

Smart, Sustainable and Resilient cities:

the Power of Nature-based Solutions



Acknowledgments

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FOREWORD

Italy, as holder of the G20 Presidency, would like to focus attention on the important ecosystem services that nature can provide to urban populations. Nature-based Solutions (NbS) directly address three urgent and fundamental challenges: they improve the quality of life in cities, they reduce the urban ecological footprint, and they increase cities' capacity to adapt to climate change in a cost-effective way.

By accelerating the implementation of NbS, decision-makers can help their cities adapt to the changing climate while also enhancing climate resilience and providing other critical benefits, including cleaner air and water.

Covid-19 recovery plans offer a great opportunity to scale up NbS in cities, with a view to building back better in ways that protect, conserve, and restore our ecosystems and their services, while addressing the social and economic challenges of urban areas and significantly reducing environmental impacts.

By building on the Riyadh (2020) and Osaka (2019) G20 legacy and the full engagement of the membership to pursue concrete climate action, we have paid special attention to smart cities. As the world's centres of innovation and economic dynamism, cities will be critical to defining the path toward a zero-emissions future with resilient and prosperous societies.

To this end, we have focused the G20 work on the evaluation of multiple benefits and how to maximize them with good quality governance. Cooperation across sectors and subnational authorities is key to fostering the integration of NbS into urban, peri-urban and infrastructure planning.

To better reflect the different governance structures in G20 countries, a survey was promoted jointly with UNEP and UNDP to gather information and suggestions from G20 countries at different administration levels. Two events were organized to facilitate exchanges among G20 members on this important topic: the first in collaboration with UNEP on "Resilient, Smart and Sustainable Cities: The power of Nature-based Solutions" (16 April 2021), the second on "Multilevel Governance Approaches to Scale Up Nature-based Solutions in Urban Contexts", organized in collaboration with UNDP and UNEP, and with the contribution of Urban20 and ICLEI (23 April 2021).

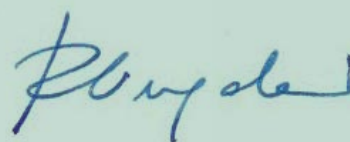
Both events highlighted the multiple benefits of implementing NbS in cities and demonstrated that NbS – adapted to local circumstances – can work in all contexts. Scaling up the positive experiences will require further quantification of the breadth of benefits, the integration of NbS



into planning processes, as well as innovative business and finance models and smooth multi-level governance.

On the basis of the results of the G20 process undertaken during the 2021, the Italian Presidency is pleased to present this report, which offers an overview of the best practices of NbS implementation in cities. The report also offers a set of guiding principles to improve territorial governance and establish multi-level governance frameworks to increase the impact and coherence of policies and private investments. We would like to express our sincere gratitude to UNEP for its support in preparing this report.

A fundamental climate transition needs to take place in cities. We hope that the report will inspire further action by national governments and city authorities to enhance Nature-based Solutions in cities to reduce their vulnerability to climate change.



Roberto Cingolani

Italian Minister of Ecological Transition

Acronyms and abbreviations

CBD	United Nations Convention on Biological Diversity
CEU	Central European University
C40	C40 Cities
EbA	Ecosystem-based Adaptation
GHG	Greenhouse gas
ICLEI	Local Governments for Sustainability
ILO	International Labour Organization
IUCN	The International Union for the Conservation of Nature
NbS	Nature-based Solutions
SDGs	Sustainable Development Goals
TNC	The Nature Conservancy
UCLG	United Cities and Local Governments
UNDP	United Nations Development Programme
UNEP	United Nations Environment Programme
UNFCCC	United Nations Framework Convention on Climate Change
WHO	World Health Organization
WRI	World Resources Institute
WWF	World Wildlife Fund



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Executive Summary

City life is becoming the default human experience. Cities are engines for development, and increasing urban populations provide connection and opportunity. But cities can also exacerbate some of the world's most serious environmental and socioeconomic challenges.

Cities concentrate millions of people into locations that can be highly vulnerable to disaster, pollution, and the impacts of climate change. Twenty-one of the world's 33 megacities are in low-lying coastal areas: it is estimated that almost 700 million people live in urban or peri-urban areas that are less than 10 metres above sea level. Meanwhile, cities are hotspots for both air pollution and disease. A recent study estimated that meeting WHO air quality standards in 1,000 European cities would save 52,000 lives annually.

For years the story of cities has been a tale of attempting to carve a place for humans outside of nature, but we are increasingly realizing that smart, sustainable and resilient cities need to **harness the power of nature.**

Nature-based solutions (NbS) deliver important ecosystem services to urban dwellers. Examples of NbS include forests, wetlands, green belts and parks in and around cities as well as green infrastructure such as natural wastewater plants, green roofs, green walls, combined non-motorized transport and ecosystem corridors and other green, blue and hybrid infrastructure. These

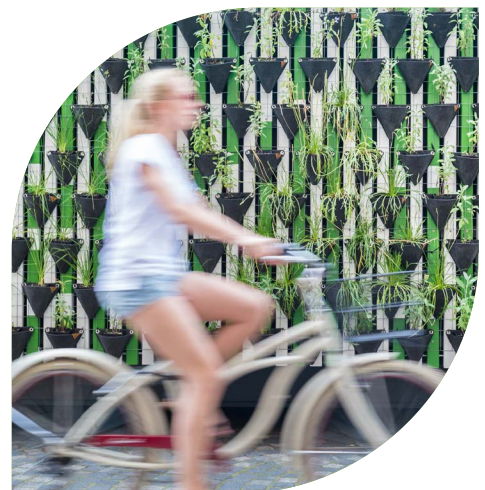
and other nature-based solutions build resilience and reduce disaster risk while delivering many other benefits: climate adaptation and mitigation; clean water and air; cooler streets; and access to green public spaces for recreation and physical, mental and spiritual well-being.

