

# Realising the Potential of Nature-Based Solutions for a Transformative Societal Change

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### **About the Author**

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## Introduction

The Glasgow Climate Pact, the draft decision of the recently organised United Nations Climate Change Conference (COP26) in Glasgow, Scotland, highlighted *“the importance of protecting, conserving, and restoring nature and ecosystems to achieve the Paris Agreement temperature goal, including through forests and other terrestrial and marine ecosystems acting as sinks and reservoirs of greenhouse gases and by protecting biodiversity, while ensuring social and environmental safeguards”*.<sup>1</sup> The conference outcomes further emphasised that nature has an essential role in tackling the challenges caused by climate change. 100 countries, which together host 85% of the world’s forested areas, signed the Glasgow Declaration on Forests and Land Use, and in doing so, committed to safeguard and restore forests by 2030. 45 governments joined the new Forests, Agriculture and Commodity Trade (FACT) Statement to promote the sustainable trade of agricultural commodities which otherwise exert pressure on forests and other critical ecosystems. Moreover, commitments for funding adaptation actions were further increased via various pledges, including the Global Forest Finance Pledge<sup>2</sup> and the LEAF Coalition for Lowering Emissions by Accelerating Forest Finance.<sup>3</sup>

Despite these advances, COP26 stopped short of advancing progress on nature-based solutions (NBS) - a key means through which nature, and the contributions it can make to climate change and sustainability, can be advanced. NBS, as an umbrella concept, includes approaches which focus on ecosystem services, ecosystem-based management, green and blue infrastructure, sustainable forest management, natural water retention measures and ecosystem-based disaster risk reduction approaches.<sup>4</sup> According to the definition of the International Union for Conservation of Nature (IUCN), NBS are *“actions to protect, sustainably manage, and restore natural or modified ecosystems, that address societal challenges effectively and adaptively, simultaneously providing human well-being and biodiversity benefits.”*<sup>5</sup>

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1 UNFCCC, Conference of the Parties serving as the meeting of the Parties to the Paris Agreement (2021) *Glasgow Climate Pact*. Draft decision -/CMA.3. FCCC/PA/CMA/2021/L.16. p5. [https://unfccc.int/sites/default/files/resource/cma2021\\_L16\\_adv.pdf](https://unfccc.int/sites/default/files/resource/cma2021_L16_adv.pdf)

2 UN Climate Change Conference UK2021 (2021) *The Global Forest Finance Pledge*. <https://ukcop26.org/the-global-forest-finance-pledge/>

3 Emergent (2021) *LEAF Coalition Coalition Mobilizes \$1 Billion for Tropical Forest Conservation*. Press release. [https://www.emergentclimate.com/wp-content/uploads/2021/11/Press-Release-LEAF-Coalition-Mobilizes-1-Billion-for-Tropical-Forest-Conservation\\_021121-1.pdf](https://www.emergentclimate.com/wp-content/uploads/2021/11/Press-Release-LEAF-Coalition-Mobilizes-1-Billion-for-Tropical-Forest-Conservation_021121-1.pdf)

4 EEA (2021) 'Nature-based solutions in Europe: Policy, knowledge and practice for climate change adaptation and disaster risk reduction'. *European Environment Agency*.

5 Cohen-Shacham E., Walters G., Janzen C., et al. (2016) *Nature-Based Solutions to address societal challenges*. Switzerland., pxi



Figure 1: Conceptual framework on nature-based solutions as an umbrella term for ecosystem-related approaches<sup>6</sup>

Since NBS have the potential to address the two-fold planetary emergency of climate change and biodiversity loss while positively affecting human health and societal well-being, their systematic and context-appropriate application can support a cost- and resource-efficient transition towards global sustainable development.

To unpack the transformative potential of NBS, this brief synthesises the current state of knowledge surrounding nature-based solutions. It maps the overall landscape of NBS, including the challenges which NBS can address, the policy frameworks which drive NBS approaches, and the enabling conditions which support NBS implementation. Accordingly, it aims to answer the following questions:

- Which issues do NBS address and where?
- Who is driving forward the NBS agenda?
- Why are some NBS becoming more successful and emblematic than others?
- How can the evidence base be strengthened to promote upscaling of NBS?

Concerning the evidence base for NBS, the brief also introduces two interactive digital maps of global NBS practices. The development of the two complementary platforms was supported by the British Academy and produced in partnership with the Nature-based Solutions Initiative (NbSI) at the University of Oxford and the Department of Environmental Sciences and Policy Department of Central European University. The maps aim to demonstrate the variety of NbS implemented in different urban and rural areas around the world and showcase their potential to address multiple sustainability challenges, including climate change.<sup>7</sup>

In preparation for the UN Biodiversity Conference in Kunming, China (CBD COP15) and the UN Climate Change Conference (UNFCCC COP 27) in Sharm El-Sheikh, Egypt, the brief concludes with a set of policy recommendations for promoting the use of nature-based climate solutions.

<sup>6</sup> IUCN. Commission on Ecosystem Management (2021) *Nature-based solutions*. <https://www.iucn.org/commissions/commission-ecosystem-management/our-work/nature-based-solutions>

<sup>7</sup> British Academy (2021) *Mapping Nature-based Solutions*. <https://www.thebritishacademy.ac.uk/projects/mapping-nature-based-solutions/>

## Which issues are NBS addressing and where?

NBS can be implemented in urban, peri-urban and rural settings. They provide benefits across different landscapes and ecosystems including forests, grasslands, deserts, mountains, agricultural areas, wetlands, marine and coastal environments, and built environments. Depending on the local context in which they are implemented, they can encompass a wide variety of different solutions. Such solutions might range from the creation, management or rehabilitation of forest areas, through to the protection or restoration of wetlands or mangroves, or the construction of green buildings, green parking lots or rain gardens in the built environment.

To support analysis of the current state of NBS implementation, categorisations of NBS type are being developed. These categorisations<sup>8</sup> typically focus on either the ecosystem/setting in which the NBS is implemented, or on the type of NBS intervention/action. Based on the review of existing practices, Figure 1 provides a categorisation for the first of these two aspects, the ecosystem/setting in which NBS might be implemented.

