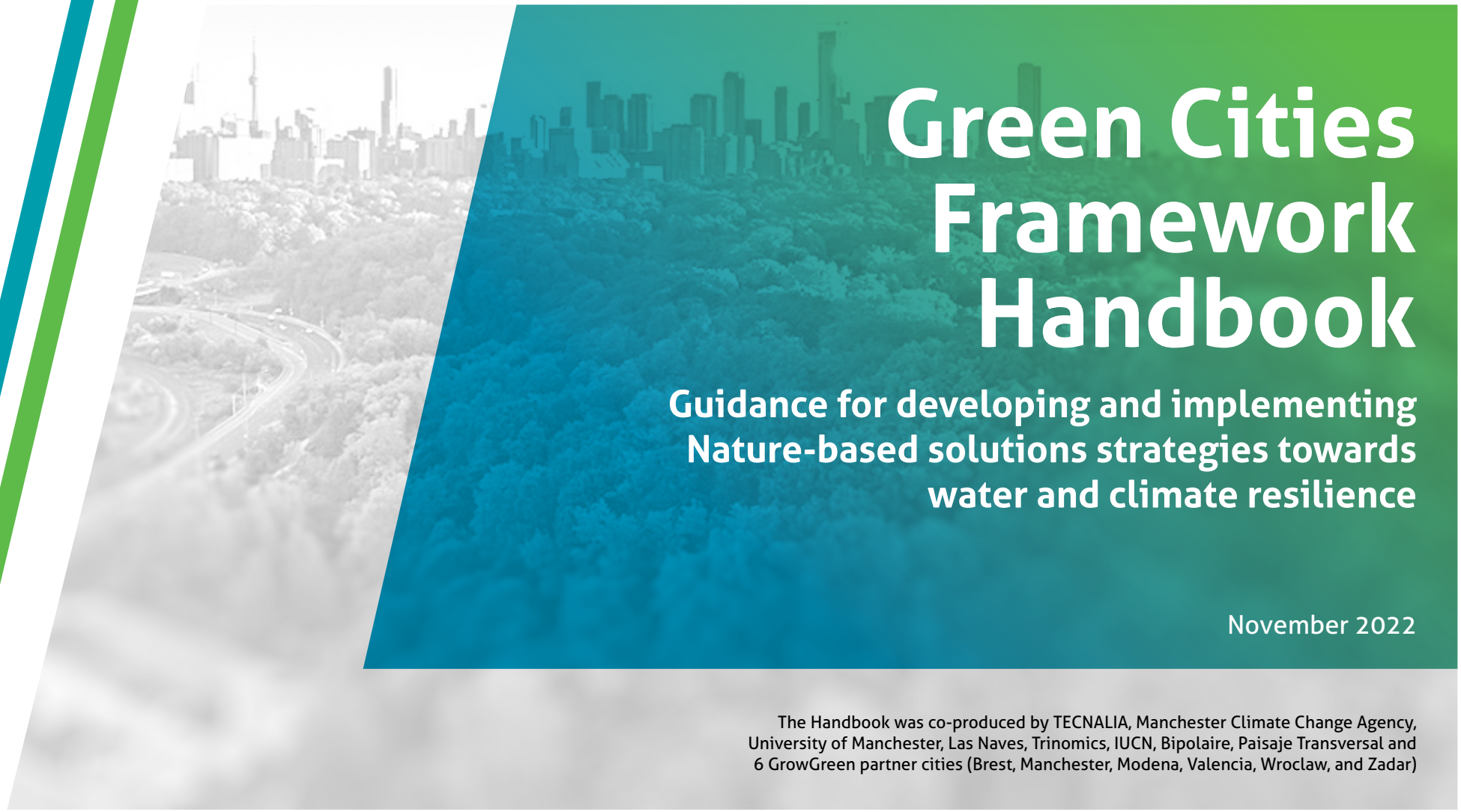

Green Cities Framework Handbook

Guidance for developing and implementing Nature-based solutions strategies towards water and climate resilience

November 2022

The Handbook was co-produced by TECNALIA, Manchester Climate Change Agency, University of Manchester, Las Naves, Trinomics, IUCN, Bipolaire, Paisaje Transversal and 6 GrowGreen partner cities (Brest, Manchester, Modena, Valencia, Wroclaw, and Zadar)

This project has received funding from the European Union's Horizon 2020 research and innovation programme under Grant Agreement number: 730283.

Preface

Today, it can be said that there is a consensus on the fact that embedding green and blue spaces in long-term city planning, development, and management, will help improving citizens´ health; reducing natural risks, such as flooding and heat stress, enhancing biodiversity by providing homes for wildlife; cleaning the air we breathe, create an attractive environment for citizens, visitors and investments, and the list goes on.

Despite all the many benefits that green spaces and waterways can provide, most cities still face several constraints of technical, policy and financial nature, which must be urgently overcome, with responsibility and determination, if we want to speed-up our race against climate change.

Renaturalisation, implies political commitment in the long term for the incorporation of green and blue spaces as integral component in city plans, from city strategies, land use plans, major development, and regeneration plans, to small-scale projects. Key to this, is the active involvement of those who will benefit from nature, towards a real co-creation of renaturalisation process. This co-creation approach implies going far beyond the compulsory one-way public hearing required as part of the plan approval process.

By harnessing the vision, motivation, and knowledge of potential beneficiaries – local citizens, developers, housing companies, the water company, health providers, local government, and others –it will be possible to develop social accepted and long-term successful plans for all.

> *"Healthy ecosystems are more resilient to climate change and provide life-critical services such as food and clean water", "By restoring degraded ecosystems and effectively and equitably conserving 30 to 50 per cent of Earth's land, freshwater and ocean habitats, society can benefit from nature's capacity to absorb and store carbon, and we can accelerate progress towards sustainable development, but adequate finance and political support are essential."*
>
> *Hans-Otto Pörtner. Co-Chair IPCC Working Group*

However, the cost-effectiveness of renaturalisation, has been widely questioned, particularly in relation to maintenance costs, despite the abundant scientific studies and reports providing evidence that point out on the opposite direction.

Therefore, a strong effort is still needed for socializing the benefits of renaturalization processes, to get political commitment and society support.

The involvement of beneficiaries in the renaturalisation process and their consideration as investors is nowadays being explored. Through investing their time and money, these are the people and organisations that stand to benefit from creating and managing new and existing green spaces and waterways. As well as finding new sources of funding, we should aim to re-direct existing sources of funding, to achieve better value for money and outcomes than those that are typically achieved.

Still, the role of spatial and urban planning instruments as enablers for NbS market is critical, as most NbS are mostly not commodifiable, nor privately financially available.

To put all of this into practice the Grow Green project works around the nature-based solutions concept and has produced a simple, easy-to-use package for supporting cities in the development and implementation of effective strategies for renaturing cities, allowing them to create innovative and inspiring ways to tackle major urban challenges, particularly climate change.

Gemma Garcia Blanco
Senior researcher -TECNALIA
Research & Innovation

This project has received funding from the European Union's Horizon 2020 Research and Innovation Programme under Grant Agreement No 730283

Acknowledgements

This handbook introduces the **Green Cities Framework (GCF)** a comprehensive guidance tool for any city to carry out its Nature-based Solutions City Strategy and implementation.

It provides a selection of tools and resources from Grow Green and beyond, and examples of how they have been used in Grow Green cities.

This handbook is intended for a wide audience of practitioners, from urban planners at local authorities to community groups, entrepreneurs, and non-governmental organisations.

The Grow Green GCF was co-produced by:

- Gemma Garcia-Blanco, Igone Garcia, Saioa Zorita (Tecnalia)
- Blanca Pedrola, Alejandro González, Héctor Muñoz (Bipolaire)
- Adam Barker, James Rothwell (University of Manchester)
- Francisca Hipólito, Mercedes Poveda (Las Naves)
- Kym Whiteoak (Trinomics)
- Iñaki Romero (Paisaje Transversal)
- Chantal van Han, Susanna Gionfra (IUCN)

and supported by the representatives from the 6 partner cities of the project namely Brest, Manchester, Modena, Valencia, Wroclaw, and Zadar.

For more information on this handbook, contact Gemma Garcia-Blanco (gemma.garcia@tecnalia.com).

GROW GREEN – Green Cities for Climate and Water Resilience, Sustainable Economic Growth, Healthy Citizens and Environments (Grant agreement No 730283). This project has received funding from the European Union's Horizon 2020 research and innovation programme.

This project has received funding from the European Union's Horizon 2020 Research and Innovation Programme under Grant Agreement No 730283

Picture credits Michelle Oddy

Content

This project has received funding from the European Union's Horizon 2020 Research and Innovation Programme under Grant Agreement No 730283

FOUNDATIONS

Conceptual approach

The **Green Cities Framework (GCF)** is the Grow Green project guidance tool for cities that are facing the challenge of developing and implementing Nature based Solutions (NbS) Strategies and action plans towards water and climate resilience.

Recent discussions[1], have shown that NbS may be more efficient in fighting climate change than engineering and technological solutions, both in terms of their investment costs, implementation, and resource consumption, and in relation to the diversity of the benefits that they provide.

The **Grow Green GCF** is specifically designed for the distinctive characteristics of NbS and uses a multi-scale approach mainstreamed with the scales of planning.

Why using this handbook?

Cities of all sizes and types can develop effective strategies for nature-based solutions, allowing them to create innovative and inspiring ways to tackle major urban challenges, such as flooding and heat stress.

Embedding NbS in this way in long-term city planning, development and management will reduce climate impacts, support health, and create an attractive environment for citizens, visitors, and investments.

This handbook is intended for a wide audience of practitioners, from urban planners at local authorities to community groups, entrepreneurs, and non-governmental organisations.

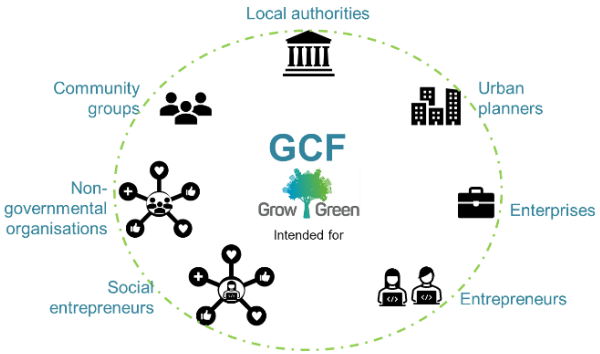

Figure 1 Potential GCF handbook users. Source: authors own elaboration.

[1] The European Conference "Nature-based Solutions to Climate Change in Urban Areas and their Rural Surroundings: Linkages between science, policy and practice" November 2015 Bonn, Germany

EC 2021 Evaluating the impact of Nature-based Solutions: a handbook for practitioners NbS handbook, https://research-and-innovation.ec.europa.eu/news/all-research-and-innovation-news/evaluating-impact-nature-based-solutions-handbook-practitioners-2021-05-06_en

Network Nature https://networknature.eu/

This project has received funding from the European Union's Horizon 2020 Research and Innovation Programme under Grant Agreement No 730283

Guiding principles

Whilst there is no set formula for an NbS strategy, there are principles that contribute to the success of development and implementation.

