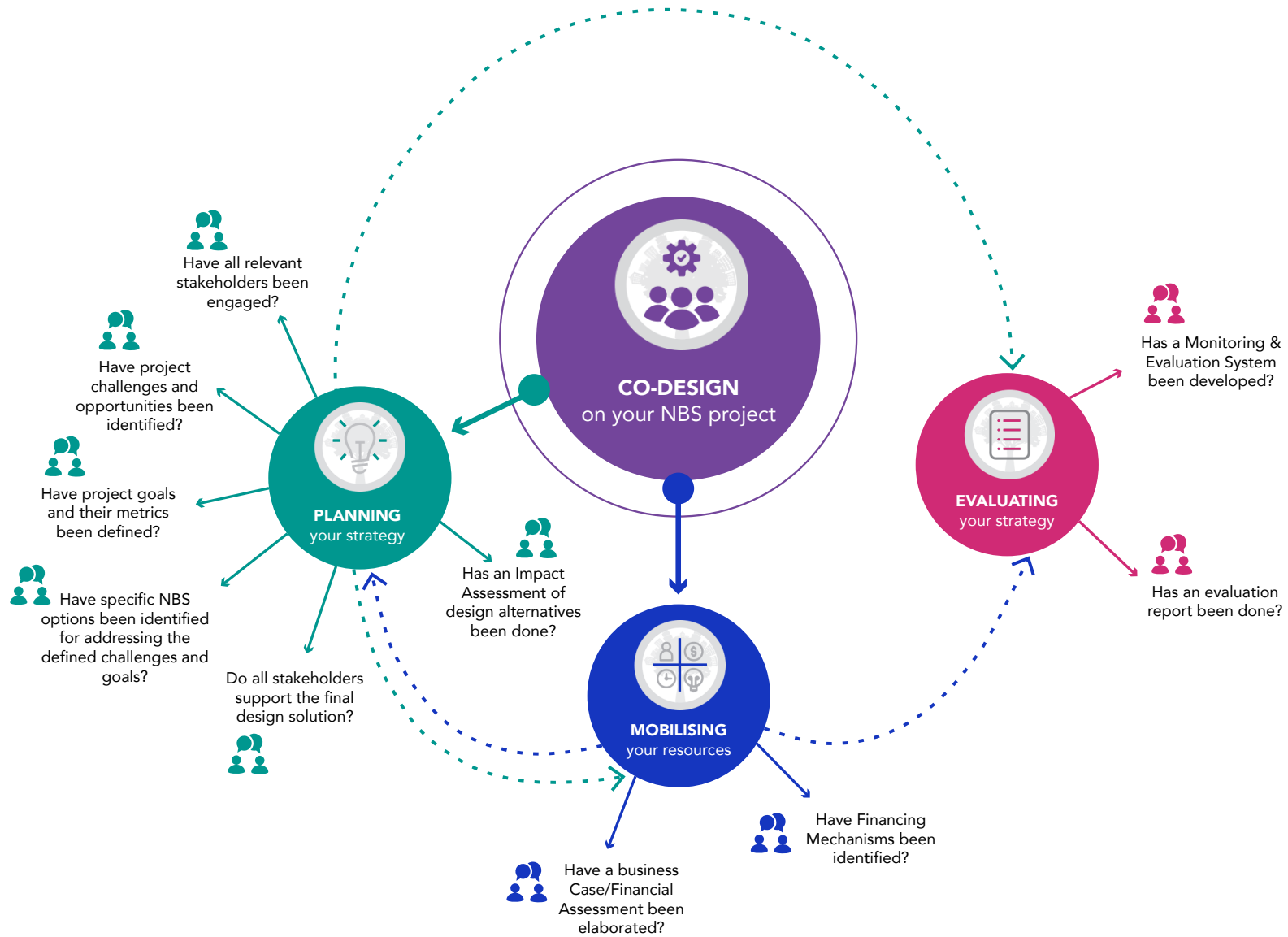
An NbS project can be initiated by various public and private actors, such as companies, social entrepreneurs, NGOs, local communities, citizens, local governments, or other. The process can have very different dynamics depending on who is leading it, or depending on the specific context. That is why NbS projects do not always start from the same point and not always can follow a lineal process. It can be the case that a project starts with specific funds to invest on NbS projects, or it can be the case that the starting point is an existing project which can be complemented with an NbS vision. That is why, this Guide has been thought as a multiple entry point path, non-lineal and interlinked.

This philosophical starting point is the result of the practical experience with cities, and specifically the result of the process followed during the co-design of the NbS projects delivered in the GrowGreen project. The Guide is conceived as a tool to support the NbS co-design process through QUESTIONS. These QUESTIONS will appear as reminders that offer support along the co-design process for an NbS project. The QUESTIONS will guide the process and make sure that all the important Milestones have been achieved.

The **GG Co-design guide** is structured similarly as the GCF (Green Cities Framework), based on three main pillars: **Planning, Mobilising, and Evaluating**. But, instead of following a lineal and standarized structure, the guide provides aleatory QUESTIONS.

The **QUESTIONS** included are related to specific milestones that need to be accomplished to complete an NbS co-design process. Along with each question comes a description of the milestone, the tasks that have to be completed to achieve that milestone, and a confirmation that Stakeholders Engagement has been taken into account in each one of the tasks. Stakeholder's Engagement is a horizontal element which is present at all stages of the process.

The following sections explain how the Guide can be used, provides information about each pillar **(Planning, Mobilising, Evaluating)**, and the specific milestones under each pillar to achieve. It also provides case studies that illustrate how this GG Co-design process can be utilized in any NbS project development.

CO-DESIGN
on your NBS project

PLANNING
your strategy

Have all relevant stakeholders been engaged?

Have project challenges and opportunities been identified?

Have project goals and their metrics been defined?

Have specific NBS options been identified for addressing the defined challenges and goals?

Do all stakeholders support the final design solution?

Has an Impact Assessment of design alternatives been done?

MOBILISING
your resources

Have a business Case/Financial Assessment been elaborated?

Have Financing Mechanisms been identified?

EVALUATING
your strategy

Has a Monitoring & Evaluation System been developed?

Has an evaluation report been done?

01

PLANNING PHASE

The planning phase is where the projects are created and where the first ideas are transformed into specific solutions to be implemented. There are several milestones to achieve in this phase in order to accomplish a collaborative planning phase.

We have expressed these milestones in the form of questions:

Q01 Have all relevant stakeholders been engaged?

Q02 Have project challenges and opportunities been identified?

Q03 Have Project Goals and their metrics been defined?

Q04 Have specific NbS options been identified for addressing the defined challenges and goals?

Q05 Has an impact assessment of design alternatives been done?

Q06 Does all stakeholders support the final design solution?

Q01

Have all relevant stakeholders been engaged?

Description

A successful NbS strategy is developed and implemented collaboratively with citizens and stakeholders. Including them will lead to the best design decisions based on data and technical, political and social opinion. Involving a wide diversity of stakeholders in decisions helps to gain and maintain their trust and to create ownership and empowerment. At the same time citizens and stakeholders have different types of knowledge, from technical, political or experiential knowledge all of which is very necessary to deliver a successful project.

Mapping the relevant stakeholders and citizens groups and planning for their involvement is essential no matter the size of the project: local authorities, architects, ecologists, sociologists, community groups, associations, contractors, citizens... It is also important to make sure that diversity and social inclusion is embedded in the process, in order to include in the project also the voices of minority citizen groups too often not listened. At the same time, bringing in experts in the early stages of the project could save you a lot of money and time. From the moment where the key issues affecting the site have been identified, you can determine which areas you need to seek expert advice.

Suggested: **Bringing the experts together for a combined approach can avoid conflicting actions as they may be required at different stages of the project.**

Assessing the challenges of stakeholders and those of the project will help you identify priorities and opportunities for the project.

More info

You can find more information on Stakeholder Identification and Citizen Engagement in the following links:

1. Table. List of possible stakeholders and their key roles
2. GrowGreen "Citizen engagement for Nature-based Solutions: Fact Sheet"(**Link**)
3. "GrowGreen report: Engaging citizens in nature-based solutions" (**Link**)
4. "Step-by-step guide for co-production and cocreation of Nature-based Solutions". Nature4Cities project, H2020. (**Link**)
5. GrowGreen"Engaging municipal departments in developing a nature-based solutions strategy". (**Link**)
6. "Green Infrastructure in Parks: A Guide to Collaboration, Funding, and Community Engagement. United States Environmental Protection Agency "(**Link**)
7. "Biodiversa Stakeholder Engagement Handbook. JNCC, Biodiversa" (**Link**)
8. "Citizen Engagement Handbook. Naturvation, H2020" (**Link**)
9. "Engaging UN-usual suspects. ConnectingNature, H2020" (**Link**)

Real Life Comments

You can find some comments collected from GrowGreen stakeholders. The online application foresees to include a space for live real life comments from all users.

> *The most effective engagement was going to the footfall hotspot in the area (the local school at pick up time in the afternoon) with a walk-in container unit that people could physically walk in to and discuss the design ideas with the landscape design team.*

MANCHESTER

> *Transparency with the neighbourhood associations allowed openness of opinion and vision throughout the process.*

Iñaki, Romero
PAISAJE TRANSVERSAL
VALENCIA

> *There was one boy with his grandmother – they brought their own tree and planted it and it was a very uplifting moment.*

WROCLAW

GrowGreen Case Studies (1/4)

WEST GORTON COMMUNITY PARK, MANCHESTER

The citizen engagement **activities ranged from access to information, to consultation, and decision making**. Educating and engaging citizens on of climate change in relationship to the project proved challenging. This was due to the fact that **citizens did not have previous knowledge about climate change** and felt that flooding was not an issue in the area. Therefore, engagement was first focused on health and wellbeing benefits, opportunities to play, and other 'fun' aspects to open the conversation and build the relationship. Issues surrounding climate change were gradually introduced to people. Furthermore, **the language around nature-based solutions proved to be difficult to understand, therefore terminology and explanations were simplified and visual aids were used**.

Despite an established programme of activities with various groups in West Gorton, Groundwork, the contracted engagement partner, alongside the Guinness Housing Trust, still found the community difficult to engage. **The most effective engagement was going to the footfall hotspot in the area** (the local school at pick up time in the afternoon) **with a walk-in container unit that people could physically walk in to and discuss the design ideas** with the landscape design team. This approach of bringing the consultation to the community, with quite a low-tech approach resulted in the largest numbers of people engaging in the design process.
Aspirations from the community were initially fairly low in terms of what their 'new park' might look like, for example some asking simply for "a new set of swings". This is a good example of how patient listening, alongside pushing their boundaries of citizen expectation, resulted in the delivery of something quite different to the standard municipal park, which had been the expectation.