<b>Blue areas (inland)</b>	Lakes/ponds ; Rivers/streams/canals; Deltas; Wetlands/bogs/fens; Marshes
<b>Coastal and marine ecosystems</b>	Coastlines; Mangroves; Sand dunes, Seagrass, Coral reefs
<b>Water management solutions</b>	Rain gardens; Swales and filter strips; Sustainable urban drainage systems, Wells
<b>Agricultural and food production areas</b>	Horticulture, Pasture, Community gardens and allotments, Aquatic structures
<b>Forests and urban parks</b>	Forested areas, Urban parks, Semi-natural forests; Green belts and corridors
<b>Shrub- and grasslands</b>	Shrubs, Grasslands, Wildflower meadows, Urban lawns
<b>Grey infrastructures with green features</b>	Alley and street greens; Railroad bank and track greens; Riverbank greens; Green squares and parking lots; Green playgrounds and school grounds
<b>Nature on and in buildings</b>	Green roofs; Green facades; Balcony greens; Green walls and ceilings; Atriums

Figure 2: Types of nature-based solutions

8 For example: Eggermont et al. (2015) 'Nature-based Solutions: New Influence for Environmental Management and Research in Europe'. *Perspektiven in Natur-, Geistes- und Wirtschaftswissenschaften*. 24, 243 – 248; Somarakis, G., Stagakis, S., & Chrysoulakis, N. (Eds.). (2019). *ThinkNature Nature-Based Solutions Handbook*. ThinkNature project funded by the EU Horizon 2020 research and innovation programme under grant agreement No. 730338 and World Bank. (2021). *A Catalogue of Nature-Based Solutions for Urban Resilience*. Washington, DC.

Concerning the type of intervention, NBS can be characterised based on whether they focus on the creation or maintenance of green or blue areas; management of coastal, agricultural, mountain or dryland landscapes; protection of natural ecosystems; or the ecological restoration of degraded ecosystems. In addition to the implementation of infrastructural and technological measures, these NBS interventions can also encompass soft measures, including knowledge creation and awareness-raising; development of a strategy, policy or plan; or implementation of governance, management and monitoring practices.

It is now widely acknowledged that different NBS types can tackle multiple environmental and socio-economic challenges.<sup>9</sup> NBS can deliver benefits related to climate change adaptation and mitigation, biodiversity conservation and restoration, improved water management and increased coastal resilience and environmental quality. NBS also confer co-benefits of improved social cohesion, improved public health and well-being, more inclusive governance, and increased economic development and green job creation.<sup>10</sup>

Regarding environmental challenges, NBS can improve overall environmental quality (including water, air, and soil); enhance the sustainable use of natural and water resources; regulate and improve built environments. Specifically relevant to **climate change**, NBS can mitigate the progression of climate change by reducing carbon emissions and increasing the sequestration and storage of carbon. NBS can further support adaptation to the impacts of climate change by reducing (human) exposure to climate risks directly, reducing the impacts of climate risk events, and by building climate resilience. Table 1 summarises various examples of how NBS can deliver benefits which address the challenges posed by climate change.

Table 1: Examples of how NBS can contribute to climate change mitigation and adaptation.

NBS for Climate Change Mitigation	NBS for Climate Change Adaptation
<ul style="list-style-type: none"> <li>• Reduce energy use and carbon emissions through introduction of sustainable agricultural practices</li> <li>• Increase carbon sequestration through increased wetland and tree coverage</li> <li>• Increase carbon sinks and carbon sequestration through introduction of sustainable forest management measures</li> <li>• Increase carbon sequestration through selection of more adaptable species</li> <li>• Increase carbon sequestration and cooling through installation of vertical or horizontal artificial surfaces</li> <li>• Halt desertification by restoring grasslands or other ecosystem types</li> <li>• Promote climate-friendly lifestyle practices</li> </ul>	<ul style="list-style-type: none"> <li>• Increase water availability and reduce drought-associated shortages through water capture and/or storage</li> <li>• Prevent and/or manage occurrence of desertification, soil erosion and landslides</li> <li>• Reduce outdoor temperature, minimise the urban heat island effect and prevent forest fires through increase in vegetation cover</li> <li>• Dissipate the effects of flooding and storms through restoration of wetlands and coastal ecosystems</li> <li>• Prevent coastal erosion and pollution through protection of coastal ecosystems</li> <li>• Minimise the impact of stormwater through implementation of sustainable urban drainage infrastructure, renaturalisation of rivers and other water bodies</li> <li>• Increase agricultural resilience through planting climate-resistant species and encouraging the use of sustainable agricultural practices</li> </ul>

9 Raymond et al. (2017) *An Impact Evaluation Framework to Support Planning and Evaluation of Nature-based Solutions Projects*. Report prepared by the EKLIPSE Expert Working Group on Nature-based Solutions to Promote Climate Resilience in Urban Areas.

10 For further discussion see Mabon L (2021) *Nature-Based Solutions and the Green Economy*, The British Academy, London and Xie L (2021) *Valuing Inclusion and Diversity, Embracing Uncertainty: Ways Forward for Nature-based Solutions*. The British Academy, London.

When designed and implemented effectively, NBS also have strong potential to **safeguard biodiversity** via protecting existing habitats and supporting the creation of new ones; restoring lost or damaged ecosystems; improving habitat and ecological connectivity; protecting native and/or endangered fauna and flora; controlling invasive species; encouraging the sustainable use of natural resources; protecting and supporting use of traditional knowledge, particularly related to conservation practices; raising public awareness about NBS and the natural environment; and involving the public in conservation efforts.<sup>11</sup>

Regarding **socio-economic challenges**, analysis of practice to date has proven that effective realisation of NBS in and around communities has potential to provide citizens with health and well-being benefits. Such benefits may result from the improvement of environmental factors (e.g. air quality) or the creation of opportunities for relaxation, recreation, or physical activity, which can improve both physical and mental health. NBS can additionally improve social cohesion; address environmental/ climate justice challenges; support the protection of natural heritage; support the protection of historic, cultural landscape and infrastructure; safeguard cultural diversity and historic traditions; as well as strengthen participation in the planning, implementation and monitoring of infrastructural or nature conservation projects and improve the effective management of such projects. Implemented projects also showed that NBS have potential to promote sustainable practices related to tourism, real estate and agricultural development, job creation, and production and consumption. Table 2 summarises various examples of how NBS can deliver societal benefits.

Table 2: Examples of how NBS can deliver societal benefits

Impact Area	NBS Type and Benefit Created
<b>Health and Well-being</b>	<ul style="list-style-type: none"> <li>• Creation or enhancement of forests and urban parks can improve physical and mental health through improved air quality and provision of opportunities for recreation and physical exercise</li> <li>• Creation of community gardens can provide access to healthy food and opportunities for recreation</li> <li>• Installation of green roofs or walls can improve working conditions in office buildings and schools and support individuals' recovery in health institutions</li> </ul>
<b>Social Cohesion and Justice</b>	<ul style="list-style-type: none"> <li>• Encouragement of sustainable agriculture practices can improve local food production and communal self-reliance</li> <li>• Tree planting, riverbank greening and community gardening can improve sense of community and identity</li> <li>• Urban green areas can provide opportunities for social interaction and improve social cohesion through the involvement of marginalised groups</li> </ul>
<b>Inclusive and Effective Governance</b>	<ul style="list-style-type: none"> <li>• Involvement of local communities in creation/management of forest or wetland areas can increase ownership and ensure long-term maintenance of the NBS</li> <li>• Introduction of market mechanisms (e.g. water funds or forest bonds) can encourage improved management and use of natural resources</li> </ul>

11

Based on Xie, L. and Bulkeley, H. (2020). 'Nature-based solutions for urban biodiversity governance'. *Environmental Science & Policy*, 110, pp. 77-87.

