



**CLEVER
Cities**

Multi-level policy framework for sustainable urban development and nature-based solutions

Status quo, gaps and opportunities

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List of abbreviations

CBD	Convention on Biological Diversity
COP	Conference of the Parties
DE	Deutschland (Germany)
EASME	The Executive Agency for Small and Medium-sized Enterprises
EBRD	European Bank for Reconstruction and Development
ECU	Ecuador
EIA	Environmental Impact Assessment
EIB	European Investment Bank
ENABLE	Enabling Green and Blue Infrastructure Potential in Complex Social-Ecological Regions (BiodivERSa project)
ERDF	European Rural Development Fund
ES	Spain
ESPON	European Observation Network for Territorial Development and Cohesion
EU	European Union
FONAG	Fondo para la Protección del Agua (Quito)
GI	Green Infrastructure
GR	Greece
IAP	Information, awareness-raising and public engagement
IT	Italy
IUCN	The International Union for Conservation of Nature
LIFE	EU funding instrument for the environment and climate action
MAES	Mapping and Assessment of Ecosystem Service
MR	Monitoring and research
NATURVATION	NATure-based URban innovation (H2020 project)
NBS	Nature-based solutions
NCFF	Natural Capital Financing Facility
NGO	Non-Governmental Organisation
P.G.T.	<i>Piano di Governo del Territorio</i> (the land management plan)
RISA	Rain InfraStructure Adaption (Hamburg project)
RO	Romania
SDGs	Sustainable Development Goals
SE	Sweden
SER	Serbia
SUD	Sustainable Urban Development
SUDS	Sustainable Urban Drainage Systems
UK	United Kingdom
UN	United Nations

Executive summary

This report, which has been carried out as part of the CLEVER Cities project, explores the extent to which current policy frameworks support sustainable urban development (SUD) and nature-based solutions (NBS).

To this end, the focus was on reviewing policies at the international and EU levels as well as at the national, regional and local levels pertaining to the nine CLEVER Cities case studies (Hamburg, Germany; London, UK; Milan, Italy; Belgrade, Serbia; Larissa, Greece; Madrid, Spain; Malmö, Sweden; Quito, Ecuador; and Sfântu Gheorghe, Romania). Complementary expert interviews supported the identification of gaps and windows of opportunities to strengthen SUD. In total, 34 policies at the international and EU level and 66 policies at the local, regional and national level were reviewed.

The analysis reveals that a variety of different terms are used across countries and from the local to international scale in policies and discourses in support of SUD, with *green (and blue) infrastructure* being the most frequently used. In addition to searching for the explicit support of SUD-related concepts in policies, the review also looked for implicit support. Ultimately, while many policies were shown to have *strong explicit support* for SUD, these often lack mandatory policy instruments. The most common policy instruments within the reviewed policies to support implementation are: financing of targeted research projects, planning/zoning, public information programmes, national or regional strategies and action plans, and standards.

While the reviewed policy frameworks provide a strong starting point for strengthening SUD through NBS, several challenges remain which must be overcome in order to tap this potential. Key challenges include, for example, the insufficient standardisation of NBS at the EU level, and difficulties in the mainstreaming of SUD and NBS across policies at all levels and across jurisdictional boundaries, particularly at the local level. In addition, the potential benefits of NBS for cities are still not well known to decision-makers, practitioners, the private sector and civil society. This is compounded by the slow and highly bureaucratic administrative processes, institutional inertia and the inflexibility to consider new ideas. At the local level, authorities often lack capacities and sometimes capabilities to navigate and access the complex European funding landscape or to access investments from the private sector for NBS in SUD.

Given these findings, it can be concluded that while many policies have high potential for supporting SUD, the significant lack of mandatory instruments potentially limit their impact in practice. Case studies can help to spread available knowledge and experiences to increase the level of awareness and uptake within cities of NBS. To mainstream NBS and their implementation at local level, EU funding mechanisms are of major importance. Access can be supported by the provisioning of guidance as well as the continued development of learning and exchange platforms across regions. The international policy targets, e.g. of the Paris Agreement and the 2030 Agenda for Sustainable Development, also provide an opportunity to promote SUD and NBS. Increased cooperation across different administrative levels, agencies and sectoral departments is necessary to foster SUD and the mainstreaming of NBS.

The range of challenges currently facing society and resulting policy initiatives provide an opportunity to strengthen NBS in SUD, not least through e.g. climate change adaptation plans, urban resilience strategies or strategies for viable and liveable cities.

1. Introduction

As highlighted in the New Urban Agenda (2017), cities have the potential to be a source of solutions to – rather than only the cause of – a number of challenges being faced globally, such as rapid growth in urban population, climate change, environmental pollution and unequal access to resources. Developing sustainably is a precondition to achieving this positive potential, and requires commitments at and coordination between the international, EU, national, regional and local levels. If successful, multilevel actions for sustainable urban development (SUD) can enable cities to become more liveable and resilient places, while ensuring equitable access to the benefits and opportunities being generated.

Nature-based solutions (NBS) are increasingly recognized as a promising tool to foster and support sustainable urban development. Unlike conventional ‘grey infrastructure’ solutions, NBS utilise nature to create multiple ecological, economic, social and urban planning benefits simultaneously. However, the extent to which NBS can contribute to SUD and the degree to which sustainability considerations are integrated at the local level depends on a number of factors. National jurisdictions as well as the design and implementation of policy frameworks play a central role, and can drive sustainable urban development through their objectives, targets, requirements and instruments.

This report aims to increase the understanding of the extent to which the current policy framework supports sustainable urban development and NBS within and beyond Europe and elucidate which instruments play what role. To this end, policy frameworks at the international and EU levels have been identified and analysed, as well as at the national and local levels in eight CLEVER Cities project case study cities (Hamburg, London, Milan, Belgrade, Larissa, Madrid, Malmö, Quito and Sfântu Gheorghe). Complementary expert interviews supported the identification of gaps and windows of opportunities to strengthen SUD at these different governance levels. The findings serve as an entry point for targeting the contribution of the CLEVER Cities project to respond to real world needs by, for example, providing guidance and tools to support cities in designing NBS actions and informing local policy and decision-making processes.

Given these aims, the report is structured as follows:

- Section 2 outlines the methodological approach;
- Section 3 elucidates the current level of support of the EU and international policy frameworks for SUD and gaps and opportunities for the uptake of NBS in SUD;
- Section 4 addresses the same issues as in section 3, but focuses on the city and national levels;
- Section 5 presents a cross-scale comparison of the reviewed policy frameworks, looking at differences and commonalities at the explored policy levels; and
- Section 6 summarises key findings and highlights the gaps and opportunities for improving support for NBS in SUD.

The table below presents the key terms utilised in this report as well as their definitions.

Table 1. Understanding of key terms in this report

Key term	Definition
Sustainable urban development (SUD)	A process of synergistically integrating economic, social, physical and environmental issues within a city, while respecting the limits of planetary boundaries. The aim is to ensure the wellbeing of the local population in the long-term without compromising possibilities to develop surrounding areas and the opportunities of future generations. ¹
Nature-based solutions (NBS)	Systemic interventions that can be inspired by or support nature in addressing various societal challenges, such as climate change mitigation, water management, land-use and sustainable urban development. This entails planning and designing with natural features, such as trees, plants and green spaces, in a way that can help address the aforementioned urban challenges.
Policy	A set of ideas or plans that is used as a basis for making decisions in politics and also usually includes instruments for its implementation. A policy can be a strategy, action plan, roadmap, regulation or guidance document. ²
Policy framework	The combination of policies and financing programmes acting together to regulate and impact actions at a given governance level.
Policy instrument	The instruments which enable policies to be implemented and thereby achieve their objectives, including the following categories: regulatory instruments; economic instruments; information, awareness-raising and public engagement instruments; and research activities.

2. Methodological approach

The analysis presented in this report is the result of a two-pronged methodological approach, including a multilevel policy framework review and complementary interviews. The data collection and analysis processes of each are described in more detail below.

2.1. Data collection

The key elements of the policy framework review are i) the assessment matrix (see Annex), ii) the expert interviews at EU level and the respective national and/or local levels of the CLEVER Cities case study cities, and iii) the executive summaries provided by the authors of the CLEVER Cities case study cities. In order to clearly distinguish between both concepts (SUD and NBS) in this data collection, the assessment

¹ Adapted from Camgani, R. (1998): Sustainable urban development: Definition and reasons for a research programme. *International Journal of Environment and Pollution* 10(1) January 1998. DOI: 10.1504/IJEP.1998.002228 https://www.researchgate.net/publication/240748684_Sustainable_urban_development_Definition_and_reasons_for_a_research_programme.

² In this report also large EU funding programmes are included in the analysis.

matrix focuses on the current understanding of **SUD** and its support through policies and corresponding instruments. In this context and building on existing literature as well as feedback from the city partners, key terms for SUD were derived for the assessment. The expert interviews were used to explore in more detail the current use and uptake of **NBS in SUD**, related gaps, and opportunities. The executive summaries for the case study cities combine the key findings from the assessment matrix and interviews.

Identification of relevant policies

The key policies constituting the international and the EU Policy Framework for SUD and NBS were identified based on in-house expertise, former research projects (e.g. NATURVATION and ENABLE³) and a desk-based review.

The national and city level reviews were limited to the CLEVER Cities case study cities and their national policy frameworks (i.e. Hamburg (DE), London (UK), Milan (IT), Belgrade (SER), Larissa (GR) Madrid (ES), Malmö (SE), Quito (ECU) and Sfântu Gheorghe (RO)). Relevant policies at these levels were identified by the respective city partners from the CLEVER Cities project based on their expertise and – on the basis of expert interviews (see below) – validated and partially sometimes extended with the help of expert interviews. Majority of the policies analysed are either local or national, with the exception of three regional policies: two from the Lombardy region in Italy and one from Sfântu Gheorghe where also one regional policy has been included.

Assessment matrix

To analyse the selected policies, a common assessment matrix (see Annex A) and a guidance document were developed to ensure consistency and comparability across the reviews. The Excel-template was discussed with CLEVER cities representatives and includes:

- A datasheet presenting the key terms and typologies used in the review more specifically:
 - Relevant terms to describe SUD
 - Priority areas for SUD
 - Typology of policy instruments (including regulatory, economic, Information, awareness-raising and public engagement (IAP); monitoring and research instruments)
 - Typology to assess the 'Level of support'
- A datasheet (template) to fill in the findings (building on key terms and typologies listed above) for each reviewed policy and/or funding programme including:
 - Overview (policy type, aims, coverage etc.)
 - Mentioning of SUD (including a link to the priority areas, policy instruments and indicating whether instruments are mandatory or voluntary)
 - Summary of relevance (explicitly and most frequently mentioned terms, extent type and level of support for SUD)

The key terms and typologies used are presented in more detail in the text below.

³ <https://naturvation.eu/>, <http://projectenable.eu/>.

Each policy first underwent a **review to identify basic information**, including:

- Date of entry into force
- Update/reforms (if applicable)
- Type of policy instrument (strategy, framework, directive etc.)
- Aims, objectives and targets relating to SUD (including quantitative and qualitative goals)
- Coverage
- Additional accompanying documents of relevance

As a second step, each policy document was screened for the **explicit or implicit use / employment of SUD or related terms**. To capture the range of terms and concepts used for SUD, a brief literature and online review was conducted to identify those. These terms were validated and adjusted with the help of the city partners and are listed in Table 2.

Table 2. Key terms for sustainable urban development

Key terms for sustainable urban development	
urban sustainability	urban resilience, resilient city
sustainable city, sustainable communities	low carbon city
urban sustainability transition	urban ecology
(sustainable) urban transformation	urban disaster risk reduction
urban regeneration, urban renewal	sustainable urban planning
green and blue infrastructure	sustainable local economy
green city	sustainable urban growth
eco-city	smart city, smart growth

Explicit mentions were identified using a text search function, while implicit mentions were identified by scanning the text for any relevant paragraphs. For each identified paragraph in the reviewed policy, further details were entered regarding the **priority areas for SUD** (see Table 3).

Table 3. Priority areas for sustainable urban development

Priority areas for sustainable urban development	
Ecosystems and their functions	Mobility
Protection and existing network of green and blue spaces	Noise and light pollution
Adaptation to climate change	Mental and physical health
Air pollution	Social cohesion and environmental justice
Quality of place	

In addition also the types of policy instruments mentioned as well as the nature of these instruments was indicated. **The types of policies instruments** include a range of regulatory instruments, economic instruments and instruments targeting information, awareness-raising and public engagement, as well as monitoring and research. A complete list with all policies is included in Annex E.

The **nature of these instruments** could either be: i) mandatory, including mandatory requirements or standards; ii) voluntary, encouraging voluntary action; or iii) the paragraph just included information relating to sustainable urban development thematically, but does neither encourage nor require action.

On the basis of the information entered for the aforementioned categories per policy, a final section of the template required a **summary of the relevance** of the policy regarding the extent and type of support for SUD. This included an identification of the terms related to SUD which were explicitly mentioned and an identification of which were most commonly used. Finally, a categorization of the **level of support** for each policy for SUD was entered in the template on the basis of the review (see Table 4).

Table 4. Level of support for sustainable urban development

Level of support	Description
Strong explicit support	Sustainable urban development or related terms are explicitly mentioned and strongly embedded throughout the framework, including in objectives, policy measure design and/or supported actions.
Strong implicit support	Strong framing of nature as a means to address (select) societal challenges, with multiple references to/support for elements of sustainable urban development; no explicit mentioning of sustainable urban development or related terms.
Medium support	Sustainable urban development and related concepts are not a prominent feature, but deployment is supported through references to / support for individual elements of sustainable urban development.
Low support	Sustainable urban development is neither a prominent feature nor relevant for/mirrored in policy measure design and supported actions.

Interviews and summaries

A series of **semi-structured interviews** were conducted with relevant stakeholders at the city, national and EU levels (e.g. policy officers in environment/spatial planning, environment agencies and NGOs or experts in this field). The interviews aimed to:

- validate the set of policies identified for the policy analysis;
- evaluate the use of concepts of SUD and NBS and the uptake of NBS in SUD;
- assess effectiveness of these policies in supporting SUD and NBS;
- identify gaps and opportunities in fostering the uptake of NBS in SUD; and
- explore potential for EU support for wider uptake of NBS (in SUD) at national level.

The interviews were conducted either before the policy review in order to confirm the selection of policies for review, in parallel or after the policy review. Interviews took place face-to-face or by phone, using a questionnaire (see Annex B and Annex C) to guide the discussion and maximize consistency.

The CLEVER Cities case studies cities have been also asked to provide an **executive summary** summarising key findings from the policy framework review and interviews about which terms/concepts are most prevalent, the extent to which these have been taken up in national discourse/activities vs. national policies and the type of national support for NBS implementation in SUD.

2.2. Data analysis, quality control and limitations

A total 101 policies were included in the review comprising:

- 8 international policies,
- 15 EU policies and 11 EU funding programmes,
- 30 national policies,
- 3 regional policies and
- 34 city policies.

Furthermore, 22 expert interviews have been conducted (four at the EU level and 19 at the national or local level⁴, see Annex D). Findings from the policy review and interviews serve as a basis for a qualitative and quantitative analysis. In order to prepare for the quantitative analysis, data gathered in the Excel-templates was checked in terms of consistency with the provided guidance and terminology. Where necessary, data was edited to ensure its comparability. The data from the different Excel-files was then merged (using a table generator) in order to facilitate cross-scale analyses and derive statistical reports. The analysis of the qualitative mostly gathered through the interviews as well as the executive summaries is limited to a descriptive analysis addressing in particular effectiveness of policies as well as gaps and opportunities in fostering the uptake of NBS in SUD.

In addition to frequent quality checks during the data collection and preparation process, findings from the policy review at EU and city/national level were also validated and complemented by experts via the interviews. Nevertheless, the quantitative analysis has some inherent limitations. For instance, it is possible that key terms were not found explicitly in a policy, but that the general idea or meaning was indeed included in the policy text. Such examples might have been included for some policies, but not for others due to the multiple contributors to the review. The need to translate the list of key terms created an additional challenge in this regard. Moreover, the quality checks and interviews showed that reviewers often assessed the level of support of a policy for SUD with regard to the political context in their country, which may limit the comparability of these assessments.

⁴ For each CLEVER Cities case study cities between one and five interviews were conducted.

3. EU and international policies

This section presents an analysis of the reviewed international and EU policies as well as EU funding mechanisms. In total, eight international policy documents and 26 EU policy documents have been reviewed (including eleven EU funding mechanisms and 15 EU policies) (see Annex E for a full list of reviewed policy documents). The reviewed policies include directives or binding agreements (1 international, 3 EU), strategies (4 international, 7 EU), position papers and non-binding resolutions (3 international, 1 EU) as well as action plans or programmes (4 EU).

3.1. Key terms

The analysis of international policies, EU policies and EU funding mechanisms reveals different frequencies in the explicit use of key terms for sustainable urban development at the international and EU levels (see Figure 1). Of the 16 searched terms, eleven terms only appeared in three or less policy instruments and three terms did not explicitly appear in any of the reviewed policy instruments (*green city*, *eco-city*, *sustainable urban growth*). The term most often used in the EU policies and funding mechanisms is *green (and blue) infrastructure* (ten policies, seven funding mechanisms), followed by the *smart city* concept (ten, equally split between policies and funding mechanisms). This concept is included in the European Regional Development Fund (ERDF), Horizon 2020, Interreg Europe, the New Urban Agenda and the Pact of Amsterdam, among others. Third most frequently, the reviewed policies included general references to *sustainable urban development* or *urban sustainability* (five policies, four funding mechanisms). Half of the key terms do not explicitly appear in any of the EU policies.