Citizen engagement activities, West Gorton, Manchester
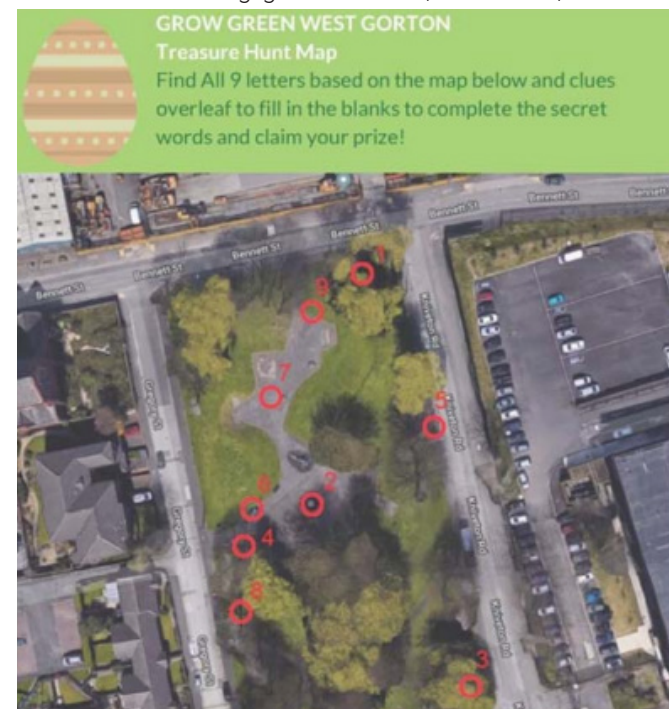
NATURE-BASED SOLUTIONS IN BENICALAP, VALENCIA

The participation process was designed to engage citizens in the development of a series of nature-based solutions demonstration projects. The process was structured around the **'Listening and Transforming' methodology**. A number of citizen engagement actions took place in public spaces to communicate the intentions of the pilot projects to the local residents in an innovative way. For example, **visual messages, and painted floor signs were used in Benicalap's public spaces to explain the location of the projects** and the environmental improvements they would create. The signs also acted as a demonstration of how the residents' engagement had been acknowledged and put into action as a result of their participation in the project.

A mobile app was developed to engage local people with their new nature-based solutions and to make them aware of local plants and wildlife.

The engagement process began at a disadvantage, both the choice of the place of intervention and the planned pilot projects had been designated by the Council beforehand, without a participation process. Therefore during the development phase, these decisions had to be validated, and a relationship of trust built with the community. **Transparency with the neighbourhood associations allowed openness of opinion and vision throughout the process**.

Another successful idea was not to address directly the pilot projects, but rather the problems and needs related to the wider public space of the neighbourhood, to draw attention and talk about issues that influence the community, and finally to apply these opinions to the pilot projects indirectly.

Citizen engagement activities, Benicalap, Valencia

NEW GREEN SYSTEM, WROCLAW

In order to ensure inclusivity in the design and implementation of the NBS, the concepts were co-designed with a wide group of stakeholders during a **series of workshops held with citizens**. A number of citizen engagement techniques were used in the workshops, **the most successful technique highlighted was the use of photo maps**. The photo maps were helpful in two ways; Firstly, they gave the citizens an overview of the entire area which helped in the identification of what they preferred in each location. Secondly, they helped the designers when incorporating NBS and citizen's suggestions into their designs.

A key **element of success was including the district council in the workshops**, as the council is closer to the citizens than the city municipality and is aware of the problems in the area. Engaging citizens in the process of designing helped and encouraged them to take care of the demos. During one series of the workshops done, citizens were invited to plant the flowers and shrubs together with designers and municipal workers, it turned out that some of the people had never done it before. There was one boy with his grandmother – they brought their own tree and planted it and it was a very uplifting moment.

Citizens' initial concerns that the demonstration projects would reduce available space for parking were alleviated primarily by changing how parking is managed. The parking spaces in the residential courtyards are now more organised, allowing space for both parking and other uses.
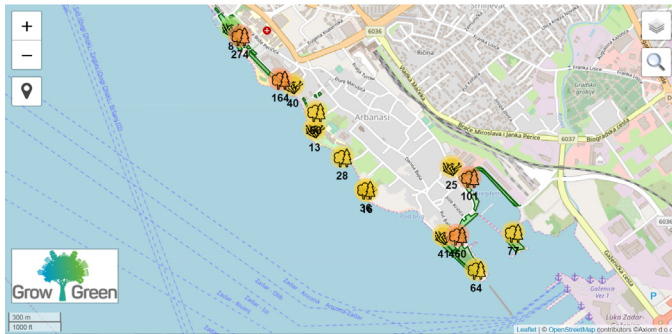
Citizen engagement activities, Downtown area, Wroclaw

GrowGreen Case Studies (4/4)

NATURE-BASED SOLUTIONS IN ZADAR

A public hearing was held, which detailed the process to develop a nature-based solutions strategy for the city of Zadar. Up-to-date information was published on the government's website, including a call for citizens and interested stakeholder's engagement. Furthermore, relevant news articles were posted on local radio stations and news pages.
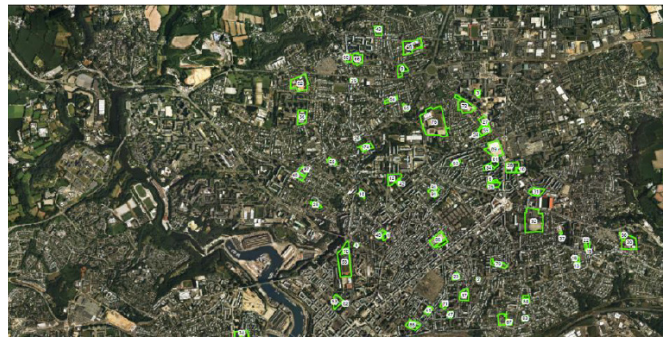
NATURE-BASED SOLUTIONS IN BREST

The city of Brest is vulnerable to sudden flooding caused by heavy rainfall, made worse by climate change, and the roads, pavements, and other impermeable surfaces in the city. As part of GrowGreen, the city is updating its stormwater management plan to better manage rain and reduce flood risk. A video has been produced to help citizens understand stormwater management and how NBS can be used to help tackle flooding. The River Spernot is being re-naturalised and local children helped out by placing rocks in the stream, and learn about water management in the city.
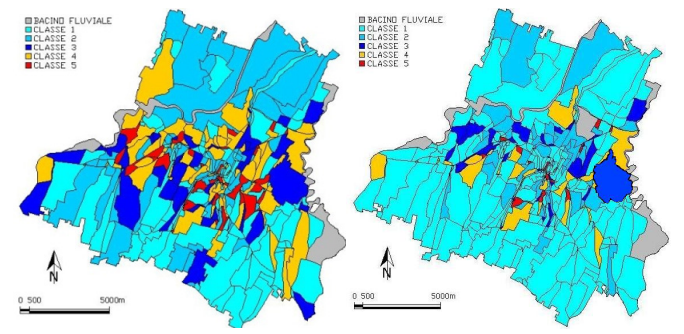
NATURE-BASED SOLUTIONS IN MODENA

Following engagement with city policy makers, planners and practitioners' events will now be developed to engage citizens in the NBS agenda.

Green Cadastre of south-west Zadar.

Public space identification for possible interventions, Brest

Flood risk, current and future scenario. Tipological section, Modena

Q02

Have project challenges and opportunities been identified?

Description

A good NbS project, as any other urban project, is that that once implemented transforms the spaces to achieving a higher quality of life, greater economic vitality and a more efficient use of resources. The planning process starts with a phase of research and collecting data that become design criteria. A diagnostic has to be done in two directions: top down (research, urban observation studies, environmental data of the place, policies, regulations…) and bottom up (collecting citizen data, their challenges and experiential knowledge).

• Policy set out by central and local government. Relevant information such as laws, regulations, building codes, guidelines, etc. need to be taken into account.
• Spatial information has to be collected (maps, plans, geographical information, etc.).
• Feasibility based on an understanding of economic and market conditions.
• Context of the site, its setting, adjacent land uses and local heritage issues. This includes an urban analysis to be done (history of the place, geographic location, open spaces and vegetation, existing urban fabric, connectivity and transportation, mobility, land use, utilities and services…).
• Citizens information needs to be integrated. Community involvement, including those directly affected by the scheme by virtue of proximity, local amenity groups and the wider community.
• Approach of the design team and the people who manage and plan the design process.

With this information, it will be possible to assess existing features of the site and identify opportunities, priorities and project ambitions.

This phase is about collecting all the basic data to approach the design. It is important to take into account the existing policies so that the design does not conflict to it and is successful in getting planning permissions. At the same time it is important to understand what is feasible so that the proposal is successful in terms of commercial, economic, social and environmental terms.

*Suggested: **The community will provide the experiential knowledge which is very relevant to deliver a successful urban project. Besides, if they are engaged during the planning phase they will trust the proposal more and support it. On the other hand, the vision and approach of the design team, experts and the developers is essential to take it into account to identify priorities, objectives and in the end to have a vision.***

More info

You can find more information on Stakeholder Identification and Citizen Engagement in the following links:

1. Inclusive and Sustainable Urban Planning: A Guide for Municipalities. UNHabitat. Vol.1 (**Link**)
2. ISUP: A Guide for Municipalities. UNHabitat. Vol.2 (**Link**)
3. ISUP: A Guide for Municipalities. UNHabitat. Vol.3 (**Link**)
4. ISUP: A Guide for Municipalities. UNHabitat. Vol.4 (**Link**)
5. The Councillor's Guide to Urban Design. CABE (2003). (**Link**)

Real Life Comments

You can find some comments collected from GrowGreen stakeholders. The online application foresees to include a space for live real life comments from all users.

> *Regeneration activities in East Manchester have attempted to secure a partnership approach to planning and development. MCC has actively promoted the use of Neighbourhood Planning (NP) as a mechanism for collective and deliberative decision-making.*

MANCHESTER

> *People living in Benicalap may be particularly vulnerable to climate-related events. Specifically the impact of heat stress accentuated by fuel poverty linked to low income.*

VALENCIA

> *Wrocław has created open, dynamic and friendly spaces that serve to satisfy the desire of contact with culture, art and beauty, using many models. However, there were some negative perceptions of the Olbin district that needed to be tackled. These include high rates of crime and high levels of alcohol dependency. There is no specific data to evidence these perceptions and these issues were further explored during the co-design process.*

WROCLAW

WEST GORTON COMMUNITY PARK, MANCHESTER

Climate
Manchester has a temperate oceanic climate. Summers are relatively mild, although temperatures often exceed 20°C. Winters are cool. The average Urban Heat Island intensity for West Gorton is increasing.