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**Cultural and  
Natural Heritage  
Preservation**

- Promotion of traditional conservation or agricultural practices can encourage safeguarding or restoration of natural ecosystems
- Connection of historic areas to nature can facilitate their reinterpretation as community centres, recreational spaces, and tourist destinations

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**Economic  
Development  
and Sustainable  
Production and  
Consumption**

- Establishment of community gardens can promote sustainable consumption in cities
- Application of agricultural-NBS can promote sustainable production in rural areas
- Transformation of former industrial or derelict areas into green-blue spaces can increase opportunities for tourism and stimulate economic development

Moreover, NBS have proven potential to provide a suite of varied environmental and socio-economic multi-benefits simultaneously. Evidencing this, analysis of 1000 urban NBS projects implemented across Europe showcased that eight in ten projects addressed both environmental and social challenges simultaneously, with projects typically setting three to seven different environmental and social goals concurrently.<sup>12</sup> In addition to green space creation, water management, biodiversity protection or climate action, the studied projects often considered urban regeneration, health and well-being or social cohesion among their objectives.

Considering the applicability of NBS in different physical and social landscapes, in combination with their significant potential to both deliver solutions for various climate change and biodiversity-related challenges, and their capacity to address multiple environmental and socio-economic sustainability issues in tandem, it is now widely suggested that the systematic application of NBS can also contribute to achievement of the United Nations Sustainable Development Goals (UN SDGs) and therefore deliver transformative change.

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12 Almassy, D., Pinter, L., Rocha, S., Naumann, S., Davis, M., Abhold, K. and Bulkeley, H. (2018) *Urban Nature Atlas: A Database of Nature-Based Solutions Across 100 European Cities*.



## Who is driving forward the NBS agenda?

Global development actors and national and local governments are increasingly considering the integration of NBS approaches into policy and implementation frameworks.

The IUCN and the European Union (EU) were amongst the first bodies to advocate for, and promote, NBS approaches. The IUCN has undertaken research to explore NBS approaches for infrastructure development and ecosystem protection and management; developed tools for NBS use; and more recently, set a global standard for NBS use.<sup>13</sup> The EU has supported research pertaining to NBS; developed the evidence-base for application of NBS; and promoted upscaling of NBS by integrating NBS approaches into EU policy frameworks including the European Green Deal, the Biodiversity Strategy for 2030, the Strategy on Adaptation to Climate Change, the Forest Strategy and the Water Framework Directive.<sup>14</sup> Building on these initiatives, global environmental agreements have started to support implementation of NBS as a means by which to realise the multiple benefits of increased climate resilience, reduced biodiversity loss and promotion of sustainable development. Such global environmental agreements include the United Nations Framework Convention on Climate Change (UNFCCC), the Convention on Biological Diversity (CBD), the Sendai Framework for Disaster Risk Reduction (SFDRR) 2015-2030 and the New Urban Agenda – Habitat III.<sup>15</sup>

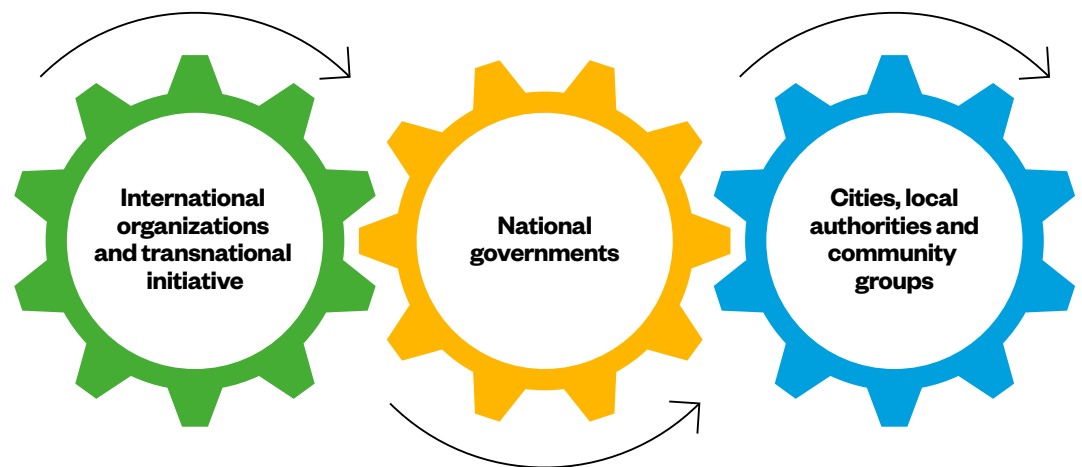


Figure 3: Who is driving forward the NBS implementation agenda?

At the **global level**, NBS approaches have been promoted by various international and transnational actors. The United Nations (UN), primarily via its Environment Programme and various environmental conventions, has had a vital function in endorsing NBS approaches amongst its member countries and fostering national NBS commitments. Various global research organisations, think-tanks, and non-governmental organisations (NGOs), such as the World Wildlife Fund, the World Resource Institute, the Nature Conservancy, Wetland International or Conservation International, have also contributed to the framing of the NBS agenda. Transnational

13 IUCN (2021) *Nature-based Solutions*. Our work. <https://www.iucn.org/theme/nature-based-solutions/our-work>

14 European Commission (2021) *Evaluating the impacts of nature-based solutions. A summary for policy-makers*.

15 EEA (2021) *Nature-based solutions in Europe: Policy, knowledge and practice for climate change adaptation and disaster risk reduction*.

governance initiatives have also recently gained importance in researching NBS and promoting their uptake and upscale. Examples of such networks include the Friends of Ecosystem-based Adaptation (FEBA), which constitutes more than 90 government bodies, UN agencies, NGOs and research organizations;<sup>16</sup> the Ocean Risk and Resilience Action Alliance (ORRAA) and the China-led Belt and Road Initiative International Green Development Coalition (BRIGC), involving over 130 governmental and international actors.<sup>17</sup>

International development and financing actors are also progressively focusing on promotion of, and investment into NBS in order to accelerate the translation of NBS approaches into implementable actions. Funded by the Federal Environment Ministry of Germany in 2020, the Global EbA-fund aims to support the “*the implementation and the upscaling of ecosystem-based adaptation*”.<sup>18</sup> The World Bank has begun to explore its potentials to promote “*nature-smart*” development approaches,<sup>19</sup> as well as the Inter-American Development Bank (IDB) and the Asian Development Bank both expressed their ambition to support the implementation of NBS.<sup>20</sup> At COP26, the nine Multilateral Development Banks, including the World Bank Group, were led by IDB in signing a statement titled “*Nature, Planet, People*” in which they pledge to “*support countries to secure high ambition for implementing nature-based solutions (NbS)*”.<sup>21</sup> Research does however suggest that the current level of annual investment in NBS (USD 133 billion) needs to be tripled by 2030 and quadrupled by 2050 to significantly reduce the threats of climate change and ecosystem damages.<sup>22</sup>