- ✓ Applying **strategic thinking** about planning.
- ✓ Looking for a **shared city vision** - interdepartmental working is vital.
- ✓ Using a **co-participative, inclusive, multi-stakeholder approach.**
- ✓ **Building a stable working group** to guarantee implementation.
- ✓ Identifying potential **beneficiaries and users- no one left behind.**
- ✓ Applying a **knowledge-based** decision making. Using evidence built on ground-breaking cutting-edge research and guidance, means more informed decision making
- ✓ Aligning your strategy with **policy landscape and planning frameworks.**
- ✓ Defining **clear, achievable, and measurable targets** and objectives and implementation pathway.
- ✓ **Mainstreaming blue and green infrastructure and NbS into local agenda,** not competing to other priorities.
- ✓ Aiming at elaborating a flexible, adaptable, and dynamic action plan able to be refreshed regularly to include new priorities in a changing world.
- ✓ Defining **efficient funding, business model and delivery** mechanisms.
- ✓ Defining **city optimized key performance indicators** to monitor qualitative and quantitative impact.
- ✓ Applying a systematic and long-term **monitoring and reporting.**

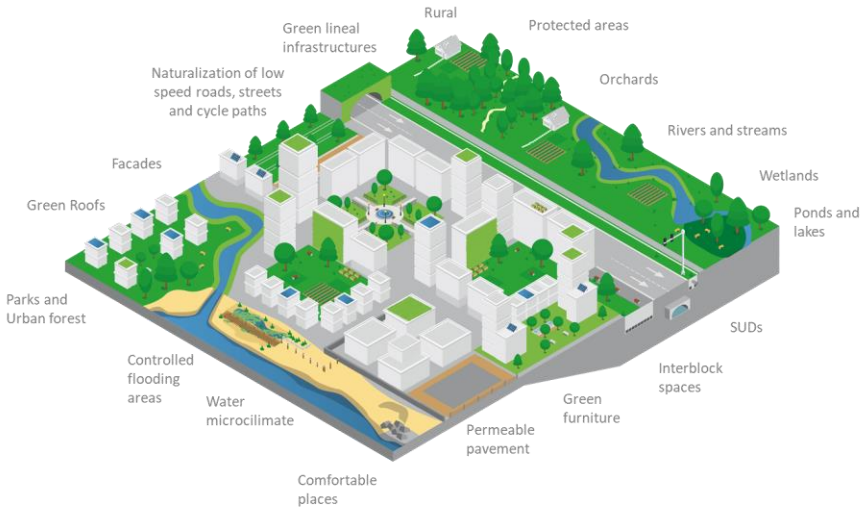

Figure 2 Nature-based Solutions at different scales. Source: authors own elaboration.

This project has received funding from the European Union's Horizon 2020 Research and Innovation Programme under Grant Agreement No 730283

How to use this handbook: structure and content

The handbook is structured in 3 modules. It starts with **MODULE 1** for the operational set up of the strategy. **MODULE 2** on the development of the NbS strategic document, that includes 3 core interactive phases: **PLANNING, MOBILIZING,** and **EVALUATING & REPORTING.** Each of these phases then breakdown into steps to guide the process. **MODULE 3** focuses on the co-design of NbS projects.

The Grow Green project supports the upscaling of the implementation of city NbS strategies and projects and has produced several outcomes and resources, ranging from city-level implementation of NbS demonstration projects, to factsheets, webinars, and capacity building activities to guide the development and implementation of NbS strategies in cities.

The handbook navigates through each component of the GCF, providing a description and aims, tips for successful application and resources from the Grow Green project and provides links to external resources to deepen knowledge if needed, and real cases comments and inspirational examples from Grow Green case studies.

The GCF takes cities through the different elements of developing a successful strategy NbS, ensuring the outcome is grounded in evidence, co-developed with stakeholders and easy to put into practice.

The components of the framework should be read organically rather than sequentially. This means that each city can find their own entry point to the process, depending on their interests, momentum of opportunity and maturity in the development process.

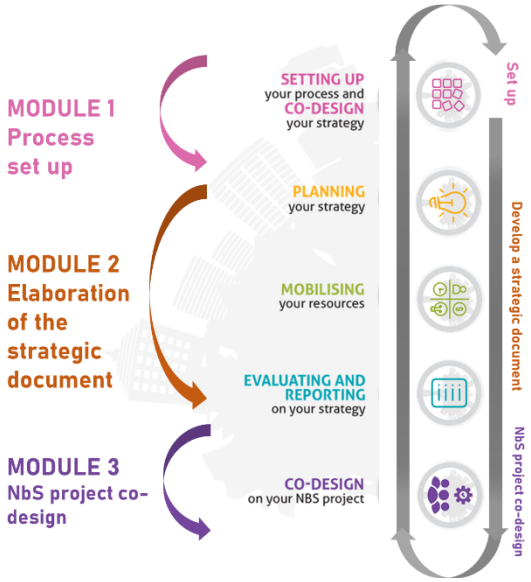

Figure 3 GCF Handbook structure. Source: authors own elaboration.

This project has received funding from the European Union's Horizon 2020 Research and Innovation Programme under Grant Agreement No 730283

Figure 4 -Summary of structure and content of GCF Handbook. Source: authors own elaboration

This project has received funding from the European Union's Horizon 2020 Research and Innovation Programme under Grant Agreement No 730283

Nature-based Solutions Strategies in Grow Green cities

The GCF has been tested in the 6 Grow Green partner cities (see Figure 5) which allowed the incorporation of improvements along the process considering cities feedback accordingly.

An outline of the co-created NbS strategies and action plans delivered in the 6 Grow Green partner cities is summarized in Figure 6.

Nature-based Solutions Strategy for stormwater management in Brest. Balancing grey and green solutions to fit sanitation compliance and flood risk mitigation.

Manchester Green and Blue infrastructure Strategy. Implementation Plan Refresh 2021- 25. Generating evidence for social impact and build investment confidence.

Nature-based Solutions Strategy of the city of Modena. Systemic approach and integrated planning.

Nature-based Solutions Strategy for climate proofing urban planning in Valencia. Nature-based solutions as adaptation measures in planning decisions.

Bule and Green Infrastructure Action Plan for Wroclaw. Multiscale deployment of micro nature- based solutions.

Nature-based Solutions Action Plan for the city of Zadar: climate change as an opportunity.

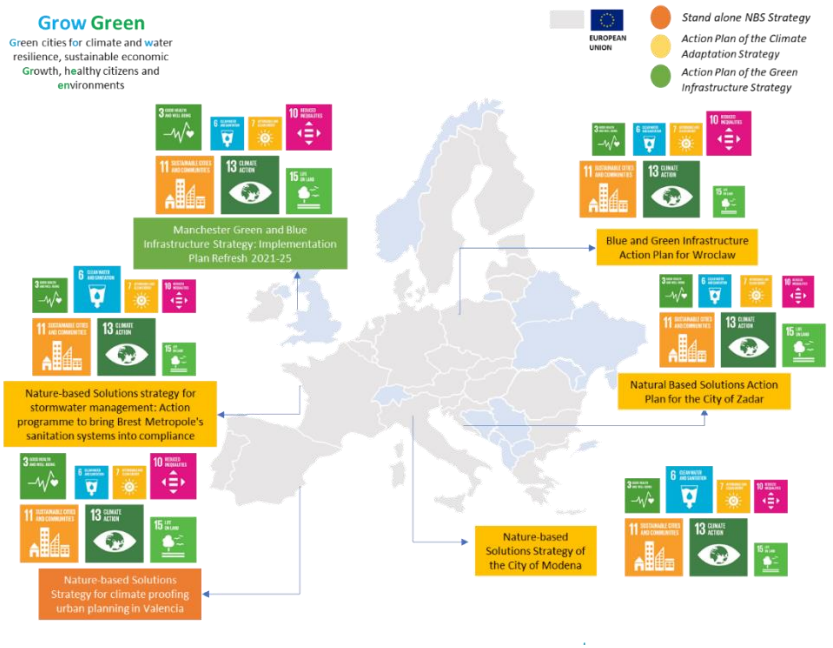

Figure 5 Strategies and action plans delivered in the Grow Green partner cities and its contribution to SDG. Source: Garcia-Blanco et al (2022). Grow Green D3.3 Nature-based Solutions Strategies in Grow Green Cities and Fellow City Pilot Projects.

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Manchester

The ***Implementation Plan Refresh 2021-25*** updates and refines the *Manchester's Great Outdoors: A Green Infrastructure Strategy for Manchester (MGO).* It proposes 18 headline actions focused on Nature and networks, Biodiversity, River Valleys, Trees and Woodlands, Gardens, and Health and Ageing. The headline actions are supported by different projects pipeline.

Valencia

The ***Nature-based Solutions strategy for the city of Valencia*** is under the umbrella of the city's *Green and Biodiversity Plan* and has fed the new *Master Plan* (both in development). The NbS strategy is articulated around three strategic objectives (Resilient Urbanism against climate change, Environmental health and comfort and Ecological and multiscale connectivity and accessibility) linked to amendments.

Wroclaw

The ***Blue-Green Infrastructure Action Plan with special emphasis on nature-based solutions (NBS-type)*** incorporates the NBS into the *Municipal Climate Change Adaptation Plan 2030 of the City of Wrocław*. The plan includes a proposed classification of NBS- to facilitate their application-, a description of the NBS implemented in GrowGreen and concrete application proposals for specific areas.

Brest

Nature-based Solutions strategy for stormwater management has been developed as an ***Action programme to bring Brest Metropole's sanitation systems into compliance.*** This plan includes two complementary and articulated axes: the creation of underground structures for the temporary storage of excess water and the reduction of rainwater inflows into the combined sewerage system

Modena

The Nature-based Solutions Strategy of the City of Modena places at the centre the Sustainable Energy and Climate Action Plan 2030 (SECAP), supported by the General Urban Plan, Grow Green, the Sustainable Urban Mobility Plan (SUMP) and the European project Zero Carbon Cities. The Action Plan works on 3 levels City level (retention and the dry swales); District level (forestation, greenery and dispersing floorings); and site level (green roofs and walls, rain gardens and dry swales) to take the city out of a hydraulic load situation.

Zadar

The ***Natural Based Solutions Action Plan of the City of Zadar***, included in the Program for air protection, ozone layer, climate change mitigation, and adaptation to climate change, elaborate and defines measures related to climate change adaptation that are based on nature-based solutions. It takes its objectives of the Climate Change Adaptation Strategy for the Republic of Croatia and includes of 22 measures.

Figure 6 Summary of co-created NbS strategies and action plans in the 6 partner cities. Source: Garcia-Blanco et al (2022). Grow Green D3.3 Nature-based Solutions Strategies in Grow Green Cities and Fellow City Pilot Projects.

This project has received funding from the European Union's Horizon 2020 Research and Innovation Programme under Grant Agreement No 730283

MODULE 1

SETTING UP your process

01. Define a vision for your NbS strategy

02. Set up your local working group

03. Make your stakeholder and citizen engagement plan

04. Collaboratively design your strategy

This project has received funding from the European Union's Horizon 2020 Research and Innovation Programme under Grant Agreement No 730283

SETTING UP YOUR PROCESS

01 Define a vision for your NbS strategy

Description

NbS contributes to enhancing strategic thinking and the positioning of ecological processes and their benefits as relevant planning criteria for more resilient territorial development.

Your NbS strategy needs a **Vision** with aims, objectives and a clear scope based on local needs. This vision will help keeping all actions aligned towards a common goal.

Your vision should reflect the political will and the commitment by all departments of the municipality to a shared strategic view in the long term towards a more resilient, healthy, and safer city, by means of renaturalisation processes and NbS.

The sponge city concept refers to a way of urban management that allows cities to resolve urban waterlogging, improve water storage and discharge capacity, enhance water quality, and alleviate heat island effects through a mix of nature-based solutions and grey solutions.

Grow Green resources

Grow Green compendium of nature-based and 'grey' solutions to address climate and water-related problems in European cities.

More information

Climate-ADAPT

H2020 RESIN Adaptations Options Library

Wuhan Sponge City Programme

Real life comments

"The framework has inspired cities on reinforcing the importance of having a clear strategic and long- term vision based on local needs".

"It is crucial that the vision is understood and shared by all stakeholders and citizens".

"The definition of a strategic and long-term vision has helped cities to reflect on social and economic inequalities. Manchester incorporated a new concept called progressive resilience integrated into their action plan"

"Applying a strategy and long-term vision for the city has allowed them to find a common threat across all city policies, strategic and planning documents. This is an innovative approach since previously the vision was defined for specific purposes".

Grow Green Case studies: Manchester City overarching vision for the Green and Blue Infrastructure Strategy

"By 2025 climate resilient, well maintained green and blue spaces will be an integral part of all neighbourhoods. The city's communities will be living healthy, fulfilled lives, enjoying access to parks and green spaces and safe green routes for walking, cycling and exercise throughout the city. Green and Blue Infrastructure will be supporting Manchester's growth".

