



## TOWARDS SUSTAINABLE NATURE-BASED SOLUTIONS: RESEARCH TO ENHANCE THE SYSTEMIC TRANSITION

As an EU-funded project, OpenNESS has focussed on nature-based solutions with a European dimension. In Europe 'nature-based solutions' are looked at in various ways:

- European Commission DG Research and Innovation (R&I) on nature-based solutions (2015): Nature-based solutions to societal challenges are defined as solutions that are inspired or supported by nature, which are cost-effective, simultaneously provide environmental, social and economic benefits and help to build resilience. They bring more nature and natural features and processes into cities, landscapes and seascapes, through locally adapted, resource-efficient and systemic interventions.
- The Advisory Group Report for Horizon 2020 Societal Challenge 5 (EC 2014): nature-based solutions are those which are inspired by, use, copying from, or are assisted by nature.
- Horizon 2020 e-consultation quote: "a nature-based solution is the application of knowledge about the features and processes of nature for future actions that are resilient, resource efficient and attuned to local conditions and needs. Industrial challenges and environmental problems caused by human activities can be resolved by looking to nature for design and process knowledge."
- The EU BiodivERsA network: nature-based solution thinking broadens the way we conserve and use biodiversity in a sustainable manner. The three types are:
  1. using existing ecosystems by minimising the intervention on the systems themselves;
  2. modifying existing ecosystems to better deliver selected ecosystem services; and
  3. creating new ecosystems (e.g. through ecological engineering, green roofs, etc.).

OpenNESS is funded by FP7 which strives to contribute to four societal challenges: Human well-being, sustainable ecosystem management, governance and competitiveness. They all have links to nature-based solutions.

### HUMAN WELL-BEING

Nature-based solutions related to economic, social and environmental risks and so help to enhance human well-being, through ecosystem-based strategies for risk reduction, climate change adaptation, and 'one health' approaches to disease outbreaks.

### SUSTAINABLE ECOSYSTEM MANAGEMENT

Nature-based solution concepts often include discussion of stakeholder knowledge and engagement, and the use and management of ecosystems to ensure essential ecosystem services are preserved and enhanced.

### GOVERNANCE

Governance is a key area for promoting nature-based solutions. Engagement with stakeholders and users of ecosystem services are important considerations for managing and implementing nature-based solutions.

### COMPETITIVENESS

Nature-based solutions are relevant to issues in industrial / business competitiveness and innovation (e.g. biomimicry), as well as to wider social and environmental competitiveness.

## In OpenNESS, **nature-based solutions** are used as an overarching term for OpenNESS place-based explorations highlight how

### What are the nature-based solutions in OpenNESS urban place-based applications?

In **VITORIA-GASTEIZ, SPAIN**, OpenNESS is demonstrating the benefits of incorporating a system of green spaces in the urban planning as 'green infrastructure' that can supply ecosystem goods and services as part of sustainable urban management.

**Nature-based solution:** Nature-based increase of city 'livability' and sustainable mobility will be gained by creating new ecosystems through ecological engineering and green roofs.

In **TRNAVA, SLOVAKIA**, OpenNESS works in a study area that consists of the city and its buffer area. The work assesses the current state of the natural capital and ecosystem services framework implementation in Slovakia, and proposes methods for landscape and spatial planning at the local and regional level in urban and peri-urban areas.

**Nature-based solution:** Nature-based education, consisting of productive and educational farming plots in vacant areas of the city fields, meadows, pastures, orchards.

In **OSLO, NORWAY**, OpenNESS is developing a way of measuring the contribution of blue-green-infrastructure (called the blue-green area factor): different green and blue 'structures' are scored based on their importance, and new developments are required to achieve a minimum total score, while giving the developer flexibility of design.

**Nature-based solution:** Nature-based solutions are designed primarily to address climate change adaptation and can be designed to better provide added benefits for urban recreation and pollinator biodiversity.

In **SIBBESBORG, SOUTHERN FINLAND**, OpenNESS is investigating how to benefit from ecosystem services in social and economic terms. A special focus is on green infrastructure and the development of new tools to manage open green space as part of the urban realm. Distinct themes of the Sibbesborg Plan approved by the Municipality are local food production and green care; the latter refers to social, health and educational services relying on natural and agricultural environments.

**Nature-based solution:** Nature-based business and health care: e.g. bio-farms, green care, eco-therapy, animal therapy.

In the metropolitan region of **BARCELONA, SPAIN**, OpenNESS is integrating the ecosystem services approach into the landscape and urban planning processes.

**Nature-based solution:** Nature-based community building, based on the potential of urban gardens and parks to connect people, communities, and nature, to avoid growing isolation, disconnection of urban citizens from nature and a resulting loss of ecological knowledge.



Photo: Green infrastructure planning of the Avenida Gasteiz in Vitoria-Gasteiz, Spain



Photo: View on Oslo from the Holmenkollen



applications based on ecosystem services, natural capital and 'lessons from nature' nature-based solutions are applied to various situations.