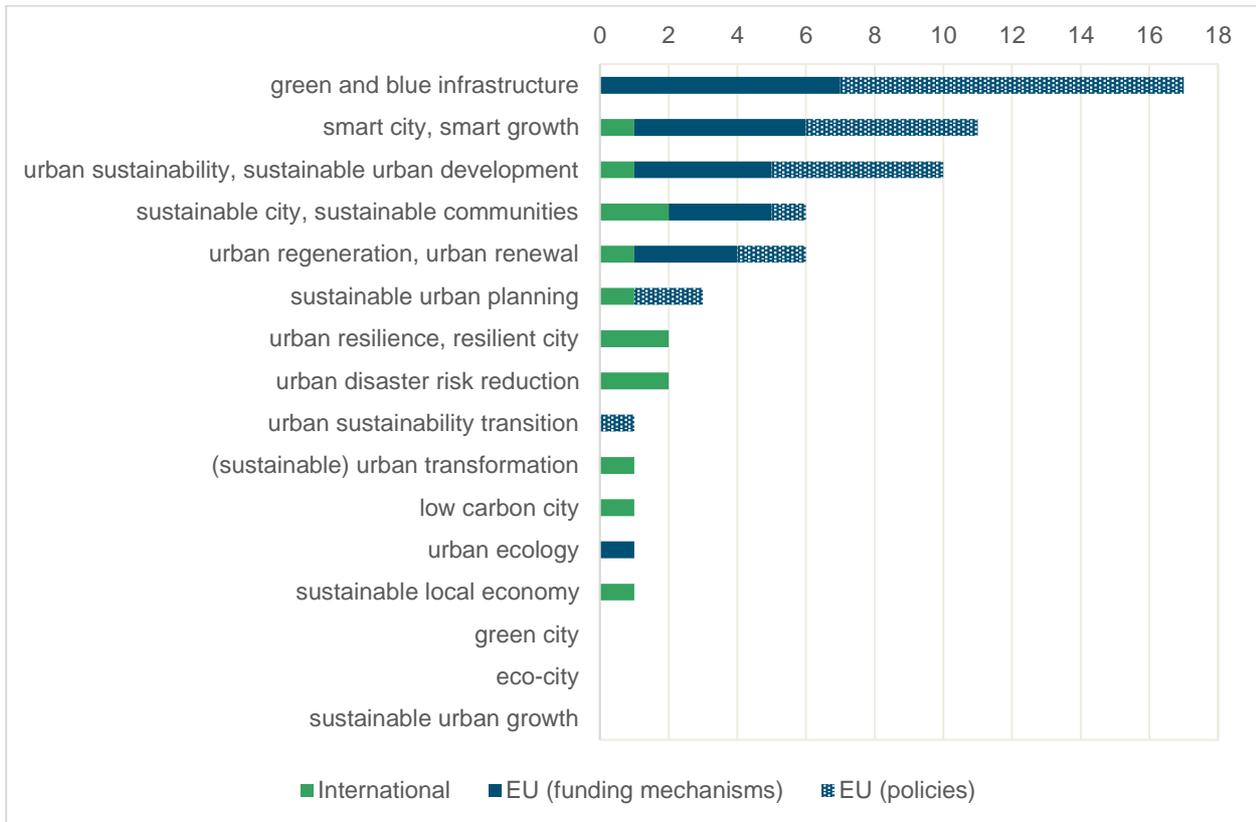


Figure 1. Key terms for sustainable urban development mentioned in international policies, EU policies, and EU funding mechanisms

While this reveals a clear focus on the explicit use of specific terms in EU policy documents, no such focus is visible for the international policies. Here, ten of the 16 terms were explicitly mentioned, but only in a maximum of two policies for any single term. In comparison to the EU level, *urban resilience/resilient city* and *urban disaster risk reduction* seem to be used more frequently in international policies. The terms are explicitly mentioned in the New Urban Agenda and the Global Indicator Framework for the Sustainable Development Goals (SDGs).

3.2. Policy instruments

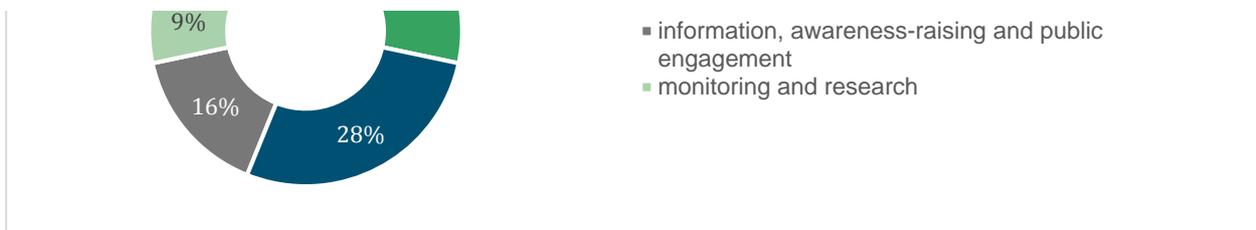


Figure 2). Instruments included in the category *other* included, for example: funding for projects other than research projects; general investment priorities or funding possibilities; tools for data collection and

management; interregional cooperation or cooperation between other entities; as well as soft instruments, such as capacity building, networking and exchange, and the sharing of best practices.

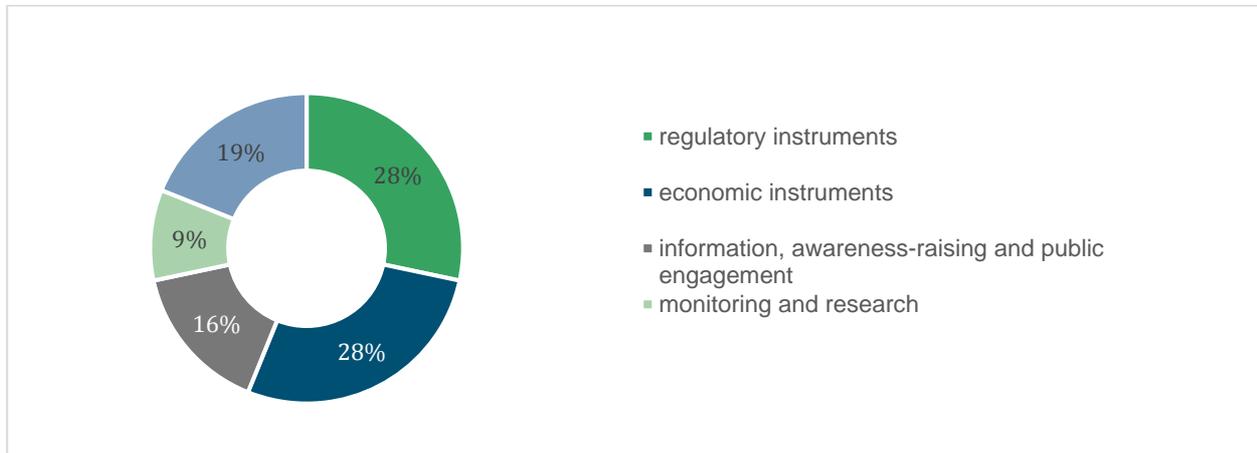


Figure 2. Share of instrument types with reference to sustainable urban development mentioned in international policies, EU policies, and EU funding mechanisms

The distribution of policy instruments across international policies, EU funding mechanisms and EU policies is presented in **Fehler! Verweisquelle konnte nicht gefunden werden.** below. Results reveal that the single most frequently mentioned policy instrument (see Annex A) was the *financing of targeted research projects* (35), followed with a considerable gap by *planning/zoning* (14), *public information programmes* (13), *national or regional strategies and action plans* (11), and *standards* (10).

For **EU policies**, *regulatory and economic instruments* are most often included in the policies (28 times each), followed by 14 policy instruments in the category *information, awareness-raising and public awareness* and ten *monitoring and research* instruments. **EU funding mechanisms** strongly focus on *economic instruments* (21). *Regulatory instruments* and *information, awareness-raising and public awareness* are only mentioned seven times each. Only one instrument falls in the category of *monitoring and research*. In contrast, **policies at the international level** mention *regulatory instruments* a lot more often than *economic instruments* (14 vs. 1), while instruments for *information, awareness-raising and public awareness* (7) and *monitoring and research* (6) lie in terms of numbers in-between these two.

Looking at EU and international policies individually and the number of policy instruments in place, the Action Plan of the “Sustainable Use of Land and Nature-Based Solutions Partnership” mentions the highest number of single instruments (31). The European Regional Development Fund and the New Urban Agenda have the second and third highest frequencies, with 17 and 15 instruments, respectively.

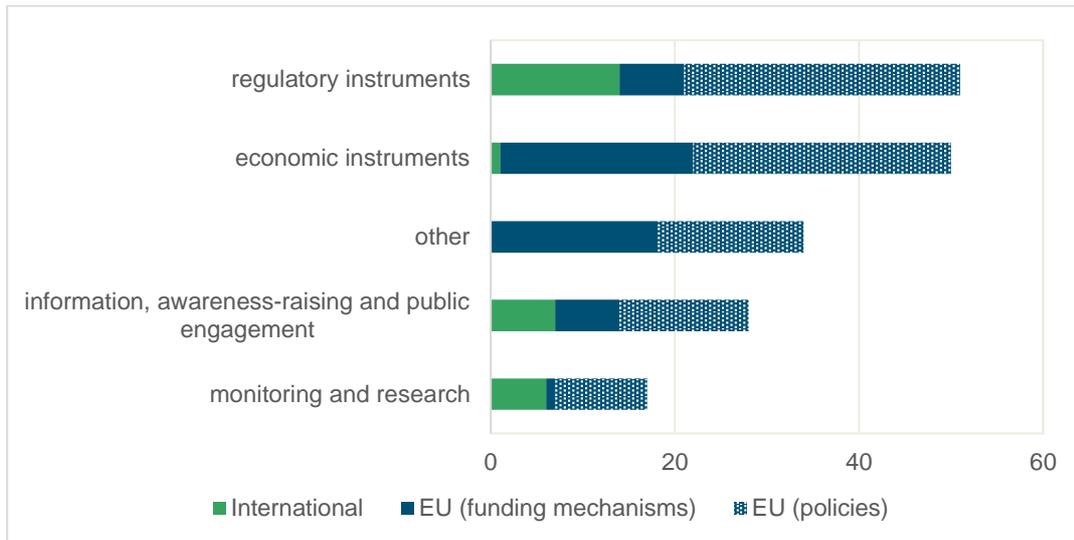


Figure 3. Type of policy instrument for sustainable urban development mentioned in international policies, EU policies, and EU funding mechanisms

Among the **regulatory instruments** *planning/zoning* (14), *regional strategies and action plans* (11), and *standards* (10) were mentioned or highlighted most often. Single policies with a high number of references to regulatory instruments were the *New Urban Agenda* (11 references), the *Action Plan of the Sustainable Use of Land and Nature-Based Solutions Partnership* (8 references) and the *Environment Action Programme to 2020 Living well, within the limits of our planet* (6 references). When taking a closer look, the *New Urban Agenda* mentioned *standards* and *planning/zoning* four times each, as well as *public procurement*, *national/regional strategies and action plans*, and *national/regional planning law or regulations* once. In fact, *public procurement* was only mentioned in the *New Urban Agenda*, but in none of the other documents analysed. *Permits/quotas* and *bans* were not mentioned a single time.

The *financing of target research projects* was by far the most prominent **economic instrument**. It was mentioned in half of the documents analysed at European and international level. It was especially prominent in the *European Regional Development Fund*, the *Cohesion Fund*, and the three *Horizon 2020* work programmes that were analysed. *Payments to landowners or private actors for practices* as well as *private sector loans* were both mentioned four times. *Payments to landowners* were highlighted in the *Action Plan of the Sustainable Use of Land and Nature-Based Solutions Partnership* and once in *LIFE*. *Private sector loans* were mentioned in the *EU 2020 Biodiversity Strategy*, the *EU Action Plan for nature, people and the economy* and again in the *Action Plan of the Sustainable Use of Land and Nature-Based Solutions Partnership*. *Taxes and charges*, *reducing taxes/charges*, *trading of permits for using a resource*, *tariffs*, and *crowdfunding* were not included in any of the analysed policies.

The three types of **information, awareness-raising and public engagement**, namely *trainings and qualifications* (6), *public information programmes* (13), and *stakeholder and public participation* (9) do receive considerable backing through the analysed documents. IAP instruments were the most prominent in the *Action Plan of the Sustainable Use of Land and Nature-Based Solutions Partnership*, the *Sendai Framework for Disaster Risk Reduction*, *URBACT*, and the *Horizon 2020 Work Programme 2018-2020*.

With regard to **monitoring and research**, assessments of *green infrastructure status or ecosystem services* were mentioned most frequently (8), followed by *monitoring systems for Green Infrastructure* (6).

Another aspect which was considered in the analysis was the **level of bindingness** of the policy instruments. This refers to whether the identified policy instruments were mandatory, voluntary, or simply provided information. Among the 180 policy instruments mentioned in the analysed documents only four instruments (mentioned in EU policies) were mandatory. The four mandatory policy instruments either belong to *environmental impact assessments (EIAs)* or *planning/zoning* and are included in three policies:

- the Environmental Impact Directive (mandatory to (1) conduct EIAs with regard to certain infrastructure projects and to (2) address the visual impact of projects in EIAs in order to preserve historical and cultural heritage and the landscape),
- the Floods Directive (mandatory flood risk management plans), and
- the Water Framework Directive (mandatory reporting on key types of measures under the Directive).

EU funding mechanisms do not include any mandatory policy instruments. This does not, however, come as a surprise given that these mechanisms provide opportunities to receive funding – but the application itself for funding is of course voluntary. When it comes to the international level, only one of the analysed policy documents, namely the Paris Agreement, is legally binding but does not include any binding policy instruments regarding sustainable urban development.

3.3. Level of support

According to the assessment, 13 out of 34 analysed international and EU policy documents (about 38 %) provide *strong explicit support* for SUD. The highest share is found among the EU funding instruments (50 %), as illustrated in the figure below. While none of the analysed EU documents (policy or funding) were classified as having a *strong implicit support*, the majority showed either *medium support* or *low support* for SUD (35 % and 27 % respectively).

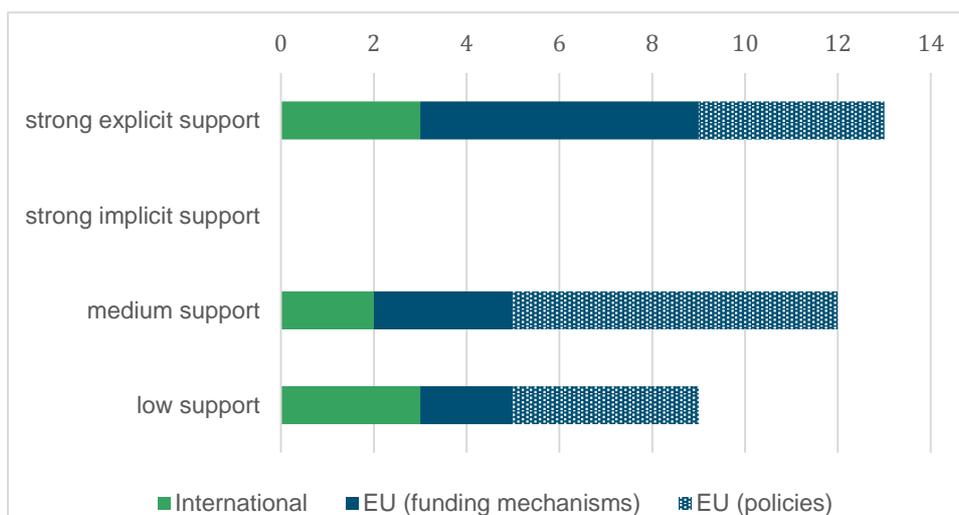


Figure 4. Level of support for sustainable urban development (SUD) in international policies, EU policies, and EU funding mechanisms

Among the reviewed **EU funding instruments**, the specific focus and requirements regarding SUD varied greatly. For instance, the European Regional Development Fund can be considered very relevant for SUD. However, its provisions are very general, as it sets out very general funding priorities that do not make explicit reference to the use of SUD or NBS. On the other hand, there are other, more targeted instruments, such as the work programme 2016-2017 of the H2020 and the BiodivERsA research programmes addressing NBS; or the Natural Capital Financing Facility (NCFF) regarding implementation of concrete city greening projects, where NBS plays a central role. Further EU funding instruments that were assessed as having a *strong implicit support* for SUD have been the H2020 work programme for 2018-2020 and URBACT.

Regarding the **EU policies**, about 27 % of the analysed documents showed a *strong explicit support* of SUD, including the EU Urban Agenda, the General Union Environment Action Programme to 2020, the EU Green Infrastructure Strategy and the Sustainable Use of Land and Nature-Based Solutions Partnership (and its action plan). According to an interviewed EU expert, the latter two policies are the most relevant to promote SUD and NBS. The EU Green Infrastructure Strategy (2013) is seen as a key instrument to include NBS in the H2020 working programme and research agenda (2015). It provides the opportunity to explore benefits, co-benefits, challenges and barriers for NBS in different sectors and contexts. In the follow up, the EU Sustainable Use of Land and Nature-Based Solutions Partnership (2018) was established, linking NBS to the EU Urban Agenda and being the first policy document mentioning and focusing specifically on NBS. This development also revealed the importance of SUD and NBS for implementing the SDGs and European aspirations for sustainable urban development. It also indicates that the potential (according to the expert opinion), that NBS will become an increasingly defined policy field within SUD at EU level.

Sustainable Use of Land and Nature-Based Solutions Partnership (SUL_NBS)

The SUL_NBS is one out of 12 partnerships within the Urban Agenda where cities, regions, national governments and other organisations work together to develop solutions and recommendations that contribute to sustainable urban development. The partnership supports sustainable land use by promoting compact city development, reducing urban sprawl and minimising land-take. Nature-based solutions are regarded as one important tool through which this can be achieved. However, all measures of the action plan remain voluntary.