Precipitation
Rainfall is relatively evenly distributed throughout the year with total rainfall slighly less that the UK average. Changes in rainfall between the two 30-year periods of 1961–1990 and 1981–2010 show an enhanced seasonal variation, with an increase in winter/autumn precipitation and a decrease in summer precipitation.

Vulnerability to Climate change
People living in West Gorton may be particularly vulnerable to climate-related events. Relatively high levels of sensitivity (compared to the average for England) suggest that people are more susceptible due to individual factors such as age and health status. In particular, there are high proportions of children under 5 and higher proportions of people in ill health compared to the English average. There is extreme inability to respond to and recover from heat-related events and an acute inability to prepare for such events.

Biodiversity
Investigations revealed that reworked natural clay and dense sands are overlain by 'made ground' across the majority of the proposed development. This made ground is commensurate with historical heavy industry at the site and consists of:
• Topsoil to depths of 0.6m
• Demolition waste between 0.4m and 3.1m

• Ash and clinker between 0.4m and 3.1m
Elevated levels of heavy metals and hydrocarbons were detected in the ash and clinker (derived from coal-fired boilers, furnaces and other high-temperature combustion). Asbestos fibres were detected in the demolition waste from one trial pit south of the playground – marked orange on the map above.
There has been a net loss of approximately 10% of greenspace since 2000.

Social
(1) Participatory Planning and Governance
Regeneration activities in East Manchester have attempted to secure a partnership approach to planning and development. MCC has actively promoted the use of Neighbourhood Planning (NP) as a mechanism for collective and deliberative decision-making. This work has been supported by the promotion of Resident Steering Groups in each target area including Gorton.
(2) Social Cohesion
Levels of crime in the area are relatively low. In September 2017, West Gorton was ranked 40th of 92 areas. This represents the 43rd percentile in the context of Manchester LA boundary (1st place having least crime).

Citizen engagement activities, West Gorton, Manchester

NATURE-BASED SOLUTIONS IN BENICALAP, VALENCIA

Climate
The average annual temperature is 23.0 °C during the day and 13.8 °C at night. In January (the coldest month), the temperature typically ranges from 14 to 20 °C during the day and 4 to 12 °C at night. In August (the warmest month), the temperature typically ranges from 28 to 34 °C during the day and about 22 °C at night.

Precipitation
Precipitation in the València region tends to be concentrated in a relatively low number of days, with a large share of the total precipitation generated in a few rainfall episodes. Since the diagnosis report was written in May 2018 there have been a number of flash flooding events in València in November 2020 and Oct 2021.

Vulnerability to Climate change
People living in Benicalap may be particularly vulnerable to climate-related events. Specifically the impact of heat stress accentuated by fuel poverty linked to low incomes.

Biodiversity
Green space in Benicalap District represents 9.8 % of the district and 4.8 m2 per capita. In comparison with other districts in València, the percentage of green areas in Benicalap is high.

Benicalap Park is the largest green space in the district with a surface of 8 ha which was built in 1983. It is an important patch of València green infrastructure, which connects urban open spaces with the agricultural area

known as Huerta de València. In total, the park has 1400 trees corresponding to 103 species. There is a strong bird presence from surrounding areas like La Huerta de Valènciaor the natural areas, Albufera Natural Park and Turia Natural Park.

Social
(1) Participatory Planning and Governance
The neighbourhood entities with most activity in the district of Benicalap - Ciutat Fallera, are the Benicalap - Campanar Fallas Group (related to the local festivity "Fallas") and the Neighborhood Association Benicalap - Entre Caminos. But there is not a strong resident participation in the participatory processes because of a lack of enthusiasm to participate in public initiatives or a lack of commitment by local associations. There is a general feeling of abandonment of the neighbourhood by the municipality.

It is worth commenting that bordering the neighbourhood are the best group of ancient farmhouses in all of València. Several of them have already disappeared but others are still standing, such as the Alquería dels Moros, the Alquería de la Torre or the group of Alquerías de Lluna. Despite their heritage value some of them are very deteriorated, even in danger of ruin.
(2) Social Cohesion
In this district there is little association movement. The main association of the neighbourhood, "Association of Neighbors Benicalap-Entrecaminos", has even had clashes with neighbours for the lack of information or neighbourhood participation in matters such as the construction of a centre for the indigent.
There is a strong presence of immigrants and different nationalities (percentage of immigrant population is 17.5%). but there is little coexistence because they are concentrated by nationalities throughout the district.

Citizen engagement activities, Benicalap, Valencia

NEW GREEN SYSTEM, WROCLAW

Climate
The average annual air temperature in Wrocław is 9.0 °C, the coldest month average air temperature (January) is -0.4 °C, and the warmest (July): 18.8 °C. The Ołbin district, due to the location within the city limits and the nature of the built environment (the vast majority of impermeable surfaces, lack of greenery), is struggling with the problem of an intense urban heat island. Differences in daily temperatures during heat waves, compared to the daily temperatures of suburbia, are among the highest in the city.

Precipitation
Wrocław belongs to cities with low rainfall. Precipitation occurs approx. 167 days a year. In recent years, there has been an increasingly frequent occurrence of extremely heavy rainfalls, which cause problems such as sewage overflow, flooding of basements and low premises, periodic difficulties in traffic, water pollution of outflows.

Ołbin is a district particularly exposed to the above problems, due to the nature of the built environment (the vast majority of impermeable surfaces, the lack of greenery).

Climate change adaption and mitigation
In recent years, periods of drought (even up to 3-8 weeks without precipitation) were recorded during summer seasons, resulting in lowering river and groundwater levels. Apart from climatic and metrological conditions, it is also necessary to take into account the consequences of urban heat island, however, heat waves are more and more frequent during the summer, with temperatures reaching up to

35-39°C and on single days even above 40°C.

Due to the existing situation, the rainwater management and retention plan is being implemented. Decrease in water levels and longer periods of drought require the introduction of measures to prevent fast drainage and evaporation of water, which is why retention of rainwater is necessary. It is necessary to introduce green areas and use permeable surfaces.

Biodiversity
There was a lack of baseline data on bio diversity in Olbin but there was a general lack of greenery in the area. Courtyards with residual greenery are mostly covered with clogged soil and there was a lack of greenery along the streets.

Social
Participatory Planning and Governance
Ołbin was one of the most active districts in submitting projects to the Wroclaw Civic Budget. Projects submitted

by the residents of the district included: increasing the number of renovations of tenement houses; increasing the number of green spaces, street greenery, places separated from traffic, etc.; increasing the amount of street lighting; increasing the budget for liquidation of solid fuel boilers; introduction of mechanisms to support thermo-modernization of buildings; new bike routes and improved safety at crossings and extended infrastructure.

Social Cohesion
Poland is a mono-ethnic and mainly monocultural state. Wrocław, like the vast majority of Polish cities and regions, practically does not have any national minorities or their number is very small. Ołbin district, compared to other districts of the City, has a relatively large group of Romani community (about 0.5%).

Citizen engagement activities, Downtown area, Wroclaw

Q03

Have Project Goals and their metrics been defined?

Description

Multiple stakeholders take part during the planning process and therefore it is important to define common goals that are shared among all participants during the co-design process. This helps focusing on the solutions needed to achieve those objectives. The problems caused by climate change may not be equally experienced across your city. So it is helpful to assess what climate change risks as well as social and urban challenges are affecting most in your area for NbS implementation. The challenges are explored during the milestone **"Have all challenges and opportunities been defined?"** through spatial analysis and diagnostic. A good understanding of the challenges will help you identify project goals in collaboration with all the stakeholders involved. Reference values must have been set up per each of the identified challenges.

Once you have identified the project goals, you are ready to define Key Performance Indicators (KPIs) that will help you assess your project performance. The selection of potential KPIs can be done collaboratively with stakeholders. It is important that KPI calculation methods and tools have been defined, so that the monitoring and evaluation is feasible. This milestone is included in the "Evaluating" phase.

*Suggested: **Define goals in a collaborative manner is essential to focus on the solutions needed and evaluate the success of the project.***

More info

You can find more information on Stakeholder Identification and Citizen Engagement in the following links:

1 Identification of Priorities/Goals Template
2 Define Climate Change Problems (GrowGreen) (**Link**)
3 Definition of KPIs Template

Real Life Comments

You can find some comments collected from GrowGreen stakeholders. The online application foresees to include a space for live real life comments from all users.

> *It was recognised that engagement of the local community would be key to the ongoing success of the park, but also presented an opportunity to engage citizens around the concept of Nature Based Solutions and climate change more widely.*

MANCHESTER

> *In Valencia the goals of the GrowGreen demonstration projects were on the one hand pre-defined by the project proposal and complemented by other priorities from the City Council perspective and the citizens expectations. New layers were added with the stakeholders views.*

Blanca, Pedrola
BIPOLAIRE ARQUITECTOS
VALENCIA

> *The introduction of new paved surfaces or unnecessary elements of development, which are associated with higher maintenance costs, such as gyms, larger playgrounds or shelters as meeting places, was limited. During the public consultation, it was explained to residents that these elements should not be located in backyard spaces and are well accessible in adjacent public areas.*

WROCLAW

WEST GORTON COMMUNITY PARK, MANCHESTER

The co-benefits for the West Gorton project were agreed as:
•Improved social, health and well-being, including social cohesion, stakeholder engagement, etc.
•Access-improved distribution of public green space and access to green space.
•Biodiversity-enhancement of species present, habitat, vegetation, etc.

These were supplementary to the main benefits of the project which are agreed as:
•Improved water management and reduction in flood risk
•Decrease in peak temperatures

Water resilience and management
The main design driver for the West Gorton demonstration project was to reduce the risk of surface water flooding by the use of a range of sustainable urban drainage features (SUDS) The design was built around the concept of a "park that drinks water" inspired in part by the project visit to Wuhan in Nov 2018.

Biodiversity
Native species trees, shrubs, perennials and grasses have been planted to enhance the woodland 'feel' and to encourage insects, birds and small mammals to forage. Existing trees were retained within the design where possible.

The scheme includes new tree planting of both native, ornamental and fruiting varieties, in addition to new shrub and perennial planting. To extend the flowering season to encourage pollinators, bulb planting provides sources of nectar at times of the year when food sources can be scarce.

Participatory planning and governance
The park in West Gorton was developed in consultation with a large group of stakeholders from a diverse range of organisations including citizens, political Members, schools, private companies, an environmental charity, a housing association, academics, and various departments in the city council.