The rationale is that human societies are on a trajectory where the planetary supply of natural resources and services ultimately cannot meet demand. Thus the overall challenge is to bring and maintain the human demand for resources and services within the global and, in some cases, regional supply constraints. Nature, itself, is resource efficient and can inspire or support innovation that contributes to meeting this global challenge.

Advisory Group for Horizon 2020 Societal Challenge 5: Climate Action, Environment, Resource Efficiency and Raw Materials, 2014

Operationally one can explore the scope of a 'nature-based solution' by unpacking the different elements in the concept, namely:

- **Nature** – as it relates to biodiversity at large, i.e. individual elements of biodiversity (gene pools, species, habitats, ecosystems), the functions that maintain them, and/or ecosystem services.
- **Nature-based** – as it refers to ecosystem management, including sustainable use and harvest, ecological restoration, biodiversity conservation and bio-engineering.
- **Solutions** – as it refers to interventions directed to a specific societal problem or issue that lead to beneficial outcomes.

Inclusion of the idea of a 'solution' in the concept explicitly recognizes that people agree that there must be **a problem that needs to be solved**.

## OpenNESS is also looking at place-based applications in the wider countryside that provide nature-based solutions to urban problems

In **GORLA MAGGIORE, NORTHERN ITALY**, OpenNESS is exploring the benefits of multi-purpose wetland construction and landscape restoration in a peri-urban area.

**Nature-based solution:** Nature-based green infrastructure, consisting of a set of constructed wetlands designed to treat water and prevent floods but also providing additional benefits such as recreation, education and wildlife.

OpenNESS is investigating opportunities for the operationalization of ecosystem services involving bioenergy production and mandatory preservation of areas of native vegetation in interior **SÃO PAULO, BRAZIL**.

**Nature-based solution:** In Rio Claro, nature-based solutions are based on the generation of ecosystem services in rural areas for beneficiaries in cities; the services provided include water resources and biodiversity conservation, carbon storage and soil protection.

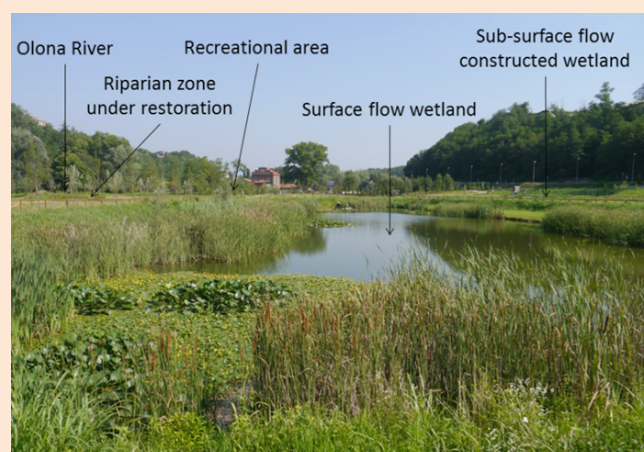


Photo: Case study site in Gorla Maggiore

## OpenNESS looks for answers to key questions of nature-based solutions

Nature-based solutions must not compromise or negatively affect biodiversity and its protection. This should be a boundary condition to avoid mere exploitation of nature to solve human problems. OpenNESS approaches the concept through various activities:

### Key challenges and conceptual frameworks:

OpenNESS is showing how the application of the concept might be unpacked in relation to the suite of 'solutions' that are possible responses to the four societal challenges: Human well-being, sustainable ecosystem management, governance and competitiveness.

### Regulatory frameworks and drivers of change:

OpenNESS is exploring whether nature-based solutions could be codified in the EU to enhance sustainability and improve outcomes in for example, sustainable development, climate change mitigation and adaptation.

### Biophysical control of ecosystem services:

OpenNESS is developing adaptation and mitigation scenarios, that will help in understanding and mapping the biophysical factors that control ecosystem services, and which are therefore vital in the development of sound nature-based solutions.

### Valuation of the demand for ecosystem services:

Nature-based solutions have been promoted as a means of addressing conflicts and trade-offs associated with use and management of ecosystem services – OpenNESS is exploring how this can be incorporated into practical methodologies for monetary or non-monetary valuation.



Oppla will support nature-based solutions:

[www.oppla.eu](http://www.oppla.eu)

## Advice and practical tools to solutions

- The OpenNESS reference book is available in the library on the website ([www.openness-project.eu](http://www.openness-project.eu)) and provides a suite of synthesis papers of topical issues relevant to nature-based solutions.
- The Menu of Multi-Scale Solutions being developed by OpenNESS will synthesise knowledge about tools that can be used to develop nature-based solutions, and show how they link to policy.
- The Oppla platform will provide access to the methods and tools that have been tested through the case studies and exemplars being worked on jointly with the OPERAs project.

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### FOR MORE INFORMATION

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OpenNESS is funded by the European Union's Seventh Programme for research, technological development and demonstration under grant agreement No 308428.

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