Regarding the **international policies**, about 38 % of the reviewed documents showed a *strong explicit support* for SUD, which include the Sendai Framework for Disaster Risk Reduction 2015-2030, the New Urban Agenda and the Global indicator framework for the SDGs.

3.4. Gaps and opportunities

The insights gained through four expert interviews with representatives from NGOs, academia, city networks and independent research and consultancy, have informed the identification of gaps and opportunities for NBS support, particularly regarding EU policies and funding mechanisms (a full list of the interviewees and the represented organisations is provided in Annex D). While the interviews focused on the

EU level, discussions offered valuable insights on the challenges and opportunities for implementation at the local level.⁵

EU and international policy support and NBS mainstreaming

The role of EU policy is considered relevant by all interviewed experts for defining priorities and giving guidance to national and local decision-makers. Since the concept of NBS was coined at EU level, interviewees regarding the EU level often focused on NBS as part of SUD.

Despite having selected policies that are strongly pushing the NBS discussion forward (such as the EU Green Infrastructure Strategy or the Sustainable Use of Land and Nature-Based Solutions Partnership), actual mainstreaming of NBS is still far from having reached its potential. Moreover, while it is deemed important that NBS become a political priority and that policies reflect this, stronger or more compulsory regulation at EU level is not believed by the interviewees to be the right approach. This is largely due to being difficult for the EU to broadly decide if and when NBS are the right solution to specific Member State or local problems. Therefore it can go against the EU's principle of subsidiarity. Furthermore, it was argued that by making certain types of interventions obligatory through an EU Directive or otherwise in national legislation, for example under climate change adaptation, there is a high probability that municipalities in charge of implementing such measures would not have the staff or financial resources to fulfil the requirements. Instead, incentives are recommended to be provided to increase the implementation of NBS. On the other hand, all interviewed experts agreed that further integration of NBS in EU policies is necessary for establishing NBS as a political priority.

As one interviewee pointed out, the future reviews of current EU policies (as e.g. for the Environmental Impact Assessment Directive) can serve as useful entry points for including NBS in those. Moreover, on the international level, he argued that the relevance of NBS for achieving the targets set for important treaties, such as the Paris Agreement and the 2030 Agenda for Sustainable Development, are an important argument for the inclusion of an NBS perspective in further treaties at UN level.

EU Financial support for research and communication

Given that NBS implementation normally takes place at the local level, a significant portion of the EU level interviews focused on elucidating the gaps and opportunities of NBS adoption as relates to the role of funding. Two main topic fields were focused on, namely: *research and communication* of the relevance of NBS for cities in order to increase its acceptance among involved stakeholders; and the *capacities of local authorities to access funding* in order to implement NBS.

Regarding the *research and knowledge base* on how to implement NBS, one interviewee highlighted that the technical community remains reluctant to implement NBS, such as for flood protection. The reason for this is that NBS still lack the experience and evidence that is already established in technical standards for more traditional *grey infrastructure solutions*. An additional gap is that NBS is still a relatively new

⁵ These findings are largely consistent with a previous analysis prepared in CLEVER Cities, namely "Barriers and success factors for effectively co-creating nature-based solutions for urban regeneration" (CLEVER Cities Deliverable 1.1.1), available under http://clevercities.eu/fileadmin/user_upload/Resources/D1.1_Theme_1_Barriers_success_factors_co-creation_HWWI_12.2018.pdf.

term. Thus, sufficient best practices examples in a large variety of contexts are still lacking, while the existing examples are not collected in a centralised way, nor investigated using a standardised approach. One interviewed expert considered particularly important that such interventions do not only show the benefits of NBS, but also tangible ways to effectively implement them as well as the costs created. The most crucial challenge in this regard remains the *communication* of the research results among decision-makers, practitioners, the private sector and civil society in order to increase the attractiveness of NBS as an approach to help solve urban challenges

Nonetheless, all interviewees agreed that the Horizon 2020 funding instrument has opened up a window of opportunity to start addressing some of these gaps. Two experts referred concretely to the work programme 2016/2017, which included a dedicated call on *Smart and Sustainable Cities*. Through the programme's funding of research-oriented pilot projects in cities, success stories have been created that have in turn inspired other cities to participate, even if the overall scale of the NBS interventions still remains low. According to one interviewee, products such as the Urban Nature Atlas⁶ developed in the H2020 funded NATURVATION project, which contains 1,000 case studies of urban NBS from across Europe, have also helped in the communication of NBS by presenting already existing examples of green infrastructure and nature-based initiatives in cities and labelling those as NBS.

While the funding provided by research EU funding programmes, such as H2020, LIFE or BiodivERsA, already plays an important role in the creation of a knowledge evidence base and a narrative of NBS, more case studies in different contexts and with a streamlined approach to monitoring impact, cost effectiveness, etc. are still needed. Some interviewees argued that further research needs to be based on the co-creation of knowledge, together with the municipalities and the local population to increase the awareness about the relevance and potential of NBS. Moreover, alternative and bottom-up financing mechanisms for NBS projects (such as crowd-sourcing) should be strengthened to empower and enable citizens to co-create natural elements in their cities. Furthermore, the experiences with such news instruments need to be communicated in a targeted way to decision-makers at local, regional and national levels, so there's clear evidence of how important it is to move on with them.

For instance, one expert argued that *greening strategies* in cities also have a positive impact on economic development and should therefore be highlighted as important to achieve the targets of the EU 2020 Strategy, which are focused on economic growth and jobs. Greener cities offer an attractive environment for businesses and employees and can thus attract more investments and increase tax revenue. Similarly, the private sector can be presented with examples of NBS that have the potential to reduce costs and can in turn be an effective partner for communicating positive experiences.

Access to EU funding by local authorities

While EU funding is recognized as a valuable complement to national and local budgets with regards to funding NBS, cities often face challenges in accessing these funds. Additionally, difficulties arise in terms of cities being able to utilise available EU funds for their desired objectives, such as for developing city wide NBS strategies. Key challenges include EU restrictions on eligibility and a lack of human and finan-

⁶ <https://naturvation.eu/atlas>.

cial capacities within municipal governments. Another challenge is that EU funds often focus on NBS implementation and fund individual projects, but do not address the precursory actions which are necessary for developing city-wide management strategies or plans. The H2020 funding instrument, for example, places a strong focus on innovation and NBS project-related research and implementation. Aspects such as standardisation and mainstreaming, which are necessary for creating dedicated NBS strategies, are not typically supported as part of H2020 projects. The Cohesion Fund or the Structural Funds, on the other hand, are a potential source of funding for cities wishing to pursue these aspects of NBS, but eligibility is dependent on where a city is located. Nevertheless, all interviewees agreed that while there is a funding gap for NBS interventions, this is more related to the complexity of the EU funding landscape and the resultant difficulty of access than to a lack of EU funds that could apply to NBS.

The existence of more targeted financing mechanisms which combine funding and lending present additional opportunities to fill funding gaps and help address the outlined financing challenges. Programs such as the *Natural Capital and Finance Scheme* from the European Investment Bank (EIB) or the *Green City Programme* of the European Bank for Reconstruction and Development (EBRD), are highlighted as being important in this regard. The latter, for example, it is quite comprehensive and aims at providing public funding for the achievement of all environmental targets and objectives set out in EU directives. To this end, the bank supports consultancy at early stages strategic development and then lends money for implementation. While it is still in a piloting phase and only being tested in selected cities, interviewees argued that the intention of the Green City Programme is to make such processes a standard procedure of the bank and a pre-requisite for funding once the piloting phase is concluded. This could help mainstream NBS among funding and financing institutions by legitimizing them as being eligible interventions for the mitigation of environmental risks and for supporting the attainment of EU environmental objectives. A further opportunity identified by one interviewee was the recent publishing of a practical guide by the EIB called *Investing in Nature: Financing Conservation and Nature-Based Solutions*⁷ in the context of the NCFE. This document provides a reader-friendly outlook of different financing options and examples of how these can be applied. Ultimately, it aims to explore ways how cities or stakeholders can develop their capacities to effectively combine EU and local/national funding to finance nature conservation and NBS projects.

Regarding these gaps and opportunities in access to funding, the interviewees pointed out the importance of increasing the support of municipalities for navigating the complex funding landscape. One interviewee highlighted the relevance of learning partnerships between cities, such as the one provided by URBACT, which help build up knowledge to address outstanding needs and create awareness amongst cities. It is thus important that the EU continues supporting these mechanisms and continue explicitly integrating NBS in different strategies and funding programmes to support mainstreaming. Moreover, in order to help reduce the resources necessary for accessing funding, efforts should be made to align different funding programmes to reduce the complexity of applications. In parallel, cities should continue to be provided with guidance to support awareness of and access to available funds.

⁷ <https://www.eib.org/attachments/pj/ncff-invest-nature-report-en.pdf>.

4. Local and national policies

This section presents an analysis of the reviewed local/regional and national policies in the CLEVER Cities case study cities. The analysis builds on information from the assessment matrix, interviews and executive summaries provided by the case study cities. In total, 37 local/regional and 30 policies have been reviewed. Focus of the analysis was on key terms used for SUD (and where mentioned in the city reviews also reflecting on the use of NBS), level of support for SUD by policies, uptake of NBS in SUD as well as gaps and opportunities and upcoming policy developments (outlook).

4.1. Hamburg | Germany

Key terms

The interviewees indicated that the terms *green and blue infrastructure* as well as *ecosystem-based approaches* are quite common and the typical terms used by people with an urban development background/perspective. In addition, frequently used concepts include the idea of *green infrastructure*, such as the *Grünes Netz* (Green Network), or *Biotopverbund* (biotope network), which both aim to increase green corridors for an increased connectivity of existing green spaces and improved network of green spaces/biotopes. The term NBS is known to experts in the field of GI, but interviewees stated that it is not used in any national or local policy. In the field of climate adaptation, the concept of *learning from nature* and *solutions that are close to nature* are used frequently. The idea to give parks and green spaces at least the same level of importance as traditional grey infrastructure (streets, railways, etc.) is quite common at the regional and local level, although often not referred to explicitly as *green/blue infrastructure*. *Ecosystem-based approaches of flood management* were also mentioned by one of the interviewed experts who stated those were well-known, even though the flood protection in Hamburg focuses mainly on technical solutions.

Moreover, policies analysed also use terms such as *(sustainable) urban transformation*, *green city* and *urban disaster risk reduction*. But the terms are generally only used for very specific aims and are not essential for the overall strategy (e.g. National Biodiversity Strategy).

Reviewed policies

Nine policies were reviewed for this city profile:

Key facts | Hamburg

Population:	1,834,823 inhabitants (2018)
Density:	2,430 inhabitants/km ² (2018)
GDP per capita:	64,957 EUR (2017)
Altitude:	6 m
Geography:	located at the river Elbe, close to the North Sea coast
Share of green space:	32,9 % (2017)
Type of green space:	parks, fruit farming, forests

Table 5. Local and national policies reviewed for Hamburg/Germany

Policy	Date	Type	Level
(A) Weißbuch Stadtgrün (B) Grünbuch Stadtgrün (Green and White Paper: Green in the City)	2017 (A) 2015 (B)	Strategy	National
Aktionsplan Anpassung der Deutschen Anpassungsstrategie an den Klimawandel (Action Plan: German strategy for adaptation to climate change)	2011	Action Plan	National
Nationale Strategie zur biologischen Vielfalt (National Biodiversity Strategy)	2007	Strategy	National
Bundeskonzzept Grüne Infrastruktur (Federal Green Infrastructure Concept)	2017	Strategy	National
Hamburger Klimaplan (Hamburg Climate Plan)	2015	Strategy	Local
Mehr Stadt in der Stadt - Gemeinsam zu mehr Freiraumqualität in Hamburg (More city in the city – Towards more open space quality in Hamburg)	2013	Strategy	Local
Mehr Gründächer für Hamburg (Green roof strategy Hamburg)	2014	Strategy	Local
(A) Landschaftsprogramm (LaPro), (B) Biotopverbund, (C) Grünes Netz (Landscape programme, biotope network, green network)	2013(A) n.a.(B) 2010(C)	Strategy/ Framework	Local
RISA Strukturplan Regenwasser 2030 (RISA Structural Plan for Stormwater 2030)	2013	Strategy/ Framework	Local

Level of support

The policies analysed support SUD to varying degrees: Three local and one national policies provide *strong explicit support* (RISA, green roof strategy, green network and adaptation action plan), two policies provide *strong implicit support* (Hamburg Climate Plan and Federal GI concept), and three policies provide only *medium support*. Of the latter three, two stem from the federal level and are not binding. This means, they do not mandate any compulsory measures or any financial support. Nonetheless, the fact that national strategies address the topic of sustainable urban development serves to increase awareness and attention for this topic.

While the term NBS is not explicitly mentioned in any of the reviewed documents, the concept of GI is the focus of several national policies and there is also support for NBS in local strategies without the explicit mentioning of the term.

Uptake of NBS

At the district level, NBS are developed and supported by research projects in cooperation with universities and other partners. While these projects do not often use the term *NBS* to describe their activities, the concept of working with nature to address societal challenges is nevertheless realised in practice. There are also many campaigns and policies in Hamburg (e.g. green roof strategy and Naturcent⁸) to foster the uptake of NBS, but citizens are often not aware of these initiatives or the benefits such interventions can provide. As revealed by one interviewee, even those individuals who are aware about the campaigns and policy instruments are not familiar with the term NBS, as it is not used in the German context, because of its very broad and unspecific definition.

Gaps and opportunities

A general challenge in Germany is the need to work across administrative levels (national, federal states, regional/local level). Even in Hamburg, where the state and local levels are much closer than in other German federal states, there are conflicts between the districts and the city administration.

Expert interviews reveal that the existing strategies and instruments in Hamburg could be stronger regarding communication and participation aspects, in order to more effectively secure long-term stability within NBS projects. The existing policy instruments are deemed to be lacking transparency and true participation, which should be refined to more actively engage a diversity of stakeholders and not only include the “usual suspects”. A further challenge is the consolidation of project activities after the termination of project funding.

Implementing a NBS as a physical example of how nature can be used to improve flood protection and rainwater infiltration can be a good opportunity to gain publicity, demonstrate integrated approaches and foster a wider uptake and support for NBS. Moreover, experiences in working with schools or kindergartens implementing green solutions are seen as being very important for create a “collective consciousness” and building emotional connections to nature, as well as for raising awareness of sustainable solutions.

Outlook

A recently organised citizens’ initiative has put pressure on the government of Hamburg to protect valuable areas and improve the quality of nature in the city. Hamburg’s politicians responded to the initiative with an agreement for more nature conservation and nature quality. The agreement sets the goal for the Hamburg Senate to preserve the current share of nature reserves and protected landscapes in relation to the size of the city, including the areas of the biotope network. This means that 30 % of Hamburg’s urban area will be protected in the future. In addition, the natural quality will be quantified in a *natural value*, which is based on standardised assessment procedures for biotope or land use types commonly used in environmental impact assessments. This score is evaluated every five years and is to never decline. The initiative thus had a lot of power and developed an effective contract, that can be regarded as a milestone

⁸ Naturcent is a regulation that is unique in Germany which creates ecological financial compensation for land consumption as a result of construction projects.

in the protection of Hamburg's urban green spaces. Since the natural value should not decrease any further, the contract is foreseen to also result in a continuous improvement of urban green spaces.

Within the national White Paper: Green in the City, several measures were defined to improve and support urban green spaces. It mentions, e.g. support for green infrastructure within urban development (*Städtebauförderung*). Several initiatives, toolkits and competitions are also mentioned.

The review also revealed that the national funding for urban development (*Nationale Städtebauförderung*) should explicitly embrace the concept of NBS. For instance, funding could be more strictly allocated towards projects and measures that not only address the main targets of the funding stream (e.g. strengthening city centres, urban redevelopment measures or securing services of general interest), but create co-benefits to help address a wider range of urban challenges, including in the areas of sustainability, environmental conversation, human health and well-being, etc. Adopting a mid-term perspective, one interviewee believed that the formal procedures in land-use planning need to be adapted in order to enable flexible, collaborative processes.

4.2. London | United Kingdom

Key terms

In the UK and in London, the term *green infrastructure* (GI) is used more frequently in the area of SUD, compared to *nature-based solutions*. Although used in London since 2008, terms such as GI and *ecosystem-based approaches* became more widely used following the publication of *The Natural Choice* in 2011 – the Government White Paper on the natural environment. Since then, these two terms have become firmly embedded in national policies and strategies. At the national level and in London – through the 25 Year Environment Plan and the London Environment Strategy respectively – GI is a well established term and concept. Further key terms used to a minor extent at local and national scale, relating to SUD are: *green city*, *urban resilience*; *sustainable urban growth*; *smart city* and *sustainable city*; and *low carbon city*.

As pointed in the interviews, the statutory national agencies, responsible for promoting and delivering various aspects of NBS and SUD, use the term GI. There is also recognition of the multifunctionality of NBS with a particular focus on e.g. reducing flooding and improving water quality (the Environment Agency), urban air quality and urban cooling (the Forestry Commission) and biodiversity and access to open space (Natural England).

Key facts | (Greater) London

Population:	9.01 million inhabitants (2018)
Density:	5,610 inhabitants/km ² (2017)
GDP per capita:	55,900 EUR (2017)
Altitude:	11 m
Geography:	located at the riverside of the Thames
Share of green space:	48 % - including gardens (2018)
Type of green space:	parks, natural habitats, private gardens, agricultural land in the Green Belt

Reviewed policies

Eight policies were reviewed for this city profile.