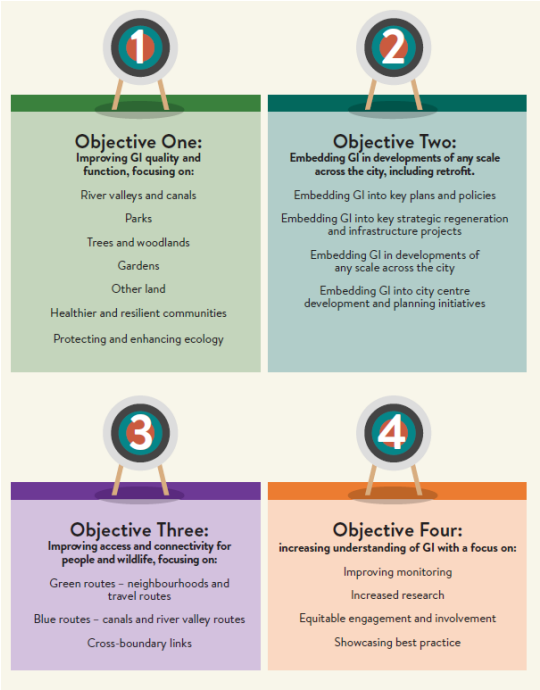

Figure 7 Objectives and Headlines Actions of the Green Infrastructure Strategy in Manchester. Source: Manchester Green and Blue Infrastructure Strategy: Implementation Plan Refresh 2021-25.

This project has received funding from the European Union's Horizon 2020 Research and Innovation Programme under Grant Agreement No 730283

02 Set up your local working group

Description

Having a **stable local working group** for the NbS strategy keeps internal and external stakeholders engaged in the process and ensures that the final strategy includes their input.

Your local working group should include the local internal and external stakeholders that will be ultimately involved in strategy implementation.

Examples of potential members include municipal departments of urban planning, environment, climate change, green spaces, water management, public infrastructure, and others, as well as NGOs, associations, and civil society.

The local working group contributes to defining the objectives and scope of the strategy, mapping and engaging stakeholders, and champion the importance of NbS and the strategy.

Bring experts into the local group

- Urban architects, design consultants, landscape architects, geographers, and planners to decide on what the best viable outcome would be for the overall development.

- Biodiversity and ecology experts to provide an understanding of the city as a socio-ecological system, putting in value the current natural capital and biodiversity already existing in the city, and defining the main goals and needed actions for preserving and enhancing this capital.

- Hydrology/drainage experts as well as physicists specialized in air quality and noise, soil and heat stress and other environmental areas, to give guidance on areas that are susceptible to suffer climate related impacts such as flooding, heat island effect, landslides, or under other natural risks.

Get senior support from the decision makers

Get to know your organisation and how decisions are made, you will need backing from someone senior in the organisation that can support the weight of the checkpoints, policies and procedures.

Real life comments

"The configuration a stable multidisciplinary local working group for the elaboration of the NbS Strategy has been recognized as a valuable input of the GCF, leading to decisions based on data and technical, political and social opinion".

"In Brest, all departments contributing to water management i.e., water department, highways and infrastructures department". joined forces for the first time in the elaboration of the NbS Strategy, which was an innovative approach"

"The local working groups for the NbS Strategy elaboration and delivery remains mainly institutional".

Grow Green Case studies

Governance for urban and water management through NbS in Brest.

Applying an integrated approach, Brest Metropole and its water public company, called Eau du Ponant are at the core of the Local Working Group for the definition of the NbS Strategy for Stormwater Management, associating urban planners with water specialists.

Setting the local working group has been an opportunity to raise awareness associating internal departments to establish a dedicated action plan.

Besides, a wide range of stakeholders from civil society have been incorporated in different moments of the NbS Strategy elaboration with a remarkable effort for including high schools, social housing, and elementary schools.

This action plan relies on awareness-raising, identification of opportunities, coordination and planning interventions, implementation, evaluation, learning, and adjustments of the action plan.

This project has received funding from the European Union's Horizon 2020 Research and Innovation Programme under Grant Agreement No 730283

03 Make your stakeholder and citizen engagement plan

Description

A successful NbS strategy is developed and implemented collaboratively with stakeholders and citizens. They can also be **engaged in decision making for strategy development** and in **co-designing NbS on the ground**, leading to the best design decisions based on data and technical, political, and social opinion.

Key considerations

Engage and mobilise a wide diversity of stakeholders in decisions to gain and maintain their trust.

Encourage working with the non-usual suspects, new stakeholders, and beneficiaries about opportunities to save or earn money through NbS.

Use real participation to inform decision making via thematic sessions and workshops.

Involve all relevant stakeholders from the very early stages of the process, and keep them regularly informed and connected through meetings, newsletters, or phone calls, to gain legitimacy about the decisions and citizens co-responsibility in the implementation and maintenance.

Planning for their involvement, including actors mapping, responsibilities and level of engagement methods and tools for gathering their views, as well as procedures for sharing knowledge and best practices between stakeholders and territories.

Grow Green resources

Stakeholder and citizen engagement processes within an NbS city strategy.

Engaging citizens in nature-based solutions

More information

Naturvation Handbook for Citizen Engagement

Citizen Engagement 101 – A guide for local governments

Smarter engagement: Harnessing public voice in policy challenge

Why do we need 'participatory democracy' if we already have democracy?

Real life comments

"The inclusion of the private sector (besides the practitioners) and the civil society in the co-design of strategic documents at city level, remains challenging".

"Greening the city and introducing NbS on the streets is usually good news for neighbours, so it's a great hook to generate attachment and create shared strategies".

Grow Green Case studies.

The Blue and Green Infrastructure Action Plan for Wroclaw was led by Water and Energy Department of the Wroclaw Municipal Office, and it is related to the Climate Change Adaptation Plan (MPA Wrocławia).

There were extensive consultations with citizens and with external and internal professionals' bodies, under the municipal leadership from Wroclaw City Council (Sustainable Development Department, the Municipal Greenery Management Company and the Municipal Water and Sewage Company). Other members of the local working group are - the Wroclaw Social Council for Ecology and Greenery, an external advisory body to the City Mayor consisting of professionals, academics, and NGO's; the Green Table, an internal body of professionals working on blue-green infrastructure issues from different municipal departments and municipal companies. And at a national level, the Ministry of Environment, and the Ministry of Infrastructure.

Picture credits. Kornelia Kwiecińska

This project has received funding from the European Union's Horizon 2020 Research and Innovation Programme under Grant Agreement No 730283

04 Collaborative design of your strategy

Description

As any other city plan, your NbS strategy needs to be designed collaboratively with the city's stakeholders, to get technical and social support, and thus to create deeper and shared improvements. A collaborative design implies two key interconnected processes:

- **the co-design process**, which seeks the best design decisions based on data and technical, political and social opinion; and
- **the engagement process**, which aims to include the greatest diversity of stakeholders and to involve them in the decisions, to maintain their trust.

City scale strategy concerns different stakeholders and engagement methods

Civil society should be involved in the city plan through neighbour associations, and directly in site scale projects near their residence.

Council departments, regional government, and other public institutions. They should be part of the city local working group mentioned above, including their interests on the Strategy.

Council technicians. Their knowledge must be consulted in all the processes stages.

Politicians may be involved in a strategic (portfolios of Deputy Mayors) or local role and will be key in influencing decisions and championing local projects.

University and scientific stakeholders. They must be included in the local working group to support good city decisions.

Private sector and services providers. Through the City Strategy they could provide tools and information and keep informed for site scale project work.

Despite the direct citizen participation is less prominent at the city scale than at the site level, a Citizen Hearing, a process of communication, opinion gathering and public presentation of the strategy, should be defined, integrated, and aligned as much as possible with the other planning processes in the city (i.e., City Master Plan, Climate Change Adaptation Plan).

Flexible steps but some key condition

There are three main conditions to be aware off, if you want to keep the trust of stakeholders and citizens:

Building a stable and honest relationship amongst the stakeholders, defining clear objectives, targets, and time plan for their engagement in different moments of the design process.

Providing a continuous follow- up and transparent reporting back to involved stakeholders.

Keeping an open communication channel, available and active for anyone at any time during the process.

Grow Green resources

Engaging municipal departments in developing a nature-based solutions strategy

More information:

Step-by-step guide for co-production and cocreation of Nature-based Solutions Nature4Cities

Green Infrastructure in Parks: A Guide to Collaboration, Funding, and Community Engagement United States EPA

Biodiversa Stakeholder Engagement Handbook JNCC, Biodiversa

Making the case for green infrastructure UK Green Building Council

Citizen Engagement Handbook Naturvation

EcoCompass – A compendium of educational resources as part of EcoCitizen World Map Project EcoCity Builders

Engaging UN-usual suspects Connecting Nature.

QuickScan – participatory modelling method for environmental assessments EEA and Wageningen University

Real life comments

"City scale strategy design and delivery still concerns the more "official" stakeholders: civil society, council departments, council technicians, politicians, academia (university and scientific community), private sector and services providers".

This project has received funding from the European Union's Horizon 2020 Research and Innovation Programme under Grant Agreement No 730283

Grow Green Case studies

Mechanisms for engaging across departments in NbS Strategy delivery

Working on NbS requires partnerships and collaborations across the many municipal departments and external stakeholders involved, such as departments responsible for green spaces, stormwater/flood management, highways, health, and many others. However, when each department has its own culture and way of working, it can be difficult to build partnerships between them.

Some interesting mechanisms to be explored are:

- A network of interlinked plans and policies can contribute to creating a common urban culture across a city.

- Technical days, visits to interesting sites, webinars and other events can support this common culture by allowing people to share experiences and ideas, and to build relationships.

- Building relationships with individuals in other departments takes time, especially for staff to make the case for engaging up the decision-making hierarchy.

- The goals of a NbS strategy can be integrated into departmental goals, therefore building accountability, and ensuring progress can be regularly monitored.

- Establishing a competition between cities can help to inspire action, especially if the questionnaire/competition application requires inter-departmental collaboration to complete.

- When discussing nature-based solutions, ensuring that the benefits for each department/stakeholder group are highlighted helps to build support. Linking NbS to health and wellbeing will be important during the recovery from COVID19.

- Citizens can also be engaged in the topic, for example through citizen science programmes for gardeners.

Results of the question-and-answer session during the online webinar.

"Engaging municipal departments in developing a nature-based solutions strategy" 20th June 2021

Picture credits Grow Green website

This project has received funding from the European Union's Horizon 2020 Research and Innovation Programme under Grant Agreement No 730283

MODULE 2

DEVELOP A STRATEGIC DOCUMENT

PLANNING your strategy

MOBILIZING your resources

EVALUATING and REPORTING on your strategy

This project has received funding from the European Union's Horizon 2020 Research and Innovation Programme under Grant Agreement No 730283

PLANNING your strategy

01. Review your city's governance and policy framework

02. Define, identify and asses your city's climate change-related problems

03. Assess the current financing available for NbS and the additional financing needed

04. Identify and assess scenarios for NbS implementation

This project has received funding from the European Union's Horizon 2020 Research and Innovation Programme under Grant Agreement No 730283

PLANNING your strategy

01. Review your city's governance and policy framework

Description

How does urban planning and regulations affect your NbS Strategy? Where do you need to introduce changes and take action?

Your city probably already has **policies and a legal framework** in place that influence the implementation of NbS. The city's governance structure also defines how decisions can be taken. It is important to identify and examine the policy instruments and measures that can help with NbS implementation and facilitate market development.

Governance and policy overview, aims at providing an understanding of the policies and legal framework that may influence NbS implementation as well as the governance structure and systems which explain how decisions are taken, in order to support the development of business models and delivery mechanisms and also to inform spatial planning. This step helps identifying and examining the range of policy instruments and measures that could promote the deployment of NbS and facilitate market development, to support cities in developing policies and appropriate incentives to promote NbS uptake.

