



Nature-Based Solutions in the EU: Innovating with nature to address social, economic and environmental challenges[☆]



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ABSTRACT

Contemporary societies are facing a broad range of challenges, from pressures on human health and well-being to natural capital depletion, and the security of food, water and energy. These challenges are deeply intertwined with global processes, such as climate change and with local events such as natural disasters. The EU's research & innovation (R & I) policy is now seeking to address these challenges from a new perspective, with Nature-Based Solutions, and turn them into innovation opportunities that optimise the synergies between nature, society and the economy. Nature-Based Solutions can be an opportunity for innovation, and are here promoted by both policymakers and practitioners as a cost-effective way of creating a greener, more sustainable, and more competitive economy.

Since 2013, the European Commission has devoted particular attention to Nature-Based Solutions through consultations and dialogues that sought to make the concept of these solutions more concrete and to define the concept's place within the spectrum of ecosystem-based approaches. In 2014, the Commission launched an expert group, which conducted further analysis, and made recommendations to help increase the use of Nature-Based Solutions and bring nature back into cities. In 2015, a survey was conducted on citizens' views and perceptions of 'Nature in Cities' to provide further insight for future work. Based on these elements and on results from running EU projects, the Commission has developed an R & I agenda for Nature-Based Solutions and has published targeted calls for proposals for large-scale demonstration projects in this field in 2016 and 2017.

Additional R & I actions at EU level that promote systemic Nature-Based Solutions and their benefits to cities and territories are planned with the aim to improve the implementation capacity and evidence base for deploying Nature-Based Solutions and developing corresponding future markets. They are also expected to foster an interdisciplinary R & I and stakeholder community and the exchange of good practices in this field, as well as help shaping and implementing international R & I agendas on Nature-Based Solutions.

1. Introduction

There is a growing awareness of the value of nature in addressing environmental, social and economic challenges. This awareness is present in the worlds of business and policy, and in society more broadly (Maes and Jacobs, 2015). The EU has actively supported environmental research since the start of its Framework Programmes for Research and Technological Development (FP). These programmes had an initial emphasis on biodiversity assessments, better understanding ecosystem structures and functioning, and on assessing ecosystem services and the vulnerability of these ecosystems to stressors. The framing of research within a socio-ecological framework as of FP6 (Sixth Framework Programme; 2002–2006) is evidence of the progressive

integration of social and political sciences. The further consideration of economic dimensions has led to research on the value of ecosystems (and their services), with an increasing focus on the benefits that nature may provide for humans (MA, 2005; TEEB, 2010; Mace, 2014). The science and research community is now focusing on the best ways to use innovation to find solutions that mutually support nature, society and the economy. With its new orientation towards Nature-Based Solutions, the EU's R & I policy addresses cross-cutting societal challenges by focusing research on biodiversity and ecosystem services for innovation, growth and job creation.

Nature-Based Solutions (NBS) is a concept that builds on and supports other closely related concepts such as the ecosystem approach (Eggermont et al., 2015). The ecosystem approach is a concept that has

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been used in the scientific community since the early 2000s. It advocates the integrated management of land, water, and living resources and promotes their conservation and sustainable use in an equitable way (COP 5 Decision V/6). A number of other ecosystem-based initiatives have been promoted by the European Commission and further integrated into its policies, each of them being part of a dedicated strategy at European level. These include Ecosystem-based Adaptation, Green Infrastructure, Ecosystem-based Disaster-Risk Reduction and Natural Water Retention Measures. These approaches can be complementary and promote a variety of policy goals. But each of them often focuses on short-term economic gains and effectiveness (Nesshöver et al., 2016). Moreover, they tend to address social, economic and environmental challenges from a distinct perspective, whether the challenges are biodiversity conservation, climate change adaptation, disaster risk reduction, or human health and well-being.

The strength of the concept of Nature-Based Solutions is its integrated perspective for addressing societal challenges. Ecosystem services are the contributions that ecosystems, in combination with other inputs, make to human well-being. Nature-Based Solutions operationalize the concept of ecosystem services in real-world situations to promote sustainability more explicitly. Nature-Based Solutions also play a critical role in promoting 'transitions' from a resource-intensive growth model towards a more resource-efficient, inclusive and sustainable growth model. Transitions are radical innovations in structures, mind-sets and practices that involve actors from different sectors, domains and scale levels in the co-design and co-implementation of solutions (Nevens et al., 2013).

Research has shown that Nature-Based Solutions can spark social innovation in cities and accelerate the transition to sustainability. They do this by fostering innovative planning and governance, as well as new models for business, finance, institutions and the wider society (Wolfram and Frantzeskaki, 2016; see EU-funded ARTS project).