Table 6. Local and national policies reviewed for London, UK

Policy	Year	Type	Level
The Natural Choice: securing the value of nature	2011	Policy Framework	National
Local growth: realising every place's potential	2010	Policy Framework	National
25 Year Environment Plan	2018	Action Plan	National
National Planning Policy Framework	2018	Policy Framework	National
London Environment Strategy	2018	Strategy	Local
London Plan	2016	Policy Framework	Local
London Infrastructure Plan 2050	2014	Action Plan	Local
Mayor's Transport Strategy 2018	2018	Strategy	Local

Level of support

All of the analysed policies were found to support SUD (and partially also GI). Three policies provide *strong explicit support* (25 Year Environment Plan, London Environment Strategy and London Plan), four policies provide *strong implicit support* and only one policy provides *medium support* (Local growth).

Experts interviewed highlighted that the primary mechanism for delivering GI at a national scale through is the land-use planning system. This has established a framework resulting in GI being embedded within new developments and regeneration projects in ways that complement or replace traditional infrastructure. *Green infrastructure* has been further mainstreamed, by revealing its potential economic value within the concept of natural capital.

The need for a GI approach that provides a coherent and integrated policy framework and supports urban regeneration and growth, is recognised in the government's Local Growth and Industrial Strategies and the London Infrastructure Plan 2050. In London, GI policies have been prepared to support and complement broader environmental, social and environmental objectives as set out in the Mayor's Transport Strategy and Health Inequalities Strategy.

Uptake of NBS

Interviewees highlight that the importance of GI and related concepts such as NBS has been recognised in the discourse by a wide range of national government departments and national agencies (other than the statutory environmental agencies listed above). Specific examples include Public Health England, Highways England and Network Rail. In addition the work of the Natural Capital Committee and the Ecosystems Knowledge Network have been important in highlighting the potential economic value of GI.

Expert interviews revealed that the policy framework established by the national government provides a good support for the planning and implementation of GI (and NBS). The policy framework (especially the National Planning Policy Framework) has provided the impetus to secure funding and resources for GI (and NBS) through planning obligations and requirements for developers. This has been a particularly important source of funding and financing for NBS in the urban environment, albeit favouring areas (such as London) where there is significant regeneration and where land values are high.

Gaps and opportunities

One of the main barriers regards implementation of GI (and NBS) is the current lack of (innovative) fiscal mechanisms that can be put in place to leverage private sector investment as well as funds to deliver the public goods provided by ecosystem services. The economic payback from GI often reaches its peak only after many years, which is less attractive to private capital for investment than endeavours with high short-term payoff. High capital investments are made by public agencies, but these bodies and local governments don't hold sufficient funding to maintain the quality of the initial investment in the long-term. There also is a need to make better use of public procurement processes to support GI.

Further barriers to the implementation and wider integration of GI (and NBS) are institutional inertia, lack of collaboration among agencies, a lack of trust in GI (and NBS) performance (i.e. insecurity about the delivery of benefits vs costs in the long-term). Moreover, there is still suspicion in some quarters that GI will hinder rather than help economic growth. Additional costs of GI is used as a reason not to implement GI in economically weaker regions of the country, where such costs are assumed to threaten the viability of new development.

The government's **25 Year Environment Plan** is seen as a great opportunity to increase the implementation of GI (and NBS) by setting out specific objectives and commitments on behalf of the national government. These include:

- Delivering a 'biodiversity net gain' by developers when building new housing or commercial development – i.e. habitats for wildlife must be enhanced and left in a measurably better state than they were pre-development;
- Valuing the economic benefits of GI through and supporting investors and managers of urban GI via new tools, such as 'Greenkeeper';
- Developing and providing guidance on new standards through tools, such as 'Building with Nature', to provide planners and developers with the knowledge on the design, implementation and management of GI.

Outlook

The operationalisation of the national *25 Year Environment Plan* offers a huge potential to foster the implementation and wider uptake of GI (and NBS) throughout the country. As with all policies, however, the extent to which this plan will be successful remains to be determined.

Interviewees stated that in order to seize existing opportunities and successfully implement the *25 Year Environment Plan*, further actors, such as the HM Treasury, should get engaged in encouraging the proper valuation of GI, for it to be accounted for in public finances. This is being pushed forward through changes in the Treasury Green Book, in order to take account of GI. Moreover, the Office for National Statistics has been asked to develop a roadmap to 2020 to ensure that natural capital is embedded in national accounts. Further, the national government has established other institutions, such as the Council for Sustainable Business, to provide advice on the implementation of the 25 Year Plan.

The new *London Plan*, due for publication in 2020, strengthens the local policy framework for GI. More specifically, a new policy on Urban Greening requires all new development to include elements of GI determined by the application of an Urban Greening Factor calculation. Furthermore, the confirmation of London as a National Park City in summer 2019 establishes a more compelling public-facing narrative for the implementation of GI policy and projects.

4.3. Milan | Italy

Key terms

National policies and agencies focus on *green infrastructure and cities* concepts and *resilient city* objectives (related to climate adaptation), which are also reflected in regional policies. In addition, the concept of *sustainable planning* is used at the regional level. While several urban sustainability concepts are used in local policies, the most common and widely accepted term is *green and blue infrastructure*. The most frequently quoted concept is *city resilience*. According to a national and EU expert, the concept of NBS is known and supported by national agencies and environmental experts groups since 2016. Apart from the discourse, the term is also occasionally used explicitly in policies themselves, but not as frequently as *green and blue infrastructure*.

Key facts | Milan

Population:	1,372,810 (2018)
Density:	7,556.61/km ² (2018)
GDP per capita:	51,600EUR (year 2017)
Altitude:	122 m
Geography:	Alluvial Plain (Po river valley)
Share of green space:	40.6 % (2018)
Type of green space:	parks and gardens, squares, green areas, farmland included in metropolitan protected areas

Reviewed policies

Eight policies were reviewed for this city profile:

Table 7. Local, regional and national policies reviewed for Milan / Italy

Policy		Type	Level
National Law 205/2017 Greening tax credit	2017	Law	National
National Climate Change Adaptation Strategy	2015	Strategy	National
National Green Procurement Strategy and Criteria	2008/17	Strategy/Standard	National
Lombardy Law 12/2005 Land Planning and Building	2005/17	Law	Regional
Lombardy Climate Change Adaptation Plan	2016	Strategy	Regional
Milan PGT - Land Management Plan	2018	Planning	Local
Milan Future Landscapes - greening strategy	2016	Strategy	Local
Milan Sustainable Energy Action Plan / Building code related attachments	2018/16	Action Plan/Standard	Local

Level of support

Strong implicit support for sustainable urban development has been identified in the National Law 205/2017 Greening tax credit and the building code-related attachments of the Milan Sustainable Energy Action Plan. The remainder of the reviewed policies are classified as providing *strong explicit* support. In the case of the Lombardy Law 12/2005 Land Planning and Building, the objectives and principles were found to provide *strong explicit* support for sustainable urban development, but the chapters relating to the enforcement of implementation only provide *medium* support. According to the expert responsible for developing this case study, the concepts relating to sustainable urban development found in analysed policies get confused with others which decreases their relevance and thus the support for them while passing from strategies to direct regulation and implementation.

Regarding NBS in the context of sustainable urban development, an interviewee highlighted that NBS policies are being discussed and considered within policy-making discourse. One example of this is the national working group on NBS that has been established at the level of the Ministry of the Environment; this group involves, amongst other actors, officers of the metropolitan city. Furthermore, agencies and ministries involved in the promotion of European funds (such as LIFE, H2020, and the structural funds) organize meetings to inform the cities about these funds and – in doing so - use the corresponding EU terms in discussions.

Uptake of NBS

At the national level, the uptake of NBS can be divided into the private and public sectors. For the private sector, a tax discount incentive for green works has been established. However, with a cap of € 5,000 for a given household, this discount is only significant for residential condominium buildings in which several

single households combine their discounts to finance their shared green roof or de-pavement interventions in adjacent lots. Regarding public works, the Environment Ministry has established implementation tools in the National Green Procurement Strategy and its corresponding sectoral plans. Their application is, however, not compulsory and rather serves as a target. In 2016, the Infrastructure Ministry included green public procurement guidelines into the public procurement law, but only as a selection criteria, not as a compulsory standard. According to an interviewee, the national agencies (ISPRA State Institute for Environmental Research, ENEA National Agency for Alternative Energy sources, CNR National Research Council) provide more indirect support for NBS via research, dissemination and training activities.

At the regional and local levels, NBS are integrated into a series of regional laws on planning, setting aims and standards for city plans, agricultural soil preservation, sustainable city regeneration, and green and blue networks redesign. A recent regulation has been introduced which focuses on soil imperviousness and the preservation and restoration of permeable lands with runoff control by Sustainable Urban Drainage Systems (SUDS).

The City of Milan tried to anticipate the evolution of national and regional level regulations and strategies in its ongoing update of the *Piano di Governo del Territorio* (P.G.T., meaning the land management plan) with sustainable building regulation. Aspects were included as possible alternatives for reaching standard sustainability requisites, such as SUDS, de-pavement intervention incentives and green roofs, and partially substituting minimum standards of public services areas. A green and blue infrastructure plan is also part of the P.G.T. Service Plan document since 2012. The final approval of the P.G.T. update is scheduled to take place at the end of 2019, providing the opportunity to integrate some preliminary results emerging from the CLEVER Cities project.

Gaps and opportunities

The Italian policy framework on NBS is afflicted by some more overarching difficulties concerning the Italian policy and legislation framework on the environment, infrastructure, public works and city planning; some of the key challenges include:

- A lack of coordination between the national level (which is the main legislation and policy-making level for the environment and public works) and the regional government level (which – since the Italian Constitution reform of 2001- retains legislative power on land and city planning) when simultaneously updating policies.
- A lack of thematic coordination between environmental policies which are primarily defined at the national level by the Ministry of Environment, Land and Sea Protection, and land use and infrastructure policies which are managed at the national level by the Infrastructure Ministry (in case where decision-making is not delegated to the regional governments).
- The city level holds the main decision-making power regarding land use and city planning, and its general planning document, named P.G.T. (L1) in Lombardy. Due to a lack of coordination with the higher governmental levels, cities are often forced to manage some overlapping and contradictory issues stemming from these levels in their planning and policy documents.

An interviewee confirmed this assessment and commented that a major problem is created by the historical absence of a national guidance dedicated to sustainable urban development. Currently, there is no ministry or a dedicated department for this topic area, and the urban theme is rather assessed across national policies without any systemic and permanent actions supporting cities in financial terms. The previous government launched a steering committee for PON funds (the national FESR fund programme for urban areas) and National Periphery Rehab Fund, where the theme of urban sustainable development played a stronger role. Prosecution of these policies by incoming government since 2018 is still uncertain.

Outlook

National soil preservation law and landscape ecology strategies have been proposed at the national level, but - according to a landscape ecology national expert⁹ - have not been approved to date. Nevertheless, they are in force in laws, strategies and planning instruments in some regions, such as in Lombardy, Tuscany and Emilia-Romagna (Bologna region).

According to an interviewee, a guidance is needed as a systematic action for diffusion and coordination between ministries and national and regional agencies. Strengthening cities' capacities to access the structural funds for urban areas can be key, inserting the explicit objective to consider NBS and SUDS as tools to support adaptation to the climate change. The development of a co-financing fund would also be beneficial to support cities in financing LIFE or on other European-funded projects.

4.4. Belgrade | Serbia

Key terms

In the reviewed national policies, the most frequently used key term is *urban regeneration / urban renewal*, but as a traditional concept which is related to economic activities and cultural heritage protection rather than to *ecosystem-related approaches* and *nature-based solutions*. Another prominent concept is *urban sustainability*, although used more implicitly.

Additional terms encountered in national policies include *low carbon city*, *smart* (specialisation/city), (urban) *ecology*, (urban) *resilience* and concepts related to *urban disaster risk reduction*, which are also used only implicitly. The term *nature-based solutions* has not yet been integrated into any national Ser-

Key facts | Belgrade (Inner-City Area)

Population:	1,166,763 (2011)
Density:	3,241/km ² (2011)
GDP per capita:	9,614 EUR (2017)
Altitude:	117 m
Geography:	on the slope between two alluvial planes
Share of green space:	13.2 % (2010)
Type of green space:	parks, forests/woods, river banks

⁹ Informal conversation with Arch. Gioia Gibelli SIEP president, Italian Association for Landscape Ecology, affiliated to IALE International Association for Landscape Ecology.

bian policies. In the reviewed local policies, *green infrastructure*, *smart urban development* and *urban renewal* were the most frequently used terms. These often appeared in combination with *urban resilience*, *urban transformation*, and *reduction of climate-related risks*.

Reviewed policies

Eight policies were reviewed for this city profile:

Table 8. Local and national policies reviewed for Belgrade/Serbia

Policy	Year	Type	Level
Sustainable and Integrated Urban Development Strategy of the Republic of Serbia (Draft)	N/A.	Strategy	National
Law on Planning and Construction	2009	Law	National
Law on Spatial Plan for the Republic of Serbia from 2010 until 2020	2010	Law	National
National Programme for Disaster Risk Management	2014	Programme	National
Belgrade Development Strategy until 2021	2017	Strategy	Local
General Urban Plan (Masterplan) of the City of Belgrade	2016	Legal Act	Local
Belgrade Climate Change Adaptation Action Plan and Vulnerability Assessment	2015	Action Plan	Local
Belgrade Environmental Protection Programme	2015	Strategy	Local

Level of support

The terms linked to SUD are rarely used in direct relation to the defined priority areas (e.g. *ecosystems and their functions*, *adaptation to climate change*, *mobility* and *social cohesion and environmental justice*). Instead, they often represent broader, more declarative principles and are often related to economic development, competitiveness, etc. While the support for SUD through the analysed policies is – in theory – usually quite strong (five policies were rated to provide *strong explicit support*, another one *strong implicit support* and the last two *medium support*), their significance is weaker than expected, as these policies are not adequately enforced and implemented in practice. According to one of the interviewed experts this is due to “insufficient readiness for innovation, conservative thinking at both institutional and personal level and a lack of education”.

Uptake of NBS

As one interviewee points out, none of the concepts related to NBS is used systematically by Serbian national agencies. Uptake of NBS thus remains limited.

At the local level, the Executive Committee of the City Assembly decided in December 2002 to initiate the project *Green Regulation of Belgrade*¹⁰. This project aims to regulate the management of Belgrade's green space system, i.e. its planning, development, arrangement, maintenance and protection. However, due to a very slow or sometimes non-existent implementation of plans, a number of informal/non-institutional greening initiatives emerged. These initiatives gradually contribute to the implementation of the green infrastructure concept formulated in the *Green Regulation of Belgrade* study. Community involvement is thus key in achieving a higher level of sustainability (economic, social, and environmental) in/of public spaces.

Gaps and opportunities

Existing barriers for implementing NBS in SUD are first and foremost the lack of NBS integration into national policy documents and the lack of national funding mechanisms. Experts also pointed to a general lack of commonly recognised glossary, nomenclature as well as public policies and plans that cover the issue.

Opportunities for implementation include the cooperation of national institutions with NGOs, which could significantly increase the implementation of NBS and related concepts to achieve SUD. The Serbian Ministry of Construction, Transport and Infrastructure could contribute to this cooperation enhancement through its calls for proposals for small projects in the civil sector.

Outlook

As Serbia is an EU accession country, it is considered important to integrate NBS into the Needs Assessment Document (National Priorities for International Assistance) to acquire funding via the instrument for Pre-Accession Assistance. The National Urban Development Strategy has been integrated into this document for the period after 2020. With the implementation of its measures, Serbia will hopefully support a wider uptake of NBS. National institutions are also preparing to cooperate with the Global Green Growth Institute to tap into international sources of funding.

¹⁰ https://urbel.com/uploads/Magazin-INFO-arhiva/info_br11_tema_broja.pdf,
<https://www.mdpi.com/2071-1050/9/7/1183/htm>.

4.5. Larissa | Greece

Key terms

In Greece, terms such as *green interventions*, *bioclimatic interventions*, *green and blue infrastructure* (mainly in guidelines in operational programmes, but not in national policies) *green roofs* and *urban green* are used. The particular use of each term depends on the general scope and focus of the ministries' responsibilities, which are also mirrored in their sectoral operational programs and project funding.

The Greek Ministry of Environment, for instance, focuses in *bioclimatic/green interventions*, *water and waste management*, and *energy as infrastructure development*, while the National Ministry of Economy and Competitiveness prioritises actions for *circular and green economy*, *innovations*, and *smart city solutions*. The legislation for urban planning requires a certain balance between built and green spaces, however, in general, it is quite land-use oriented, connected to building rights, opposed to broader notions of urban sustainability. Interlinkages with other strategies or policies relevant for sustainability (e.g. energy and climate change policies) are very weak.

As interviewees pointed out, the term *nature-based solutions* is neither used in regulations nor strategic documents.

Reviewed policies

Two policies were reviewed for this city profile:

Table 9: Local and national policy reviewed for Larissa/Greece

Policy	Year	Type	Level
Building Energy Efficiency Regulation	2017	Regulation	National
General Urban Plan of Larissa	2005	Strategy	Local

Level of support

In the review, the support for the Building Energy Efficiency Regulation was rated as *strong explicit*, for the General Urban Plan of Larissa as *medium*.

Key facts | Larissa

Population:	162,591 inhabitants (2011)
Density:	485 inhabitants/km ² (2011)
GDP per capita:	14.375 EUR (2016)
Altitude:	67 m
Geography:	in the middle of the largest plain of Greece
Share of green space:	6.82 % (2016)
Type of green space:	parks, city squares, street alleys

There are many national policies that address different sectors or aspects of SUD, but relevant legislation is only rarely updated. This makes it difficult for local authorities to incorporate new concepts such as NBS in their long-term planning (e.g. the General Urban Plans). Interviewed experts described urban planning as a very demanding, time-consuming, complicated process in terms of administrative requirements, with outcomes that are already outdated when funding finally gets approved. Overall, interviewees criticise the existing institutional framework as being adapted and modernized at a very slow pace, thereby creating obstacles to implementing new ideas, principles or concepts.