It was recognised that engagement of the local community would be key to the ongoing success of the park, but also presented an opportunity to engage citizens around the concept of Nature Based Solutions and climate change more widely. The Guinness Partnership (the local social housing provider, and GrowGreen partner) contracted Groundwork, an environmental charity who specialise in community engagement work to deliver the community consultation element of the project.

Social cohesion
The initial outline designs showed how the park areas could work spatially and how it could connect with desire lines and paths across the site, and importantly, to connect the old and the new communities in the area. This was a particular aim of the project – to connect two communities. To the east of the site is older housing with an existing community, whereas to the west of the site are the newly developed homes. Every effort was made by Groundwork to engage with both sets of residents equally, to ensure participation and engagement with the park by all, and to facilitate new relationships forming.

Citizen engagement activities, West Gorton, Manchester

NATURE-BASED SOLUTIONS IN BENICALAP, VALENCIA

General Design Overview

The city of València is prone to really hot and humid summers due to its Mediterranean climate and geography, respectively, and thus the urban heat island effect is a growing health issue because climate change is making summers even more hot. During the summer and fall, really heavy rains occur (explosive cyclogenesis), but due to its geography and climatology the city is particularly vulnerable to flooding. With climate change, these precipitation events have multiplied and intensified and have become a growing dangerous issue.

The demonstration projects have been developed to show how NBS can help València to adapt to these climatic conditions:

•**Green Roof**: The temperature regulation has been monitored by sensors present on the roof and inside the building, to measure the reduction in the maximum temperatures reached during summer.Water retention has been a primary objective to prevent inundations and leaks in the roof. The water capacity retention is being monitored by measurement systems.

•**Vertical Garden**: Water retention, depuration and reutilization is the main objective of this action and these factors and the use of the water in the school's orchards are being monitored by sensors and measurement systems.

•**Green-Blue Corridor**: At the end of the corridor the Regino Mas Square has been totally reformed and sensors will be installed to monitor the temperature regulation done by the pergola and the new green areas. The expanded street grates will not be monitored. Water retention and depuration is the main objective of this action, that includes SUDs installed in the new green areas, including Regino Mas Square, and in street parking lots. It will be monitored via observation and testing of the streets and the sewerage during/after heavy rains.

•**Green Civic Centre**: Due to the harsh summers and the proximity of Hermanos Machado, an avenue with a lot of traffic, the Green Civic Centre will provide shelter and thermic comfort in the Espai Verd orchards.

•**Sustainable forest**: Water retention and depuration has been a primary objective to prevent flooding due to the lack of water resilience of the area before the action, that includes a big and naturalized SUD system. It will be monitored via observation and testing of the streets and the sewerage during/after heavy rains.

•**Biodiversity**

Some of the demonstration projects have been developed to create a bio diversity net gain:

•**Sustainable Forest**: One of the main drivers, the new park has mainly native plants and includes a small area for a naturalized and "wild" urban Mediterranean forest, but the impacts in biodiversity will not be monitored and rather will have to be noticed by visitants.

•**Green-Blue Corridor**: One of the main drivers, the New green areas present mostly native plants, and the new pergola of Regino Mas Square includes some insect hotels, but the impacts in biodiversity will not be monitored and rather will have to be noticed by visitants.

Citizen engagement activities, Benicalap, Valencia

NEW GREEN SYSTEM, WROCLAW

Improving climate conditions, air quality and biodiversity

Adaptation to climate change by improving habitat conditions: rationalisation of the number of treatments in green areas, mulching and mycorrhization and loosening of soil structure and soil replacement.

Plants will adapt cities to climate change: flower meadows and urban amenity meadows, ruderal plant beds, climbers on facades and support structures, eco-efficient and low-maintenance "biogroups" and restoring trees in road lanes.

Activities for birds and insects in the city: create food and habitat base for birds and insects, activities for birds and insects.

Water resilience and management

Capturing and collecting rainwater and snowmelt: rainwater for watering plants, distribution of rainwater, water collection and infiltration into the ground, water drainage and infiltration within sealed surfaces, permeable and semi-permeable surfaces on internal routes and parking lots, eliminating barriers to water.

All of the indicated measures were considered at the stage of preparing conceptual designs and discussed with stakeholders. Most of the listed above indicators were successfully included in the technical designs as it is shown below.

Measures related to improving climate conditions, air quality and biodiversity

1. Adaptation to climate change by improving habitat conditions,

2. Rationalisation of the number of treatments in green areas,

At the stage of implementation of design studies, aspects related to rational maintenance of areas were taken into account, in particular:
• introduction of native vegetation, resistant to difficult urban conditions;
• locating planting in the lowest parts of the area, where rainwater will accumulate;
• community gardens, which can be independently maintained by residents.

The GrowGreen project was implemented in areas with established maintenance scopes of work and none of the contractors were previously responsible for maintaining the demonstrator areas. During the design phase, discussions were held to rationalize treatments in selected areas.

As part of the implementation of the works, biological reclamation was carried out: mulching, mycorrhization, loosening the structure and soil replacement.

In the context of the GrowGreen project's experience in rationalizing the number of treatments on public lands, the following should be identified as key:
• introduction of biogroups from native species;
• collection and management of rainwater;
• engaging residents - setting aside community gardens for residents.

3. Plants will adapt cities to climate change

Actions related to increasing biodiversity constituted the broadest package of NBS-type solutions implemented within the Grow Green project. On the demonstrators were implemented flower meadows and urban amenity meadows; climbers on facades (Green Daszyńskiego Street); climbers on support structures; climbers on rubbish sheds.

Citizen engagement activities, Downtown area, Wroclaw

Q04

Have specific NbS options been identified for addressing the defined challenges and goals?

Description

It could be the case that a specific NbS has been already proposed, or that you have to decide what NbS is the most appropriate to face challenges and goals that have been previously identified. If you are in the case to decide what NbS can be more efficient for the project, it is helpful to identify strategies or adaptation measures to be applied in the design that will lead you to what NbS is more effective to achieve those.

There are many compendiums that you can use to help you identify the most suitable NbS for your project. You can also use the "GrowGreen Compendium of Solutions" (**Link**).

Using different NbS will lead to different impacts. For this reason it is important to link this milestone with the **"Has an impact assessment of design alternatives been done?"**.

*Suggested: **Knowing what NbS are possible and what are their features will help identify which ones will perform best for our project.***

More info

You can find more information on Stakeholder Identification and Citizen Engagement in the following links:

1   Compendium of solutions. (**Link**)
2   GrowGreen Compendium of nature-based and 'grey' solutions (**Link**)
3   Global Standard for Nature-Based Solutions (IUCN) (**Link**)
4   Green Infrastructure Case Studies. EPA (**Link**)
5   UNaLab Technical Handbook of Nature-Based Solutions (UNaLab) (**Link**)
6   Urban Nature Atlas (Naturvation) (**Link**)
7   Oppla (**Link**)

Real Life Comments

You can find some comments collected from GrowGreen stakeholders. The online application foresees to include a space for live real life comments from all users.

"

In our case, there is still a 'failsafe' outflow pipe into the main sewer system at the end of each swale system, however, the research fundings could demonstrate that these are not necessary, and provide a business case for co-funding from a water company who would make savings on treating that water which would normally enter their sewer.

MANCHESTER

"

Different NbS were chosen or Valencia based on their functionality since the water management, the thermal stress and the urban quality were the main objectives.

Bruno, Sauer
BIPOLAIRE ARQUITECTOS
VALENCIA

"

In this area, the most important challenge was to manage all the rainwater and level its outflow to the storm water drainage system. To this end, the landscaping was designed to direct the water to the center of the courtyard, away from the tenement houses, which were previously flooded during heavy rain falls.

WROCLAW

WEST GORTON COMMUNITY PARK, MANCHESTER

As a H2020 Research and Innovation Project, it was important to innovate in the design for the park! The incorporation of a drainage design layer into a traditional park design had never been done before in the Manchester.

The process by which the park designs were developed is new in Manchester. By getting all the stakeholders together to help decide on the main design 'drivers' for the park, the project was able to adopt a unique approach to design that ensured that the main KPIs for the project were considered and included in the landscape designs.

In terms of design features, the connection between the highway and the park, with rainwater runoff being redirected from the roads surrounding the park and flowing in to the NBS features has never been done in a park design in Manchester before.In our case, there is still a 'failsafe' outflow pipe into the main sewer system at the end of each swale system, however, the research fundings could demonstrate that these are not necessary, and provide a business case for co-funding from a water company who would make savings on treating that water which would normally enter their sewer. It has certainly provoked discussions with the Highways Department on how this could be done elsewhere.

The sloping basketball court (the only non-permeable surface in the whole park – see figure 20), which very gently slopes down towards an open drainage channel and bioretention tree pit, is an innovative feature which could be replicated elsewhere.

The community plaza garden is another example; whereby rainfall that falls on thepermeable surface of the plaza area is 'captured' in a large liner under the plaza and redirected towards an ornamental rill which leads to a bioretention tree pit.

Built pilot and NBS solutions, West Gorton, Manchester

NATURE-BASED SOLUTIONS IN BENICALAP, VALENCIA

Sustainable forest

A topography is generated to manage rainwater during rainfall events. The topography has been studied so that runoff is directed to the different sustainable urban drainage systems (SUDS). The proposed SUDS typologies that have been used are mainly bio-retention systems such as the three infiltration basins connected in cascades; perimeter filter ditches and connection ditches between basins; and permeable pavements (access area to the Benicalap Park and road).

The improvement of biodiversity is achieved by creating different strata of vegetation (trees, shrubs, and terrestrial plants), encouraging the diversity of species and creating spaces for animal habitat. Sustainable vegetation management (pruning, cleaning, watering) has been considered. To improve thermal comfort in the area, tall vegetation has been considered to reduce exposure to direct solar radiation.

Blue green corridor

This intervention has aimed to create a laboratory of solutions, in which to combat climate stress, increase biodiversity and improve the rainwater drainage system through the modification of the pavement, allowing the retention and/or infiltration of water to the subsoil through different solutions and through the modification of the existing gardens into rainwater retention/infiltration areas and biodiversity nodes.

The existing trees in the area have been maintained as they are in good condition and provide a dense vegetation cover for the street. The lower stratum of vegetation has been completed to enrich the biodiversity in the Calle del Foc and the trees in the

Plaza de Regino Mas have been increased.