The European Commission defines Nature-Based Solutions as a way to address societal challenges with 'solutions that are inspired and supported by nature, which are cost-effective, simultaneously provide environmental, social and economic benefits and help build resilience. Such solutions bring more, and more diverse, nature and natural features and processes into cities, landscapes and seascapes, through locally adapted, resource-efficient and systemic interventions' (EC, 2016a). This description builds on the report of the European Commission Expert Group on Nature-Based Solutions and aims to promote the use of a common narrative within the science, practice and policy communities. The Expert Group report also provides examples of Nature-Based Solutions for bringing nature back into cities and degraded ecosystems, improving human health and well-being, and adapting to climate change. These examples include green roofing, floodplain restoration and creating pocket parks (more than 200 measures implementing NBS are listed in the report; EC, 2015b). Multiple societal challenges can be addressed simultaneously through Nature-Based Solutions (Raymond et al., 2017; Cohen-Shacham et al., 2016). These include: increasing human well-being; urban regeneration; enhancing coastal resilience; multi-functional watershed management and ecosystem restoration; increasing sustainable use of matter and energy; developing the insurance value of ecosystems; and increasing carbon sequestration (Fig. 1). In the implementation of Nature-Based Solutions, the conservation of biodiversity is an objective, but it is also a pre-requisite: functioning ecosystems are necessary to ensure the delivery of ecosystem services.

The following sections highlight recent developments in the Nature-Based solutions R & I agenda and describe how they align with EU policies and global agreements. European standards and environmental legislation have already contributed to reducing human impacts on the

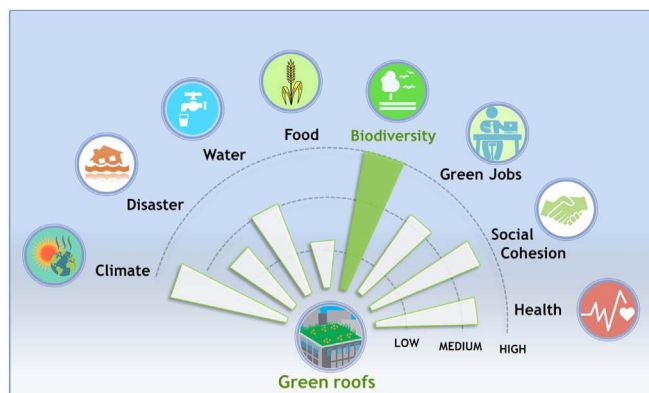


Fig. 1. Potential environmental, social, and economic benefits provided by a nature-based solution, in this case a green roof in an urban environment. Nature-Based Solutions should always help enhance natural capital and promote biodiversity while delivering other co-benefits.

environment (SOER, 2015). Europe is therefore well-placed to adopt a leadership role and take decisive action to address the challenge of global sustainability through innovative environmental technologies and policies (Oberthür and Roche Kelly, 2008; Gupta and Grubb, 2013; EC, 2016a). Although significant knowledge gaps in the field have yet to be filled, Europe has extensive pools of knowledge, scientific expertise, skills, and technological capacity relevant to Nature-Based Solutions. Specific actions that support the R & I agenda and promote the systematic exploration, development and implementation of Nature-Based Solutions are described below. The European Commission is actively engaged in investing in Nature-Based Solutions, and using them as a driver for a wide deployment of ecosystem-based approaches in Europe and worldwide (EC, 2016a, 2016b).

2. Nature-Based Solutions in the global policy context

Science-based organisations such as The Nature Conservancy and the International Union for Conservation of Nature, have been active in integrating Nature-Based Solutions into policy debates (IUCN, 2012). As part of its Strategic Framework for Climate Change and Development, the World Bank has helped secure investment of ca. \$6 billion between 1988 and 2008 in climate change mitigation and adaptation projects that fully or partially support Nature-Based Solutions for enhanced conservation and sustainable use of natural capital (World Bank, 2008).

The EU has played a leading role in the negotiations of three global agreements: the Paris Agreement (2015), the New Urban Agenda (2016) and the Sendai Framework for Disaster Risk Reduction (Estrella et al., 2016). They all underline the role of Research and Innovation for their implementation. The Paris Agreement notes the importance of ensuring the integrity of all ecosystems in its preamble and the agreement underpins the role of adaptation in protecting livelihoods and ecosystems (Article 7). The New Urban Agenda makes specific reference to nature-based innovation for urban and territorial planning (Article 157). Nature-Based Solutions and other ecosystem-based approaches have also been promoted in decisions of the UN Convention on Biological Diversity relating to restoration of biodiversity, climate change and mainstreaming biodiversity (CBD, 2016). The role of strategic urban planning involving Nature-Based Solutions, such as green buildings is also highlighted in bilateral cooperation (EU-China Partnership on Urbanisation; EC, 2012). The recommendations from

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