When it comes to more informal support, there are quite a number of conferences and events organised by public or private institutes and universities or by national agencies that provide knowledge and experiences about concepts similar to NBS. Some agencies, networks or organizations also provide webinars, guidelines and digital material that has often been developed within projects.

Uptake of NBS

In the municipality of Larissa, public spaces, urban green and mobility interventions are highly ranked on the political agenda. The municipality has developed a 30-year strategy to connect public spaces with walking and cycling routes, to create a green ring and green corridors and to reduce the use of private cars. In fact, Larissa is also the first Greek city to implement a Sustainable Urban Mobility Plan.

However, the municipality struggles with the bureaucratic procedures for approving and implementing such green projects and, according to interviewees, there is no extra motivation or reward for taking action. All interviewees expressed a need for additional funding.

Gaps and opportunities

One of the major barriers to widespread mainstreaming and uptake of NBS is the lack of common terminology, which can be a hindrance when applying for funding in different programmes. A common terminology would also help local actors to incorporate concepts, such as NBS, in their local strategies and operational programmes.

Opportunities are also driven by the fact that the concept of resilience is an emerging theme in Greece. While the number of municipalities working on resilience is still low, the concept can present a new area of discussion on the future of urban sustainable development.

Another opportunity would be to address the concept of NBS and related concepts in the seminar programme for public employees organised and executed by the National Center of Public Administration. The existing three- to five-day seminars (focus on different topics such as energy efficiency, urban planning, mobility, technical work, etc.) offer the prerequisites needed for this purpose.

A closer cooperation between local authorities and universities in projects that include pilot implementations, research and entrepreneurship could also strengthen sustainable urban development.

Outlook

There are currently three projects that can potentially influence the implementation of NBS and related concepts in Larissa in a positive way: First, there are the so-called *Sustainable Urban Mobility Plans*, which many local authorities have received funding for to develop such a plan. A number of its principles are relevant to the *upgrading* of urban areas. Secondly, there is a funding programme for energy efficiency, which allows for energy-oriented refurbishment in buildings, both public and private, funding – among others – green roofs. Third, there is a project on urban resilience by the University of Thessaly, which is supervised by the Sub-Department of Urban Planning in the Municipality of Larissa. The project addresses, for instance, the phenomenon of thermal islands, which, in Larissa, occurs mainly in the summer (high temperatures of 40-45° C). Increasing the green and shading in public spaces is one of the measures that the city of Larissa is taking, combined with policies for reducing the use of private cars, water elements, use of cool materials, etc. Another issue of the urban resilience project is the water management and exploitation of rain as well as storm waters for watering green spaces and improving the quality of the ecosystem of the River Pinios.

4.6. Madrid | Spain

Key terms

The most predominant key term both in national and local policies is *green infrastructure* (GI), which is used more frequently than NBS, as its use dates further back in time. At the national level, the most relevant policy at the moment, namely the *State Strategy for Green Infrastructure, Connectivity and Ecological Restoration*, explicitly considers NBS as a way to develop or support green infrastructure. Further widely used key terms in the reviewed national policies are *sustainable urban development*, *urban regeneration/renewal* and *green city*. Local policies mentioned most frequently the key terms *urban resilience/resilient city*, *urban regeneration/renewal* and *low carbon city*. The term NBS is more widespread in policies addressing climate change in some form, for instance the *Plan A: Quality of air and climate change plan in the city of Madrid* where NBS are explicitly mentioned.

According to interviewed experts, the concept of NBS is gaining acceptance among universities, research centres and civil social associations which are increasingly including it in their projects. However, these solutions are not always called NBS, but also have other names, such as *green solutions*. In Spain, there still is some discussion about the definition of NBS and the sort of interventions that should be included under this concept.

Key facts | Madrid

Population:	3.221.824 inhabitants (2018)
Density:	5.265 inhabitants/km ² (2017)
GDP per capita:	34.000 EUR (2017)
Altitude:	657 m (2019)
Geography:	plateau
Share of green space:	37,5 % (2017)
Type of green space:	natural forest parks, green areas, trees

Reviewed policies

Eleven policies¹¹ were reviewed for this city profile:

Table 10: Local and national policies reviewed for Madrid/Spain

Policy		Type	Level
Guide to Creating Local Climate Change Adaptation Plans	2015	Guide	National
Real Decreto 903/2010 (Water-Flood Management)	2010	Framework	National
State Strategy for Green Infrastructure and Ecological Connectivity and Restoration: A New Instrument to Protect Biodiversity	N/A	Strategy	National
Plan Nacional de Adaptación al Cambio Climático (The Spanish National Climate Change Adaptation Plan)	2006	Plan	National
Real Decreto 163/2014 (Registry Of Carbon Footprint, Offsetting and CO ₂ Removal)	2014	Registry	National
Ordenanza de Gestión y Uso Eficiente del Agua en la Ciudad de Madrid (Ordinance on Water Management and Efficient Use in the City of Madrid)	2006	Ordinance	Local
Guía Básica de Diseño de Sistemas de Gestión Sostenible de Aguas Pluviales en Zonas Verdes y otros Espacios Libres (Basic Guide for the Design of Systems for the Sustainable Management of Stormwater in Green Zones and other Free Spaces)	2018	Guidance	Local
Madrid Compensa (Madrid Offsets)	2010	Initiative	Local
Plan A: Plan de Calidad del Aire y Cambio Climático de la ciudad de Madrid (Plan A: Quality of air and climate change plan in the city of Madrid)	2017	Plan	Local
Plan de Infraestructura Verde y Biodiversidad de la Ciudad de Madrid (Green Infrastructure and Bioersity Plan of Madrid City)	2018	Plan	Local
Madrid+ Natural (Nature-based Climate Change Adaptation Programme)	2016	Programme	Local

Level of support

According to the policy review, the level of support for SUD is generally quite high. Two policies have been evaluated as having an *intermediate level of support* and the rest are categorized as having a high level of *explicit support*. However, there are no binding regulations regarding GI (or related concepts such

¹¹ Additionally, the project *AdapteCCa* was analysed but not included in the table, as it is not a policy or funding instrument itself. This online platform is part of the activities of the National Plan for Adaptation to Climate Change (PNACC) and aims at facilitating the knowledge exchange between different stakeholders involved in climate adaptation (see <https://www.adaptecca.es/>)

as NBS). The main legal document regarding GI is currently in debate at national level – the *State Strategy for Green Infrastructure and Ecological Connectivity and Restoration*. This policy would mandate regional governments to develop their own strategies, which must include mandatory clauses.

At the national level, GI (and NBS) relate mainly to nature conservation issues. Nevertheless, awareness of this type of solution is developing in the fields of water management, river basin management, and water infrastructure, amongst others. Climate Change initiatives at national and local level refer more strongly to NBS-related concepts with a wider scope and a specific focus on cities.

Uptake of NBS

According to the interviewed experts, the first considerations of GI in policies at a national scale are related to the protection of natural spaces and the conservation of biodiversity. At the local level and specifically in the city of Madrid, the NBS and GI proposals have been introduced as part of the development of climate change policies. Initiatives such as *Plan A: Air Quality and Climate Change Plan* and the *Madrid + Natural* program have been the planning tools that have introduced these concepts. These concepts have later been incorporated into the management of green areas, as shown in the *State Strategy for Green Infrastructure*. Urban planning has not yet incorporated these concepts and solutions. However, some specific projects that deploy sustainable urban drainage systems are starting to put these concepts on the agenda in a bottom-up way.

In spite of this, the discussion of NBS still remains mainly at a technical level and there is no a general understanding within the population about the concept. As revealed by the city case study authors, there is no widespread application or demand for these solutions although there is a traditionally positive opinion towards the presence of nature in the city.

Gaps and opportunities

Although the implementation of NBS in Madrid is progressing and there are different actions and projects already in progress, there still is a long way to go in this regard. Several barriers need to be overcome in order for NBS to play a role in the city beyond the currently implemented pilot projects. One of these barriers is the current municipal structure and the jurisdiction distribution. Being a matter of transversal development, no municipal service feels directly responsible for this line of work. Therefore, strong political support is necessary, as well as the combination of a robust top-down normative base with the development of bottom-up exemplary experiences. Moreover, in order for NBS strategies to work at different levels, it is necessary that the planning processes incorporate the participation of the different administrations: national, regional and local.

Furthermore, NBS or GI initiatives provide co-benefits that stretch across various urban activities and can generate positive synergies. They should be aligned with further sectorial plans and strategies, for instance: Urban Strategy Regeneration Plans, Sustainable Urban Mobility Plans, Urban Landscape Plans, and Public Health Plans.

Finally, there still is a lack of specific knowledge on NBS and evidence to support the uptake of NBS. Quantifiable results and cost-benefit analyses are key to support decision making to introduce new criteria for developing NBS, also to improve the acceptance of such approaches among the general public and technical professionals.

Outlook

The latest revision of the *State Strategy on Green Infrastructure* extends the objective, scales and areas of implementation of GI. Consequently, the fight against Climate Change takes more relevance, particularly regarding the qualities of GI and NBS as means to mitigate and adapt to the impacts. Moreover, it includes urban actions and widens the goals to social and economic issues. According to the interviewed experts, local governments in various Spanish cities are also working on implementing NBS, e.g. Madrid, Barcelona, Zaragoza, Valencia, Vitoria-Gasteiz, and Málaga, developing projects through their environment, or their energy and climate change departments. Key to their successful implementation is the good governance between departments and among different government levels (national, regional and local). An example of this is the project *Cuidados en entornos escolares en la ciudad de Madrid* (Caring for School Environment in the City of Madrid) which has been developed as a cooperation between the Health, Urban Planning and Environmental Departments of the city. The project focuses on the refurbishment of schoolyards, integrating health, social issues, and adaptation to climate change through the implementation of NBS in a co-creative process together with the students.¹²

4.7. Malmö | Sweden

Key terms

For the promotion of sustainable urban development in Sweden and Malmö specifically, the most widely used terms are *ecosystem services*, *blue / green solutions* or *blue / green infrastructure*. Furthermore, *sustainable urban development* and the question of how to combine *green cities* with *densification* (*förtätning*) are central terms at the local level, according to the policy review and the interviewed experts. The term NBS is not widely used, but the concept is being increasingly included in detailed plans where specific problems can be addressed through green or blue infrastructures, mainly in relation to stormwater management and climate change adaptation. NBS are explicitly mentioned in the recently adopted national *Action Plan for Climate Change Adaption*.

Key facts | Malmö

Population:	339,313 (12/2018)
Density:	2,162/km ² (12/2018)
GDP per capita:	46,711 EUR (2016)
Altitude:	12 m
Geography:	coastal region
Share of green space:	43 % (2010)
Type of green space:	Parks, trees or meadows, private gardens, green corridors, etc.

¹² <http://madridsalud.es/cuidado-de-los-espacios-publicos-de-los-colegios/>.

Reviewed policies

Eight policies were reviewed for this city profile:

Table 11. Local and national policies reviewed for Malmö/Sweden

Policy	Year	Type	Level
Environmental Quality Goals , Swedish Environmental Protection Agency	1999	Guidance	National
Sveriges friluftsmål / Sweden's objectives for recreational life	2012	Objectives	National
Strategi för levande städer / Strategy for viable cities	2018	Strategy	National
Action plan agenda 2030 – 2018-2020	2018	Action plan	National
Det fortsatta arbetet för ett socialt hållbart Malmö / The continued work for a socially sustainable Malmö	2014	Action plan	Local
Environmental Programme for the City of Malmö 2009-2020	2009	Strategy	Local
Översiktsplan för Malmö 2018/ Overview plan for Malmö 2018	2018	Planning strategy	Local
Program för aktiva mötesplatser/ Programme for active meeting places	2015	Strategy	Local

Level of support

In the review, the support for SUD was rated as strong explicit for five policies (Strategy for viable cities, Action plan agenda 2030, Environmental Programme for the City of Malmö, Overview plan for Malmö 2018 and Programme for active meeting places) and medium for the remaining three. However, the strategies, goals and objectives that explicitly and strongly support SUD, are mostly not compulsory.

According to the interviewees, current legal and financial support for NBS is low, both at the national and local levels, especially on private land. On the national level, NBS are mainly supported through the encouragement of local/regional actions via funding opportunities of green infrastructure (limited since the last elections), the provisioning of information, method development, guidance with a focus on ecosystem services, and collaboration of municipalities with relevant departments at the national level. There also is some legal support provided by *Sweden's Planning and Building Act*¹³, but not enough to require specific NBS. One relevant recent change in the Act is, that municipalities now have the right to decide whether a permit is needed for measures that can negatively affect a surface's permeability.

¹³ This policy has not been analysed in detail, but was mentioned in the executive summary of the city report.

Uptake of NBS

Two targets of the *National Environmental Quality Goals* refer to the integration of ecosystem services into planning, building and management. Moreover, the National Board of Housing, Building and Planning recently published methods and guidance on how to integrate ecosystem services into the planning process, but has not yet initiated awareness raising towards anchoring this material at the regional and local level.

The *Strategy for Viable Cities*, published in April 2018, had a great impact on the national discourse as it strongly supports sustainable urban development through the integration of urban greenery and ecosystem services in urban environments. A funding programme for green infrastructure in cities was launched together with the Strategy. It gave priority to initiatives that were both innovative and established or developed existing ecosystem services related to recreation, stormwater management and biodiversity. However, the new government elected in September 2018 decided to stop the funding in 2019.

Despite the lack of clear regulatory support, Malmö has been at the forefront of sustainable urban planning in Sweden and has also been recognised internationally as an important example. Green roofs and facades have been widely implemented due to the municipality's adoption of the so-called *Green Space Factor*, a planning tool with a prescribed minimum amount of green cover in every building lot. In addition, an open drainage system in the neighbourhood of Augustenborg was already created in the early 2000s to solve the flooding and waste management problem and increase the neighbourhood's attractiveness through green spaces and water features.

Gaps and opportunities

According to the interviewees, one of the main challenges for implementing NBS for sustainable urban development is, that generally all nature is removed from construction sites in order to start from scratch. Experts consider this as being ineffective. Instead, there should be clear requirements in the procurement process to protect and integrate the existing nature in new construction projects. A second challenge is that NBS often become suboptimal and compromised when various landowners need to be involved. Third, NBS have only recently become known as a concept and their benefits are hard to measure and predict.

Opportunities for implementing NBS include the fact that there are many policy areas connected to different aspects of sustainable urban development. This provides the possibility for different departments and agencies to collaborate on the issue. There also is the chance to look at financial models for NBS that go beyond investment support solely for climate and environmental demands, for instance, money from national and regional funds or grants that focus on education or cultural projects. The implementation of NBS can also help to foster bottom-up approaches, to think of social and ecological issues together and to build contacts with the construction sector and property owners. In short: There is a potential market for NBS, which still needs to be explored.

Outlook

Apart from the recent developments outlined above, reviews are currently being undertaken at the national level regarding the responsibility towards climate change adaptation and more specifically storm-water management. This process is being organised by the Swedish Meteorological and Hydrological Institute, which cooperates and exchanges with different other national agencies. The outcomes of these reviews might affect future legislation and responsibilities within the government. At the local level, the city is currently developing procedures to integrate ecosystem services in its planning and exploring ecological compensation. Due to the recent local election and changes in city government, it is likely that these processes will take some time to develop.

4.8. Quito | Ecuador

Key terms

The most frequently used key terms in the reviewed national policies are *urban resilience* and *sustainable urban planning*. Regarding the local policies, a larger variety of key terms were explicitly mentioned, including *sustainable cities/communities*, *green city* and *sustainable urban development*. The term *nature based solutions* is also explicitly mentioned in one analysed policy documents, namely the *Resilience Strategy of Quito*.

Key facts | Quito (Metropolitan District of)

Population:	2.6 million (INEC, 2017)
Density:	5,400/km ² (2016,)
GDP per capita:	5,090 EUR (2010)
Altitude:	500 – 4,780 m (2015)
Geography:	highland plateau
Share of green space:	42 % (2015)
Type of green space:	Forests/woods, natural habitats, urban parks, trees

As revealed by the city report authors, particularly technicians and specialized experts are acquainted with NBS, for instance within the different levels of government, academia and private sector related to these practices.

Reviewed policies

Eight policies were reviewed for this city profile:

Table 12. Local and national policies reviewed for Quito/Ecuador

Policy	Year	Type	Level
Metropolitan Plan for Urban Development and Land Use	2015	Strategic plan	Local

Ordinance 172 "Land Administrative Regime of the Metropolitan District of Quito"	2011	Ordinance	Local
Ordinance 102 "Promotes and regulates the metropolitan system of citizen participation and social control"	2016	Ordinance	Local
Climate Change Action Plan of Quito	2012	Strategic plan	Local
Resilience Strategy of Quito	2017	Strategic plan	Local
National Development Plan 2017 - 2021	2017	Strategy	National
National Strategy Against Climate Change of Ecuador 2012 - 2025	2012	Strategy	National
National Environment Law	2017	Regulation	National

Level of support

In the analysed national policies, the level of support for SUD was found to be *implicitly high* in two policies and *explicitly high* in one, namely the *National Environment Law* which contains mandatory provisions regarding sustainable urban planning. For instance, regarding best practices in environmental management and resilience in infrastructures.

In respect to the local policies, the level of support in the urban context was assessed as being *medium*. None of the analysed documents contains compulsory instruments to ensure its implementation. The only mandatory provisions are found in *Ordinance 102* regarding public participation. These provisions can potentially apply but are not specific to the use of NBS for SUD.

Uptake of NBS

At the national level, NBS have been incorporated conceptually (not explicitly) in certain policies, e.g. the National Development Plan 2017 – 2021 and the National Environment Law. The actual implementation of NBS in Ecuador precedes its articulation in policies, with application taking place mainly rural areas in relation to: the protection and provision of “biological” services, such as those related to the long-term coastal resilience (e.g. shrimp aquaculture); or with regard to hydrogeological features, necessary to guarantee the water supply for the population, as is the case in the *El Ángel Ecological Reserve* or the *Fund for the Protection of Water* (FONAG) of Quito. However, implementation of NBS in the urban context still is not very widespread.

