GLOSSARY: NATURE-BASED SOLUTIONS

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KNOWING THE NATURE-BASED SOLUTION

The Pact of Amsterdam, signed in June 2016, established the European Union Urban Agenda which, in turn, set 12 areas of interventions to be pursued by as many partnerships.

The Municipality of Bologna, together with the Polish Minister for the Economic Development, have been chosen to coordinate the activities of the working group on sustainable land use and nature-based solutions.

One of the mail goal of the partnership is to provide clarification and simplification of current language used around Nature-Based solutions topic. Indeed, the language effect brings some obstacles, as the NBS concept is not yet understood and applied universally and in relation with close terms – green infrastructure, greenways, ecosystem services, is not always clear. To some extent, this leads to civil society having limited engagement in NBS initiatives and the knowledge of the positive effects they bring is not widely available. Furthermore, the general public, in some instances, might also demonstrate low appreciation and acceptance of the measures adopted for sustainable urban development (i.e. a green space converted into a pond for water retention, rather than parking) whether their benefits are not properly mentioned and communicated. For this reason, the Foundation for Urban Innovation, the University of Bologna and the Municipality of Bologna, wrote a Glossary that represents an easy to consult instrument focused on NBS and their implementation on urban scale.

This glossary aims at:

• Simplifying the language and provide recommendations to the different stakeholders by standardising the vocabulary in close dialogue with the community of NBS projects and DG RTD. Terms and definitions connected to NBS will be analysed, simplified if needed, and explained with the final objective to define a set of terms to be used by both institutions and citizens. In fact, the key for spreading a concept is to better define it and make it simple and useful for everybody, eventually using best practices as examples.

• Engaging the scientific and practitioners community in this process working together with communication experts and high-skilled professionals to standardize the vocabulary on the topic. The process will be organized in working groups for a set period of time (i.e. 6 months) and the final output will be the creation of a booklet which clearly communicates the theory and meaning behind NBS, with specific examples.

ADAPTATION TO CLIMATE CHANGE

Climate change adaptation can include in a series of actions, methodologies, tools and theories that provide concrete response to global warming. Climate adaptation seeks to reduce the vulnerability of social, ecological and biological systems to the consequences of climate change. Adaptation to climate change include various methods, actions and measures going from communication and information campaign, technological innovations and nature-based innovations. Indeed, if we focus on cities' adaptation to climate change, nature based innovations and solutions, such as green roof and walls, urban parks and forests, green corridors, can contribute to cool down the temperature and the heat-island effect in our cities, decrease water run-off and consequently flood risk.

AWARENESS RAISING

Awareness is the state of knowing something, such as the awareness that the sun comes up every morning.
Increase knowledge throughout different categories of stakeholders and the civil society is crucial to see and achieve long-lasting and integrated changes.

BIODIVERSITY

Biodiversity refers to the variety and diversity of biological species and ecosystem in the Earth. Biodiversity refers to diversity of species both in flora and fauna and it can be used as an indicator of wellness of a particular ecosystem. It is affected by geomorphological, climatic, chemical and anthropic influences and can drastically change due to external stress and disturbances such as introduction of new species, climate change and anthropic intervention. Changes in biodiversity can strongly affect the whole ecosystem functioning.

CULTURAL ECOSYSTEM SERVICES

Cultural Ecosystem Services are defined as 'nonmaterial benefits people obtain from ecosystems through spiritual enrichment, cognitive development, reflection, recreation, and aesthetic experiences' (MEA, 2005:39). Within cities and urban areas natural ecosystems are mostly represented by urban parks and forests, rivers, lakes, urban farming spots, green corridors and private gardens. Benefits that people gain from using green spaces for very different activities (running, walking, enjoy the sunlight, reading, socializing, etc.) are the so-called cultural ecosystem services. Research has linked CES to improved physical health outcomes and psychological well being (Clark et al., 2014).

ECOSYSTEM

Dynamic complex of plant, animal and microorganism communities and their nonliving environment interacting as a functional unit[1].
Ecosystems are often grouped in units that have similar specific biotic and abiotic features.

ECOSYSTEM PROTECTION

Natural Ecosystems are increasingly vulnerable due to population growth, urbanization, commercial and industrial development, and climate change. These natural ecosystem needs to be carefully protected and conserved. To do so several strategies have been put in place such as limited access, limited activities to be performed, protection of vulnerable species, etc.

ECOSYSTEM RESTORATION

Ecological restoration is the process of assisting the recovery of an ecosystem that has been degraded, damaged, or destroyed (SER Primer, 2004)[2].
Ecosystem can degrade because of pollution, climate change or human intervention. Ecological restoration process can make use of different instrument, tools and methods going from technological innovations to nature-based solutions and innovations.