At the national level, efforts to utilise NBS are also accelerating. Nature4Climate’s NBS policy tracker has identified 220 policies originating from 80 countries which advocate for NBS. These policies focus primarily on increasing coastal restoration, reforestation and nature conservation or restoration.<sup>23</sup> Recent analysis of nationally determined contributions (NDCs) undertaken by the World Wildlife Fund (WWF) identified that of 114 NDCs updated since 2019, 105 included reference to NBS. This signalled an increase in the inclusion of NBS into NDCs, with a higher number of countries including specific, measurable actions concerning NBS in their updated NDCs as opposed to their previous NDCs, and a higher number of countries also considering additional ecosystem types besides forests, including wetlands, mangroves or agricultural lands.<sup>24</sup> NBS implementation is also being supported at the supranational level, via the establishment of various country coalitions. Examples include the African Great Green Wall initiative or the Resilient Islands initiative in the Caribbean.

Nonetheless, limitations of policies which support NBS implementation have been noted. National policies which focus explicitly on NBS or alternatively consider their application in a wider context still vary in focus, scope, and ambition, and also risk taking a siloed approach to NBS interventions. An analysis of relevant national policies in selected EU Member States found that while NBS concepts do appear in policy frameworks, they rarely contain specific, quantifiable actions, and are often

16 Friends of Ecosystem-based Adaptation (FEBA): <http://www.friendsofeba.com>

17 Green Finance and Development Center (2021): Belt and Road Initiative International Green Development Coalition. <https://greenfdc.org/belt-and-road-initiative-green-coalition-brigc/>

18 Global EbA fund: <https://globalebafund.org>

19 World Bank Group. (2021). *Unlocking Nature-Smart Development: An Approach Paper on Biodiversity and Ecosystem Services*. World Bank, Washington, DC.

20 Oliver, E. et al. (2021). *Nature-Based Solutions in Latin America and the Caribbean: Support from the Inter-American Development Bank*. Washington, DC: Inter-American Development Bank and World Resources Institute.

21 Joint Statement by the Multilateral Development Banks: NATURE, PEOPLE AND PLANET. <https://idbdocs.iadb.org/wsdocs/getdocument.aspx?docnum=EZSHARE-1729984378-40>

22 United Nations Environment Programme (2021). *State of Finance for Nature 2021*. Nairobi.

23 Durkin, L. et al. (2021) *Nature-based Solutions Policy Tracker*. <https://www.metabolic.nl/publications/nature-based-solutions-policy-tracker-report/>

24 WWF (2021) *NDCs – A Force for Nature*. 4th Edition. [https://wwfint.awsassets.panda.org/downloads/wwf\\_ndcs\\_for\\_nature\\_4th\\_edition.pdf](https://wwfint.awsassets.panda.org/downloads/wwf_ndcs_for_nature_4th_edition.pdf)

limited to the management and restoration of existing green and blue spaces.<sup>25</sup> Some extant national NBS policies or NDC pledges support emission mitigation through tree-planting, yet risk promoting monocultural tree-plantation, therein resulting in disregard of biodiversity objectives.<sup>26</sup> Another potential limitation pertains to NBS policy creation in developing regions. These processes are often driven by global development actors which can potentially hamper uptake and local ownership of NBS implementation. Recent research has also found that governments of G20 nations have largely failed to promote a green recovery following the COVID-19 pandemic, with proposed measures lacking nature-based approaches.<sup>27</sup>

**The role of cities and local authorities** in taking forward the application of NBS is also crucial, with 68% of the global population expected to live in cities by 2050, compared to 55% in 2019 and 47% in 2000.<sup>28</sup> Recognising the multitude of challenges which cities are facing - and will increasingly face - as a result of climate change, biodiversity loss and social inequality, and recognising the potential of NBS to address these challenges, cities around the world are taking the lead in NBS implementation. By developing local policies and implementation frameworks which promote NBS, cities are seeking the realisation of systemic and transformational change. Notable examples of NBS implementation in cities include:

- Basel, Switzerland, has promoted installation of green roofs since the mid 1990s through the introduction of both building regulations and financial incentives. It now has the highest coverage of green roofs per capita m<sup>2</sup> in the world.<sup>29</sup>
- Gothenburg, Sweden, has implemented the Rain Gothenburg Strategic Initiative, a city-level application of green and blue infrastructure solutions to manage stormwater.<sup>30</sup> Whilst the city already experiences 150 rain days per annum, the initiative offers a framework to address a foreseen increase in stormwater challenges whilst also creating multifunctional, natural spaces for public use.
- Curridabat, Costa Rica, created the ‘Sweet City’ plan, to renature the city by creating green spaces in different urban areas and connecting them via ecological corridors.<sup>31</sup> To address the various challenges in different neighbourhoods of the city, the initiative created a series of master plans with the involvement of local stakeholders.
- Jakarta, Indonesia, introduced a ‘Green Open Spaces’ plan, with the aim to increase urban parks and forests and revitalize existing green areas. The plan aims to reach at least 30% green space in the city. To monitor progress, it is also developing a Green Open Space indicator.<sup>32</sup>

25 Davis, M.; Abhold, K.; Mederake, L.; Knoblauch, D. (2018) *Nature-based solutions in European and national policy frameworks*. Deliverable 1.5, NATURVATION. Horizon 2020 Grant Agreement No 730243, European Commission, 50.

26 Seddon N, Chausson A, Berry P, Girardin CAJ, Smith A, Turner B. (2020). ‘Understanding the value and limits of nature-based solutions to climate change and other global challenges’. *Phil. Trans. R. Soc. B* 375: 20190120.