Vertical ecosistem

The Green wall system or vertical ecosystem is located at the south-west façade of the public-school "Ciutat Artista Faller". The main function of the technology is to purify the grey water from the school toilets. It is composed of the green wall with plants, a series of buffer tanks to store the water as it passes through each process, a water softener, a reverse osmosis membrane and an ultraviolet lamp for disinfection, installed immediately afterwards to be able to reuse this water to irrigate the plants and the school garden.

Green roof

After an analysis of alternatives, it was decided to carry out the installation of the landscaped roof in an activity center for the elderly in Benicalap. The roof has an approximate area of 345 m; originally it was formed by a layer of gravel that performed the functions of insulation.

The green roof project included both the technical elements for the drainage of the green roof and its waterproofing as the substrate and the plantations. The garden roof proposal is extensive with Sedum sp. as a plant species to be implanted.

The purpose of the project was to provide the Benicalap senior activities center with all the advantages provided by a garden roof, both in terms of sustainability and environmental services as well as benefits for people's health and well-being.

Citizen engagement activities, built pilot, Benicalap, Valencia

NEW GREEN SYSTEM, WROCLAW

Within the GrowGreen project, the following solutions were studied and implemented:

•Rainwater collection and management systems in green areas;

•Green roadways and parking lots, which help retain rainwater runoff and heat up less than traditional paved surfaces;

•Climbing plants on facades, supports and shelters, which may often be the only form of greenery available;

•Natural planting beds using native species that are drought tolerant while enhancing biodiversity;

•Recreation and leisure spaces using natural materials;

•Community gardens around tenement houses maintained by residents.

As a result, the aesthetics of the courtyards have been improved, rainwater management has been improved, and the proportion of permeable paving and greenery has been significantly increased.

Some of the solutions tested were innovative for Wroclaw conditions:
1. For the courtyards the permeable surface for the access road was tested made of farmer's pavement, grassed over with permeable substrate.

2. As for the green street a "rail" for greenery was

designed in the sidewalk, which has the qualities of a sealed pot and, at the same time, is connected to the adjacent native soil; moreover, it collects and directs rainwater from the sidewalk towards the trees. The success of the solution is the introduction of trees in the street with the infrastructure network under the roots. The selection of trees is based on native species, which are characterized by high resistance to urban conditions: salinity, tight soil, drought, difficult soil conditions, air pollution.

Building proccess, Downtown area, Wroclaw

Q05

Has an impact assessment of design alternatives been done?

Description

Designing is an iterative process in which the final solution is achieved after producing different solutions at intermedium stages that are being validated and improved with information received from all stakeholders. The design team progresses based on new data and experience that is getting during the planning phase.

Different types of NbS can be implemented in different combinations and in different locations to tackle the climate change-related problems experienced in your city. It is helpful to evaluate and benchmark different scenarios of NbS implementation, based on an assessment of their costs and benefits.

Calculation of impact is very valuable to assess the different design alternatives and compare based on the criteria and KPIs that have been previously set and agreed by all stakeholders. This methodology will allow to make decisions, decide what measures have a good result and be able to modify design alternatives in order to get a final design which includes the best options assessed by all stakeholders.

It is important to prepare different design alternatives in order to compare them and analyse the impact of the different alternatives.

We provide you with a list of tools that you can use for the calculation of impacts(link).The capacities needed to use it depend on each calculation tool.

Whithin these general lines, there are several approaches that GrowGreen cities have followed, supporting different methods depending on the main focus point as developed in the case studies.

For example, Manchester has taken an ideal approach at a district scale, searching for what the ideal solution would be and afterwards, which separate part can be built. Valencia has relied on calculation tools such as Envimet or Ecodistrict to calculate heat stress maps and rely on different alterantives of the same plot. Wroclaw, on the other hand, has relied on the alternatives proposed by the citicen engagement phase, relying in their input and assesing their impacts.

More info in the Adaptation Pathway Factsheet developed in the Green Cities Framework.

Suggested: ***Calculating the impacts of different solutions will help the decision making process in an informed manner.***

More info

You can find more information on Stakeholder Identification and Citizen Engagement in the following links:

1   John F. Benson (2003) What is the alternative? Impact assessment tools and sustainable planning, Impact Assessment and Project Appraisal, 21:4, 261-280, DOI: 10.3152/147154603781766185 (**Link**)
2   GrowGreen Inventory of Tools (Link)
3   Green City Too. European Comission (**Link**)
4   Urban Adaptation Support Tool. Covenant of Mayors (**Link**)

Real Life Comments

You can find some comments collected from GrowGreen stakeholders. The online application foresees to include a space for live real life comments from all users.

> *It is fundamental to make an insightful selection of the indicators to ponderate and to include all relevant stakeholders in order to create an objective process and be able to really compare the benefits of each design alternative, using the full potencial of this tool.*

BIPOLAIRE ARQUITECTOS
VALENCIA

> *It provides a spatially explicit powerful visualization of the different design alternatives ponderated by the different actors.*

TECNALIA
VALENCIA

> *There was one boy with his grandmother – they brought their own tree and planted it and it was a very uplifting moment.*

WROCLAW

WEST GORTON COMMUNITY PARK, MANCHESTER

The approach of Manchester varied as they did not consider design alternatives of the same plot, but they explored the ideal situation of the district they were going to intervene in, and then start building part of it. This way, there is a more generall view of the general outcome of what nbs can provide given a bigger scale.

On the other hand, they elaborated a table of key performance indicators that was ponderated manually by the stakeholders involved in the project to asses the impact of the project. The stakeholders involved were Manchester city hall, University of Manchester, Guiness Partnership, Groundwork, BDP architects and Arup. The indicators ponderated were carbon storage, biodiversity, water quality, air quality, noinse, bistribution ans access to greenspace and economic impacts among others.

A score of 1-5 was given by each stakeholder. A score of 1 being of little importance/relevance to the project and 5 being very important/relevant to the project.

The co-benefits for the West Gorton project were agreed as Improved social, health and well-being, including social cohesion, stakeholder engagement, etc.; Access - improved distribution of public green space and access to green space and Biodiversity - enhancement of species present, habitat, vegetation, etc.

These were supplementary to the main benefits of the project which are agreed as: Improved water management and reduction in flood risk and Decrease in peak temperatures

KPI ponderation by relevant stakeholders, Manchester

NATURE-BASED SOLUTIONS IN BENICALAP, VALENCIA

One of the platforms used by the city of Valencia for visualization, for provision of a common interface for operating the different modules and for multi-criteria analysis and benchmarking of alternatives is Ecodistrict ICT.

Ecodistr-ICT: Decision Support tool phases

1.Indicators selection to calculate the impact of the different alternatives.
- Specific and coordinated indicators.

2. Creating design alternatives.

3.Impact calculation. Show the difference between the "As is" and the "design alternative"

4.Comparing alternatives. Indicator ponderation made by stakeholders (1 not a priority – 5 priority)

5.Informed decision making between the involved stakeholders (Citizen participation, Cityhall, Project team) to select the more convenient location.

This decision support tool enables cities to sustainably renew urban districts. It integrates views and preferences by the different actors involved in the process, such as the various Cityhall departments involved, the university, and other private stakeholders.

On the other hand, ENVIMET was also used to create a thermal model of the Sustainable Forest plot. It considered various alternatives in which the number of trees and their size changed.

It showed the variation of the PET and TMRT values on the diferent alternatives, concluding that the PET values did not vary significantly, whereas the variation of the TMRT values could be easily seen.
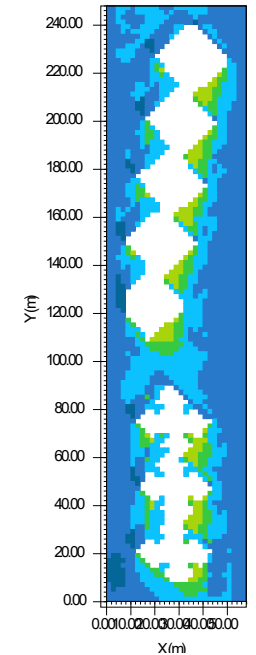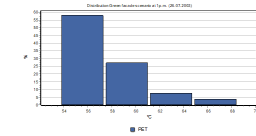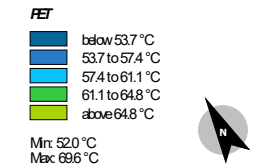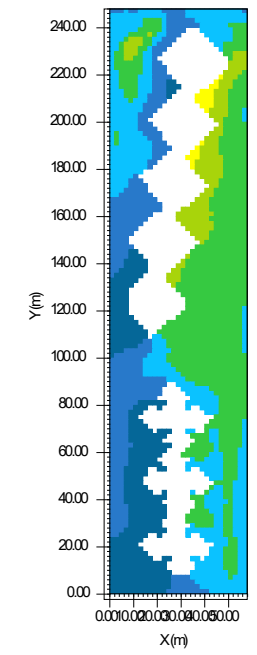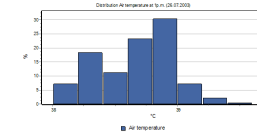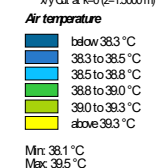
Design alternatives with Ecodistrict analysis, developed by Tecnalia
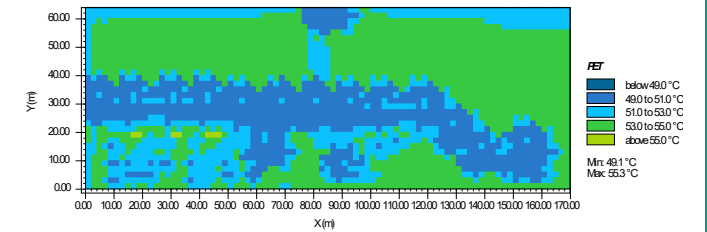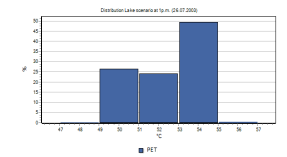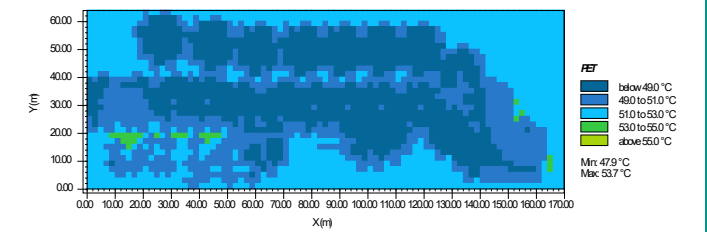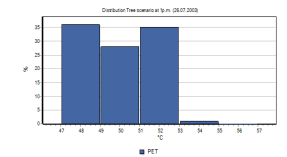
NEW GREEN SYSTEM, WROCLAW

In the case of wroclaw, the alternatives came from the citizen engagement phase. being the future users of the pilots the ones who proposed different uses and models to create the design alternatives. The consultations had started during preparing the application, because the residents of Olbin district were asked to identify on on-line maps places where they would like to have green interventions.