ECOSYSTEM SERVICES

As in the definition of the Millennium Ecosystem Assessment (MA)[3], ecosystem services are “the benefits people obtain from ecosystems”. These include supporting services such as nutrient cycling; provisioning services such as supply of food and water; regulating services such as flood regulation and disease control; cultural services such as spiritual, recreational, cultural and aesthetic benefits. The most relevant categories in urban spaces are: Cultural Ecosystem Services (CES) and Regulatory Services.
Regulatory services include all those benefits provided by urban green spaces related to micro-climate regulation, air pollution reduction, water runoff control and pollination.

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1. *SWD/2013/0155 final*
2. *Society for Ecological Restoration definition*
3. *www.millenniumassessment.org*

ECOLOGICAL VALUE

Non-monetary assessment of ecosystem integrity, health, or resilience, all of which are important indicators to determine critical thresholds and minimum requirements for ecosystem service provision.

ECOLOGICAL NETWORKS

Biotic interactions in an ecosystem in which species (nodes) are connected by pairwise interactions. They include areas covered by a wide range of conservation measures, from a single ecoduct (wildlife crossing bridge) to intercontinental connected networks of protected and non-protected areas. Each Green Infrastructure element should play a role in the ecological network.

GREEN INFRASTRUCTURE

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LAND USE

The term land use deals with the spatial aspects of all human activities on the land and with the way in which the land surface is adapted, or could be adapted, to serve human needs (Goodall, B., Dictionary of Human Geography, Penguin Books, London, 1987)

MITIGATION TO CLIMATE CHANGE

Climate change mitigation actions and measures aims at reducing, limiting or stopping the magnitude of emission of global warming responsible components or at removing those from the atmosphere. Climate change mitigation generally involves reductions in emissions of greenhouse gases (GHGs) such as CO2, CH4, NO2, O3. Mitigation actions can involve a wide range of actions in very different sectors from mobility and transport, industrial productions and nature-based solutions.

NATURA2000

It's the main political tool designed by the EU to protect biodiversity within its member states. Natura 2000 sites have been designated specifically to protect core areas for a subset of species or habitat types listed in the Habitats and Birds Directives. Stretching over 18% of the EU's land area and almost 9,5% % of its marine territory, it is the largest coordinated network of protected areas in the world. It offers a haven to Europe's most valuable and threatened species and habitats. Natura 2000 is a network of core breeding and resting sites for rare and threatened species, and some rare natural habitat types which are protected in their own right.
It stretches across all 28 EU countries, both on land and at sea.
The aim of the network is to ensure the long-term survival of Europe's most valuable and threatened species and habitats, listed under both the Birds Directive and the Habitats Directive[4].

NATURAL CAPITAL

Natural capital is the stock of living and nonliving parts of the natural system that directly and indirectly yield benefits to humans (M. Wackernagel, W.E. ReesPerceptual and structural barriers to investing in natural capital: economics from an ecological footprint perspective Ecol. Econ., 20 (1997), pp. 3-24).

NATURE-BASED SOLUTIONS

Solutions that are inspired and supported by nature (ecosystem-based) which are cost effective, simultaneously provide environmental social and economic benefit and help to build resilience (EC Commission, 2015). Nature based solutions respond to societal challenges of cities, provide ecosystem services and should be tailored to the specific issues of the cities. Nature-based solutions going from small work (green walls and roof, green shelters, etc.) to ecosystem-based solution (urban parks and forests, artificial lakes, river restoration, etc.)

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[4]. *http://ec.europa.eu/environment/nature/natura2000/index_en.htm*

PARTICIPATORY PROCESS

A participatory approach is an approach in which everyone who has an interest in the intervention has a voice, either in person or by representation, and the right to contribute to a decision-making process. In this sense, a participatory approach does not include simple communication where stakeholders receive an information or provide information and knowledge to well-defined questions, but directly involved different parties in the discussion regarding the topic at stake. In EU cities participatory planning it is increasingly common, where citizens and relevant territorial organizations are asked to contribute to the definition. This participatory approach allows to include several voices, opinions and points of view in the cities' transformation, making them more acceptable, shared and valuable.

RENATURING CITIES

The underlying idea of this concept is to bring back nature into the cities. Indeed as from the beginning of the 20th century, nature has been pushed out from our cities, leaving space to grey infrastructures, concrete buildings and architecture. To reverse these trends, it is necessary not only to put back greenspace and nature in urban areas but to put back biodiverse and functioning ecosystems (Hostetler et al., 2011).
Such ecosystems are represented by urban forests and parks, green roofs and walls and private green.

REWILDING CITIES

Rewilding is a progressive approach to conservation. It's about letting nature take care of itself, enabling natural processes to shape land and sea, repair damaged ecosystems and restore degraded landscapes. Through rewilding, wildlife's natural rhythms create wilder, more biodiverse habitats[5].

