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. Reporting under Art. 17 Habitats Directive – Database: https://www.eea.europa.eu/data-and-maps/data/article-17-database-habitats-directive-92-43-eec-1 Reporting under Art. 17 Habitats Directive – GIS Data: https://www.eea.europa.eu/data-and-maps/data/article-17-database-habitats-directive-92-43-eec-1#tab-gis-data Urban Atlas (2012), Art. 17, WISE WFD reference spatial data sets – Surface Water Body (2016), Linkages of species and habitat types to MAES ecosystems

10.8 Number of veteran trees per unit area

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

Author/s and affiliations: Stuart Connop

Sustainability Research Institute, University of East London, UK

Number of veteran trees per unit area	**Biodiversity**
Description and justification	In addition to the multifunctional benefits that are provided by trees, veteran trees play a crucial role in the conservation of biodiversity. An effective measure of conservation of veteran trees is the number of such trees within a unit area (e.g., Formal Urban Area).
Definition	Although not as old as ancient trees provide holes, cavities and crevices which are especially important for wildlife. In particular, trees with decay containing cavities are important habitats for many saproxylic invertebrate species. As such, targets and measures of number of veteran trees in a landscape can contribute the biodiversity conservation objectives and strategies. Whilst provision of nature-based solutions rarely created new veteran trees (due to long time-sales involved in veteran tree development), nature-based solutions can

	protect veteran trees, deliver veteranisation of young trees, or cause the loss of veteran trees. As such, this represents a valuable biodiversity indicator.
Strengths and weaknesses	The strength of evidence relates to the direct count methodology which retains an absolute total of veteran trees. It does not, however, include an assessment of the value of individual trees in terms of presence/absence of habitat features associated with the highest biodiversity value veteran trees, nor any assessment of the quality of biodiversity assemblages supported by the veteran trees. This can also be a resource intensive survey process for large target areas, unless veteran tree mapping has already been carried out and merely need to be updated based on presence/absence, which can be done using remote sensing methodologies.
Measurement procedure and tool	Standard veteran tree identification and mapping protocols have been developed. An example of this from the UK was developed by Treeworks (1996). This protocol supports the identification, characterisation and mapping of veteran tree networks. The protocol is based on field survey and subsequent mapping.
Scale of measurement	Site, region, or city-wide (e.g., Functional Urban Area)
Data source	
Required data	Background maps (e.g., Ordnance Survey Maps) and ground-truthed GPS point source data to represent each individual veteran tree
Data input type	Quantitative and spatial
Data collection frequency	Once a baseline spatial dataset of canopy cover has been established, it may be possible to update the regularly using satellite imagery. This is particularly to case for individual trees in urban/pasture settings. Veteran trees as part of woodland canopies would require ground truthing surveys which, due to their resource intensity, are generally carried out less frequently. Under such a scenario surveys should be repeated at 5 yearly intervals or less.
Level of expertise required	Expertise is typically required either for veteran tree identification and mapping. However, surveying methods can be adapted to surveyor expertise. GIS expertise is required for creation of maps and any subsequent remote sensing evaluation.
Synergies with other indicators	Synergies with other greenspace mapping indicators and protected habitats and species indicators, particularly Article 17 listed species.

Connection with SDGs	SDG 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	Treeworks (1996) Veteran Trees Initiative Specialist Survey Method. Report produced by English Nature. Available from: http://www.treeworks.co.uk/downloads/SSM_HandBook.pdf

10.9 Quantity of dead wood per unit area

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

Author/s and affiliations: Stuart Connop

Sustainability Research Institute, University of East London, UK

Quantity of dead wood per unit area	**Biodiversity**
Description and justification	Deadwood plays a key role in within ecosystems. Evaluating the quantity of deadwood associated with nature-based solution delivery can represent a proxy for quantification of biodiversity value. It can also be used to establish a baseline to ensure that deadwood provision is considered in future land management change decisions.
Definition	Deadwood encompasses all non-living woody biomass not contained in litter, either standing, lying on the ground, or in the soil (FAO, 2004). Deadwood provision is a key consideration in biodiversity conservation due to its value in terms of providing microhabitats for other species, providing a structural/functional role in stabilizing steep slopes and stream channels, and contributing to carbon, nitrogen and phosphorus cycles (Paletto et al 2012).
Strengths and weaknesses	If quantity is defined as presence/absence, this can be a relatively straightforward survey process (as long as a categorisation of 'deadwood' can be agreed upon). Such a method, however, misses critical data on deadwood volume and condition. If a more detailed quantification is desirable, defining and identifying deadwood can be more challenging as a standardised method has not been agreed upon in scientific literature. Moreover, the indicator represents a measure of habitat quality rather than biodiversity value as it does not include an assessment of organisms associated with deadwood (e.g., the many scarce and