The review would also help **identify existing diagnoses, studies and information** related to climate change, ecosystem services and green infrastructure that are useful to inform the future NbS strategy.

Having a clear understanding of the policy, planning frameworks and governance arrangements at European, national, regional and local levels that may influence green infrastructure and NbS in the city would help in identifying who owns what, who is responsible for what, who pays for what?

Think outside of the box here as there may be underlying social issues of ill health or biodiversity issues involving protected species that improvements in green infrastructure of the city can help to address.

More information:

Green Infrastructure and Urban Biodiversity for Sustainable Urban Development and the Green Economy Green Surge ICLEI

Policy guides for green infrastructure US EPA

The governance and politics of nature-based solutions Naturvation

Visual toolbox for system innovation Climate KIC

Real life comments

"*The GCF reaffirms the importance of having a strong nested policy hierarchy. NbS alignment with current city strategies and plans is crucial to guarantee success*".

"The GCF has helped to trigger the inclusion of new policy commitments for the Environment Act and integrated thinking on new UK green infrastructure standards".

Grow Green case studies

Climate, environmental policy and strategy plans in Modena: Modena has placed its NbS Strategy at the centre the Sustainable Energy and Climate Action Plan 2030 (SECAP), the General Urban Plan and the Sustainable Urban Mobility Plan (SUMP).

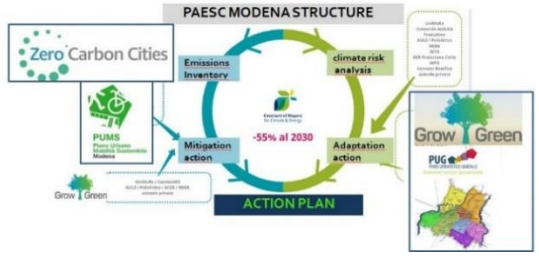

Figure 8 Sustainable Energy and Climate Action Plan (SECAP) Modena Structure. Relation to the different plans and European Projects and the Action Plan. Source: NbS Strategy of the City of Modena.

This project has received funding from the European Union's Horizon 2020 Research and Innovation Programme under Grant Agreement No 730283

02. Define, identify and asses your city's climate change-related problems

Description

The problems caused by climate change may not be equally experienced across your city. So, it is helpful to assess which areas of the city are most affected by climate change risks and which are most vulnerable to its effects. This helps to detect challenges, identify areas at risk and define priority areas for NsS implementation. Spatial analyses and climate change scenarios should be analysed.

Urban areas can be understood as complex socio-ecological systems which are directly and/or indirectly co-responsible for global change through their contribution to Greenhouse Gas (GHG) emissions and, at the same time, recipients of habitual, adverse climate impacts. (EC, 2021a[2]).

More than 40% of total GHG are emitted by human activities (IPCC, 2021[3]). Moreover, high concentrations of primary and secondary pollutants are affecting the quality of urban and peri-urban environment. For example, more than 4 million premature deaths were recorded in 2016 due to environmental pollution (WHO, 2016[4]).

Despite globally urban areas cover less than 4% of the land urbanization processes affects the sustainable use of natural resources and make important pressure on natural resources and ecosystems (Endreny, 2018[5]). Artificialization process and loss of soil permeability cause important changes on the water cycle, deriving in droughts and reduction of storm water infiltration capacity which poses significant threats to human settlements from increased urban flood risk. Thermal stress derived from the intensification of the urban heat island effect, may also cause environmental, economic, and social damage, including health conditions, damage to housing and infrastructure, loss of business or loss of productivity, among others. Given this situation, it is key that urban management and development effectively integrate mitigation and adaptation to climate change (Barker, et al. 2022[6]).

NbS can limit the impact of climate change on vulnerable cities. To use NbS successfully to address the pressure of climate change, the existing environmental risk needs to be evaluated (Barker, A.et al, 2022).

Yet, there is still great uncertainty in planning practice regarding the methods, stages, and scales of the planning process that it is feasible to make use of or when integrating the NbS and Ecosystem Services (ES) approach (Barker, A.et al, 2022).

Acknowledge your challenges and climate related risks under climate change context

The evaluation of climate hazards and risks of your socio-ecological systems can allow better informed regional and urban planning decisions, to anticipate the possible impacts of climate change, as well as act proactively, to increase the efficiency and resilience of the territory.

Nowadays, there is an increasing number of initiatives at EU, member states and regional levels, generating climate data and services, local studies on vulnerability, risks and adaptation needs, that could be used to inform planning decisions, enhancing and boosting the compliance with monitoring of international commitments such as the Global Covenant of Mayors for Climate and Energy and development of local adaptation plans and the reinforcement of climate change perspective into the political agenda and key local sector policies i.e., risk management in emergency plans, public health, others.

[2] European Commission, Directorate-General for Research and Innovation, (2021). Evaluating the impact of nature-based solutions: a handbook for practitioners, Publications Office. https://data.europa.eu/doi/10.2777/244577

[3] IPCC (2021). Summary for Policymakers. In: Climate Change 2021: The Physical Science Basis. Contribution of Working Group I to the Sixth Assessment Report of the Intergovernmental Panel on Climate Change.

[4] WHO Regional Office for Europe. (2016). Urban green spaces and health. CopenhaQ5gen: WHO Regional Office for Europe.

[5] Endreny, T.A. Strategically growing the urban forest will improve our world. Nat Commun 9, 1160 (2018). https://doi.org/10.1038/s41467-018-03622-0

[6] Barker et al 2022 Sustainability Assessment of Urban Infrastructures. Nature-Based Solutions for More Sustainable Cities – A Framework Approach for Planning and Evaluation. ISBN: 978-1-80043-637-4, eI SBN: 978-1-80043-636-7. Eds Edoardo Croci and Benedetta Lucchitta. Bocconi University.

This project has received funding from the European Union's Horizon 2020 Research and Innovation Programme under Grant Agreement No 730283

Use data, existing knowledge and specific studies and spatial analysis to inform planning decisions

Which are the most significant future climate related hazards? And Which are the expected impacts of the climate change in your city?

Where are the most vulnerable areas within the city and why?

Which are the potential risks?

What is the current potential and the value of the resources already in place to tackle hazards and mitigate the impacts of climate change?

Which adaptation options might be defined to reduce exposure, vulnerability, and risk in the city by means of NbS?

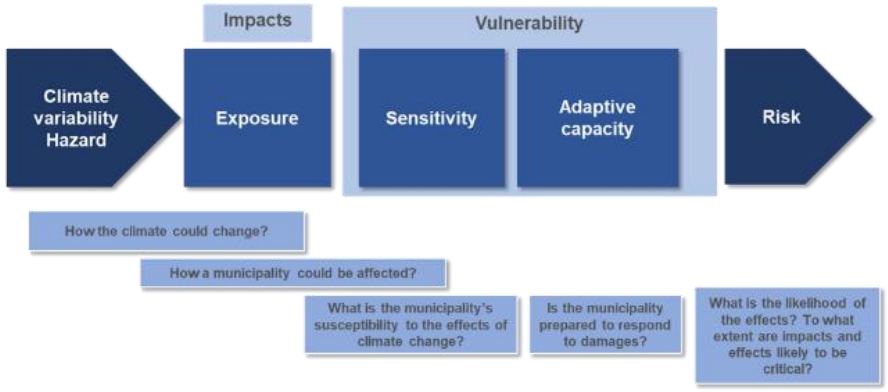

Figure 9 Evaluation of climate related risks. Source: Authors own elaboration, based on 5º assessment report of the Intergovernmental panel of climate change, 2014[7]

Apply a knowledge-based decision making

For the effective elaboration of your NbS strategy, the available information on climate data and services, local studies on vulnerability, risks and adaptation needs, will help you in developing specific studies at municipal and district level on thermal stress, flood risk for example, to inform urban development plans urban regeneration plans, investment projects, etc. The incorporation of climate change information in planning decisions enables the identification of priority intervention areas in need for targeted adaptation measures based on their significant vulnerability and risks as well of opportunity areas for implementation of adaptation measures.

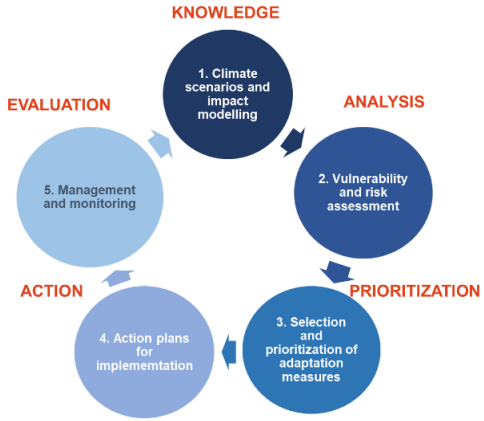

Figure 10 Climate adaptation cycle. Source: Authors own elaboration

Identify priority NbS options for addressing the problems identified

Pre-identify the potential NbS options available to tackle the climate related problems in your city.

[7] Intergovernmental Panel on Climate Change conceptualisation of climate risks in its Fifth Assessment Report, AR5 (IPCC (2014) AR5, WG-II, Ch. 19

This project has received funding from the European Union's Horizon 2020 Research and Innovation Programme under Grant Agreement No 730283

Grow Green resources

Climate change, vulnerability, and risk in urban areas

Unpackaging Urban Heat Island: concepts, methods and practice examples for assessing urban climate and UHI effect to enhance planning decisions

More information

On climate scenarios and projections

The Copernicus Climate Change Service (C3S)

The European Climate Data Explorer

The European Climate and Health Observatory

On vulnerability and risks assessments

Urban Adaptation Support Tool Covenant of Mayors for Climate and Energy
Urban Flood Management in a Changing Climate Associated Programme on Flood Management

On adaptation options

The European Climate Adaptation Platform Climate-ADAPT

NetworkNature EU platform on Nature Based Solutions

OPPLA is the EU Repository of Nature-Based Solutions.

IPBES The Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services

Nature-based solutions to address global societal challenges IUCN

On decision support tools

Natural Water Retention Measures (NWRM) catalogue

Ecodistr-ICT Integrated Decision Support System ARIES – mapping natural capital and ecosystem services

Envimet – Urban Climate micro scale tool

Watershed Management Optimisation Support Tool US EPA

MapNat app (mapping nature's services) UFZ

Green City Tool – Assessment on approach to Nature & Biodiversity European Commission DG Environment

Evaluating green infrastructure: A combined sewer overflow control alternative for long-term control plans New Jersey Department of Environmental Protection

Greening CSO plans: Planning and modelling green infrastructure for combined sewer overflow (CSO) control US EPA

New Jersey Stormwater Best Practices Management manual New Jersey Department of Environmental Protection

Green infrastructure modelling toolkit US EPA.

Real life comments

"The GCF reinforces the importance of having a good understanding of climate threats by the cities. offering valuable resources for the assessment of vulnerability and risks, particularly those related to heat stress and surface flooding, including modelling exercises to evaluate impacts. This helps to detect challenges and identify areas at risk and define priority areas for action".

"The GCF stresses the importance of analysing the natural capital and green infrastructure provision in the city and the potential for deployment NbS as climate change adaptation measures".

This project has received funding from the European Union's Horizon 2020 Research and Innovation Programme under Grant Agreement No 730283

Grow Green case studies

Identification of climate related challenges in Zadar: a qualitative approach.

In the city of Zadar, the most relevant climate change related challenges are characterized in a qualitative way based on the expected intensity and potential influence.

Challenge	Intensity	Influence	Challenge	Intensity	Influence
Heat	High	High	Extremely cold days	Small	Small
River floods	Small	Small	Precipitation	Medium	High
Surface floods	Small	High	Storms	Medium	High
Coastal floods	High	High	Landslides	Small	Small
Droughts Water shortage	High	High	Forest fires	High	High

Figure 11 Identification of challenges and assessment of the level of challenges in- Zadar

Identifying climate change challenges in Modena: a spatially explicit and quantitative approach.