Notwithstanding, there are some examples of NBS uptake in local (urban) policies. For instance, the *Resilience Strategy of Quito* recognises that prioritising cost-effective actions, which incorporate nature in urban design, and are carried out with sound civic participation, is an effective practice to protect both people and infrastructure. Hence, such measures reduce urban risks, strengthen social cohesion among

the most vulnerable people, and improve the urban image. These actions are focused on encouraging the design and adaptation of public areas, to include green infrastructure capable of providing services through regulations embedded in public policies. It further prescribes the execution of pilot programs along the metro line and its stations to show the benefits of green infrastructure and the development of legislation to promote the use of such options.

Gaps and opportunities

The main challenges regarding the integration of NBS in policies in Quito are mainly related to the implementation of proposed policies. The city of Quito's urban management instruments allow for the application of NBS, but they are currently not specific or specialised enough to promote and ensure a correct and effective design and application of NBS. Hence, even if problems have been identified, which can be addressed with NBS, the municipality does not consider or prioritise the benefits of NBS in the planning and decision-making process.

However, the interviewed experts recognize the conditions set by the *Ordinance 172* as an opportunity. This enables the elaboration of development and land use plans for specific areas with a certain geographical extent (so-called Partial Plans). Such a mechanism can be used, for instance, when dealing with problems that specifically affect the mass transit systems (Subway and Bus Rapid Transit systems) infrastructures face, such as the flooding in stations. Moreover, this planning instrument allows for management and development strategies for specific city areas that face particular problems, such as the Carmen Bajo-Llano Chico district in the north of the city, where the CLEVER Cities interventions will take place. Next to severe socioeconomic deprivation, this district faces natural threats, such as landslides. Through the creation of a Partial Plan, it will be possible to design and implement targeted interventions using NBS to deal with these issues without the need to modify the land use plan for the whole metropolitan area.

Working with vulnerable populations and providing benefits is also recognised by the interviewees as a challenge difficult to meet. One proposed approach that could serve to close this gap could be the use of tyres as a structural basis for the construction of retention walls in unstable slopes. Here, NBS can be incorporated afterwards in order to solve additional problems, e.g. regarding water runoff. Such a measure could be beneficial by applying principles of a circular economy and incorporating communities in the implementation of NBS, thus guaranteeing the affordability and suitability of the solutions in socially disadvantaged parts of the population.

Outlook

At the local level, the municipality of Quito has been trying to further integrate the subject of NBS in the planning regulations with proposals aiming at having environmentally responsible and nature-based oriented planning rules. However, such a transition bears difficulties as this implies complex normative changes. Thus, the local government of Quito has expressed the intention of continuing to generate new regulatory frameworks, not least in order to improve the acceptance of NBS among the population and

create incentives for their implementation by private companies. This could be achieved through the update of the *Metropolitan Land Use and Development Plan*. At a city level, this includes management mechanisms which can make some of the initiatives already applying NBS more viable.

4.9. Sfântu Gheorghe | Romania

Key terms

National agencies focus on the sustainability concept (with reference to the SDGs) and use the terms *smart and sustainable city*, *sustainable communities* and *green infrastructure* in this context. According to a government official, the term NBS will likely be used when the action plan for implementing Romania's Sustainable Development Strategy is created/finalised. The review of policies revealed that key terms in local level policies also refer to the concept of sustainable development, such as *sustainable city/sustainable community* or *sustainable urban planning* and *sustainable urban growth*.

According to the interviewees the term *nature-based solutions* is neither used at the local or regional, nor at the national level.

Reviewed policies

Five policies were reviewed for this city profile:

Key facts | Sfântu Gheorghe

Population:	56,006 (2011)
Density:	59,90/km ² (2011)
GDP per capita:	4,372.70 EUR (year 2011)
Altitude:	555 m
Geography:	mountain area (Carpathians)
Share of green space:	3.81 % (2018)
Type of green space:	parks and gardens, squares, green areas, green areas housing, recreational forests

Table 13. Local, regional and national policies reviewed for Sfântu Gheorghe/Romania

Policy		Type	Level
National Strategy on Climate Change 2013–2020	2013	Strategy	National
Romania's Sustainable Development Strategy	2018	Strategy	National
Planul de Dezvoltare a Regiunii Centru 2014–2020 (central region development strategy)	2014	Strategy	Regional
Sustainable Energy Action Plan of Sfântu Gheorghe Municipality	2018	Action plan	Local
Strategia integrata de dezvoltare urbana a municipiului Sfântu Gheorghe (Integrated Urban Development Strategy of Sfântu Gheorghe Municipality)	2017	Strategy	Local

Level of support

In the review, the support of the policies for SUD has been rated as *strong explicit* for the Sustainable Energy Action Plan, the Integrated Urban Development Strategy and Romania's Sustainable Development Strategy as well as *strong implicit* for the remaining two policies. According to an interviewee, NBS are neither integrated into national policies or strategies, nor promoted by national agencies, as there is no specific instrument to fund the implementation of NBS. However, a state official stated that NBS are a topic within national workshops and events; a focus within informational materials, campaigns and capacity building exercises; as well as an element for new (targeted) financing instruments, and funding of research and interventions regarding SUD.

Uptake of NBS

Nature protection and sustainable development are not at the top of the political agenda amongst decision makers and are generally connected with a low level of public awareness, which is why the uptake of NBS remains very limited. As an example, flood protection is still considered a construction work without any connection to ecosystems.

At the local level a few, isolated initiatives exist that implement NBS (e.g. green roofs, redevelopment of green spaces). Sfântu Gheorghe only recently started to consider NBS as means to increase its resilience in the face of extreme weather events, while at the same time improving access to and quality of green spaces for locals. Though the term NBS is not used, one of the municipality's aims is to make the town more liveable, greener (more appropriate to nature) and well-managed (self-sustainable if possible), serving as the motivation to start using NBS.

Gaps and opportunities

According to the interviewees, one of the main challenges in implementing NBS within SUD is that collaboration between different institutions with responsibilities in managing different urban issues remains severely limited. Furthermore, the lack of human resources in the administration is an important obstacle in implementing NBS. A wider uptake of NBS would require greater collaboration across different policy areas, sectors and stakeholder groups. Further, there is a need for national government funding to implement and maintain NBS. At the local level, there is a lack of human resources in the administrations, which constitutes an important obstacle towards implementing NBS.

A promising opportunity for implementing NBS would be to create a business case in collaboration with local authorities that would realise NBS and could transfer and multiply the concept within the society. With the support of EU funding, multi-stakeholder partnerships, private sector leadership, and citizen engagement could be encouraged.

Outlook

At the national level, sectoral strategies and national action plans will be updated according to the *National Sustainable Development Strategy 2030*. The national government further wants to increase financial support and research for sustainable development. Whether this will be realised remains to be seen.

In the meantime, it is very important that a number of European projects exemplify the importance and potential of NBS in order to increase the interest of local stakeholders to duplicate these measures. Interviewees considered the national agencies as currently being too inflexible to consider these new ideas.

5. Cross-scale comparison: international/EU vs national/local policies

This section presents a cross-scale comparison of the reviewed policies, looking at differences and commonalities at the explored policy levels (i.e. local/regional, national, EU, international). While some aspects in this chapters have been presented from a different angle in previous chapters, some figures and arguments presented in this chapter build on further data gathered through the analysis (see templates in the annex).

In total, 101 policies are taken into account in this comparison, including eight international policies, 26 EU policies, and between two and eleven local or national policies for each reviewed city (see Table 14).

Table 14. Amount of policies analysed by policy level

City/Region	Number of policies analysed				
	Local/regional	National	EU	International	Total
EU			26		26
International				8	8
Hamburg/Germany	5	4			9
London/UK	4	4			8
Milan/Italy	5	3			8
Belgrade/Serbia	4	4			8
Larissa/Greece	1	1			2
Madrid/Spain	6	5			11
Malmö/Sweden	4	4			8
Quito/Ecuador	5	3			8
Sfântu Gheorghe/Romania	3	2			5
Total	37	30	26	8	101

5.1. Key terms

The 101 reviewed policies were screened for the explicit use of 16 key terms. About a fifth of the screened documents (18 %) did not mention any of the key terms selected for the analysis; 82 % named one or more of the key terms. The term “green and blue infrastructure” was mentioned most frequently (51 times), including 17 times at the EU level, 15 times at the national level and 19 times at the local or regional level; it was not used at all in the eight policy documents screened for the international level (see Figure 5). The terms “urban sustainability” (31 in total), “urban regeneration, urban renewal”, “sustainable urban planning”, “sustainable city, sustainable communities” were also frequently used (25 times each) as well as “urban resilience/resilient city” and “smart city, smart growth” (24 times each).

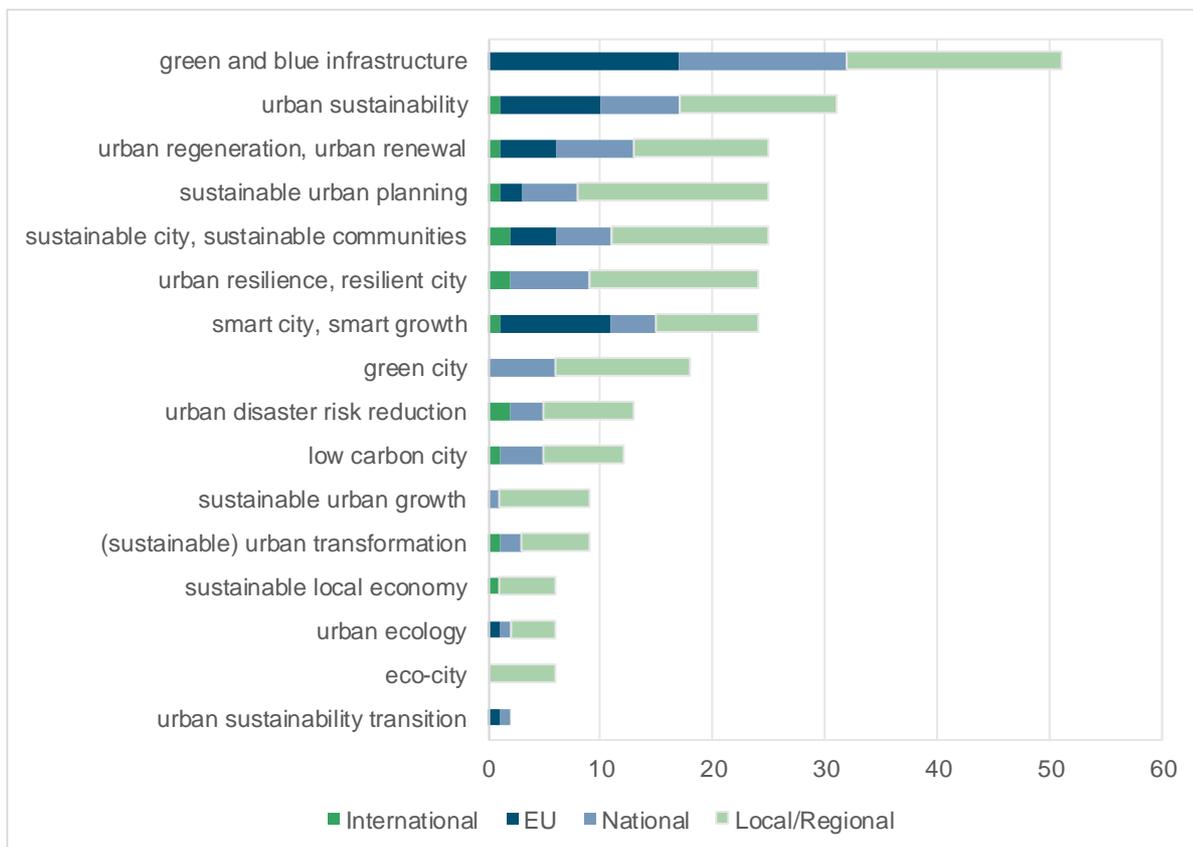


Figure 5. Key terms for sustainable development mentioned in international policies, European policies, national as well as local and regional policies in the nine CLEVER city countries

However, the analysis of policies at different policy levels reveals a different use of key terms. At the EU level, only eight out of the 16 key terms are used at all; 14 terms were used at the national level and 15 terms at the local/regional level. On the other hand, the variety of terms is the greatest at the international level, where ten different terms are used in only eight documents screened.

The analysis further identified which term was used mostly frequently in a single policy, independent from how many different key terms were used in total (see Figure 6). In 30 documents, *green (and blue) infrastructure* was the term mentioned most frequently (eleven times at EU level, nine at national level and ten at regional or local levels). Far less frequently mentioned, but still ranking second, is the term *urban sustainability*, which was mentioned in 19 documents, nine at EU level, three at national level and seven at regional or local level. The term *sustainable city* or *sustainable community* was used 13 times: once at international level, twice at EU level, three times at national level and seven times at local or regional level.

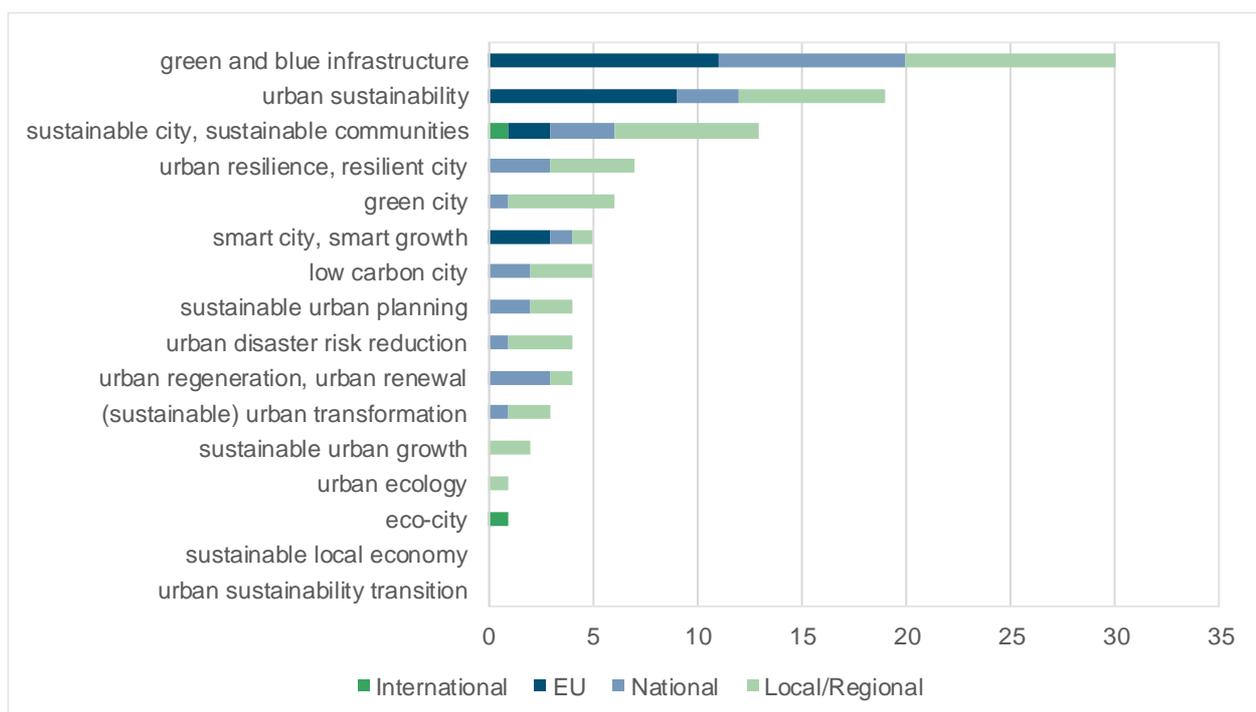


Figure 6. Key terms for sustainable development mentioned in international policies, European policies, and European funding mechanisms

At the EU level, the 26 analysed documents used four terms most frequently: green and blue infrastructure, urban sustainability, sustainable cities/sustainable communities and smart city/smart growth (see Figure 6). Across the regional/local policies, 13 terms were used most frequently across the 37 analysed policies. Finally, of the 30 national level documents screened across the CLEVER Cities countries, eleven terms were used most frequently. From these results, it can be concluded that variability in the most frequently used terms is low amongst the EU policies and quite high at the national and local/regional levels. These inconsistencies highlight that the rather narrow wording of EU policies does not trickle down to the lower governance levels. It can be hypothesized that this indicates a tailoring of terms and policies to the national and local/regional contexts and needs.

5.2. Extent to which international and/or EU policies are reflected in national and local policies

Apart from the question, how often which term was used, we also wanted to know to which extent international and/or EU policies are explicitly mentioned in national and local or regional policies. We therefore analysed the references made to the policies of the respective higher governance levels.

Only a small number of international and EU policies are explicitly mentioned in national and local policies. These include strategies for sustainable development, biodiversity strategies and climate mitigation strategies or action plans. While strategies fostering sustainable development refer to the SDGs, national biodiversity strategies refer to the Convention of Biological Diversity (CBD) and strategies for climate mitigation or action plans at the national or local level refer to the international climate commitments, such as the Paris Agreement. The concept of NBS that has been coined at the European level is not widely used and hardly ever explicitly mentioned at the national or local level. An exception to this rule is the recently adopted national “Action Plan for Climate Change Adaption” in Sweden. Green infrastructure strategies at the national level often refer to Natura 2000 (e.g. “State Strategy for Green Infrastructure” in Spain or “Federal Green Infrastructure Concept” in Germany). Regulations and policies that are more specific than strategies often do not refer to any international or EU policies.

5.3. Priority areas

In total, 101 policy documents were screened for nine priority areas (see Figure 7). A tenth option was to state that the policy area was not relevant for the policy document analysed.