This report recognises there is **no multilaterally agreed definition of NbS.** Instead, it uses NbS as an umbrella concept that encompasses a range of established approaches, such as ecosystem-based adaptation, ecosystem-based management, green infrastructure and blue-green infrastructure and ecosystem-based disaster risk reduction, and so on.

NbS are ready-to-go, (often) low-tech and low-cost solutions for people, planet and prosperity. There is increasing evidence that green, blue and hybrid infrastructure can cost-effectively deliver what otherwise would require expensive grey infrastructure investments or other energy-intensive responses.

NbS can create jobs, and COVID-19 recovery schemes can tap into this potential. But, like any innovation and change, they can require trade-offs and lead to unintended consequences. This underlines the need to communicate better to policy makers and the general public about the opportunities, and also the implications, of NbS action.

This report highlights the multiple benefits that nature-based solutions offer to make cities smarter, more sustainable and more resilient in the twenty-first century...



Initiatives to pilot urban NbS are underway in many countries in the G20.

These demonstrate that NbS – when adapted to local circumstances – can work in all contexts. They are providing important lessons on how to protect, sustainably manage, finance, and restore nature in an urban context. Yet these efforts are often piecemeal, underfunded and applied at too small a scale to have a transformative impact. Delivering NbS at scale requires action at all levels of government coupled with public-private partnerships and community engagement.

Quantifying and communicating the benefits of NbS will help to build the **new business and finance models** that are needed to

scale up action. Incorporating the benefits of nature into **business accounting** allows the monitoring of impacts of NbS interventions. But environmental financial data, particularly in developing countries, is still missing.

For cities to make peace with nature, we need to design urban infrastructure with nature in mind.

To be successful over the long term, NbS have to be integrated into the infrastructure planning process at the earliest stage possible (upstream planning stage) and tailored to local contexts. They also have to take into account the climate impacts that the region will experience. Stronger national policies, procurement guidelines and regulations, as well as technical capacities are needed to create a favourable environment for the effective implementation of NbS.

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The way we design, plan and manage our cities and infrastructure may

determine whether we can meet the Sustainable Development Goals (SDGs). Three quarters of 2050's infrastructure doesn't yet exist. We need to integrate nature into infrastructure as we build it. This integration can take many forms, from green and hybrid infrastructure to renewed efforts to reduce the negative impacts of construction materials that put further pressure on climate and nature. The Global Biodiversity Outlook 5 identifies sustainable cities and infrastructure as key to a transition to living in harmony with nature.

The G20 is a powerful platform to accelerate the uptake of nature-based

solutions to promote smart, sustainable and resilient cities around the world, including as part of COVID-19 recovery. NbS should be a cornerstone of a green and resilient recovery given its potential to create jobs, provide green space for recreation, and improve urban health.

...and suggests ways to scale up the experiments in urban NbS that are underway in many G20 countries.



Bosco Verticale
(Vertical Forest), Milan, Italy



01 Foundations

City life is becoming the default human experience; more than half of the world's population already lives in cities, and on current trends by 2050 two thirds of a global population of more than 9 billion people will live in urban areas. Cities are becoming an increasingly consequential force in the global ecosystem: already they account for some 75 per cent of global resource and energy use, while producing more than half of global waste and at least 60 per cent of greenhouse gas (GHG) emissions.¹

This report

This report investigates the potential of nature-based solutions (NbS) to help build smart, sustainable and resilient cities. It draws from more than a decade of research and experience from G20 countries and beyond. It is informed by the rich discussions held by the energy and climate working group of the G20 in March and April 2021, as well as collateral events organized on 16 and 23 April 2021 by the Italian Presidency with the support of UNEP and UNDP.

Section 2 outlines what we mean by nature-based solutions and the multiple benefits they can deliver. Section 3 describes some of the experience that has been gained to date in applying nature-based solutions to urban challenges. Section 4 investigates the systems that need to be in place for NbS to thrive: viable business models and multilevel governance, drawing off a review of multilevel governance among G20 cities and countries (see Annex 1). Finally, section 5 looks to the future and the role of the G20 in deploying nature-based solutions at scale across the world's cities..

Cities on the frontline

Cities allow for economies of scale, delivering services to large numbers of people, driving economic growth and innovation, and creating jobs. But cities are also at the forefront of both the causes and impacts of major environmental challenges such as climate change, pollution and biodiversity loss.

Cities concentrate millions of people into locations that can be highly vulnerable to disaster and the impacts of climate change. Migrants arriving in cities from rural areas are particularly likely to end up in exposed and poorly serviced urban areas. Intense rainfall events put huge strain on urban storm wastewater systems, particularly where large parts of cities have been rendered impermeable by road and building construction. And with 21 of the world's 33 megacities located in low-lying coastal areas, it is estimated that more than 700 million people worldwide live in urban or quasi-urban areas that are less than 10 metres above sea level.²

Cities are often hotspots for air pollution, which is a major environmental cause of death worldwide. A recent study investigated the mortality impacts

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