Understanding how climate related risks such as heat stress and flooding affect different parts of the city in a climate change context, is critical for designing an effective NbS strategy. Modena has analysed and modelled these climate changes over the last 60 years, to develop effective actions for increasing the city's resilience.

Modena is testing NbS to reduce flood peaks and improve the quality of the canal waters in the urbanised eastern part of the city. The grassy canal and swales will help to remove pollutants and increase water infiltration. Using extensive hydrological modelling and assessments along with experiences from pilot interventions, a new strategic approach for NbS in Modena's is being developed. Read more

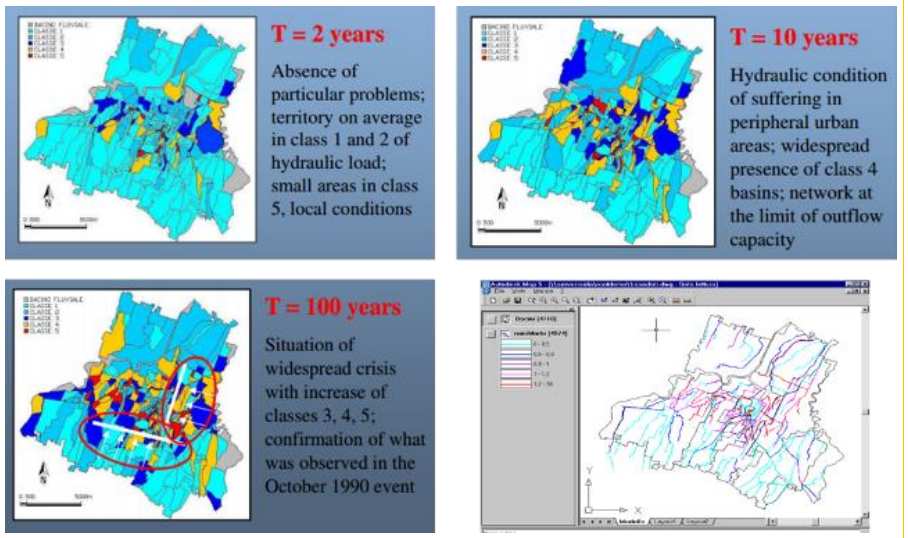

Figure 12 Snapshot of the hydraulic modelling of the urban drainage network - municipality of Modena (186.750 Ab. - Total Area 183,2 km²) Representation of the Increasing Return Periods

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03. Assess the current financing available for NbS and the additional financing needed

Description

As part of the development of an NbS Strategy, it is useful to understand the current nature and extent of financing of NbS in the city (a 'baseline') and compare this with the broad costs included in the NbS Strategy. This will provide a strong understanding of both the current financing approach, and the gap between current financing and future financing under the NbS Strategy.

Current financing could consider the following for each year over the NbS Strategy period:

- Capital costs (such as land purchases, machinery, and other longer-term assets)
- Operating and maintenance costs (on-going costs such as labour, asset maintenance)
- Planning and administration costs (if separate from 'operating and maintenance' costs above)
- Identification of which entity bears the cost of the expenditure (this could be the 'parks and gardens' department of the city, or new developers if required to invest in NbS as part of their development implementation).

For some items, it may be possible to provide accurate data, and for others a higher-level estimate may be required if no data exists.

This approach can then be revisited with the different components of the NbS Strategy.

By then comparing the two, it will be clear what the different cost profiles of the two scenarios are (the 'baseline' and the additional options for the NbS Strategy). It may not be possible to identify which entity bears the cost, but this can inform strategies to be pursued within the financing component of the NbS Strategy.

Grow Green resources

Nature-Based Solutions – Financing Assessment

More information

Financing conservation and nature-based solutions – A practical guide for Europe European Investment Bank

The value of green infrastructure CNT Center for Neighborhood Technology.

Real life comments

"The pre-financing assessment approach is innovative - it includes cost calculation of NbS, assessment of mitigated costs, identifying financing gaps, matching actions with policy and financing instruments".

"Undertaking a pre-financing assessment of the NbS Strategy delivery as part of the planning phase acted as catalyst to undertake a desk-based appraisal of green infrastructure related financial commitments in Manchester".

Grow Green case studies

A Greater Manchester Natural Capital Investment Plan

The need to establish and implement a Natural Capital Investment Plan to mobilise existing and new sources of funding was a priority outcome from the Greater Manchester Mayor's Green Summit in March 2018.

This priority arises from the current situation in which the management of natural capital draws upon a relatively limited suite of business models and financing strategies, including: public sector grants, public sector service provision, private developer investment and through community-level action. These are both narrow in scope and vulnerable to future changes to the financial and economic landscape.

The challenge of securing varied and sustained investment in natural capital is common to all cities across the UK. The natural capital investment plan developed for Greater Manchester is an innovative approach which can be replicated. Read more.

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04. Identify and assess scenarios for NbS implementation

Description

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.

Scenarios are an effective way to deal with the uncertainty inherent to complex systems and lack of data. Green infrastructure and ecosystem services could be used to generate alternative planning scenarios, benchmark and decide which ones have less significant impacts and maximize the green infrastructure network and provision of ecosystem services.

Develop an opportunity mapping to identify your natural capital assets and potential for NbS deployment

Mapping the existing green areas in your city could serve to develop a baseline and diagnosis of your potential adaptation options and future needs.

It is also important to quantify the maximum viable deployment of NbS in your city.

Identifying areas of opportunity that either require increased safeguarding or restoration it is also crucial for the maximization of investment.

Quantify NbS benefits and their effectiveness against your aims.

Evidence shows that NbS can provide a wide range of benefits for health and wellbeing; for nature recovery; to help places to adapt to climate change; and to foster prosperous communities. The following attributes of nature provision can guide you in planning, designing, and enhancing the provision of these benefits: quantity and quality; accessibility (proximity); naturalness; functionality and multiple benefits provided; connectivity (physical and functional); landscape, beauty and sense of place.

The quantification of NbS benefits and their effectiveness against climate change would help you in having a good overview of your resources and detecting the gaps and needs for further develop and implement NbS.

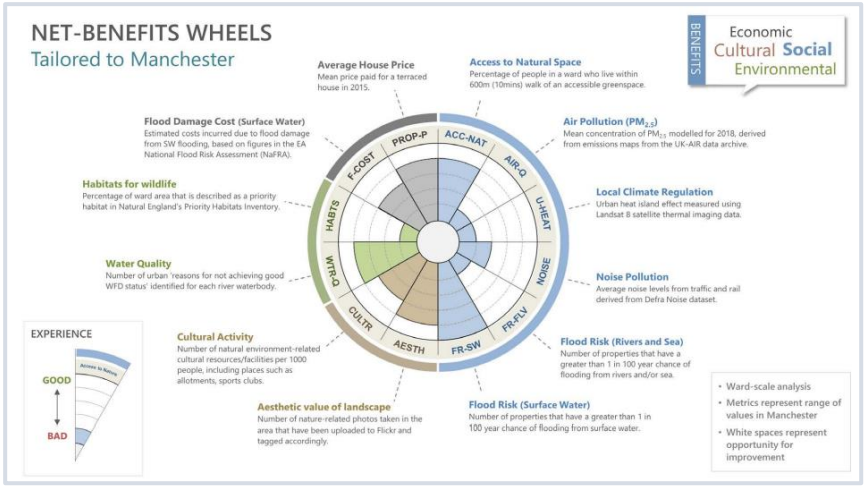

Figure 13. Summary of the Net-benefit wheel approach. Source: The nature of Manchester. Local Action Project. Read more about the Benefits wheel methodology Manchester City Council

Benchmark urban design alternatives

The comparative analysis of different planning scenarios is a good practice in any planning process.

Comparting different alternative scenarios of NbS based on their effectiveness to trackle climate related hazards (i.e. flood risk mitigation, reduction of heat stress) will definitely inform better planning decisions.

The comparative analysis of alternative planning scenarios with NbS could imply using modelling techniques to evaluate the effectiveness of different interventions under different future climate conditions.

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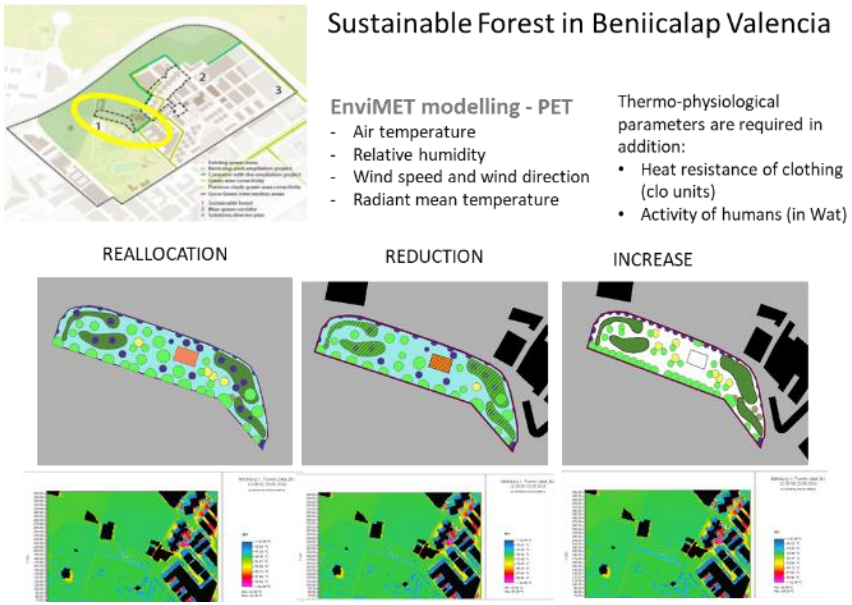

Figure 14 Benchmarking NbS design alternatives against thermal comfort in the Sustainable Forest in Benicalap, Valencia. Source: authors own elaboration.

Grow Green resources

Compendium of nature-based and 'grey' solutions to address climate and water-related problems in European cities

Integrating nature-based solutions into existing urban infrastructure: Training for Modena

Nature-Based Solutions Flexible Adaptation Pathway approach: Application for West Gorton, Manchester

More information

Ciy Bodiversity Index Singapore Biodiversity index

Global Standard for Nature-Based Solutions IUCN

Urban Adaptation Support Tool Covenant of Mayors for Climate and Energy

Green Infrastructure Case Studies EPA

Nature-Based Solutions for Climate Adaptation in the Basque Country Ihobe, Spain

A guide to support the selection, design and implementation of natural water retention measures in Europe European Commission

Operational guidelines on ecosystem-based approaches to adaptation GEF

Tools for the design and evaluation of sustainable urban drainage systems HR Wallingford

Principles and guidelines for integrating ecosystem-based approaches to adaptation in project and policy design IUCN

Urban Protected areas: Profiles and best practice guidelines IUCN

Guidelines on non-structural measures in urban flood management UNESCO IHP

Green infrastructure design and implementation
US EPA

Ecosystem Services Assessment Support Tool
Wageningen and SYKE

Implementing nature-based flood protection
World Bank

Natural and nature-based flood management: A green guide WWF and USAID

Building with Nature guidelines Deltares

Watershed Management Optimisation Support Toolkit US EPA

MapNat app (mapping nature's services) UFZ

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Green City Tool – Assessment on approach to Nature and Biodiversity European Commission DG Environment

UNaLab Technical Handbook of Nature-Based Solutions UNaLab project

Urban Nature Atlas Naturvation

GI Valuation Toolkit Mersey Forest

Integrating Green And Gray: Creating Next Generation Infrastructure World Bank and World Resources Institute

A guide for pollinator friendly cities: How can spatial planners and land-use managers create favourable urban environments for pollinators?
European Commission DG Environment

Evaluating green infrastructure: A combined sewer overflow control alternative for long-term control plans New Jersey Department of Environmental Protection.

Greening CSO plans: Planning and modelling green infrastructure for combined sewer overflow (CSO) control S EPA.

New Jersey Stormwater Best Practices Management manual New Jersey Department of Environmental Protection.