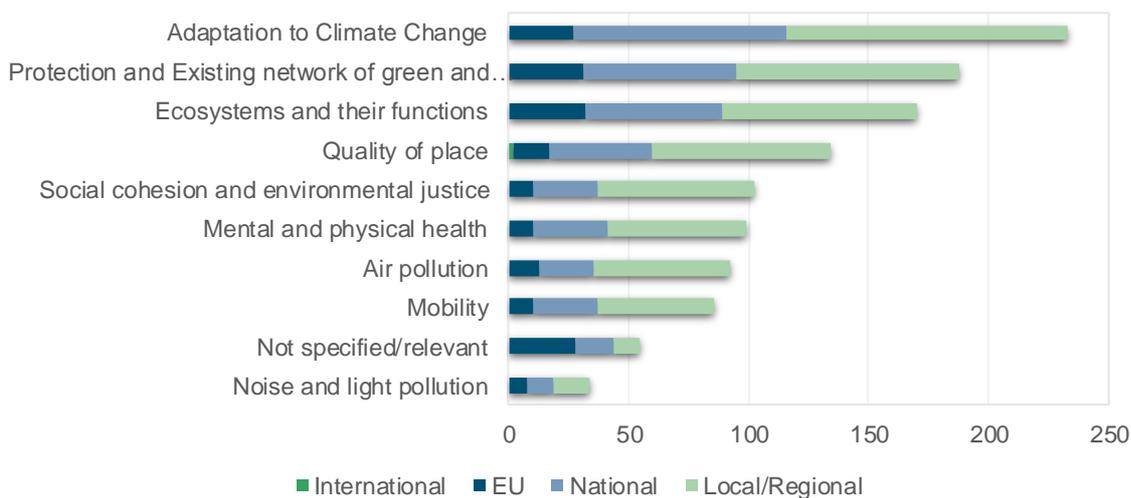


Figure 7. Priority areas mentioned in the reviewed international policies, European policies, national as well as local and regional policies

The most frequently mentioned priority area was *adaptation to climate change* (236 times), followed by *Protection and Existing network of green and blue spaces* (191 times), as well as *Ecosystems and their*

functions (178 times). The share of which priority area is mentioned at which policy level is quite evenly split, i.e. the local/regional level always holds the largest share, followed by the national and then the EU level. The exception is the category *not relevant*, which was the case most often concerning the EU level.

5.4. Policy instruments

Using the provided template for conducting the analysis, there was the option to name the policy instruments introduced in a policy. In total, 1,131 policy instruments were identified. These were clustered in regulatory instruments, economic instruments, information, awareness-raising and public engagement, monitoring and research and others (see

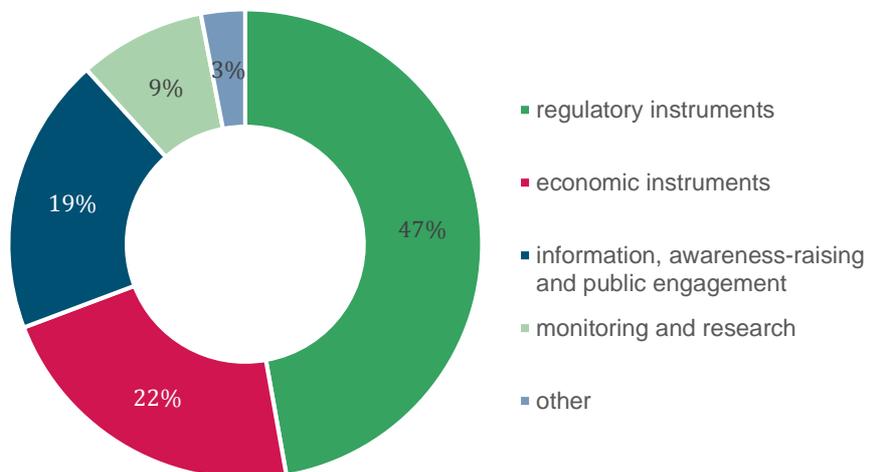


Figure 8).

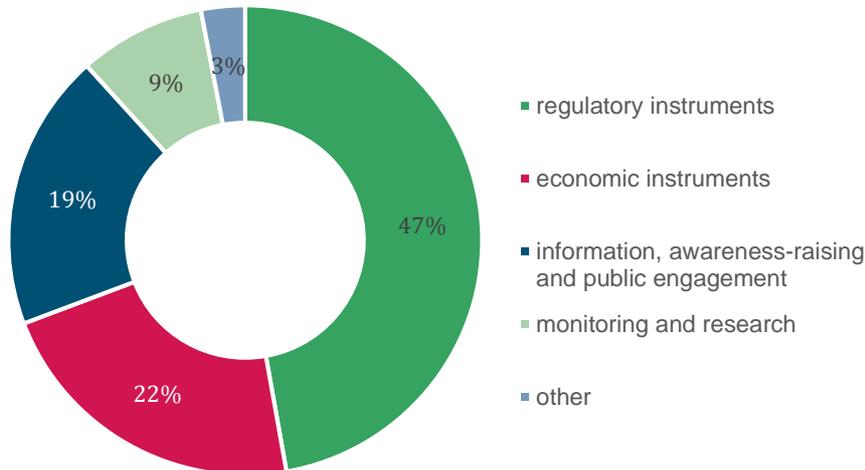


Figure 8. Types of policy instrument for sustainable urban development identified in total

Almost half of the policy instruments mentioned were *regulatory instruments* (47 %), followed by 22 % *economic instruments* and 19 % of instruments like *information, awareness-raising and public engagement*. *Monitoring and research* only represent 9 % of the overall amount of mentioned instruments, and 3 % were *others*, i.e. not belonging to any of the aforementioned categories of policy instruments.

Table 15. Number of policy instruments identified, by policy level

Number of policies instruments mentioned, by policy level				
Local/ regional	National	EU	International	Total
507	444	152	28	1,131

Most of the policy instruments identified stem from the local or regional level (507 in total), followed by 444 at the national-, 152 at EU-, and 28 at international level. Looking at the overall amount of policy instruments with a focus on the type of policy instrument at the different policy levels (see Figure 9), it can be observed that most of the *regulatory instruments* are stem from the local or regional level (49 %) and the national level (41 %). This also counts for, firstly, policy instruments like *information, awareness-raising and public engagement*, where 87 % of the instruments stem from the local/regional (44 %) or national level (43 %); and secondly, for *monitoring and research*, where 83 % stem from the local/regional (45 %) or national level (38 %).

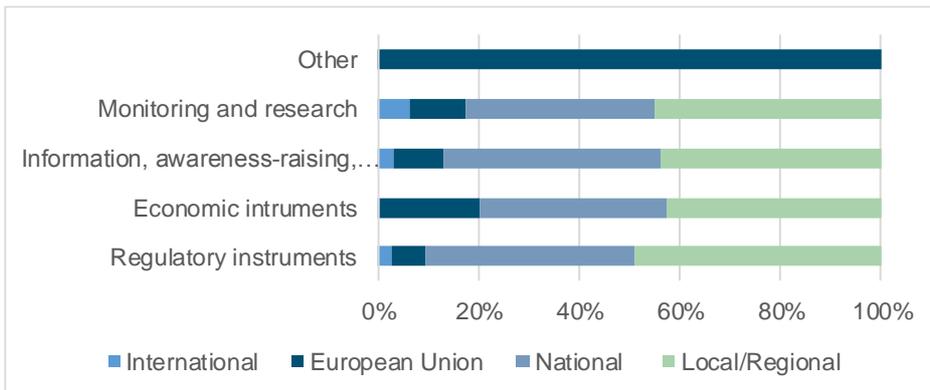


Figure 9. Type of policy instrument for sustainable urban development mentioned at different levels

5.5. Level of support

According to the assessment 47 out of 101 analysed policy documents, 46 % provide *strong explicit support* for SUD, with the highest share at the local/regional level (approx. 43 %) (see Figure 10 below). In total, 17 of the analysed documents were classified as having a *strong implicit support* (approx. 17 %), while 26 showed *intermediate* (approx. 25 %) and 12 documents *low support* (approx. 12 %) for SUD.

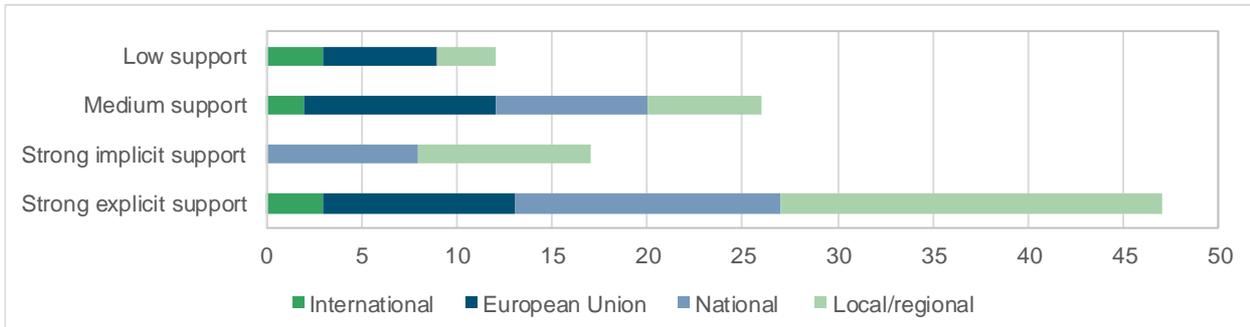


Figure 10. Policies' level of support for sustainable urban development

Overall, the level of support for SUD is considered highest at local/regional level, followed by the national level, while the support of the EU or international level is considered weaker. However, the analysis showed that the interpretation of the different experts from the local/regional and national levels sometimes varied heavily. When bringing the analysis together, it was envisaged to balance the single judgements. However, the numbers must still to be used with caution.

6. Conclusions

Looking at the level and type of support for SUD in the explored policy frameworks, and considering NBS as one key element, it becomes evident that there is significant untapped potential for increased support. There particularly remains the opportunity to foster NBS as a tool to contribute to SUD.

Insights/ key findings from the review and analysis

Many policies show strong explicit support for SUD. However, they often do not include mandatory policy instruments, thereby limiting their impact at the local scale. Accordingly, local actors expressed their wish for more financial and political support from the national level to implement NBS at the local or regional level. While it is clear that, on the one hand, a lack of mandatory policy instrument at higher governance levels does not prevent cities from implementing them; it is evident that on the other hand, non-mandatory policies still supporting SUD and/or NBS implementation also strengthen local authorities, because it strengthens their positions if they get financial and/or political support from higher governance levels. Our analysis further highlights the importance of EU funding instruments for mainstreaming NBS across policy fields and within decision making processes, but also for supporting implementation at local level.

The analysis of different terms used for SUD at different policy levels shows that no term used across international policies or that EU Member (or Accession) States with consistency. However, there is a higher degree of convergence in the use of terms across EU policies (green and blue infrastructure, urban sustainability, sustainable cities/sustainable communities and smart city/smart growth). While the different use of terms may also be caused translation challenges, it is clear that green (and blue) infrastructure is the most widely used term. Overall, the use of different terms poses a challenge towards the mainstreaming of SUD. While the concepts behind the terms are often similar, the use of a variety of vocabulary slows down the mainstreaming process of a common concept across governance levels and policy sectors. Time and place also play a role when it comes to the different employment of terms. While the concept of NBS is not new, the term only became prominent following the “EU Research and Innovation policy agenda on NBS” and corresponding Horizon2020 funding programme in 2015; the term SUD, in contrast, was already discussed and used starting in the 1990s.

Regarding the influence of international and EU policy on the local and national level, our analysis shows that only a small number of policies are explicitly mentioned in national and local policies. Particularly the concept of NBS that was coined at EU level is hardly ever explicitly mentioned at the national or local level.

Gaps and opportunities identified at the international and EU level

To date, there is no accepted standardisation of the NBS concept. While it is clear, that too stringent attempts to standardise could actually hinder the development of tailor-made solutions for the challenges at hand, too little standardisation can equally limit the power that the NBS concept may have.

At the international and EU levels as well as at the local and national levels, there is a lack of mainstreaming and integration of SUD and NBS across policies. Here, policy reviews and revisions can function as entry points through which the integration of SUD and NBS can be enhanced, particularly when framed as a tool to help achieve multiple cross-sectoral policy targets (e.g. of the Paris Agreement and the SDG agenda). At the same time, SUD and NBS are priorities on the political agenda yet, meaning that there is significant need for further promotion, research and support.

A further challenge is the lack of capacities and capabilities of local authorities to access funding to implement NBS supporting SUD at local level, or the narrow scope of activities that are eligible for funding. It is

therefore important to maintain and expand existing funding schemes to finance pilot projects which include local stakeholders in the co-creation of knowledge and empower involved populations, thereby increasing the acceptance of such measures. Further, explicit mentioning of NBS in overarching policies as a means of mainstreaming, the increased support or guidance for municipalities to navigate the funding landscape and the further development of learning and exchange platforms (e.g. such as the one presented by URBACT) are essential for narrowing the funding gap. Moreover, it is crucial to align different funding programmes to reduce complexities, for instance by enabling lending and blending between funding instruments. Currently, the private sector only plays a small role in SUD planning, while they have large opportunities to benefit from NBS implementation. Alternative funding instruments such as public-private-partnerships or bottom-up financing could be opportunities to further strengthening SUD and NBS.

Finally, there are gaps with regards to the communication of NBS benefits and their relevance to cities, decision-makers, practitioners, the private sector and civil society. This might be closely linked to the lacking finances for research on NBS evidence and cost-effectiveness via case studies, which could serve to generate evidence and awareness about NBS. Though some funding programmes aim to support these aims, such as H2020 and the BiodivERsA programme, these are only tapping a small amount of the total potential and leave substantial opportunities for increased funding and knowledge generation.

Gaps and opportunities identified at local and national level

While the CLEVER Cities case study cities are very diverse in their support and actions towards SUD and NBS and are coined by different backgrounds (socio-political, geographic, etc.), they also share some challenges and identified similar opportunities. A key challenge for most of the cities is the lack of cooperation across different administrative levels, agencies and sectoral departments, which is necessary to foster SUD and mainstream NBS. In some cases, cities lack authority to act regarding for SUD and NBS. In fact, the (legal) competences of cities and communities vary heavily within Europe. In some countries (e.g. Sweden), cities and communities have strong positions within the national jurisdiction, even the power to levy own taxes, while in other countries (e.g. Greece) cities and communities are more bound by the national jurisdiction. Moreover, many times, the slow and highly bureaucratic administrative processes, institutional inertia and the inflexibility to consider new ideas hamper the uptake of NBS in SUD. In some cases, there is a lack of trust towards the performance of NBS and their potential to deliver benefits which could be addressed by improved knowledge, exchange of experiences across cities and cost-benefit analysis based on pilot cases and demonstration projects. Through this the current decision-making and planning processes could be better informed and improved. Reviews also reveal that citizens often are neither aware of NBS initiatives nor know about their multiple benefits. Targeted communication processes and active involvement of citizens provide opportunities to increase citizens awareness and create public demand, which on the other hand can put pressure on city governments to, e.g. improve the quality of urban nature and protect valuable areas.

In line with the findings from the international and EU level, cities lack (innovative) financing mechanisms and investments from the private sector (e.g. construction sector or property owners) for NBS in SUD. A key challenge remains the maintenance of NBS interventions once constructions have been finalised. Experiences also show that funding and resources for NBS can be secured through planning obligations

and requirements for developers. Moreover, cooperation between NGOs and public institutions can provide another opportunity for implementing NBS.

Promising opportunities to strengthen NBS in SUD, mentioned by many cities, are driven by emerging societal challenges and fostered by resulting policy initiatives. Climate change adaptation (linked to stormwater management and flooding etc.) presents such a window of opportunity; next to upcoming urban resilience strategies, sustainable urban mobility plans or strategies for viable and liveable cities. Revisions and updates of policies and funding mechanisms offer another opportunity to better integrate NBS.

Outlook

There is significant potential for NBS to contribute to SUD. In the context of the CLEVER Cities project, the potential multifunctionality of NBS to provide solutions for social as well as environmental challenges is a key factor for SUD. However, hindering factors for mainstreaming SUD and NBS as a tool to help achieve SUD objectives remain. While some of these can be addressed at the local level, others need to be discussed at the national or EU level with strong support from the international level. The cities within the CLEVER Cities project have significant potential to integrate these findings and apply valuable lessons learned from this research in their activities during the remaining years of the project, making valuable contributions to NBS mainstreaming and working towards SUD.

7. Annex

Annex A: Template and key for policy review

The template presented below was used to assess the selected policies at local, national, EU and international level. Each field whose response options are numerically coded is labelled with a footnote; the key for each of these response options is presented on the subsequent page.

OVERVIEW				
Date of entry into force:				
Updates/reforms, if applicable:				
Type of policy instrument (strategy, framework, directive, etc.):				
Aims, objectives and targets relating to NBS deployment (including quantitative and quantitative goals); include page number(s)				
Coverage:				
Additional accompanying documents of relevance:				
EXPLICIT OR IMPLICIT MENTIONING OF URBAN SUSTAINABLE DEVELOPMENT				
Cite relevant text (with key terms in bold)	Priority areas (1-10) ²	Type of policy instrument ³	Mandatory ⁴	Comments
SUMMARY OF RELEVANCE				
Terms which have been explicitly mentioned ¹		1-16		
Which term was the most frequently mentioned?		1-16		
Short summary of the extent and type of support for sustainable urban development (<i>as basis for assessment of relevance</i>) ⁵				
Level of support for sustainable urban development		1-4		
Other relevant aspects for CLEVER, not covered above?				