27 Callaghan, B. and Murdock, E. (2021) *Are we building back better?* UNEP and the University of Oxford.

28 United Nations (2019) *World Urbanization Prospects: The 2018 Revision*. New York: United Nations.

29 EEA. Climate Adapt (2021) *Green roofs in Basel, Switzerland: combining mitigation and adaptation measures*. <https://climate-adapt.eea.europa.eu/metadata/case-studies/green-roofs-in-basel-switzerland-combining-mitigation-and-adaptation-measures-1>

30 Mabon L. (2021) *How is Gothenburg using green infrastructure to become the ‘best city in the world when it’s raining?’* <https://urbangreenadaptationdiary.wordpress.com/2021/06/21/how-is-gothenburg-using-green-infrastructure-to-become-the-best-city-in-the-world-when-its-raining>

31 CNU (2021) *Sweet City: Defeating the City-Nature Antagonism*. <https://www.cnu.org/what-we-do/build-great-places/sweet-city-defeating-city-nature-antagonism>

32 Cities4Forests. (2021) *Jakarta, Indonesia*. <https://cities4forests.com/cities/jakarta/>

Additional to individual city initiatives, various networks and platforms have been established to harness cities' work with nature and promote collaboration. Examples include the Biophilic Cities Network,<sup>33</sup> the Cities4Forests coalition,<sup>34</sup> and the Local Governments for Sustainability's (ICLEI) Cities with Nature initiative.<sup>35</sup> In addition to supporting exchange of experience and information amongst cities with pre-existing high ambitions, these platforms also have potential to attract cities which are only beginning to explore the potential benefits which NBS can offer. These platforms can thus inspire and motivate cities to develop ambitious policy and accelerate the adoption of NBS approaches. Furthermore, grass-root community initiatives led by citizen groups and civil society organisations (CSOs) are also crucial for promoting widespread NBS implementation. Local ownership has been shown as an important aspect of co-creation and co-production of NBS on the ground, and successful NBS planning, and maintenance of long-term positive results have both been shown to benefit from community involvement. Analysis of NBS projects in Europe and Latin America suggests that approximately one third of existing projects are initiated by non-governmental actors and of those cases which are government-led, the majority involve various stakeholders in implementation.<sup>36</sup> Lastly, the involvement of businesses and via this, private sector investments into NBS will also need to be scaled-up, especially because private financing of NBS has been very limited to date.<sup>37</sup>

Despite increasing recognition of the importance of NBS in tackling global challenges, and despite increasing efforts to mainstream NBS approaches into global, national and local policy, research suggests that current policy, governance, and monitoring frameworks are not sufficiently and efficiently supporting the uptake and upscaling of NBS implementation efforts due to a lack of coherence amongst policies, fragmented implementation, insufficient funding and limited monitoring efforts.<sup>38</sup> It is therefore necessary to consider which enabling conditions and actions can render NBS implementation both possible and appealing. It is further necessary to expand the evidence-base which showcases the varied, multiple benefits which NBS can deliver.

33 Biophilic Cities: <https://www.biophiliccities.org/>

34 Cities4Forests: <https://www.wri.org/our-work/project/cities4forests>

35 Cities With Nature: <https://www.citieswithnature.org/>

36 Ozment et al. (2021). "Nature-Based Solutions in Latin America and The Caribbean: Regional Status and Priorities for Growth." Washington, DC: Inter-American Development Bank and World Resources Institute; and Almassy, D., Pinter, L., Rocha, S., Naumann, S., Davis, M., Abhold, K. and Bulkeley, H. (2018) *Urban Nature Atlas: A Database of Nature-Based Solutions Across 100 European Cities*.

37 United Nations Environment Programme (2021). *State of Finance for Nature 2021*. Nairobi

38 Somarakis, G., Stagakis, S., & Chrysoulakis, N. (Eds.). (2019). *ThinkNature Nature-Based Solutions Handbook*. ThinkNature project funded by the EU Horizon 2020 research and innovation programme under grant agreement No. 730338. doi:10.26225/jerv-w202; EEA (2021) *Nature-based solutions in Europe: Policy, knowledge and practice for climate change adaptation and disaster risk reduction*.

## Why are some NBS becoming more successful and emblematic than others?

To enable a systemic uptake and upscaling of NBS, several actions are necessitated: the harmonisation of policies and plans across local, national and global levels; the mainstreaming of considerations for NBS implementation into different sectoral strategies; the study and promotion of multilevel and multistakeholder governance arrangements; the identification of novel business models and innovative financing mechanisms; and the development and operationalisation of evaluative monitoring frameworks which can contribute to the development of an evidence-base to highlight the impacts and benefits of NBS.

Regarding **multilevel and multistakeholder governance arrangements**, it is important to consider that NBS implementation often involves multilevel government actors working in cooperation with various non-governmental actors such as NGOs, community groups, businesses, and research/educational institutions. Since NBS are intended to provide various societal benefits, the diversity of users' perspectives must be embedded throughout the design, implementation and maintenance of NBS. To enable this embedment, and therein the successful application of transdisciplinary approaches, processes and platforms should be created which enable active citizen engagement in NBS.

### Box 1

#### **Coastal erosion management in Ban Khun Samut Chin, Thailand<sup>39</sup>**

Ban Khun Samut Chin is a small fishing community with limited resources for coastal protection. Key goals of the coastal management project were to stabilise the coast, reclaim sunken lands where possible and protect the Khun Samut Trawat Temple (now about 0.5 km seaward from the shoreline). In recent years, mangrove reforestation has been an important part of coastal management in Ban Khun Samut Chin. Villagers became involved in mangrove reforestation and are working to protect the coast by experimenting with a diversity of techniques and tools. Village leaders have organised tourist homestays and developed a coastal research knowledge centre to provide information about the village's history and experiences with coastal change.

**Novel business models and innovative financing mechanisms** will be crucial in mobilising investors and investments, and in securing financing for the application of NBS approaches at a systems level. Research has found that various values can motivate actors to finance NBS implementation. Such values may comprise risk reduction, green densification, green heritage preservation and citizen health and well-being.<sup>40</sup> The exploration of these values and the economic benefits they can deliver could promote broader NBS uptake amongst actors. To increasingly channel investment towards NBS, economic instruments such as loans, utility fees, and investment funds (e.g. from pension and insurance companies) ought to be utilised and mainstreamed into funding processes. Moreover, since national governments, local authorities and development actors finance the majority of the investment projects which could feature NBS, assessment and proofing tools are required to ensure that all their investments prioritise NBS over traditional grey infrastructure and/or

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Description taken from Dr Michael Buser's contribution at the British Academy Nature-based Solutions workshops in July 2021  
Toxopeus, H.S.; Merfeld, K. (2021) 'Capturing the Value of Nature Together: Developing Business Models for Urban Nature-Based Solutions', *USE Working Paper*; Utrecht University.

prioritise NBS projects which support climate action and biodiversity protection whilst simultaneously providing societal benefits.

### **Box 2**

#### **Forest Resilience Bonds in Yuba (California, US) to reduce fire risk<sup>41</sup>**

To raise private funding for financing projects which can reduce the risk of forest fires, the Blue Forest Conservation and the World Resource Institution launched an innovative financing tool. The Forest Resilience Bond is based on a public-private partnership mechanisms, where investors provide funding for project implementation and public bodies that benefit from reduced fire risks repay investors over time. The concept was first applied in Yuba, California to implement a forest restoration project of \$4.6 million.

In addition to improving the implementation environment of NBS, there are further factors, embedded in the design of NBS themselves, which can increase the appeal of NBS and promote their application over traditional land management and grey infrastructure solutions. Such design considerations include the presence of technological innovation, experimentation with new design, and development of large-scale, systemic solutions.

Regarding **technological innovations**, NBS approaches provide scope for experimentation with both infrastructural and process innovations which utilise nature and natural elements to secure improved provision of ecosystem services. Examples of such innovations include the application of green roofs, natural rainwater management systems, and coastal management solutions.