Green infrastructure modelling toolkit US EPA

Biodiversity in the city: Key challenges for urban green space management

Making nature's city: A science-based framework for building urban biodiversity
San Francisco Estuary Institute.

Living cities: Towards ecological urbanism Scottish Wildlife Trust.

Benefits of urban vegetation Plante et Cité.

Decision support tools for climate change adaptation RESIN project.

Transitions Handbook RAMSES project.

Nature-based solutions: Towards the implementation in Mediterranean cities
IUCN.

Real life comments

"The evaluation and benchmark of scenarios of NbS implementation based on costs and benefits is recognized as innovative approach"

"Using scenarios, prioritization and timing for NbS deployment has been considered a very relevant aspect of the planning process. Comparison of different scenarios combining green and grey solutions is being very successfully applied in Brest and Manchester".

"The Adaptation Pathway tool developed through Grow Green provided with useful analysis to inform decision making in Manchester".

Grow Green case studies

Flexible Adaptation Pathway approach: Application for West Gorton, Manchester

An example of specific mechanisms applied in Manchester for mainstreaming NbS into planning is the Flexible Adaptation Pathway as used in West Gorton. The Flexible Adaptation Pathway is a dynamic adaptive planning tool, that aims to support the best decision making under uncertainty, by "choosing among a number of planning and/or design alternatives in order to change system outcomes in a desired way". It helps to deploy long-term responses to reduce climate risks and can also be used for other non-binding policy purposes.

Manchester City Council has been very active in relation to climate action in the last years and has undertaken several studies and analysis to identify the city´s potential to fight against climate change. Grow Green has offered the opportunity to build a Flexible Adaptation Pathway for West Gorton, complementing other previous studies such as the Net-Benefit Wheel work. The Flexible Adaptation Pathway enables a comparison of the different planning scenarios in a specific area – combining different NbS and their potential effectiveness against a specific challenge, to select the best alternative to increase climate resilience.

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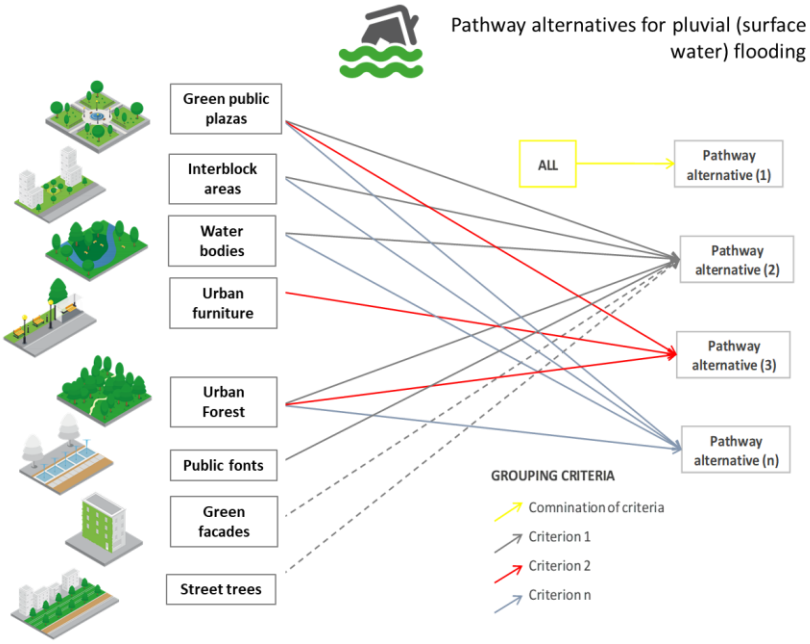

Figure 15 Simplified pathway alternatives for NbS deployment against surface flooding. Authors own elaboration

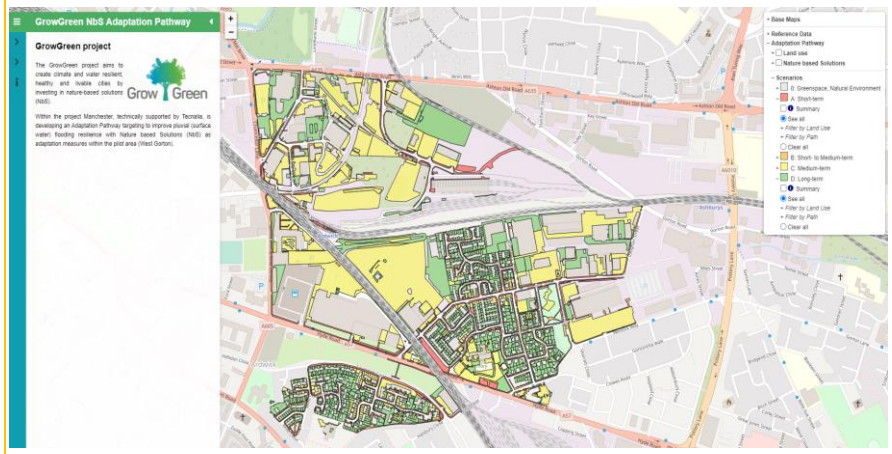

Figure 16 Snapshot of visualization of adaptation options in four scenarios.

The full report can be accessed **here**.-

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MOBILIZING your resources

01.Identify business models

02.Develop the financial plan for the strategy

03.Embed NbS into existing planning instruments

0.4 Develop standards and design criteria for NbS procurement

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MOBILIZING your resources

01. Identify business models and define a business case for your NbS strategy

Description

NbS implemented on the ground will have **economic costs and benefits**. To ensure they can be funded, it is important to link those costs and benefits to potential funding streams. Cities can **combine various financing, policy, and governance mechanisms** to design, implement and manage NbS. Specific **business models** can also be developed to finance a nature-based solution.

Business models

The concept of an NbS business model can be interpreted as the mechanisms through which a specific NbS solution (or a combination of interrelated solutions) is able to "create, deliver and capture" private and public (economic, social, environmental) value to society, consistently with the sustainability goals of the local government. A specific feature of the NbS business model is that in the majority of the occasions, the city government has a role in the value network, which can be direct (e.g. involvement in the design/provision/delivery of the solution), or indirect (e.g. setting the regulatory framework for the solution). In fact, a NbS solution can be initiated/governed/managed by the city authority itself, or by a different actor (e.g., public or private company or the citizens themselves).

- value proposition relates to the functions and benefits provided by NbS at city level (and how they are demonstrated and considered in decision-making),

- value creation refers to the ways in which NbS policies, plans, and projects are developed and implemented (linked to the concept of governance),

- value capture covers financing mechanisms, as well as related aspects such as the valuation of NbS benefits.

Business cases are reports used to justify expenditure on an initiative - here NbS - which are used to seek project funding from external sources. They focus on presenting the added value of the NbS project to potential project funders, in order to convince them that the proposed project is a useful and valuable intervention, and a good use of their funds. To do so, these documents generally rely extensively on economic and financial analysis.

For urban NbS projects, the entity seeking funding is likely to be a department of the city government and the business case would be assembled by the staff of that department. Business cases are usually prepared after quite some work has been undertaken to develop a project, but before a final decision has been made to finance and implement it.

The current limitation of public resources and the instability of the current economic framework make it essential to previously define mechanisms that ensure the financing of the NbS strategy and its projects in the long term. This prior reflection seeks better investment management and the planning of a financial return, which considers both the benefits and the savings from avoided damages (privates and publics) in the long term in its function of adaptation to climate change. [8].

Business cases are useful documents to clearly articulate why funds should be allocated to an NbS project. They demonstrate to the funder not only those benefits of the project will exceed costs, but that the project is aligned with government policies and strategies, is carefully planned and risks are managed. A well-designed business case can be a highly effective tool for securing funding for NbS projects.

The key enabling conditions to define an NbS business case are the type of strategy to be implemented and the NbS involved, taking into account ownership and scale, and by whom they are going to be implemented.

[8] EEA reports 2/2017 Financing urban adaptation to climate change (https://www.eea.europa.eu/publications/financing-urban-adaptation-to-climate-change)

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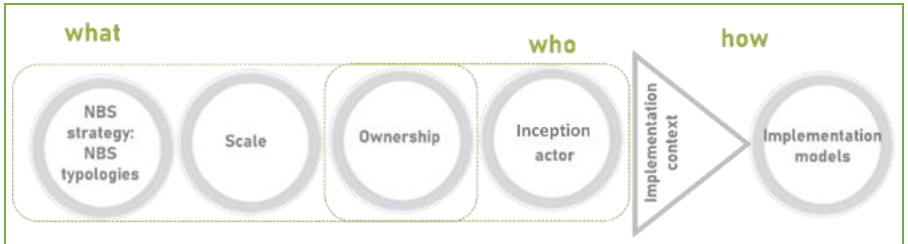

Figure 17 Own elaboration based on Nature4Cities

Policy relevance

To demonstrate policy relevance, information should be given on how the NbS project aligns with current government policy, including climate change strategies, environmental and water policy, urban planning strategies etc. This is especially important if the project is seeking funding from public sources.

Roles and responsibilities

Information on which entities will own and operate/maintain the asset over time and on who will be responsible for different aspects of the project should be presented. It must also be shown that the organisational design will enable a successful and efficient project management and delivery.

Economic and financial information

Costs and benefits information should be clearly articulated, showing expenditures and benefits (including revenues and non-financial benefits) over time, and usually illustrating that benefits exceed costs. The main costs relate to capital expenditure (money spent on physical assets such as purchase of assets and their maintenance) and operational expenditure (money spent on running the project such as human resource and project management costs). A wide variety of benefits can arise from NbS investments, because there are so many different types of NbS investments. Some benefits are unique to certain types of investments, while others may be more common. All benefits resulting from the investment need to be mapped and - where possible – quantified.

Risk and mitigation

A risk assessment can be conducted to demonstrate that full consideration of negative or unintended outcomes have been considered and that significant risks have been mitigated. Some risks can be external to the project (e.g. political change, shifts in the economy, equipment becoming obsolete, etc.), whereas others can be directly influenced by project stakeholders (e.g. failure to deliver on time or within budget, insufficient skills, poor relationships between delivery partners, etc.).

Some tips for outreaching the private sector[9]

Involve private sector at early stages.

Provide a well-developed business model, with clear return on investment.

Deploy innovative financial instruments to de-risk projects (e.g, risk underwriting, provision guarantees, and technical assistance)

Identify co-financing options that provide incentives to private investors, including subsidies and tax rebates for NbS investments

Launch an NbS project preparation office that assists private and public investors.

Elaborate a catalogue of NbS benefits, targeted for the private sector.

Ensure that NbS are consistently integrated within public built environment projects.

[9] Source: Nature4Cities H2020 project https://www.nature4cities.eu/

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Grow Green resources

Taking action to mobilise finance for creating green cities

Grow Green business models search engine

Grow Green business case guidance

More information

Business Case Natural Infrastructure for Business

Business Model Catalogue Naturvation

Nature-Based Solutions Business Model Canvas Guidebook Connecting Nature

NbS Business model Canvas developed for Nature4Cities Project

The business case for natural infrastructure WBCSD

The value of green infrastructure CNT Center for Neighborhood Technology

Valuing the Benefits, Costs and Impacts of Ecosystem-based Adaptation Measures GIZ

The case for green infrastructure. Joint Industry White PaperTNC

ENCORE (Exploring Natural Capital Opportunities, Risks and Exposure) UN Environment, UNEP Finance Initiative, Global Canopy

GI Valuation Toolkit Mersey Forest

TEEB Manual for Cities: Ecosystem Services in Urban Management

Adaptive capacity of businesses to the impacts of climate change

Real life comments

"Although innovative business models are available, their materialization remains challenging".

Grow Green case studies

Grow Green NbS Business Model Canvas

Grow Green project has developed its own Business Model Canvas for NbS implementation. It aims at supporting public and private organizations to design their own NbS intervention and to enhance their mechanisms to deliver value with it.

A template describes and analyses the main points to consider for developing a successful and replicable NbS intervention, using 9 sections that reflect the logic to follow, and main points to be considered. This template helps to describe the rationale of how a green developer creates, delivers, and captures economic, social/health and environmental value with an NbS intervention.