Key for policy assessment

¹ Key terms for sustainable urban development

1	urban sustainability, sustainable urban development
2	sustainable city, sustainable communities
3	urban sustainability transition
4	(sustainable) urban transformation
5	urban regeneration, urban renewal
6	green and blue infrastructure
7	green city
8	eco-city
9	urban resilience, resilient city
10	low carbon city
11	urban ecology
12	urban disaster risk reduction
13	sustainable urban planning
14	sustainable local economy
15	sustainable urban growth
16	smart city, smart growth

² Priority areas

1	Ecosystems and their functions	Restore ecosystems functionality to deliver a wider range of services and benefits, e.g. wetland and floodplain restoration, relocate dykes, remediate polluted areas, increased tree cover, removal of engineered rivers, renaturing brownfield sites or former industrial areas.
2	Protection and Existing network of green and blue spaces	Taking actions specifically aimed at protecting and delivering of green and blue spaces
3	Adaptation to Climate Change	Installing green facades and roofs, parks, blue areas and green fresh air corridors to reduce temperature and heat island effect; use of blue and green areas for sustainable urban drainage system to cope with stormwater flooding.
4	Air pollution	Reducing emissions from vehicles and other sources.
5	Quality of place	More usable, accessible, resilient, inclusive, activated and attractive public realm; bringing empty spaces back to life, improving the quality and recreational value of amenity green spaces, and designing infrastructure that can provide a variety of functions (e.g. highways that including cycling infrastructure and sustainable drainage).
6	Mobility	Promoting sustainable transport concepts to reduce reliance on private cars to access existing green and blue spaces; support cycling & walking infrastructure to promote modal shift.

7	Noise and light pollution	Use of green screens or other vegetation to protect residential areas from excess noise and light; Use of street green and trees to reduce light pollution, use of motion detectors and/or lamps with yellowish-orange light colour with little blue.
8	Mental and physical health	Planning and designing green and blue areas to promote health through a better microclimate, incentives to exercise and more tranquil areas; creation of attractive nature areas (parks, wilderness patches, green cycling paths and corridors, urban gardening/allotments).
9	Social cohesion and environmental justice	Ensuring equal distribution and access to environmental qualities (particularly vulnerable and excluded social groups); empowering citizens through participation in decision making, strengthening community ties through creating better quality and inclusive civic spaces e.g. creation of community gardens and food-growing spaces and paces to gather and socialize.
10	Not specified/relevant	

³ Type of Instrument

Type of policy instrument		example
Regulatory (R)		
R1	National/regional planning law or regulations	For example, spatial planning law, environmental regulation, building regulation for sustainable urban development, (socially inclusive) urban regeneration, green and blue infrastructure etc.
R2	National/regional strategies and action plans	National strategies for sustainable urban development, (socially inclusive) urban regeneration, green and blue infrastructure etc. (e.g. in cities, at landscape level)
R3	Targets	Targets focused on sustainable urban development, (socially inclusive) urban regeneration, green and blue infrastructure etc., e.g. targets to establish green and blue areas (in ha, in specific areas, type of areas; budget spent etc.). These could be part of sustainable development strategies or action plans, strategies or similar
R4	Standards	Legal or regulatory requirement for all persons or businesses to whom it applies to maintain a certain level of environmental quality confine actions to a certain type of practice or limit, or to rehabilitate resources. e.g. a certain area of private homes must be green area, green roof construction standard and a mandatory

			requirement for green roofs on all classes of new buildings.
			Mandatory or voluntary:
			· Building certification scheme
			· Environmental standards
			Voluntary:
			· Corporate social responsibility strategy
			· Planning guidance
R5	Bans		A legal or regulatory prohibition of a certain type of activity or use of a material / product.
R6	Permits / quotas		A license or authorization issued by a public official or administrative agency allowing an individual or business to perform certain acts or to have a certain portion / amount of a product. e.g. Permit to construct a building which is linked to certain requirements such as maintenance of pre-development hydrology or pollutant loading reduction requirements are tied to stormwater permits.
R7	Planning/zoning		Comprehensive planning of the different uses to be conducted in areas of an urban settlement designated by certain categories (e.g., residential, commercial, industrial, green areas), e.g. Comprehensive land use plans, zoning applications, non-conforming use applications, eminent domain
R8	Environmental impact assessments		Legal or regulatory process which an individual or business must undergo before application for approval to perform a certain action.
			Environmental Impact Assessment (EIA), audits, inspections
R9	Public procurement		Green public procurement
Economic (E)			
E1	Pricing	E1-a	Taxes and charges/fees: Compulsory payment to the fiscal authority for a service from a regulatory authority: e.g., charge for new development sites as a means of recovering costs for e.g. urban regeneration or green and blue infrastructure investments such as recreation programs ("fee in lieu")
		E1-b	Reduced taxes/charges e.g. if a landowner provides a certain (green/unsealed) area of its property for water to infiltrate

			and therewith reduced run-off of rainwater or stormwater drainage
		E1-c	Trading of permits for using a resource or trading (Building or development permits, etc.) of permits for pollution / emission levels
		E1-d	Tariffs: A price paid by users to a service provider for a given quantity of service or a schedule of rates or charges of a business or a public utility that provides a product or service which may affect the quality of green and blue areas
E2	Payments/Subsidies	E2-a	Payments to landowners or private actors for practices (e.g. installing green roofs of natural water retention areas)
		E2-b	Financing targeted research projects (e.g. developing more efficient urban sustainable solutions)
		E2-c	Payments for insurances which can cover the risk associated with the performance of newer green technologies
E3	Voluntary agreements/ Cooperation	E3-a	Payments to landowners or private actors for practices (e.g. installing green roofs of natural water retention areas)
		E3-b	Financing targeted research projects (e.g. developing more efficient urban sustainable solutions)
			Payments for insurances which can cover the risk associated with the performance of newer green technologies
			Payments to landowners or private actors for practices (e.g. installing green roofs of natural water retention areas)
			Financing targeted research projects (e.g. developing more efficient urban sustainable solutions)
E4	Private sector	E4-a	Loans (from Investment and commercial banks) (especially low interest loans) to invest in green and blue infrastructure projects, such as green stormwater technologies or restoration projects or urban regeneration projects
		E4-b	Bonds (from Capital market) e.g. Financing of adaptation measures via an investment instrument with returns, green Bonds for investing in sustainable and nature-based adaptation solutions
		E4-c	Crowdfunding e.g. Crowdfunding platform established by the city council that allows citizens to propose and finance their ideas for the city such as urban

			farming for residents of a social housing quarter, edible streets etc.
E5	Liability schemes		Offsetting schemes where liability for environmental degradation leads to payments of compensation for environmental damage. E.g. Eco-accounts, wetland destruction, brownfields funds, habitat banking)
Information, awareness-raising and public engagement (IAP)			
IAP1			Training and qualifications (obtaining certificates or proof of qualification) related to sustainable urban development, (socially inclusive) urban regeneration, green and blue infrastructure, nature-based solutions planning. Design, implementation and maintenance
IAP2			A series of activities geared toward raising the amount of information available and people's awareness about sustainable urban development, (socially inclusive) urban regeneration, green and blue infrastructure, nature-based solutions etc. and its benefits (brochure, factsheets, events, campaigns, videos..)
IAP3			Decision-making processes or knowledge-building consultations by policy makers which involve stakeholders with a direct interest in or practical knowledge of the issue being discussed, e.g. Townhall meetings, citizen councils, workshops for stakeholders, stakeholder advisory groups, multi-criteria analysis, household surveys
Monitoring and research (MR)			
MR1	Monitoring systems for GI	MR1-a	Manual or automatic system (technological or by hand) which collects data about activities, products used, timing, etc.
		MR1-b	Monitoring and reporting of green infrastructure areas
		MR1-c	Monitoring and mapping of activities relevant to sustainable urban development, (socially inclusive) urban regeneration, green and blue infrastructure
MR2	Research projects		Research related solutions for sustainable urban development, (socially inclusive) urban regeneration, green and blue infrastructure, including development of more efficient solutions (e.g. green roofs and facades)
MR3	Assessments of GI status/ ecosystem services		E.g. national overviews on the status of sustainable urban development, (socially

			inclusive) urban regeneration, green and blue infrastructure and related ecosystem services including mapping (e.g. Mapping and Assessment of Ecosystem Services - MAES)
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⁴ Nature of Instrument

1	Mandatory
2	Voluntary
3	Information

⁵ Level of Support

1	Strong explicit support	Sustainable urban development or related terms are explicitly mentioned and strongly embedded throughout the framework, including in objectives, policy measure design and/or supported actions.
2	Strong implicit support	Strong framing of nature as a means to address (select) societal challenges, with multiple references to/support for elements of sustainable urban development; no explicit mentioning of sustainable urban development or related terms.
3	Medium support	Sustainable urban development and related concepts are not a prominent feature, but deployment is supported through references to/support for individual elements of sustainable urban development.
4	Low support	Sustainable urban development is neither a prominent feature nor relevant for/mirrored in policy measure design and supported actions.

Annex B: Questionnaire for interviews – City/national scale

Please fill in the following information:

Country:
Interviewer:
Interviewee
Name:
Employer:
Title/position:
Email:
Date of interview:

Introduction

Interviewer briefly introduces CLEVER Cities project and the context of the interview.

Interview questions:

1. Please briefly describe your position in your ministry/department and role.
2. Are you familiar with the term 'nature based solution' in the context of your work?
 - a) If so- when would you estimate that this term started being used in your work environment? Has it been integrated into any national policies or strategies that you know of?
 - b) If not, are you familiar with the terms 'green (and blue) infrastructure', 'ecosystem-based approaches to climate change mitigation or adaptation', or 'working with nature' as approaches to address societal challenges? If so, when would you estimate that this term started being used in your work environment? Have any of these been integrated into any national policies or strategies that you know of?
3. Which concepts of sustainable urban development and nature-based solutions are primarily used by different national agencies, and in what context? *(e.g. Is the term ,ecosystem-based approaches' used for flood protection measures? Or is green infrastructure a topic with regards to sustainable urban development or improving the health/well-being of citizens?)*
4. In what ways are nature-based solutions (or related concepts) being used or taken up by national agencies/employees? *(e.g. they are the topic of national workshops/events, an element of new*

(targeted) financing instruments, are included in sectoral discourse/policies, are the focus of informational materials/ campaigns /capacity building exercises, funding of research/interventions, etc.) for sustainable urban development?)

5. Regarding the current national policy mix, we have identified the following policies as being most relevant regarding sustainable urban development and specifically the implementation of nature-based solutions: *(Please list the 3-5 policies proposed for the national review for your interviewee.)* Do you think there are any key policies we are missing and should include in the review? (Only ask this question if you have not finalised the policy review yet.
6. Do you think that these policies and national funding instruments are effective in supporting sustainable urban development, and specifically in fostering the use of nature-based solutions?
 - a) What would you say are gaps in the current national policy landscape in this regard?
 - b) Can you think of any specific policy or funding challenges preventing a wider integration of nature-based solutions in policies/strategies, as a tool for contributing to sustainable urban development goals?
7. What do you see as being potential opportunities to increase the implementation of nature-based solutions (or related concepts) in sustainable urban development within {COUNTRY} and its national agencies? (This can include policies/strategies currently under development or ideas on national potential for increased action/financial support/research/etc.)
8. How could the EU help support a wider uptake of nature-based solutions in your country? Can other national or regional institutions also help support this aim? If so, how? Are they likely to take these steps in your view?
9. Are there other ways to make use of potential opportunities or overcome identified challenges to wider NBS support that haven't been mentioned yet?

Wrap-up

Annex C: Questionnaire – EU level

Please fill in the following information:

Country:
Interviewer:
Interviewee
Name:
Employer:
Title/position:
Email:
Date of interview:

Introduction

Interviewer briefly introduces CLEVER Cities project and the context of the interview

Interview questions:

1. Please briefly describe your position in your institution and role.
2. Which concepts of sustainable urban development and nature-based solutions are primarily used at EU level, and in what context?
(e.g. Is the term 'ecosystem-based approaches' used for flood protection measures? Or is green infrastructure a topic with regards to sustainable urban development or improving the health/well-being of citizens?)
3. Do you think that current EU policies and funding instruments are effective in supporting sustainable urban development, and specifically in fostering the use of nature-based solutions?
 - a. What would you say are gaps in the current EU policy landscape in this regard?
 - b. Can you think of any specific policy or funding challenges preventing a wider integration of nature-based solutions in policies/strategies, as a tool for contributing to sustainable urban development goals?
4. What do you see as being potential opportunities to increase the implementation of nature-based solutions (or related concepts) in sustainable urban development within the EU?
5. What do you see as being potential opportunities to increase the implementation of nature-based solutions (or related concepts) in sustainable urban development within EU institutions, policies and financial instruments? (This can include policies/strategies currently under development or ideas on potential for increased action/financial support/research/etc.)

6. How could the EU help support a wider uptake of nature-based solutions in the Member States?
7. Are there other ways to make use of potential opportunities or overcome identified challenges to wider NBS support that have not been mentioned yet?

Wrap-up

Annex D: List of interviewees

Case Study/Political Level	Interviewee
EU	Holger Robrecht, ICLEI Europe, Deputy Regional Director
EU	Francesc Baró, Barcelona Lab for Urban Environmental Justice and Sustainability, Post-Doctoral Researcher
EU	Representative of IUCN, Europe ¹⁴
EU	Birgit Georgi, Senior Climate Change Adaptation Expert specialising in Urban Sector, Asian Development Bank
Hamburg (DE)	Jürgen Marek, deputy parliamentary party leader of the green party in the <i>Bezirksversammlung</i> (borough parliament) Hamburg-Harburg
Hamburg (DE)	Brigitte Köhnlein, Ministry of Environment and Energy, Department for Federal, European and International Affairs
Hamburg (DE)	Simon Althoff, environmental officer of the Hamburg state representation in Berlin
London (UK)	Andrew Ruck, Department for Environment, Food and Rural Affairs, Senior Policy Advisor – Natural Capital
London (UK)	Nick White, Natural England, Senior Advisor – Green Infrastructure
Belgrade (SER)	Dr Milena Vukmirović, University of Belgrade, Faculty of Forestry, Assistant Professor
Belgrade (SER)	Dr Siniša Trkulja, Ministry of Construction, Transport and Infrastructure of the Republic of Serbia, Advisor
Larissa (GR)	Dimitrios Mavidis, Deputy Mayor of Urban Development
Larissa (GR)	Georgios Soutis, Deputy Mayor of Technical Works, Infrastructure and Civil Protection
Larissa (GR)	Evangelia Giovri, General Director of Environment, Quality of Life and Cleanliness, Municipality of Larissa

¹⁴ Information was taken from an NATURVATION interview in agreement with the interviewee.

Larissa (GR)	Dr Maria Markatou, Head of Sub-department of Urban Planning, Municipality of Larissa
Larissa (GR)	Anastasia Synapalou, Sub-department of Electrical and Mechanical Works, Municipality of Larissa
Madrid (ES)	Laura Ronquillo, Fundación CONAMA
Malmö (SE)	Doris Grellmann, Boverket, (National Board of Housing, Building and Planning)
Malmö (SE)	Elin Fogelström, Naturvårdsverket (Environmental Protection Agency)
Quito (ECU)	Jose Luis Barros, Secretariat of Land, Habitat and Dwelling, Metropolitan Director of Urban Development
Sfântu Gheorghe (RO)	Ileana Luminița Bălălaşu, Government of Romania, Advisor
Sfântu Gheorghe (RO)	Ioja Ioan-Cristian, University of Bucharest, Head of Department Regional Geography and Environment, Professor at the Faculty of Geography
Sfântu Gheorghe (RO)	Anonymous, public institution of Covasna County

Annex E: List of reviewed international policies, EU policies and EU funding instruments

Policy Type	Name	Year	Political Level
Directive, binding agreement	Paris Agreement	2015	International
	EU Water Framework Directive	2000	EU
	EU Floods Directive	2007	EU
	EIA Directive	2012	EU
Strategy	New Urban Agenda	2016	International
	The Aichi Biodiversity Targets	2011	International
	Sustainable Development Goals, global indicator framework	2018	International
	The Sendai Framework for Disaster Risk Reduction	1990	International
	An EU Strategy on adaptation to climate change	2013	EU
	EUROPE 2020: A strategy for smart, sustainable and inclusive growth	2010	EU
	A Blueprint to Safeguard Europe's Water Resources	2012	EU
	EU Green Infrastructure Strategy	2013	EU
	EU 2020 Biodiversity Strategy	2011	EU
	Urban Agenda for the EU 'Pact of Amsterdam'	2016	EU
	A Blueprint to Safeguard Europe's Water Resources	2012	EU
Position paper, non-binding resolution	POST-2020 Global Biodiversity Framework: Decision	2018	International
	POST-2020 Global Biodiversity Framework: Discussion Paper	2019	International
	POST-2020 Global Biodiversity Framework: Synthesis of Views of Parties and Observers	2019	International
	The contribution of EU cities and regions to CBD COP14 and the post-2020 EU Biodiversity Strategy	2018	EU
Action Plan/ Action Programme	An Action Plan for nature, people and the economy	2017	EU
	Closing the loop - An EU action plan for the Circular Economy	2015	EU
	Sustainable Use of Land and Nature-Based Solutions Partnership. Action Plan	2018	EU
	General Union Environment Action Programme to 2020 "Living well, within the limits of our planet"	2013	EU
	Regional Development Fund	2013	EU

Funding mechanisms	Cohesion Fund	2013	EU
	LIFE	2014	EU
	ESPON 2020 Cooperation Programme	2015	EU
	European Regional Development Fund 2014 - 2020 European Territorial Cooperation - URBACT III	2014	EU
	Horizon 2020 Work Programme 2014-2015	2015	EU
	Horizon 2020 Work Programme 2016-2017	2017	EU
	Horizon 2020 Work Programme 2018-2020	2018	EU
	Interreg Europe	2018	EU
	The BiodivERsA strategic research and innovation agenda (2017-2020)	2017	EU
	Natural Capital Financing Facility (NCFF)	N/A	EU