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8.40 Soil sealing

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

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Soil sealing (Applied and EO/RS combined)	**Green Space Management**
Description and justification	Impermeable ground and modified ecosystems transform natural soil and alter important environmental processes (e.g., water cycle, energy balance, etc.). Mapping impermeable surfaces provides an indicator of urban development, e.g., densification/urban sprawl, and can aid assessments of drainage, urban heat island, biodiversity and health and wellbeing. Data on soil sealing collected in these ways can be used to: • Set targets for soil unsealing; • Monitor changes in relation to loss of permeable surfaces; • Linking to other indicators such as land use change and stormwater management;

	• Support initiatives to improve soil health and promote groundwater recharge.
Definition	De-sealing, reusing sealed sites to reduce land take/soil sealing (with impermeable surfaces), and use of permeable materials and surfaces, e.g., green roofs.
Strengths and weaknesses	**Applied methods:** Not typically a method for generating solid evidence. Tends to be more of a focus on generating an index to help quantify change. **Earth observation / Remote sensing methods:** If appropriate pixel and/or sub-pixel classification is carried out, a high level of evidence can be generated. Error factors can also be calculated based on sample areas.
Measurement procedure and tool	A variety of methods exist from applied/public participation techniques through to earth observation/remote sensing approaches. For further details on measurement tools and metrics, including those adopted by past and current EU research and innovation projects can be found in: Connecting Nature Indicator Metrics Reviews Env81_Applied and Env81_RS
Scale of measurement	**Applied methods:** City-scale typically, but may be possible to use the data to monitor local-level changes in greenspace if combined with high-resolution remote sensing imagery methods. **Earth observation / Remote sensing methods:** Analysis possible at various geographical scales.
Data source	
Required data	Required data will depend on selected methods, for further details see applied and earth observation/remote sensing metrics reviews in: Connecting Nature Indicator Metrics Reviews Env81_Applied and Env81_RS
Data input type	Data input types will depend on selected methods, for further details see applied or earth observation/remote sensing metrics reviews in: Connecting Nature Indicator Metrics Reviews Env81_Applied and Env81_RS
Data collection frequency	Data collection frequency will depend on selected methods, for further details see applied or earth observation/remote sensing metrics reviews in: Connecting Nature Indicator Metrics Reviews Env81_Applied and Env81_RS
Level of expertise required	**Applied methods**: Data is generally added to background digital maps, so some expertise in mapping/GIS is needed. **Earth observation / Remote sensing methods**: There are many kinds of remote sensing data available, but to find out the best fitting ones needs expert knowledge. Expertise in

	mapping and interrogation of data using GIS software is typically required. Level of expertise required is greater with increasing complexity of software processing. Given the large number of remote sensing data available, it is difficult to select the appropriate one because each satellite has different revisit times, ordering requirements, delivery schedules, pixel resolutions, sensors, and costs.
Synergies with other indicators	There are synergies with other indicators related to mapping urban form. The data can be used as an index for other environmental (i.e., UHI, flooding) and health/wellbeing indicators that require blue-green space mapping as the foundation for analysis. For example, impervious surface % and UHI (Yuan & Bauer, 2007) and flooding (Mejía & Moglen, 2009). Combining RS and in-situ observations takes advantage of their complementary features.
Connection with SDGs	Links to SDGs 2 to 4, 8 to 11, and 13 to 17: More opportunity for urban agriculture; Proportion of greenspace linked to health & well-being; Links to environmental education; Links to healthy working environments; Links to attractive working environments; Social equality in relation to greenspace; Sustainable urban development; Climate change adaptation; Potential co-benefits related to more sustainable water management; Potential for habitat creation; Environmental Justice; Opportunities for collaborative working.
Opportunities for participatory data collection	**Applied methods:** Lots of opportunity for community participation if appropriate methods are adopted. The LandSense app provides a mechanism to engage citizen participation and update data. **Earth observation/Remote sensing methods:** Since assessment of soil sealing is based on land use change data, modeling of future soil sealing and soil loss can also involve participatory impact assessment. The major data inputs for soil sealing are satellite image based land use maps and soil maps. The participatory impact assessment involves meetings with stakeholders and collecting their opinions in a semi-quantitative form.
Additional information	
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