Opportunities for participatory data collection	Such monitoring schemes offer great opportunities for citizen participation. This can be a mechanism to increase the scale and extent of the monitoring, and to increase community engagement with, and awareness of, urban biodiversity.
Additional information	
References	Alexander, K.N.A. 2004. Revision of the Index of Ecological Continuity as used for saproxylic beetles. English Nature Research Reports. 574. Drake C.M., Lott, D.A., Alexander, K.N.A. and Webb, J. (2007) Surveying Terrestrial and Freshwater Invertebrates for Conservation Evaluation. Natural England Research Report NERR005. Natural England, Sheffield: http://publications.naturalengland.org.uk/publication/36002 Fowles, A.P., Alexander, K.N.A. & Key, R.S. 1999. The Saproxylic Quality Index: evaluating wooded habitats for the conservation of dead-wood Coleoptera. The Coleopterist, 8: 121-141 Thomsen, PF and Willerslev, E (2015) Environmental DNA – An emerging tool in conservation for monitoring past and present biodiversity, Biological Conservation 183, 4-18.

10.17 Article17 species richness

Project Name: CONNECTING Nature (Grant Agreement no. 730222)

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Article 17 species richness	**Biodiversity**
Description and justification	Species richness is a crucial component of biodiversity and species density describes how many Art.17 species are encountered within a defined area (e.g., Functional Urban Area). This can be calculated using a count of species listed under Art. 17 per hexagonal grid cell.
Definition	Count of Art. 17 species per hexagonal grid cell, derived from modified Art. 17 dataset.
Strengths and weaknesses	+ uses a standardised EU-wide survey protocol so that data is comparable - data is only as precise as the survey methods employed and might not pick up changes related to smaller scale implementation of nature-based solutions in urban areas.

Measurement procedure and tool	The method follows that recommended in The European Urban Biodiversity Index (EUBI) and is specific to Article 17 species: The process involves several steps to obtain the Article 17 species count per hexagonal cell. At first a hexagonal grid with a unique identifier for each grid cell is created. This grid is merged with urban area polygons which have been assigned towards specific MAES habitats with a crosswalk using the GIS Tool “Union”. In a second step, the Article 17 GIS- data is clipped to the Formal Urban Area Boundary and also merged with the grid. Through this process the created datasets obtain a common identifier within the hexagonal grid, which is the basis for further processing steps. The data is imported into a database system (MS-SQL) for further processing and cleaning operation. Art. 17 hex-grid data are assigned towards specific MAES habitats using the species-habitat linkages database. The data are then joined using the common identifier assigned within the hexagonal grid as well as the MAES habitat. This allows the filtering out species which may cover a grid cell, but which are not assigned to a habitat within the cell and thus are unlikely to occur at that location. *Based on Ruf et al (2018)*
Scale of measurement	Functional Urban Area (city perimeter)
Data source	
Required data	Landcover, city perimeter and MAES species-habitats data
Data input type	Quantitative
Data collection frequency	Typically annual, but can be less frequent if resources are stretched.
Level of expertise required	Expertise is typically required either for interrogation of satellite imagery. This requirement can be reduced if low resolution land cover maps are used for calculations
Synergies with other indicators	Synergies with other greenspace mapping indicators and protected habitats and species indicators, particularly Article 17 listed habitats.
Connection with SDGs	SDGs 14, 15.

Opportunities for participatory data collection	Surveying habitats represents an excellent opportunity for widening participation. Alternatively, participatory GIS portals can be used to ground-truth satellite imagery.
Additional information	
References	Ruf, K., Gregor, M., Davis, M., Naumann, S. and McFarland, K., 2018. The European Urban Biodiversity Index (EUBI): a composite indicator for biodiversity in cities. ETC/BD report to the EEA. Urban Atlas (2012), Art. 17, WISE WFD reference spatial data sets Surface Water Body (2016), Linkages of species and habitat types to MAES ecosystems.

10.18 Number of native bird species within a defied urban area

Project Name: UNaLab (Grant Agreement no. 730052)

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Number of native bird species within an urban area	**Biodiversity**
Description and justification	Biodiversity is the measure of biological variety in the environment and it has an important role in functioning ecosystems services and health of environment and society. Biodiversity is an aspect of natural environment that is most directly affected by anthropogenic influence. City biodiversity is seen as an important aspect of sustainable and resilient urban development. Bird species numbers act as an indicator about changes in the diversity of the urban environment.
Definition	Number of different native species of birds within a defined urban area (number/ha)
Strengths and weaknesses	+ Birds are relatively easy to detect and monitor - While considered a universally good indicator of biodiversity change, the data can be difficult to obtain, it has high variability and requires long timescales to show significant trends
Measurement procedure and tool	Total native bird species detected in built areas are counted. The number of species acts as the indicator value.