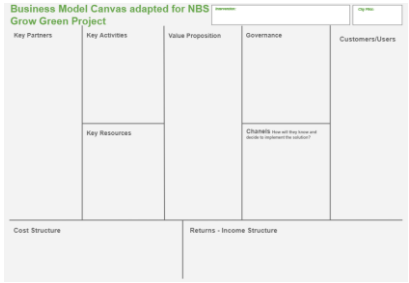

Figure 18 NbS Business model Canvas developed

The key elements of the canvas are:

Customers/Users and their expectations

Value Proposition: functions, benefits and co-benefits provided by NbS at city level.

Communication channels and awareness on NbS benefits and co-benefits.

Governance for NbS delivery.

Returns – Income Structure from the Environmental, Social /Health and Economic perspective.

Key Resources: assets and capacities.

Key Activities: enabling conditions for our value proposition

Key Partners: people and organizations vital for running the intervention. A proper business relation must be built with them.

Cost Structure: costs of planning, design, installation and maintenance costs, promotion of the solution, and other costs as investment in awareness, creation of bonifications, grants or incentives

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02. Develop the financial plan for the strategy

Description

For your nature-based solutions strategy to be implemented, it will need funding. The options for funding specific nature-based solutions should be considered and compiled into an **overall financing strategy and associated work plan**.

The financial plan specifies the resources needed to carry out the strategy according to the proposed business model, and the way to obtain them (through loans, subsidies, private participation, etc.).

Key considerations

Consider funding options for different NbS components (e.g., public funding, EIB, private sector, philanthropy, etc)

Develop funding strategy and associated work program (e.g., if one component needs a business case, they must prepare it. If it requires engagement with the private sector, assemble information needed and do that etc).

Explore market-based incentives and co-funding mechanisms for long term maintenance.

Implement NbS projects or maintain existing NbS directly:

- Innovative use of public budgets.
- Grant funding and donations.
- Instruments generating revenue.
- 'Green finance' (or debt-based instruments).

Encourage other actors to implement NbS or to contribute to the maintenance of existing NbS.

- Market-based instruments.
- Developing 'Business Improvement Districts' (BID).
- Setting up endowments.
- Creating Public-Private Partnerships.
- Revolving funds.
- Community asset transfers.
- Regulation and planning standards.
- Leveraging existing regulatory obligations.

Grow Green resources

Economic assessment of Manchester

Approaches to financing nature-based solutions in cities, working document

More information

Green Infrastructure in Parks: A Guide to Collaboration, Funding, and Community Engagement EPA

Finance for City Leaders Handbook UN-Habitat

Climate Adapt: Financing urban adaptation to climate change EEA

Investing in nature: financing conservation and nature-based solutions – A practical guide for Europe European Investment Bank

Guide to Multi-Benefit Cohesion Policy Investments in Nature and Green Infrastructure European Commission, Regional and Urban Development

The demand for financing climate projects in cities Covenant of Mayors for Climate and Energy

Innovative financing schemes Covenant of Mayors for Climate and Energy.

Real life comments

"Long-term maintenance financing remains a challenge"

"GCF approach has supported new plan for river valleys in Manchester. This was used by a third sector environmental charity to successfully bid for £1million, delivering a new programme over 2 years".

Grow Green case studies

Taking action to mobilise finance for creating green cities – Grow Green conference report

Securing sufficient long-term financing for nature-based solutions is frequently a challenge for city governments, which limits the extent to which cities can successfully adapt to climate change. In March 2019, Grow Green hosted the European conference on innovative financing for creating green cities to bring together stakeholders to jointly find solutions. The conference report is available here..

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03. Embed NbS into existing planning instruments

Description

NbS should ultimately be integrated into existing planning instruments if their use is to be mainstreamed across your city. It is important to **identify opportunities for embedding NbS** or climate change adaptation in general into the **planning system, and across other policy areas**.

Align your strategy with policy and planning

Embedding NbS into a wider programme on sustainable urban development will ensure a long- term deployment of renaturalisation actions.

Formal planning instruments could act as enablers of NbS deployment and NbS market.

Spatial and urban planning is being widely considered as an enabling discipline for territorial development, that articulates the deployment of other public policies and land use decisions and regulations.

Hence, they are also recognized (i.e. EU Climate Adaptation Strategy 2021) as the key policies in which the climate perspective should be incorporated to enable the transformational change in a global change context.

Mainstreaming NbS into existing spatial and urban planning instruments will allow anchoring the adaptation measures into planning decisions.

Grow Green resources

Using Nature to Reshape Cities and Live with Water: An Overview of the Chinese Sponge City Programme and Its Implementation in Wuhan

More information

Tackling the climate and biodiversity crises in Europe through Urban Greening Plans ICLEI Europe

Green infrastructure strategies – An introduction for local authorities and their partners

Policy guides for green infrastructure US EPA

Developing and implementing a green infrastructure strategy UK Green Building Council

Integrating nature-based solutions in urban planning Openness EU project

Green City Development Tool Kit Asian Development Bank

A guide for pollinator friendly cities: How can spatial planners and land-use managers create favourable urban environments for pollinators? European Commission DG Environment

Biodiversity in the city: Key challenges for urban green space management

Making nature's city: A science-based framework for building urban biodiversity San Francisco Estuary Institute

Living cities: Towards ecological urbanism Scottish Wildlife Trust

Decision support tools for climate change adaptation Resin project

The governance and politics of nature-based solutions Naturvation

'Nature Nearby': Accessible Natural Green Space Guidance Natural England

A guide for pollinator friendly cities: How can spatial planners and land-use managers create favourable urban environments for pollinators? European Commission DG Environment

Transitions Handbook RAMSES project

Planning for green infrastructure Central Scotland Green Network

Real life comments

"The GCF strongly encourages green infrastructure and NbS to be integrated into the wider city policy framework. The suggestions from GCF cities recognized a stronger coordination with spatial and city planners to embed NbS and climate change adaptation in general into the planning system and in particular into the Urban General Development Plan"

"The GCF approach has allowed the incorporation of policy recommendation for NbS deployment as climate change adaptation into the Urban General Development Plan of Valencia".

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Grow Green case studies

Embedding Nature-based Solutions into the General Urban Development Plan of the city of Valencia

Valencia city council incorporates climate change perspective in the revision of the General Urban Development Plan, boosting the deployment of NbS as adaptation measures.

A climate change vulnerability and risk assessment, including modelling and spatial analysis exercises, is carried out on the 23 functional areas in which the General Urban Development Plan sectorizes the municipality of Valencia, for the identification of the most vulnerable ones against heat stress, as one of the priority hazards included in the Valencia Climate Change Adaptation Plan.

A heat stress map is developed using URbCLim model. Copernicus hourly data on air temperature, relative humidity, and wind speed for the period January 2008-December 2017 and a spatial resolution of 100 m x 100 m, to identify a corresponding day of future heat stress due to climate change. A heat index is then calculated, combining temperature and humidity data.

Indicator-based vulnerability and risk assessment is applied following the approach of the fifth assessment report of the Intergovernmental Panel of Climate Change where risk is a function of hazard, exposure and vulnerability, and vulnerability a function of sensitivity and capacity of response.

A data model of 18 indicators is built characterizing demography, land use, social and cultural identity, public facilities, public space, mobility, housing, and well-being features.

A diagnosis sheet is elaborated for the 23 functional areas showing the level of risk and the indicators´ contribution to each of the risk component.

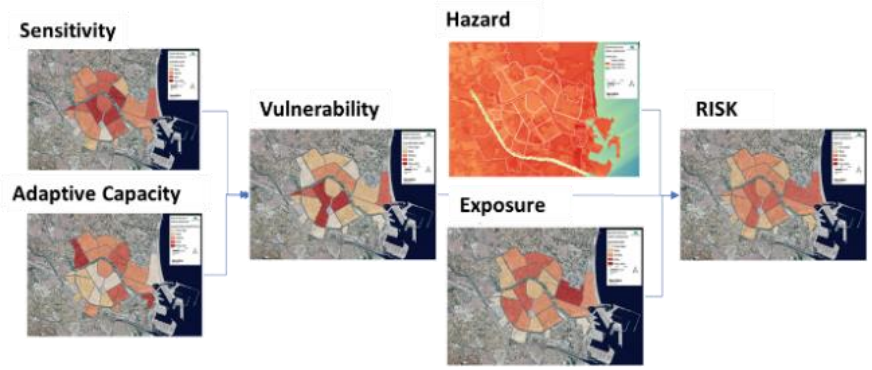

Figure 19 Risk assessment against heat stress in the General Urban Plan for the city of Valencia.

General recommendations and detailed planning guidelines are provided, with specifications for NbS deployment as adaptation measures in the functional areas that show the most significant risk. From a planning perspective, the study positively informs both, the General Urban Development Plan, and the City Green and Biodiversity Plan, a new instrument for planning and management the green infrastructure of Valencia.

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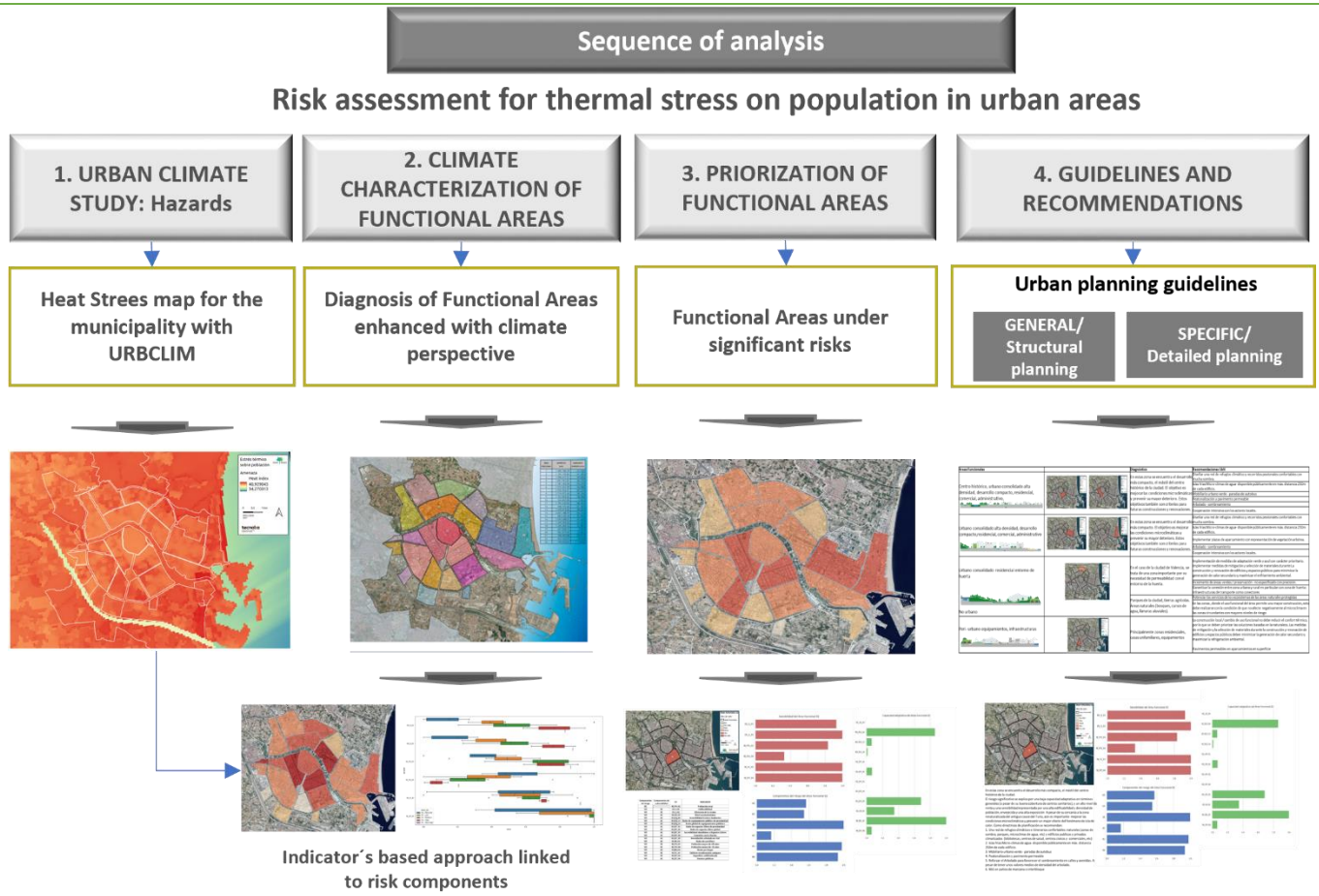

Figure 20 Logical sequence for the incorporation of climate change adaptation into urban planning though NbS. (Source: TECNALIA, 2021).