### **Box 3**

#### **The Sand Motor, the Netherlands<sup>42</sup>**

The Sand Motor is a unique project which saw the creation of an artificial peninsula close to the Hague in The Netherlands. The peninsula was constructed to serve as a natural barrier against sea level rise and protect and restore the natural coastline. The project further supports local biodiversity through the creation of habitat for diverse species, offers recreational opportunities, and contributes to knowledge creation regarding coastal protection.

Regarding **NBS design approaches which change the city or landscape**, some projects particularly stand out as a result of their unique, novel design. These projects have the potential to draw both local and wider attention to the benefits which can be conferred by building with nature. By achieving this, such projects can promote the NBS concept beyond their immediate functional areas. Examples include the construction of green buildings, combining of grey and green infrastructures, and also the development of park projects.

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41 WRI (2018) *Investors Think They Can Make Money Reducing Wildfire Risk. A Forest Restoration Project in Yuba, CA Puts this Idea into Practice.* <https://www.wri.org/insights/investors-think-they-can-make-money-reducing-wildfire-risk-forest-restoration-project-yuba>

42 ZandMotor Monitoring (2021) *The Sand Motor.* <https://dezandmotor.nl/en/>

#### Box 4

##### **Bosco Verticale and the Library of Trees, Italy**<sup>43</sup>

The Bosco Verticale provides an example of a renowned NBS design. It comprises two vertically forested skyscraper residential buildings in Milano, Italy. In the vicinity of the Bosco Verticale, a large park, the Library of Trees, was further created as a cultural, recreational and commercial centre which links different urban spaces. The Library of Trees is designed as a mosaic of irregular plots, each plot featuring specific groups of plant species. The plots with trees are organised in a series of circles: each circle of trees creates a 'living room', together offering the public shade and protection, and aesthetic appreciation.

Regarding **large-scale, systemic solutions which showcase the transformative impact of NBS**, projects can similarly stand out if their implementation concerns a larger area and/or includes both technological and social innovation. Such NBS have potential to deliver system-level change. Examples include the rehabilitation of riverine systems, the creation of green corridors and green belts, and the development of eco-districts or eco-cities.

#### Box 5

##### **Great Green Wall**<sup>44</sup>

Aspiring to become the largest natural structure on the planet, the initiative aims to create a green corridor of 8000km length across Africa to restore degraded areas, improve food security and human health as well as to create job opportunities. The initiative was launched in 2007, involves 20 African countries and is supported by various development partners. Implementation efforts to date have seen the planting of 15% of the total planned forest area.

## How to strengthen the evidence base to promote upscaling of NBS?

To upscale existing good practice and enable systemic and transformational change, the practical implementation of NBS must be further accelerated. To achieve this, it is essential to garner a better understanding of the type of challenges which NBS can address and the contexts in which this might be achieved; the potential benefits and trade-offs associated with NBS; and the drivers and mechanisms which are required to enable and support NBS implementation. It is therefore necessary to track and map projects implemented to date, focusing on assessment of the multiple benefits which they have potential to deliver, trade-offs and implementation barriers experienced by the projects, and ways in which these trade-offs or barriers have been successfully overcome.

Recognising that **the evidence base for NBS requires solidifying**, it is important to note that most research conducted to date has relied on localised case studies and focused on NBS application in the global North. Knowledge regarding NBS uptake and realisation of potential benefits is therefore more limited still in countries which have relatively diverse climatic areas, lower income levels and higher population. Moreover, efforts to monitor NBS implementation at the project level remain in an early phase

43 Urban Nature Atlas (2021) *Library of Trees*. <https://una.city/nbs/milano/library-trees>

44 Great Green Wall (2021) *The Great Green Wall*. <https://www.greatgreenwall.org/about-great-green-wall>

of development. The majority of NBS projects lack integrated, ex-ante and ex-post assessments – and thus exhibit a lack of practical support in informing planning and implementation of well-designed NBS which can deliver the promise of multiple environmental and societal benefits. As a result, the NBS evidence-base remains scattered and limitations in monitoring need to be overcome to enable NBS to realise their full potential.

To address these knowledge gaps, several efforts have been launched in recent years to catalogue good practices of NBS. These efforts attempt to map NBS uptake, and include data on project objectives, activities and outcomes for compilation into accessible databases. Examples of good practice databases are presented in Figure 4.

