	Guidance Document on Monitoring and Evaluation – ERDF and Cohesion Fund, Concepts and Recommendations, Programming Period 2014-2020, European Commission, April 2013. Annex1

23.6 Recreational monetary value

Project Name: Nature4Cities (Grant Agreement no. 730468)

Author/s and affiliations: Javier Babí Almenar[1], Claudio Petucco[1], Benedetto Rugani[1]

[1] RDI Unit on Environmental Sustainability Assessment and Circularity / Environmental Research & Innovation (ERIN) department / Luxembourg Institute of Science and Technology (LIST) – 41 Rue du Brill, L-4422 Belvaux, Luxembourg

Recreational monetary value	New Economic Opportunities and Green Jobs
Description and justification	This is an estimation of the economic value of recreation inside urban NBS interventions. For many nature-based interventions in urban areas recreation is a main function. Then, when doing monetary quantifications of costs and benefits it is important to include the monetary value of recreation. It can be used as part of cost-benefit analysis that consider positive and negative externalities and not only internalized benefits and costs.
Definition	The indicator recreational monetary value estimates the monetary value of recreation in urban NBS interventions based on key components (trees & shrubs, herbaceous plants, water, and size of the NBS), the density of people around the NBS intervention, and willingness to accept value (distance and euros) of recreation in NBS of an average person.
Strengths and weaknesses	Strength: This indicator will anticipate the monetary value that recreation in a public urban green space could have making use of a simple procedure. Additionally, the value can be calculated per year, taking into account changes in the NBS over time. Weakness: The procedure require to know two values: i) the monetary value of an average person visiting the NBS for recreation per year; and ii) the distance that an average person is willing to walk to visit an NBS based on key attributes. These values can be obtained from similar case studies making use of benefit transfer methods. However, the best option would be to calculate it locally, which it is time consuming. This indicator is specific for urban environments.

Measurement procedure and tool	Calculation method : 1st) The walking distance willing to accept for each key attribute of the NBS needs to be estimated making use of Discrete Choice Modelling. If this cannot be done, data from scientific literature can be used. We recommend the use of Ta et al., (2020), which has established the walking distances based on the presence of developed woodland, forest, water, and size of the NBS (green space). 2nd) The distance-attributes (i.e., forest/woodland, presence of water, size) of the NBS should be quantified. For the quantification of woodland and forest, the following aspects need to be considered (based on FAO, Copernicus Land Cover, and Forestry Commission criteria): - The minimum width of forest/woodland patch is 20 m. - The patch inside the NBS classified as forest or woodland has a minimum area of 10% covered by tree crowns. - If the NBS covers an area inferior of 5 ha at least 0.5 ha should be covered by continuous tree cover to quantify the presence of woodland or forest. - The average height of the trees in the forest/woodland patch should be 5 m. If there are only herbaceous plants and grassland covering at least a 10% of the area of the space and above 0.5 ha a minimum walking distance of 4 min (equivalent to 300 m) is considered. 3rd) A cumulative distance is obtained after the characterisation of the NBS based on distance-attributes. Then, based on that distance and the network of walkable streets, network analysis in a GIS software is run to calculate the service area. 4th) Based on existing population density data (for example from census database) we calculate the amount of people served by the NBS. If there is no access to local data, population density can be obtained from the polygons of the Urban Atlas of Copernicus Land initiative. 5th) The number of people obtained is multiplied by the monetary value of yearly recreation for an average person. This provides you the final value. In case, local information is not available we recommend the work of Bernath and Roschewitz (2008). Please, be aware that the use of value from literature require adjustments that at least consider the purchase parity power of the country and year for which the evaluation is applied. Note: In case you are able to calculate how trees are growing over time inside the NBS intervention, you can

	make the calculation of monetary value dynamic. This means you can see how much NBS recreational value is changing over time up to a maximum or a minimum walking distance (4 minutes is the minimum). This makes sense, since mature parks usually attract more people than new ones were vegetation is still not well developed.
Scale of measurement	☒ City ☒ Neighbourhood
Data source	Population estimates: https://land.copernicus.eu/local/urban-atlas/population-estimates-by-urban-atlas-polygon. - Willingness to accept (walking distance + monetary value per average person): local data or the one recommended in the procedure (Ta et al., 2020; Bernath and Roschewitz, 2008)
Required data	- Local Willingness to Accept values (walking distance and monetary) or values extracted from the literature. - Street Network around the NBS of interest - Population or population density data in a spatial explicit format. - Basic data regarding the attributes of the NBS analysed (should be available in documents such as its plan/design).
Data input type	- Spreadsheet with Willingness to Accept data - Shapefile (lines, and polygons) or similar such as CAD.
Data collection frequency	The data collection for the Willingness to Accept should be collected only one time. The rest of the data should be collected one time too, unless yearly monitoring of the evolution is intended. Then, Data regarding attributes of the NBS should be collected each year as weel as regading population density. For predictions of changes in value over time (no monitoring) values only need to be collected one time.
Level of expertise required	Easy-medium. It requires data and it requires at least basic knowledge of monetary valuation and GIS.
Synergies with other indicators	Accessibility of public green spaces at least 0.5 ha in size (Challenge Green Space Management) Recreational value of Green Spaces (Challenge Place Regeneration)
Connection with SDGs	3. Good health and well-being (if the calculation is used to assess alternatives, to ensure the design and implementation of the NBS attracts the maximum number people possible) 10. Reduced inequalities (if the calculation of the distance is used to ensure the whole city is covered by adequate nature-based recreation) 11. Sustainable Cities and Communities (if the calculation is used to compare alternatives and ensure nature-based recreation is adequate for all inhabitants of an urban area)

Opportunities for participatory data collection	Yes, it would be ideal if the Willingness to Accept for distance and monetary value is calculated specifically for the municipality where the indicator is going to be applied. In that case, voluntaries properly trained such university students can help with the application of the Willingness to Accept surveys.
Additional information	The procedure for calculating this indicator is being developed as part of the PhD Thesis of Javier Babí Almenar (to be submitted at the end of 2020). Reference: Babí Almenar, Javier. *2020 (Anticipated)*. Characterisation, biophysical modelling and monetary valuation of urban nature-based solutions as a support tool for urban planning and landscape design. PhD Thesis. University of Bordeaux and University of Trento.
References	Bernath, K. and Roschewitz, A. (2008) Recreational benefits of urban forests: Explaining visitors' willingness to pay in the context of the theory of planned behavior, *Journal of Environmental Management*, 89(3), 155–166. doi: 10.1590/S0001-37652012000100017. Ta, M., Tardieu, L., & Levrel, H. (2020). Specifying preference heterogeneity regarding natural attributes of urban green spaces to inform renaturation policies. In *CIRED Working Paper* (No. 2020-78).

23.7 Overall economic, social and health wellbeing

Project Name: CONNECTING Nature – Coproduction with nature for city transitioning, innovation and governance (Grant Agreement no. 730222)

Author/s and affiliations: Mary Lee Rhodes[1], Conor Dowling[1]

[1] *Trinity Business School, Trinity College, Dublin, Ireland*

Overall economic, social and health well-being	**New Economic Opportunities and Green Jobs**
Description and justification	This indicator provides information about the change in the general well-being of individuals in the community in proximity to the NBS. General measures of well-being will include economic components (incomes and or consumption) as well as social and health components. As a 'cross-cutting' indicator this will provide strong evidence of the impact of the NBS on key aspects of peoples' lives and will be easily linked to existing data collection activities throughout Europe and the world.
Definition	The change in the aggregate HDI (Human Development index) or Social Deprivation Index (SDI) for people living in the vicinity of the NBS.