So, the very first step was to identify seven demonstrators, situated in the vicinity of green street, based on scientific analysis, local conditions and citizens expectations. The next step was to establish the Municipal co-designing team in cooperation with ARAW and WUELS.

The residents had the opportunity to tell how they imagine the future development of the area, what is most important to them and put their visions on the map. The topics of parking and waste shelters were the most emotional. Some of the residents were able to accept more greenery and recreational areas at the expense of reducing the space for parking cars, but there were people who wanted only parking lots. The location of waste shelters and their service was another hot topic. It also turned out that the residents were open to new solutions - green waste and bicycle shelters, rain gardens, community gardens. As a result, designers created concepts for each of the interiors, with solutions tailored to the needs of the residents in each courtyard.

Citizen engagement activities, Downtown area, Wroclaw

Q06

Does all stakeholders support the final design solution?

Description

The planning phase ends when a final design is to be delivered. The final solution is evaluated and assessed by calculating the impact of the KPIs that have been defined and compared with previous solutions. There is no such thing as a perfect solution for all. It is important to carry out a collaborative process where all the information and the process has been shared and has been transparent so the stakeholders understand the reason behind all decisions and can support the final design as well as take ownership.

*Suggested: **Transparency and linkage between the participation project and the decisions made is essential to create ownership and trust.***

More info

You can find more information on Stakeholder Identification and Citizen Engagement in the following links:

1. John F. Benson (2003) What is the alternative? Impact assessment tools and sustainable planning, Impact Assessment and Project Appraisal, 21:4, 261-280, DOI: 10.3152/147154603781766185 (Link)
2. GrowGreen Inventory of Tools
3. Green City Too. European Comission (Link)
4. Urban Adaptation Support Tool. Covenant of Mayors (Link)

Real Life Comments

You can find some comments collected from GrowGreen stakeholders. The online application foresees to include a space for live real life comments from all users.

> *It is important to remember that whilst the Demonstration project itself is a 'Living Lab', the surrounding community are real people with real needs and priorities.*

MANCHESTER

> *The Valencia demonstration project has required the participation and teamwork of actors from all sectors of activity in the city: public, private, academia, NGOs and the media. This fact has required a coordination effort between all of them, an effort that has also had to be applied at the level of the council itself.*

VALENCIA

> *When we were looking for a landscape designer – it was hard to find the designer that was familiar with NBS, so it was our role to educate them, inspire them and co-design, setting up the goals and informing about the goals – informing people about the goals of the project, explaining why we were not going to spend the money on huge parking lots (even with permeable surface) was challenging.*

WROCLAW

WEST GORTON COMMUNITY PARK, MANCHESTER

It is important to remember that whilst the Demonstration project itself is a 'Living Lab', the surrounding community are real people with real needs and priorities. Despite an established programme of activities with various groups in West Gorton, Groundwork, our contracted engagement partner, alongside the Guinness Housing Trust, still found this community difficult to engage.

The most effective engagement was going to the footfall hotspot in the area (the local school at pick up time in the afternoon) with a walk-in container unit that people could physically walk in to and discuss the design ideas with the landscape design team. This approach of bringing the consultation to the community, with quite a low-tech approach resulted in the largest numbers of people engaging in the design process.

Aspirations from the community were initially fairly low in terms of what their 'new park' might look like, for example some asking simply for "a new set of swings".This is a good example of how patient listening, alongside pushing their boundaries of citizen expectation, resulted in the delivery of something quite different to the standard municipal park, which had been the expectation.

General floorplan, West Gorton community park, Manchester

GrowGreen Case Studies (2/3)

NATURE-BASED SOLUTIONS IN BENICALAP, VALENCIA

The Valencia demonstration project has required the participation and teamwork of actors from all sectors of activity in the city: public, private, academia, NGOs and the media.

This fact has required a coordination effort between all of them, an effort that has also had to be applied at the level of the council itself.
Indeed, the abundance of precautions and requirements for the adequate execution of public works and the need to adjust to the project deadlines, has made necessary the effort for an interdepartmental coordination.

The different municipal services have had to go hand in hand with the other partners responsible for the different actions of the pilot to be able to respond with agility to the Grow Green schedule.

Citizen engagement activities, Benicalap, Valencia

NEW GREEN SYSTEM, WROCLAW

When we were looking for a landscape designer – it was hard to find the designer that was familiar with NBS, so it was our role to educate them, inspire them and co-design, setting up the goals and informing about the goals – informing people about the goals of the project, explaining why we were not going to spend the money on huge parking lots (even with permeable surface) was challenging.

Engaging citizens in the process of designing helps and encourages them to take care of the demos. During one series of workshops we had invited citizens to plant the flowers and shrubs together with designers and municipal workers, it turned out that some of the people had never done it before. There was one boy with his grandmother – they brought their own tree and planted it and it was very uplifting moment.

Citizen engagement activities, Downtown area, Wroclaw
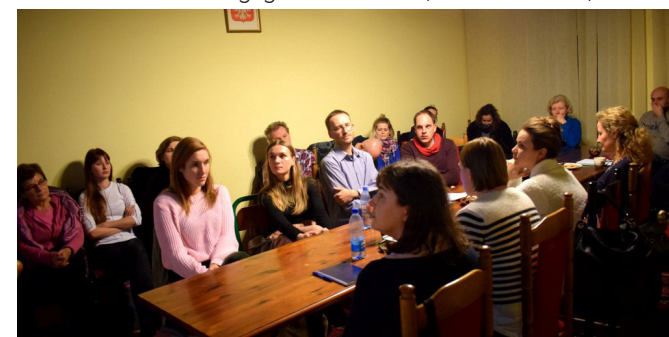
02

MOBILISING PHASE

The mobilizing phase is where the projects are evaluated in terms of feasibility and financial mechanisms are put into place to deliver the project.
There are several milestones to achieve in this phase in order to accomplish a collaborative mobilizing phase. We have expressed these milestones in the form of questions:

• Have a Business Case/Financial Assessment been elaborated?
• Have Financing Mechanisms been identified?
• Is there a Community Management/Maintenance Plan?

Again, these questions do not have to follow a lineal step by step process, but again it is possible to jump from one question to another following the different project momentums. It is essential that all milestones have been collaboratively achieved including all stakeholders knowledge. In the following sub-sections we will explore each one of these milestones.

Q01 Have a Business case/Financial Assessment been elaborated?

Q02 Have Financing mechanisms been identified?

Q01

Have a Business Case/Financial assessment been elaborated?

Description

In order to deliver NbS projects, it is important to identify appropriate and clear budget or business case, linked to a management plan.
It could be explored different possibilities for the delivery of NbS projects, from public-private-partnerships or the leverage of existing local initiatives or other initiatives from NGOs.

It is very relevant to define along the project a co-maintenance plan for the long-term maintenance of the NbS solutions. This creates ownership among the stakeholders and citizens and they will be more engaged to maintain the implemented solutions.

Creating and putting in place instruments for NBS start-ups and applying crowdsourcing mechanisms for implementing and monitoring the project is advised.

*Suggested: **The project implementation needs to have a clear businness case, though Public-private-partnerships, Local initiatives, NGOs for delivery of NBS. Comaintenance plan should be defined for the long-term maintenance.***

More info

You can find more information on business cases or financial assessments in the following links:

1. Growgreen resources website. (**Link**)
2. Manchester Green and Blue infrastructure strategy, Implementation Plan Refresh 2021-25. Manchester City Council
3. Towards a Nature-based Solutions Strategy in the city of Valencia, Climate proofing urban planning through NbS. Valencia
4. Plan działań na rzecz błękitno-zielonej infrastruktury ze szczególnym uwzględnieniem rozwiązań opartych na naturze (typu NBS). Wroclaw

Real Life Comments

You can find some comments collected from GrowGreen stakeholders. The online application foresees to include a space for live real life comments from all users.

> *The strategy provides the hooks and opportunities within the objectives and headline actions for partnerships and projects to evolve.*

MANCHESTER

> *One of the greatest complexities in understanding NBS as profitable solutions is due to the fact that these benefits fall on different actors, and the beneficiary of the savings is not necessarily the same institution that makes the investment.*

VALENCIA

> *Wroclaw Municipality introduced the policy to include NBS in all municipal investments. The NBS are a part of standard solutions that have to be taken under consideration in public tenders.*

WROCLAW

WEST GORTON COMMUNITY PARK, MANCHESTER

Due to the way in which the cost plan was structured within the tender documents (with a cost per item broken down by the three sections of the park, but then with profits and overheads/setup costs as separate lines), it is extremely difficult to provide a cost 'per NBS'. It could be helpful to structure this in such as way that the costs per NBS could be established, to assist with future business cases and compilation of cost evidence locally going forward.

On the other hand, Climate Emergency has acted as the catalyst for investment in new tree-planting. Sustainable travel investment has provided us with significant Bee Network investment. Area-based regeneration has provided us with the landscape-led opportunities outlined in Mayfield and Victoria North.

The strategy provides the hooks and opportunities within the objectives and headline actions for partnerships and projects to evolve, building confidence that this is the direction Manchester is heading. It's a clearer route for diverse and varied investment in green and blue infrastructure.

The new Implementation Plan proves the point that investment into GI is tangible, secure and desirable. From major investor and landscapeled approaches such as Mayfield and Victoria North, to Government-driven campaigns like the Green Recovery Challenge fund, the action plan gives us the confidence to develop strong project bids and take advantage of these opportunities.

Demos construction, West Gorton, Manchester

NATURE-BASED SOLUTIONS IN BENICALAP, VALENCIA

During the Grow Green Project, one of the main objectives to be achieved is to demonstrate the profitability of the implemented business models, to ensure that the proposed solutions are useful for solving problems and economically sustainable over time, so that they can be scaled for use. at the city level with a guarantee of success.

In the case of the NBS, it is necessary that all the agents involved know and understand the benefits that these solutions offer. When a nature-based solution is launched, it must be taken into account that we are going to obtain different types of benefits.

Direct benefits: These would be results directly attributable to the NBS, such as: CO2 capture, reduction in the amount of water discharged into sewage networks or energy savings for households.

Indirect benefits: These would be benefits that affect the welfare of society and increase the resilience of the city in a broad way, such as, for example, the improvement of the well-being and health of citizens, improvements in security in the real and perceived area, improvement in the quality of the space or improvement of social cohesion.

