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| | The Shannon index increases as both the richness and the evenness of the community increase. |
| **Scale of measurement** | Dimensionless<br>Typical values are generally between 1.5 and 3.5 in most ecological studies, and the index is rarely greater than 4. |
| **Data source** | |
| **Required data** | Number of individuals of different species in the study area |
| **Data input type** | Quantitative |
| **Data collection frequency** | Annually |
| **Level of expertise required** | High |
| **Synergies with other indicators** | Related to indicators estimating the richness of a certain species (e.g., species richness indicator, bird richness indicator). |
| **Connection with SDGs** | 3; 15 |
| **Opportunities for participatory data collection** | Local stakeholders can be involved in the individuals survey |
| **Additional information** | |
| **References** | Barnes, B. V., Zak, D. R., Denton, S., Spurr, S. (1998), Forest ecology. John Wiley and Sons, INC.<br>Magurran, A.E. (2004), Meausuring Biological Diversity. Blackwell |

## 10.4 Length of ecotones

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

**Author/s and affiliations:** Stuart Connop

*Sustainability Research Institute, University of East London, UK*

| **Length of ecotones** | **Biodiversity** |
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| **Description and justification** | Measurement of the length of ecotones can be a proxy for quantifying the extent of transition habitats. This can represent an important aspect of habitat characterisation and quality that is often overlooked. |
| **Definition** | Ecotones are transition areas dividing ecological communities or ecosystems. They occur in both terrestrial |

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| | and aquatic systems. Ecotones can occur at multiple spatial scales. They included both natural boundaries and human-generated ecotones. They are typically areas of high species richness and abundance that can be overlooked when using traditional habitat mapping or land use indicators. Monitoring the contribution of nature-based solutions to the creation of ecotones can support their evaluation in terms of meeting biodiversity-related key performance indicators. |
| **Strengths and weaknesses** | A key indicator related to the biodiversity value of spaces. Evaluation can, however, require specific ecological knowledge and, can also require ground-truthing to support evaluation outcomes of remote sensing data. |
| **Measurement procedure and tool** | Ecotone length can be measured by ground-truthed survey (using GPS to map ecotones). Carrying out such a process can be combined with ecological characterisation of identified ecotones. However, such methods can be very resource intensive in terms of person-hours. An alternative established method is the use of GIS (Johnston& Bonde 1989; Johnston, Pastor & Pinay 1992). Raster images can be analysed to measure the boundary associations at the edges fo land cover patches. This can provide information about the association of different cover types in the landscape. |
| **Scale of measurement** | Measurement can be carried out over a city or regional scale, however, application to smaller scales (e.g., site scales can also be relevant) can also be relevant when assessing performance against specific project targets. |
| **Data source** | |
| **Required data** | Satellite or aerial photo imagery is typically used. This can vary from low-resolution data (e.g., MODIS, moderate-resolution Landsat) to high-resolution data (WorldView and aerial orthophotos). |
| **Data input type** | Spatial & 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 habitat identification or interrogation of satellite imagery. If statistics of landscape pattern are used to infer ecological process at an ecotone level, there is a requirement to understand both ecotone ecology and the specific sensitivities of statistics to ecotone characteristics. |
| **Synergies with other indicators** | Synergies with other greenspace mapping indicators and protected habitats and species indicators. |

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| **Connection with SDGs** | Strongest link to SDGs 14 & 15. However there are links to all SDGs except 1 and 5: Biodiversity underpins food production; Links between biodiversity and health & wellbeing benefits; Links to environmental education; Links between biodiversity and water quality; Links between biodiversity and clean energy (biosolar, biofuel); Job creation; Improved green infrastructure and industry associated with biodiversity (potential disservices also); Social equality in relation to access to nature; Sustainable urban development; Biodiversity a good indicator of responsible consumption; Climate change adaptation; More sustainable water management; Biodiversity benefits; Environmental Justice in relation to biodiversity; Opportunities for collaborative working. |
| **Opportunities for participatory data collection** | Surveying habitats represents an excellent opportunity for widening participation, this includes survey of habitat condition change over time. Alternatively, participatory GIS portals can be used to ground-truth satellite imagery. |
| **Additional information** | |
| **References** | Chhetri, P.K., Thai, E. (2019) Remote sensing and geographic information systems techniques in studies on treeline ecotone dynamics. J. For. Res. 30, 1543–1553.<br>Johnston C.A., Pastor J., Pinay G. (1992) Quantitative Methods for Studying Landscape Boundaries. In: Hansen A.J., di Castri F. (eds) Landscape Boundaries. Ecological Studies (Analysis and Synthesis), vol 92. Springer, New York, NY<br>Johnston CA, Bonde JP (1989) Quantitative analysis of ecotones using a geographic information system. Photogrammetric Eng and Remote Sensing 55:1643–1647 |

## 10.5 Publicly accessible green space connectivity

**Project Name:** URBAN GreenUP (Grant Agreement no. 730426)

**Author/s and affiliations:** María González[1], Esther San José[1], Raúl Sánchez[1], Jose Fermoso[1], Silvia Gómez[1], Jose María Sanz[1], Juliet Staples[2], Jenny Hodgson[3], Sarah Clement[4]

[1] *CARTIF Foundation. Parque Tecnológico de Boecillo, 205, 47151, Boecillo, Valladolid, Spain*

[2] *Liverpool City Council. Liverpool, United Kingdom*

[3] *Institute of Integrative Biology, University of Liverpool, Liverpool, United Kingdom*

[4] *School of Enviromental Sciences, University of Liverpool, Liverpool, United Kingdom*

| **Publicly accessible green space connectivity** | **Biodiversity** |
|---|---|
| **Description and justification** | The extent and spatial arrangement of accessible green space within each sub-demo area may have an important |