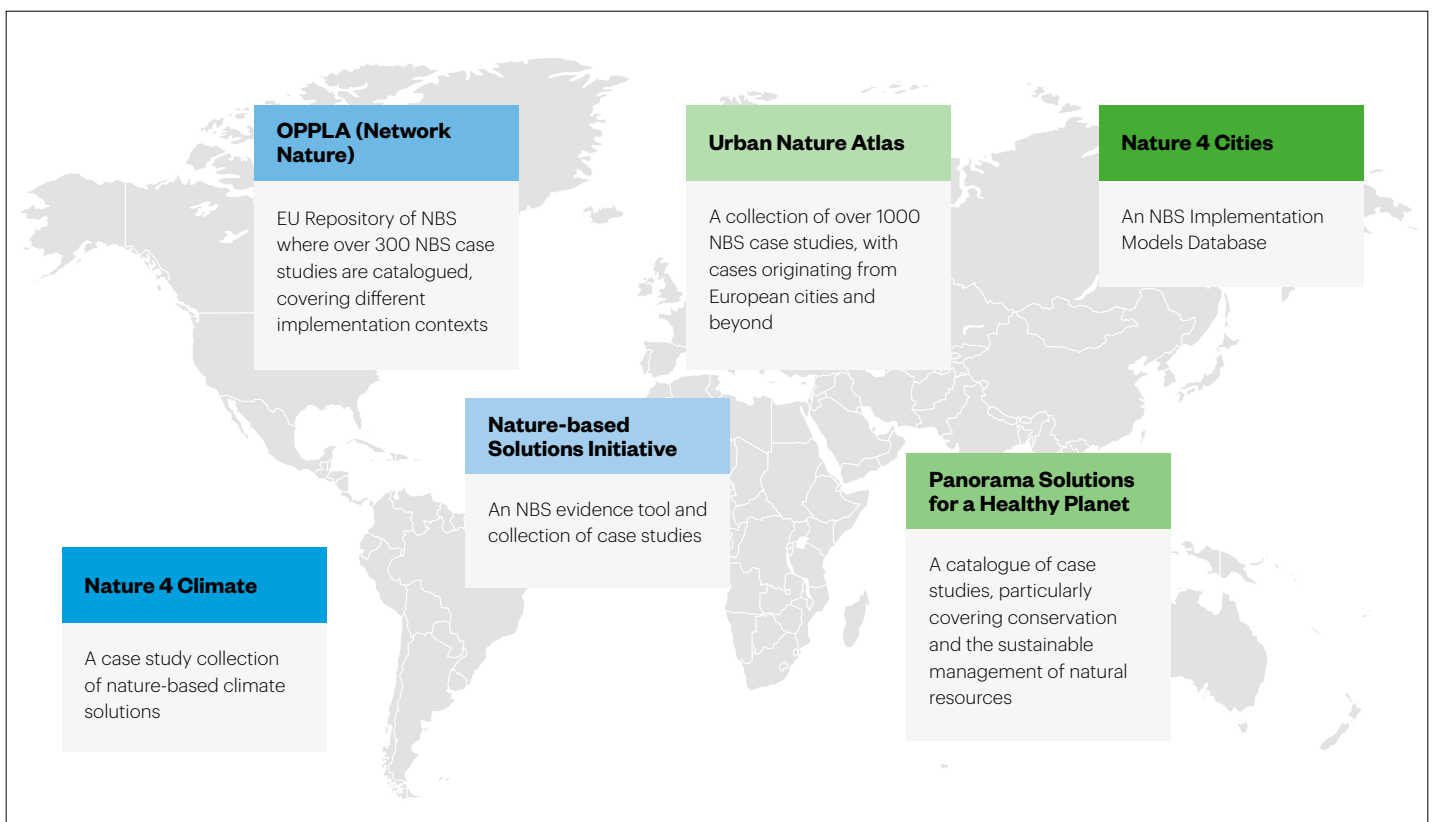


Figure 4: Examples of NBS databases (OPPLA;<sup>45</sup> Panorama Solutions for a Healthy Planet;<sup>46</sup> Urban Nature Atlas;<sup>47</sup> Nature-based Solutions Initiative;<sup>48</sup> Nature 4 Cities;<sup>49</sup> Nature4Climate<sup>50</sup>)

Thanks to the increasing collection and compilation of NBS good practice case studies which originate from around the globe, it is becoming possible to work towards the systematic development of an NBS evidence base and therefore enable assessment of the real, observed potential of NBS. Building on this newfound research capability, and as a contribution to the COP26, the British Academy has supported the publication and extension of two interactive NBS maps, the

45 OPPLA: <https://oppla.eu/case-study-finder>  
 46 Panorama Partnership Initiative. Solutions for a Healthy Planet: <https://panorama.solutions/en>  
 47 Naturvation Project. Urban Nature Atlas: [www.una.city](http://www.una.city)  
 48 Nature-based Solutions Initiative. Case studies. <https://casestudies.naturebasedsolutionsinitiative.org>  
 49 Nature 4 Cities. An NBS Implementation Models Database <http://implementation-models.nature4cities-platform.eu/explore.php>  
 50 Nature4Climate: NBS in Action - around the worlds. <https://nature4climate.org/case-study-map>



**Nature-based Solutions Initiative (NbSI)** and the **Urban Nature Atlas (UNA)**.<sup>51</sup> The two maps take a global approach to case location to present successful NBS case studies across different rural and urban, socio-economic and governance contexts.

The NbSI has created a new platform of global best-practice NBS to showcase the different ways of working with nature to address societal challenges in rural communities. The cases also highlight what can be achieved with high-quality Nbs that are underpinned by biodiversity and designed and implemented with the full engagement and consent of local communities and Indigenous Peoples.<sup>52</sup>

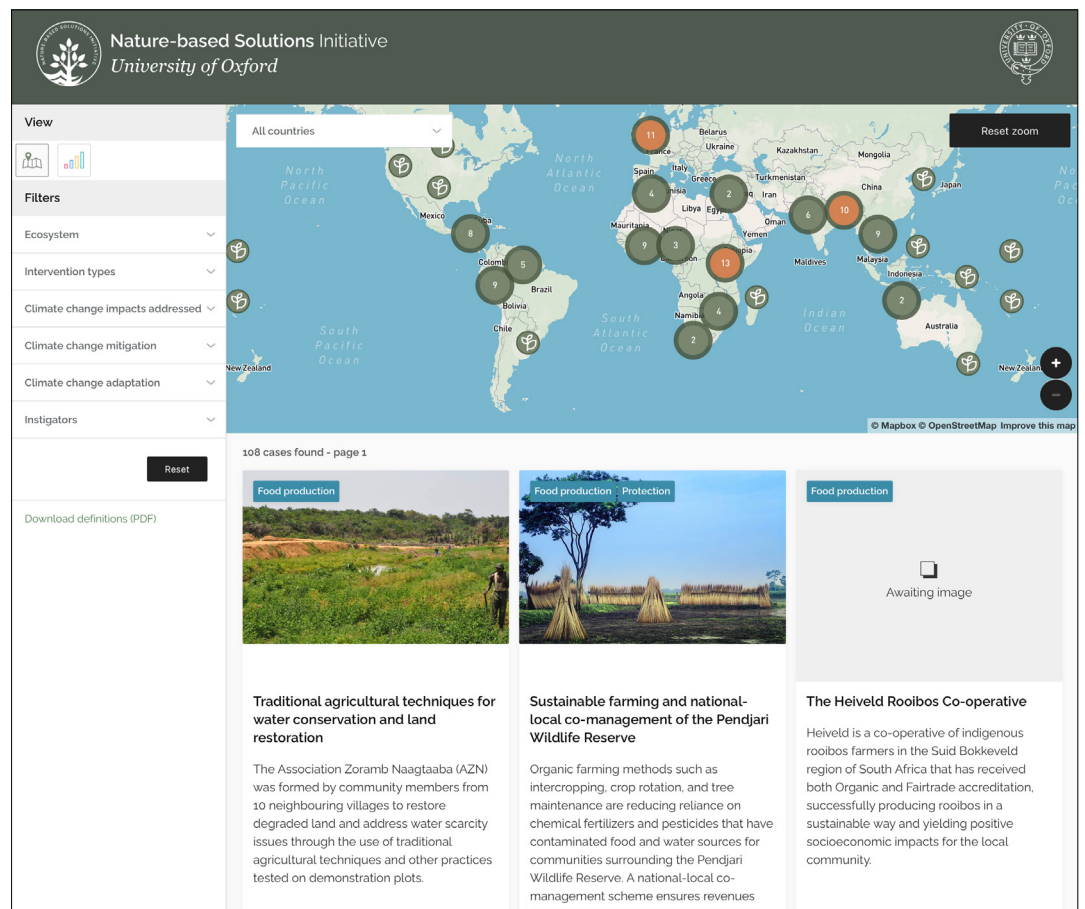


Figure 5: Landing page of the NbSI case study platform, [www.casestudies.naturebasedsolutionsinitiative.org](http://www.casestudies.naturebasedsolutionsinitiative.org)

51 The British Academy (2021) *Mapping Nature-based Solutions*. <https://www.thebritishacademy.ac.uk/projects/mapping-nature-based-solutions/>