One of the greatest complexities in understanding NBS as profitable solutions is due to the fact that these benefits fall on different actors, and the beneficiary of the savings is not necessarily the same institution that makes the investment. For example, the capture of CO2, even though it is a global benefit, is not an attribution that "parks and gardens" have to measure

or take responsibility for. In the same way, the improvement in the health and well-being of citizens that an NBS produces will affect the Department of Health, producing savings in the number of visits to the doctor and care, even if it is not the department that has made the investment. A lower discharge of water to the sewage system implies a reduction in the water to be treated in purification plants, and in the same way this saving does not fall on the agent who has made the investment in the NBS whenever we see this cost-benefit analysis of a departmental way. Therefore, the key point to understand the profitability of the NBS models is to see the city as a whole, go up a step in the

analysis by departments, and carry out a global cost-benefit analysis at the City level. Therefore, the nature-based solutions strategy should ideally be integrated into all city government departments globally, at a higher level, and should be understood and supported by all department heads involved. In some way, the ideal would be that all the beneficiaries could contribute to cover the cost of the implementations initially.

Demos construction, Benicalap, Valencia

NEW GREEN SYSTEM, WROCLAW

The NBS are embedded in Wroclaw Municipality strategic and urban planning documents. One of the first city's strategic documents referring to blue-green infrastructure is the Wroclaw City Masterplan which is the main document shaping the spatial planning policy in the city.

The new Master plan was preceded by other regulations such as a Mayoral Ordinance on actions to protect and develop greenery in 2016 (new ordinance is from 2019). The main goal was to improve the greenery administration in terms of planning, coordination and monitoring of planting trees. There was created "green area bank" used as a reserve for planting trees, as well as the "register of green investments" (ie. new tree planting, tree cutting, greenery inventory). Annual and multi-year plans for planting trees are created which include recommendations for locations of new parks, forests, and accompanying greenery.

There is also a City Council resolution on greening/real estate tax decrease. Wroclaw Municipality offers for residents financial incentives that encourage and promote creating green roofs and walls. Residents may apply for an exemption or decrease in real estate tax: if the greenery covers over 80% of the entire roof a full exemption is granted; if the greenery covers 50-80% of the roof the tax reduction is proportionate, similar rules apply to green walls.

The latest document adapted in 2019 is the Urban Climate Change Adaptation Plan for Wroclaw. The Plan has a very strong focus on nature-based solutions. The blue-green infrastructure action plan, that has been developed as a part of GrowGreen project is strongly connected with the Urban Climate Change Adaptation Plan.

As a result Wroclaw Municipality introduced the policy to include NBS in all municipal investments, so there is no extra budget dedicated for NBS. The NBS are a part of standard solutions that have to be taken under consideration in public tenders.

Demos construction, New green system, Wroclaw

Q02

Have Financing Mechanisms been identified?

Description

A financial plan for the NbS project delivery has to be developed. For this, it is necessary to assess the current financing available for the NbS project delivery and the additional financing needed.

It is important to identify a clear budget for the project delivery as well as for the project maintenance in the long term. As well as it has to be reserved a specific budget for "unexpected" constraints during project delivery.

*Suggested: **Clear budget to be defined for the project delivery and project mantainance in the long term. A specific budget envelop should been reserved for "unexpected" constraints during project delivery.***

More info

You can find more information on business cases or financial assessments in the following links:

1   Growgreen resources website. (**Link**)
2   Manchester Green and Blue infrastructure strategy, Implementation Plan Refresh 2021-25. Manchester City Council
3   Towards a Nature-based Solutions Strategy in the city of Valencia, Climate proofing urban planning through NbS. Valencia
4   Plan działań na rzecz błękitno-zielonej infrastruktury ze szczególnym uwzględnieniem rozwiązań opartych na naturze (typu NBS). Wroclaw

Real Life Comments

You can find some comments collected from GrowGreen stakeholders. The online application foresees to include a space for live real life comments from all users.

"

The original intention, given this was an entirely new park, in a largely redeveloped area of housing, had been to create a domestic household 'levy' to cover maintenance costs. This clause, requiring a nominal contribution annually, was inserted into the property deeds of all the surrounding new privately owned and rented properties.

MANCHESTER

"

We believe that this type of "Green Clauses" also send a message to the market about the position that the City Council is taking to address this type of problem in the future.

VALENCIA

"

Green infrastructure solutions generate the highest costs at the beginning, before the plants reach their final shape, while they do not require as frequent watering or care as traditional solutions, including lawns or formed hedges.

WROCLAW

WEST GORTON COMMUNITY PARK, MANCHESTER

As described in the earlier section around long term maintenance, budget for this is a topic which is very pertinent to ANY new installations of green infrastructure.

In the specific instance of West Gorton, the original intention, given this was an entirely new park, in a largely redeveloped area of housing, had been to create a domestic household 'levy' to cover maintenance costs. This clause, requiring a nominal contribution annually, was inserted into the property deeds of all the surrounding new privately owned and rented properties. New social housing was exempt. However, this mechanismwas effectively vetoed by a local political Member, who objected on the basis that this was not done in other, more affluent areas of the city with high quality green spaces.

Since the park at West Gorton has been installed, further conversations have been underway within MCC about utilising this mechanism in other places where the local authority would be responsible for the maintenance of a new green space. It has successfully been implemented for new apartments around an existing municipal park – albeit with a more affluent occupier than could be the case in West Gorton. Conversations around this topic have also been started with senior politicians. It is definitely possible that this levy will be re-visited at West Gorton at a later date.

Demos construction, West Gorton, Manchester

NATURE-BASED SOLUTIONS IN BENICALAP, VALENCIA

As a first approach to promote and facilitate the sources of financing for NBS, the Valencia City Council has promoted the implementation of "Green Clauses" for the current bidding processes in the city of Valencia, so as to favor the use of these solutions. compared to other interventions that produce similar results and serve as a breeding ground for the promotion of companies and service providers aligned with this type of solution. We believe that this type of "Green Clauses" also send a message to the market about the position that the City Council is taking to address this type of problem in the future.

Although these types of clauses can promote the use of NBS, we are aware that more effort is needed to promote the use of NBS widely, and offer sources of financing that facilitate the introduction of these innovative products in the usual processes of town hall purchase. In this sense, Valencia is developing a new urban strategy that integrates innovation to improve the quality of life of citizens at the core of the strategy, creating an overlap between strategy and innovation to obtain better results in solving problems and needs of the city, and the "Innovative Public Procurement - CPI" as a financing instrument to promote this type of solutions.

CPI allows modeling the future of cities by responding to different city challenges such as Urban Environmental Sustainability, which involves solutions such as green infrastructures, enabling sustainable mobility, the implementation of clean energy sources and the expansion of economic models. circular.

Demos construction, Benicalap, Valencia

NEW GREEN SYSTEM, WROCLAW

In the case of Wroclaw, the areas designated for demonstrators already had their managers. After completing the stage of implementing the demonstrators, they were handed over to the existing managers, i.e. Zarzad Zasobu Komunalnego (ZZK), Wroclawskie Mieszkania (WM), Zarzad Zieleni Miejskiej (ZZM) and Zarzad Drog i Utrzymania Miasta (ZDiUM).

The areas were designed and constructed in such a way as to keep the costs of greenery maintenance as low as possible. In area no. 3, at the request of residents, an area was prepared for vegetable gardens, which are maintained by the residents. Also in the other courtyards some of the gardens are under informal care of the residents. In area no. 6 there is also a herb garden. Some of the lawns were replaced by flower meadows

If we compare the maintenance costs of the interiors of the project before and after its implementation, the costs have of course increased, because previously there was practically no greenery and infrastructure such as green garbage cans, bicycle shelters, benches, playgrounds for children.

However, if one compares the maintenance costs of a green yard with the interiors realised with GrowGreen, these costs are not so high. Green infrastructure solutions generate the highest costs at the beginning, before the plants reach their final shape, while they do not require as frequent watering or care as traditional solutions, including lawns or formed hedges.

Demos construction, New green system, Wroclaw

03

EVALUATING
PHASE

The evaluating phase is where the project is monitored and evaluated so that it is possible to check its performance. This is important because you can learn and an improvement can be applied in a future project.

There are several milestones to achieve in this phase in order to accomplish a collaborative mobilizing phase.

We have expressed these milestones in the form of questions:

Q 01   **Has a Monitoring & Evaluating system been developed?**

Q02   **Has an evaluating report been done?**

Q01

Has a monitoring and evaluation system been developed?

Description

A monitoring system must be defined. First we need to define the data to be collected and how it will be collected, that means what monitoring equipment has to be installed to gather data.

The identification of data to be collected will depend on the challenges and objectives of the NbS project. For this Key Performance Indicators are selected and these will be used to monitor progress and effectiviness of the NbS project in the long term.

The required monitoring equipment to gather data will consider the use of ad hoc devices and remote sensing technologies. Citizens engagement might also be used for objective data gathering: i.e. citizens observatories to gather real time data by means of specific portable sensor/device, respecting data privacy issues; as well as for subjective data gathering: i.e. subjective/perception throughout surveys, etc.

It is important that the monitoring system defined uses standardizeddata models to harmonize the data structures for measurements, indicators, real time and context data (i.e. FIREWIRE, ISO, etc).

Finally, it is necessary to learn from the data collection to not repeat same mistakes and have a continuous improvement. For this, reflexive monitoring thinking could be applied to modify design and to inform planning decisions. The project results could be used to scale up lessons learned to other places in the city.

The monitoring and evaluation system will also contribute to City Platforms (i.e Smart cities, Urban Agenda 2030, etc).

Suggested: **Key performance indicators are to be used to monitor progress and effectiviness of the NbS project in the long term, through monitoring equipment and citizen engagement. Monitoring system should follow standarized data models to harmonize the data structures for measurements, indicators, real time and context data.**

More info

You can find more information on monitoring and evaluation systems in the following links:

1   Growgreen resources website. (**Link**)
2   Manchester city council.
3   The University of Manchester.
4   Las Naves and Valencia city council.
5   Valencia Politechnic University.
6   Wroclaw city council.
7   Uniwersytet Przyrodniczy we Wrocławiu.

Q01

Real Life Comments

You can find some comments collected from GrowGreen stakeholders. The online application foresees to include a space for live real life comments from all users.

> " The park is a Living Lab, with extensive monitoring of a range of themes across the site, all reporting on the park's functionality and usefulness for many years to come.

MANCHESTER

> " The simplicity of the indicators selected to measure the impacts and the ease with which data can be collected thanks to the installation of sensors, has turned out to be key to knowing the benefits that have been generated in the neighborhood thanks to the implementation of a series of solutions based on nature.