[5]. *https://rewildingeurope.com*

URBAN BIODIVERSITY

When thinking about biodiversity we often refer to natural and protected areas, but our cities can also be rich spot of biodiversity. Indeed, cities host a wide range of animal and vegetal species in their parks, public and private gardens and balcony. Even our own places and offices can become rich biodiversity spot. Boosting biodiversity in our cities is crucial to keep alive the ecosystem services the vegetation provides. In enhancing and conserving biodiversity, it is then crucial to carefully plan our urban biodiversity spots, thinking about future climate adaptation of species, boosting native species and taking control and appropriate measures to manage possible invasive and potentially harmful species.

URBAN ECOSYSTEMS

Urban ecosystems can be defined as those areas where the built infrastructure covers a large proportion of the land surface, or as those in which people live at high densities (Pickett et al. 2001). In the context of urban planning, urban ecosystems are often portrayed as embedding both the built infrastructure and the ecological infrastructure (Gómez-Baggethun et al., 2013). It includes all 'green and blue spaces' that may be found in urban and peri-urban areas, including parks, cemeteries, gardens and yards, urban allotments, urban forests, single trees, green roofs, wetlands, streams, rivers, lakes, and ponds (EEA 2011). Defining clear boundaries for urban ecosystems can be difficult depending on the differences between administrative and natural and ecological borders. In this context, urban ecosystem will be considered as all those ecosystems that can provide benefit and services directly related with urban areas.

URBAN HEAT ISLAND

The heat island effect has become increasingly common in the last years in EU cities and the terms is now spread into common and journal language. With 'Urban Heat Island' we refer to the significantly increase in the temperature within the city in respect with the surrounding rural or peri-urban areas. In the warmest day of summer, the minimum temperature could be up to 2° higher in the city centre than in the surrounding.
There are several causes of an urban heat island for example dark surfaces of the building, limited ventilation due to buildings position, materials used for streets and roof, lack of evapotranspiration from vegetation.
Pollution can also exacerbate the UHI.

URBAN PLANNING

Urban, city or town planning is the planning discipline dealing with the physical, social, economic and environmental development of metropolitan regions, municipalities and neighbourhoods. The expression of urban planning consists in elaborating land-use and building plans as well as local building and environmental regulations (European Conference of Ministers responsible for Spatial/Regional Planning (CEMAT), 2007. Spatial development glossary Territory and landscape, No. 2, Council of Europe Publishing).

URBAN RESILIENCE

The concept of resilience is nothing new in disciplines such as ecology and psychology, and can be defined as the 'capacity of a system to absorb disturbance and reorganize while undergoing change so as to still retain essentially the same function, structure, identity, and feedbacks' (Walker, B. et al., 2004). Following the same approach, urban resilience can be considered as 'the capacity of urban systems, communities, individuals, organizations and businesses to recover maintaining their function and thrive in the aftermath of a shock or a stress, regardless its impact, frequency and magnitude'. Creating more resilient cities will thus largely contribute to cope with climate change related hazards and risks. Moreover, urban resilience helps searching for systemic solutions to vulnerabilities and risks. Understanding and planning urban resilience requires the involvement and the engagement of a broad categories of stakeholders to ensure the maintenance of connectivity, diversity and redundancy within urban areas.

URBAN SPRAWL

Urban sprawl is the unplanned, uncontrolled spreading of urban development into areas adjoining the edge of a city. The term is also used to designate the expansive, rapid and sometimes reckless growth of a greater metropolitan area over a large area. Urban sprawl is characterised by several land-use patterns such as single-use zoning (commercial, residential, industrial), car-depending communities, low-density land-use but larger scale of development than older established areas (wider roads, larger stores with expansive parking lots) and lack of diversity in design, sometimes creating a sense of uniform urban environment (European Conference of Ministers responsible for Spatial/Regional Planning, CEMAT, 2007. Spatial development glossary Territory and landscape, No. 2, Council of Europe Publishing).

VULNERABILITY

Vulnerability is the degree to which a system is susceptible to and unable to cope with the adverse effects of injury, damage or harm. This term normally refers to climate change effects. In this sense, urban vulnerability depends on the character, magnitude, and rate of climate change events and, on the other hand, on the city's sensitivity and adaptive capacity to them (EEA 2017 - Glossary for urban green infrastructure).

WATER CYCLE

The water cycle shows the continuous movement of water within the Earth and atmosphere. It is a complex system that includes many different processes. Liquid water evaporates into water vapor, condenses to form clouds, and precipitates back to Earth in the form of rain and snow.
Water in different phases moves through the atmosphere (transportation). Liquid water flows across land (runoff), into the ground (infiltration and percolation), and through the ground (groundwater).
Groundwater moves into plants (plant uptake) and evaporates from plants into the atmosphere (transpiration). Solid ice and snow can turn directly into gas (sublimation). The opposite can also take place when water vapor becomes solid (deposition).

CREDITS

The Glossary "Nature-Based Solutions" has been realised by the Foundation for Urban Innovation, the City of Bologna and the Alma Mater Studiorum – University of Bologna, Dept. of Architecture, with the support of the European Commission.