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04. Develop standards and design criteria for NbS procurement

Description

Procuring nature-based solutions that are implemented on the ground can be a challenging step. It is important to first develop the **standards and criteria to be used in procuring contractors to implement** nature-based solutions, whether for their design, construction and/or maintenance.

Some considerations

- Consider and apply the existing urban greening factors and accessible natural greenspace standards.
- Know your potential NbS market suppliers and finance providers
- Consult experts and train your team with the required skills to successfully integrating NbS ino public tenders, including:
- Integrating social and environmental criteria within the tender
- Writing effective contract performance criteria
- Comparing the quality of different NbS solutions offers
- Understanding how to meet formal tendering requirements

More information

Global Standard for Nature-Based Solutions IUCN

Public Procurement of NbS Report 2020

Green Public Procurement Glossary

Innovation procurement platfom

Sustainable public procurement platform

A guide to support the selection, design and implementation of natural water retention measures in Europe European Commission

Evaluating green infrastructure: A combined sewer overflow control alternative for long-term control plans New Jersey Department of Environmental Protection

Real life comments

"Guidance and recommendations for NbS procurement and NbS standardization would enable NbS market deployment"

Grow Green case studies

Resolution on greening/real estate tax decrease in Wroclaw.

Wroclaw Municipality offers 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

Green Clauses in Manchester.

Manchester City Council has promoted the implementation of green clauses for the bidding processes so that the use of these solutions is favoured compared to other interventions. Whilst clauses can promote the use of NbS, more effort is needed to promote their use and offer sources of financing. Valencia is developing an urban strategy that integrates innovation to improve the quality of life of citizens at the core of the strategy. The aim is to create an overlap between strategy and innovation, the needs of the city, and the "Innovative Public Procurement - IPP" as a financing instrument.

Setting standards and design criteria for NbS implementation in Brest.

Brest Metropole is working on the NbS compendium for the city, to set standards and design criteria for the conception of these infrastructures, permit further maintenance, and give a guarantee of sustainability. These standards aim to facilitate implementation by the metropole departments and to drive studies and implementation for other stakeholders.

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EVALUATING AND REPORTING on your strategy

01.Decide on monitoring and data management

02.Evaluate, report on and communicate the strategy's impacts

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EVALUATING & REPORTING on your strategy

01. Decide on monitoring and data management

Description

Monitoring the impacts of your NbS strategy and projects, is critical for building support for its continued implementation. It is also an important step in **adaptive planning** – ensuring that the lessons learnt from the impact of this strategy feed into its next iteration. The framework for assessing the strategy's impact can be **integrated with smart city data systems**, in line with international best practice and standards.

Apply a systematic and long-term reflexive monitoring and reporting

Planning frameworks are already proactively moving towards adaptive planning and management models, as a response to uncertainy and as an option to effectively harness resilence[10]. In this context, it is utterly important that NbS implementation include provisions to enable this adaptive planning and management, generating evidence-base provided by regular monitoring and evaluation, drawing on scientific understanding as well as local knowledge. NbS effectiveness and continuous performance evaluation could be very relevant in all lifecycles of a NbS intervention, for identifying deviations maximizing synergies and total impacts, and also potential trade-offs, minimizing stranded investments

Long term monitoring is needed particularly in a climate change context. Besides, the relationships between NbS biodiversity, and ecosystem services are dynamic and must be monitored and examined over long time periods to develop effective and adaptive management measures.

Inclusive Local Monitoring System

Establish a comprehensive and co-created Inclusive Local Monitoring Team including a wide range of stakeholders involved in the NbS strategy delivery.

Define Key Performance Indicators to evaluate the impact of NbS projects against the main challenges, vision and objectives of the city.

Deploy a flexible and dynamic Monitoring Strategy with thematic experts and operational groups, allowing the monitoring indicators to be enriched, enlarged, and updated with new challenges, metrics, variables, methods etc. to respond to the city's needs.

Explore modelling tools

Climate related variables has specific conditioning for monitoring due to scale (space and time domains) that must be considered to plan the monitoring strategy. For some KPIs or variables modelling could offer a rich information to fill some monitoring GAPs or to avoid uncertainty

Monitor progress and adapt to change.

Review existing approaches to developing natural capital accounts, using key performance indicators, and collecting data.

Develop a monitoring system to regularly assess the efficiency of the interventions in view of the targets set by the strategy.

Undertake impact assessment, to allow better informed decisions and planning processes: Results from impact assessment will create evidence to underpin business models and business cases to enable investment in NbS.

Standard values for the assessment of NbS performance can also inform benchmarking between design alternatives

[10] *adaptaed from IUCN, 2020* *https://www.iucn.org/theme/nature-based-solutions/resources/iucn-global-standard-nbs*

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Integrate into local and smart city platforms

Define a data management plan, and guidance on integrating data into data platforms following best practices and international standards.

Open-sourced data should into local and smart city platforms towards innovative reporting and showcasing. Reporting is recognized as a highly relevant activity in cities and vital in terms of economic development, investment, EU positioning in the global context of NbS, and exemplars of best practice.

Grow Green resources

The Insight Briefing Grow Green Project Monitoring Strategy for Nature-based Solutions impact assessment in cities

More information

Evaluating the impact of Nature-based Solutions: a handbook for practitioners European Commission

An impact evaluation framework to support planning and evaluation of nature-based solutions projects EKLIPSE project

Reflexive Monitoring Guidebook Connecting Nature

Valuing the Benefits, Costs and Impacts of Ecosystem-based Adaptation Measures GIZ

ValuES Report: Indicators for Managing Ecosystem Services – Options and Examples

Real life comments

"Reflexive monitoring towards adaptive planning and management is considered innovative approach".

Grow Green case studies

Challenges and core Key Performance Indicators (KPIs) to evaluate NbS impact at city level.

Climate Resilience:
- Energy efficiency
- CO2 sequestration

Water Management
- Water quality

Natural and Climate Hazards
- Heat stress reduction and improvement of thermal comfort
- Water retention and flood risk reduction

Green Space Management
- Green space connectivity and accessibility

Biodiversity
- Conservation and enhancement of biodiversity

Air Quality
- Particulate capture

Place Regeneration
- Improvement of space quality

Knowledge and Social Capacity Building
- NbS for awareness raising on climate emergency

Participatory Planning and Governance
- NbS as mechanism to enable co-creation approaches

Social Justice and Social Cohesion
- NbS to guarantee equitable access to nature and social cohesion.

Health and Wellbeing
- Reduction of cardiovascular illness.
- Enjoyment of nature and mental health.

New Economic Opportunities & Green Jobs
- Increase housing prices.
- Increase on direct and indirect jobs related to renaturalisation.

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02. Evaluate, report on, and communicate the strategy's impacts

Description

Your NbS strategy has been implemented and the interventions on the ground have contributed to climate change adaptation.

It is important to **widely communicate and report on these successes**, provide feedback to stakeholders and **evaluate the lessons learnt** for future iterations of the strategy.

Tips on your NbS strategy socialization

- Decide on the most efficient reporting mechanisms tailored to different audiences including potential investors.

- Integrate and coordinate as far as possible with already existing mechanisms and channels.

- Identify the reporting mechanism you will use to keep stakeholders informed of progress.

-. Explore innovative communication channels.

- Think about the language you will communicate with; you need to make things clear to stakeholders in a way they can understand.

- Develop a communication, education, and public awareness strategy.

- Be inclusive and target your communication strategy considering the vulnerable local groups.

More information

Evaluating the impact of Nature-based Solutions: a handbook for practitioners European Commission

An impact evaluation framework to support planning and evaluation of nature-based solutions projects EKLIPSE project

Evaluating green infrastructure: A combined sewer overflow control alternative for long-term control plans New Jersey Department of Environmental Protection

How to communicate successfully regarding nature-based solutions TNC

Communication and engagement in local flood risk management CIRIA

Communication strategies for green infrastructure Georgetown Climate Center

Climate Visuals Climate Outreach

SUDS Photo Library SusDrain

Communication, education and public awareness toolkit IUCN CEC

Participedia Participedia

Communicating flood risks in a changing climate Climate Outreach

Real life comments

"The GCF helped in better shaping reporting outcomes, targeted for instance to vulnerable local groups/citizens".

Grow Green case studies

Virtual Story: Nature-based Solutions for cities – Learning from the Grow Green Project

Urban citizens worldwide are increasingly suffering the effects of climate-related disasters such as floods, droughts, heatwaves, landslides and severe storms. The Grow Green project aims to achieve long-lasting change in cities by integrating Nature-based Solutions into their planning, development, and management.

This virtual story will guide you through a vision for cities which are resilient in the face of climate variability, and the role that nature-based solutions (NbS) can play in achieving such vision. The experiences of the Grow Green cities in implementing NbS and developing NbS Strategies is presented, as well as their achievements and lessons learnt.

The virtual story can be accessed **here.**

Picture credits Grow Green website

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MODULE 3

CO-DESIGN on your NbS project

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A Nature Based Solutions Project Co-design Guide

A Nature Based Solutions Project Co-design Guide has been developed for practitioners responsible for the design and implementation of NbS projects. It provides 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.

Why using 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.

The Co-design guide is available here

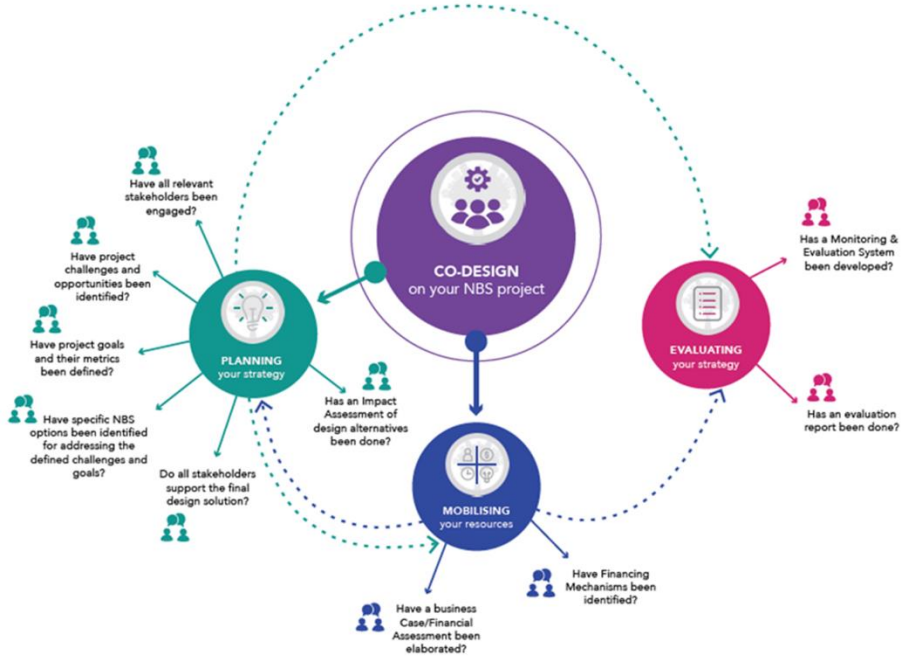

Figure 21 Overview of the NbS Project Co-design guidance.

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