52 Professor Nathalie Seddon (Nature-based Solutions Initiative) taken from NbSI (2021) *New Global Map of best-practice Nature-based Solutions launches at COP26*. <https://www.naturebasedsolutionsinitiative.org/news/new-global-map-best-practice-nature-based-solutions-cop26/>

The **UNA**, as a knowledge base dedicated to showcasing the richness and value of nature-based solutions in cities worldwide, profiles over 1000 projects from European cities and beyond.<sup>53</sup> Building on its existing infrastructure, the UNA has been extended with urban and peri-urban nature-based climate solutions from non-European cities, illustrating that the transformative potential of NBS is real and present in a wide range of contexts.<sup>54</sup>

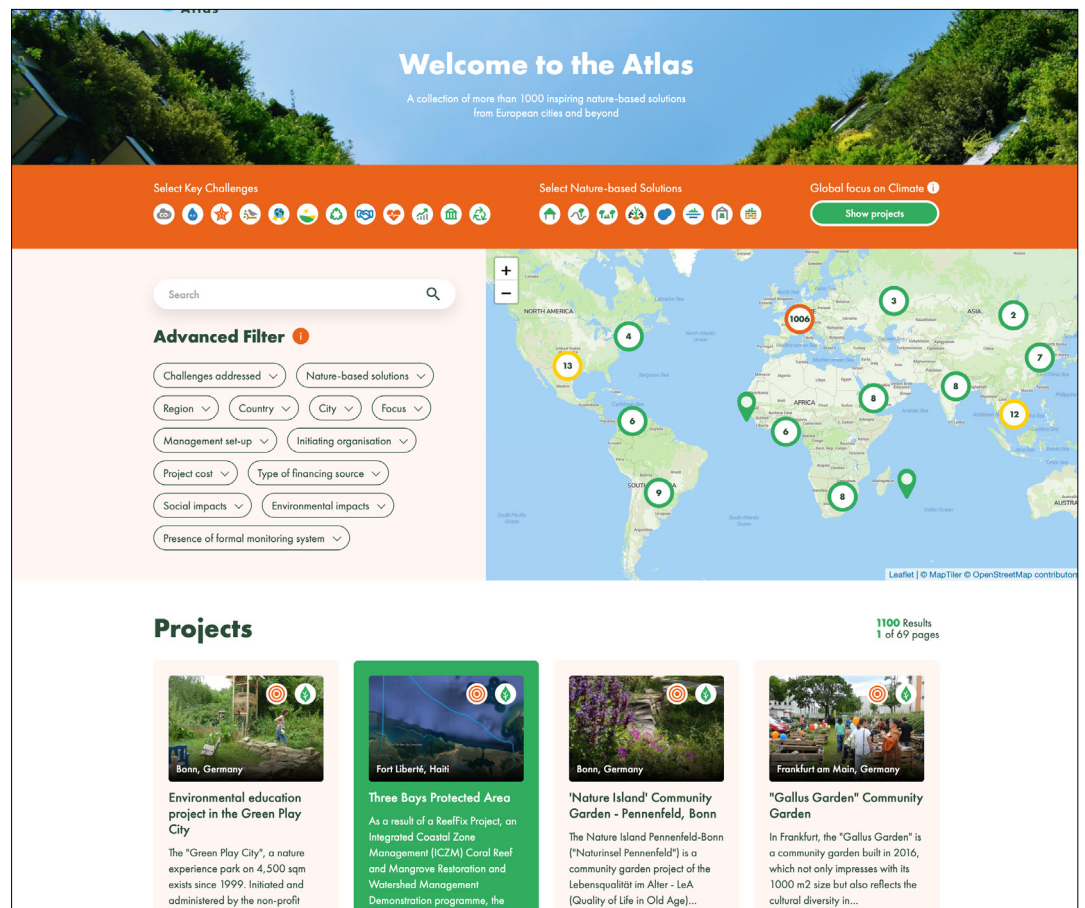


Figure 6: Landing page of the Urban Nature Atlas, [www.una.city](http://www.una.city)

To take various perspectives, values, and practices around NBS approaches into consideration, the British Academy held a series of workshops to support the mapping exercise and the identification of cases. Moreover, going beyond simply showcasing good practice examples, each map focuses on collecting and assessing evidence about the impacts and benefits of those NBS implemented. Therefore, both platforms provide the first attempts to systematically review the various benefits which NBS can confer in urban and rural areas.

53 The Urban Nature Atlas (2021) *About the Urban Nature Atlas*. <https://una.city/about>  
 54 Professor László Pintér (Central European University) taken from CEU (2021) *Urban Nature Atlas Expands Globally During COP26, Launched by British Academy*. <https://www.ceu.edu/article/2021-11-08/urban-nature-atlas-expands-globally-during-cop26-launched-by-british-academy>

## Key points and policy recommendations

Outcomes of the COP26 have shown that nature and nature-based approaches are increasingly considered part of the solution in addressing the double-threat of climate change and biodiversity loss. However, it will be crucial to promote nature-based climate solutions further and bring the agendas of the CBD COP15 and the UNFCCC COP27 closer by emphasizing the role of NBS in protecting nature and bridging the climate commitment gap.

To realise their potential, there is a need to **further integrate NBS approaches into policies and implementation actions**. The overview of the NBS landscape, relevant policy frameworks and enabling conditions, as presented in this brief, highlight the importance of translating high-level goals into concrete implementation plans, addressing conflicting objectives in different sectoral policies and plans, mainstreaming NBS considerations into public and private financing mechanisms, and improving monitoring and review of both NBS policies and implementation on the ground.

To upscale existing good practice and enable systemic change, **practical implementation of NBS approaches must be accelerated**. The design of both urban and rural NBS should leverage the full potential of NBS to deliver multiple benefits. Thus, NBS planning must take into consideration climate adaptation and biodiversity protection objectives as well as societal needs. Community involvement in the design and implementation of NBS is crucial, and the engagement of stakeholders (including urban and rural residents and indigenous groups) is a key factor for success. Additional issues surrounding NBS implementation should also be considered. These might include the role of business, issues related to justice and ethics, the development of a nature-based economy and green job creation.

Lastly, it is crucial to further **strengthen the evidence-base of NBS outcomes and impacts**. Strengthening of the evidence base can be supported by development of tools to assess NBS implementation; by undertaking regular and integrated monitoring of implemented projects; and through systematic mapping of the outcomes of such monitoring activities. Feedback obtained from monitoring should facilitate pinpointing of required improvements and enable better-informed policy and decision-making regarding NBS. A strengthened evidence base on observed outcomes of NBS could also facilitate increased accountability of implementation, particularly as regards to costs associated with NBS versus environmental and social benefits which NBS deliver. These would further showcase the transformational potential of NBS to both decision-makers and stakeholders, therein promoting their uptake and upscale at the system level and with this, addressing global sustainability challenges and securing progress towards the SDGs.

## About the Academy

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