VALENCIA

> " Monitoring, both initial and final, is divided into three sections: environmental monitoring, social monitoring and economic monitoring, due to the nature of individual research areas.

WROCLAW

WEST GORTON COMMUNITY PARK, MANCHESTER

A monitoring and evaluation strategy was deployed in West Gorton to assess the impact of the new community park. Key themes under consideration were rainfall-runoff and temperature. Other co-benefits assessed were biodiversity, water quality, health and wellbeing, social justice, participation and governance. The strategy therefore employed a range methods and approaches, including the deployment of sensors, surveys, interviews, focus groups and use of secondary and supporting data.

Prior to the development of the West Gorton Community Park, baseline monitoring was undertaken to capture a pre-greening scenario in 2018. Following construction of the new park, detailed monitoring has been undertaken during 2020,2021 and 2022. Some of this monitoring has been snapshot and discrete, such as biodiversity surveys, whereas other approaches have been continuous, such as sensor-based water and temperature monitoring.

Temperature monitoring, West Gorton Community Park, Manchester

NATURE-BASED SOLUTIONS IN BENICALAP, VALENCIA

In general terms, the Monitoring and Evaluation process to which the Grow Green pilot in Valencia has undergone has turned out to be useful for studying what improvements have been achieved in physical and environmental terms, but also what changes may be occurring with respect to some social issues such as social cohesion, citizen participation and governance.

The simplicity of the indicators selected to measure the impacts and the ease with which data can be collected thanks to the installation of sensors, especially in the case of the study of physical and environmental transformations, has turned out to be key to knowing the benefits that have been generated in the neighborhood thanks to the implementation of a series of solutions based on nature.

In this sense, the monitoring work carried out allows increasing knowledge about this type of solutions, since knowledge is being generated about the feasibility of integration, depending on what type of interventions, depending on the type and characteristics of the urban environments that are being considered. Likewise, information is being compiled regarding the best practices regarding the execution and maintenance of this type of solutions. which, ultimately, can be useful and can help establish action criteria in future urban green infrastructure plans.

Regardless of the specific information regarding the impacts generated in relation to thermal stress, the increase in biodiversity, the efficient management of water, air quality, the administration and use of green

areas and the rest of the social aspects on those who Nature-Based Solutions can generate a direct benefit, and as a result of the field work carried out over the last three years, it is important to refer to a series of issues that are not likely to be measured through a KPI. It is, in short, a series of lessons learned that should be taken into account in order to implement this type of measure in other places.

Heat stress monitoring devices, Benicalap, Valencia

NEW GREEN SYSTEM, WROCLAW

Monitoring of the project areas is divided into two stages - initial monitoring (so called pre-greening monitoring) - carried out before the introduction of selected nature-based solutions (i.e. before the introduction of pocket parks, green areas and parklets in the project areas), and final monitoring (post-intervention monitoring), carried out for 2,5 years after the introduction of the NBS. In Wrocław, as part of the Grow Green project, initial (pre-greening) monitoring of all project areas was carried out from 1.09.2018 to 31.08.2019. The final monitoring is being carried out since 17.02.2020 and will last for 2,5 years (end date is September 2022).

Monitoring - both initial (pre-greening) and final, is divided into three sections: environmental monitoring, social monitoring and economic monitoring, due to the nature of individual research areas. Each of these sections is described in the Q02.

The results of monitoring under each individual KPI, is described in a single KPI report. All KPI reports together form one collective report on monitoring works – "The Monitoring and Assessment Report". The collective monitoring and assessment report has been issued in September 2022. Check mentioned document for further detail.

Demos construction, New green system, Wroclaw
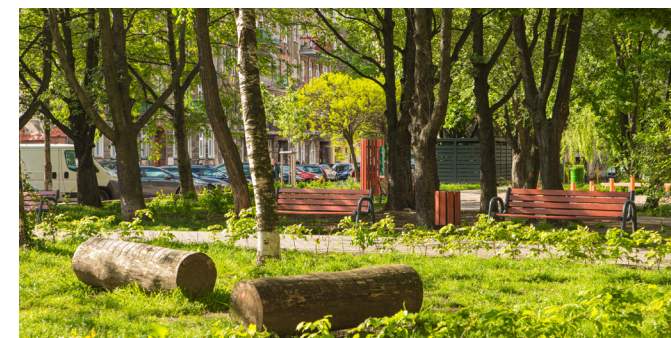
Q02

Have an evaluation and report been done?

Description

With the intention of learning lessons from every project to inform and improve in the next ones, it is important to evaluate, report and communicate the project's impacts

The monitoring will gather data that needs to be evaluated and finally the performance of the NbS project needs to be communicated. This reporting will be also done to non- technical groups/citizens towards awareness rising and educational purposes.

The monitoring of KPIs will contribute to the city reporting mechanisms and any lessons learned at project level will also betransferred to the NBS City Strategy.

*Suggested: **Reporting is to be done to non- technical groups/citizens towards awareness rising and educational purposes. Lessons learned at project level have to be transferrred to the NBS City Strategy***

More info

You can find more information on monitoring and evaluation systems in the following links:

1.   Growgreen resources website. (**Link**)
2.   Manchester city council.
3.   The University of Manchester.
4.   Las Naves and Valencia city council.
5.   Valencia Politechnic University.
6.   Wroclaw city council.
7.   Uniwersytet Przyrodniczy we Wrocławiu.

Real Life Comments

You can find some comments collected from GrowGreen stakeholders. The online application foresees to include a space for live real life comments from all users.

"

Stakeholders involved in design and implementation of the West Gorton Community Park have improved their knowledge of nature based solutions.

MANCHESTER

"

The impact on the neighborhood associative network is one of the expected results of the GrowGreen València project. The impact is, to date, unquestionable.

VALENCIA

"

The research also aims to assess the impact of introduced green infrastructure elements on the quality of environmental parameters in the whole city, and on increasing the city's climate resilience.

WROCLAW

GrowGreen Case Studies (1/3)

WEST GORTON COMMUNITY PARK, MANCHESTER

Extensive and detailed datasets on nature based solution performance and impact have been captured for West Gorton. The new community park has been a success in terms of reducing the storm runoff to the sewer system and alleviating issues of local flooding. Some cooling effect of the tree and vegetation planting is evident, particularly ground temperatures. Biodiversity has been enhanced, with a significant increase in trees, herbaceous plants and native wildflowers. Through detailed survey work, residents health and wellbeing have improved, with increases in physical activity. There has been an increase in park usage, with local residents feeling a sense of ownership and pride for the new park.

Through detailed interview work, stakeholders involved in design and implementation of the West Gorton Community Park have improved their knowledge of nature based solutions. Landscape professionals reported that the demo project had enabled them to "see differently" across the city, looking at new and existing sites as a source of nature based solution potential.Design practitioners involved in the project found the process had raised interest within their organizations. The West Gorton project also facilitated multi-sector partnership working which enabling shared learning and upskilling.

Water monitoring and biodiversity swale, West Gorton, Manchester

NATURE-BASED SOLUTIONS IN BENICALAP, VALENCIA

It has been a satisfactory evaluation due to the willingness of the people who have been part of the process. In addition, good harmony and willingness to participate in the final phase as the closure of a project from which esteem and affection emerge, as well as the interest in its continuity and replica on a city scale.

The GrowGreen València project has been and is a laboratory, also, of formulas for incorporating citizens into interventions on a local scale linked to sustainability. The project generates technical learning linked to solutions based on nature, technical-administrative learning that has allowed the management and execution of the multiple actions implemented, and technical-community learning that has guaranteed success in co-design and co-production. Thus, the incorporation of citizens in the decision-making spaces of the actions carried out has been the successful result of GrowGreen.

The technical assessment is positive, with special emphasis on the learning produced in its internal dimension, that is, in the administrative innovation related to the interdepartmental coordination of the Valencia City Council; and in its external dimension, with the call for participation through the Ideas Contest and the creation of the Espai Verd-Centre Cívic as a substantial contribution to strengthening the social fabric of Ciutat Fallera.

*Water retention and monitoring chambers, Benicalap. Valencia*

NEW GREEN SYSTEM, WROCLAW

Monitoring - both initial (pre-greening) and final, is divided into three sections: environmental monitoring, social monitoring and economic monitoring, due to the nature of individual research areas.

The environmental monitoring research in this project aims to indicate whether, and to what extent, the introduced solutions are able to improve the air quality parameters in the areas covered by the project (reduction of average air temperature, especially in relation to daily temperatures in summer, air humidity increase, air pollution reduction, including PM concentrations reduction, especially in heating season), increase the efficiency of rainwater retention and increase biodiversity in these areas. The research also aims to assess the impact of introduced green infrastructure elements (and other nature-based solutions) on the quality of environmental parameters in the whole city, and on increasing the city's climate resilience (i.e. reducing the negative effects of climate change and preventing them).

Social monitoring research in this project aims to indicate whether, and to what extent, the introduction of nature-based solutions, as well as participation of the local community in designing and creation of project demonstrators, has a chance to improve the quality of life and increase the sense of security among project area residents, increase the level of social cohesion, as well as environmental and climate protection awareness. The research is also to assess how the demonstrators are being used and whether they increase access to greenery and nature protection and conservation areas for the inhabitants of the areas covered by the project.

Economic monitoring aims to estimate potential economic benefits, business models and creation of green jobs thanks to the introduction of new green areas in the project area. As part of the economic monitoring, savings will also be estimated, obtained due to the introduction of nature-based solutions in dense urban development, e.g. avoided costs of runoff treatment.
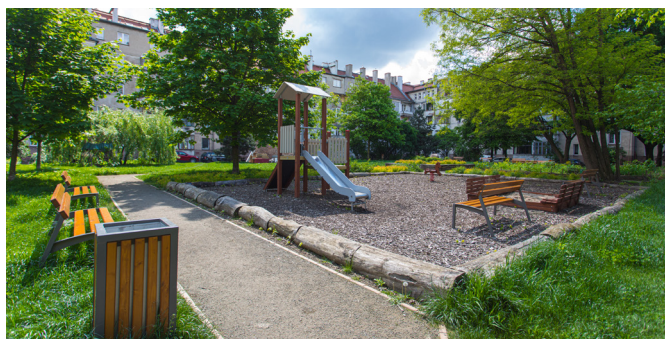
Demos construction, New green system, Wroclaw

4
GG CO-DESIGN DSS APP

GrowGreen co-design Decision Support System application

An online tool has been created which follows the same milestones that have been described in this Handbook. Its purpose is to help you visualize the process and see what has to be done to complete a process. You can feed the tool with your own "real life comments".

You can access the online "GrowGreenNbS Co-design tool" **here**.