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Glossary

Acronym	Full name
API	Application Programming Interface
CICES	Common International Classification for Ecosystem Services
LCC	Life Cycle Costing
DSS	Decision Support Systems
ES	Ecosystem Service(s)
GUI	Graphical User Interface
MAES	Mapping and Assessment of Ecosystems and their Services
MIMES	Multiscale Integrated Modelling of Ecosystem Services
NBS	Nature-based Solutions
PPP	Purchasing Power Parity
SDM	System Dynamics Model
TEEB	The Economics of Ecosystems and Biodiversity
UC	Urban Challenge
UES	Urban Ecosystem Service(s)
USC	Urban Sub-Challenge
UN	United Nations
WP	Work Package

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Executive Summary

The concept of ecosystem services (ES), i.e. the benefits that people obtain from nature, is gaining relevance for planning, design and decision making in urban contexts. This relevance have been particularly pushed forward by policy makers, built environment professionals, and researchers with the application into urban studies of nature-based solutions (NBS). The study of ES helps indeed to internalize natural benefits, usually considered an externality, into the decision-making process.

As part of the efforts to operationalize the ES concept, its implementation in real practice and decision-making, many ES assessment methods, models and tools have been developed so far. However, in many cases these instruments are framed in a local manner, are not cost-effective, and/or provide qualitative outputs only, making more difficult the operationalization of ES. Consequently, generalizable methods, transferable to a broad range of settings, have started to be developed in the form of modelling tools that act as decision support systems (DSS). These can allow decision-makers assessing specific ES supply as well as trade-offs and synergies among ES in a quantitative form, and using monetary assessment techniques.

In this regard, NBS by definition need to be cost-effective. In urban contexts, NBS are part of complex urban interventions that require the collaboration of several built environment professionals like architects, landscape architects, urban designers, environmental engineers or urban planners. To optimise the work of these professionals, DSS for NBS need to be integrated early in their workflows with a minimum additional effort from their side. Hence, to advance the operationalisation of ES and NBS in urban contexts, user-friendly DSS shall be designed, built, and operated for NBS to support built environment professionals from early project stages and costs-benefits analyses.

The present report illustrates the structure and functionalities of “MIMES-LIST”, a DSS tool developed within the framework of Task 4.4’s activities in the Nature4Cities project. The aim of Task 4.4 was to build a visualization web interface where the end-user (decision-maker, urban planner, etc.) is asked to create spatial and time-dependent scenarios of possible implementation of NBS in cities, and then run simulations to quantify the potential socio-economic impacts associated with those scenarios (in terms of site-specific biophysical and climatic conditions and land management characteristics), using archetypal NBS (i.e. pre-parameterized models of NBS types, e.g. urban forests, green walls/roofs, urban wetlands, …). In so doing, the purpose of MIMES-LIST is to inform built environment professionals and decision makers about the cost-effectiveness of different NBS alternatives from early to advance planning and design stages.

Despite developed independently as a stand-alone visualisation instrument, MIMES-LIST will be incorporated in the Nature4Cities Platform as the operational module to allow performing socio-economic assessments in compliance with the user-scenarios and archetypes defined in the platform. Deliverable D4.4 thus includes a technical description of the approach undertaken to create the DSS tool and an explanation on how to pre-calculate the archetypes and scenarios

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(archetypes database) to run the software, together with an illustration of the posterior use of the DSS for a case study of a real urban forest by built environment professionals.

While “MIMES-LIST” was the initial name given to the tool when designing its integration in the Nature4Cities Platform, the LIST team has officially renamed the DSS “NBenefit$”, which stands for “Web-based (geo)tool for monetary and biophysical valuation of ecosystem services supplied by nature-based solutions”. NBenefit$ is therefore a novel web-based prototypal DSS to enable predictive simulations and visualisation of socio-economic impacts associated with NBS. The tool implements an original modelling approach (based on a multiscale spatially-explicit and integrated system dynamics framework) for the assessment of ES associated with NBS in cities. It allows selecting urban challenges and/or urban ES, filtering NBS alternatives and visualizing impacts (costs and benefits in terms of physical and monetary ecosystem service values at different spatial and temporal conditions).

More specifically, NBenefit$ employs pre-calculated archetypes and scenarios making use of a system dynamics modelling framework of NBS developed in the Tasks 4.1 and 4.2 of Nature4Cities. As anticipated above, the methodological approach underpinning the DSS is illustrated in this report making use of a specific NBS model of urban forest (as a proof-of-concept) previously introduced in the deliverable D4.2. This model calculates ES supplied by urban NBS in biophysical units later transformed into monetary units, which can be used as inputs in costs-benefits analyses. Additional costs and externalities along the life cycle of NBS are also accounted for and incorporated as inputs of the costs-benefits analysis. To overcome current data limitations the model balances data requirements against accuracy of outputs. The Nature4Cities team developing the socio-economic assessment module expects that this, together with the user-friendly interface underpinning NBenefit$, will encourage built environment professionals to integrate NBS evaluation in their early workflows and demonstrate to decision makers the utility of detailed urban monitoring based on ES analysis.

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