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• NBS are **multifunctional solutions to deliver benefits**, to address challenges using nature and natural processes (Sgrigna, 2021)

• **Umbrella term** touching upon and/or evolving previous, neighboring concepts (Almenar et al., 2021; Somarakis et al., 2019)

Ecological restoration  
Ecosystem-based disaster risk reduction  
Ecosystem Services  
Green-Blue Infrastructure  
Urban Forestry
The urban forest is defined to comprise all trees in the urban area (Konijnendijk, 2003). This includes city parks and urban forests, gardens with trees, trees on streets or in public squares, and any other green spaces with trees, such as riparian corridors, rooftops, and nurseries (Endreny, 2018; Davies et al., 2017).
Two realizations of a common type of green element—green verge—exemplifying that composition of green-blue infrastructure is a key aspect. Whilst the example on the left cannot be considered an UF-NBS, the example on the right constitutes a part of the urban forest.
Previous research has emphasized that in urban systems, many different factors—particularly landscape and urban patterns, i.e., the urban morphology—affect local conditions, thereby ecological functions and thus benefits delivered by urban nature at multiple spatiotemporal scales (e.g., Alberti, 2005; Alberti & Marzluff, 2004; Bierwagen, 2005; Holt et al., 2015; Koc et al., 2016; Pan & Du, 2020; Wang et al., 2019; Whitford et al., 2001)
Objectives of the UF-NBS typology

1,

Describe UF-NBS on the basis of characteristic traits, including, e.g.,

... morphology (form, composition);
... spatial context and arrangement (topology);
... function;
... institutional characteristics etc.

2,

Consider the notion of UF-NBS

... as spatial entities of the green (green-blue) infrastructure, e.g., building on the NBS concept as defined by the European Commission (2015);
... as actions/interventions, e.g., NBS as conceptualized by IUCN.
Ontology as knowledge management system

Define domain and scope

Elicit concepts

Model traits

Model UF-NBS

Formalize knowledge

Test, review, evaluate

Internal discussions, Webinar & workshop

Semantic modelling as iterative process

Vocabulary to describe Form and composition

Topology (e.g., adjacency)

Institutional characteristics

Green infrastructure

Actions

Ontology as knowledge management system
UF-NBS Typology

- Street trees
- Tree alley
- (Riparian/Peri-urban) Forest
- Forest plantations
- Orchards
- Urban park
- Gardens
- Green verge/margin
- Cemetery
- Green roofs/walls

- Afforestation
- Reforestation
- Restoration action
- Monitoring action
- Enrichment planting
- Greenning
- Planting action
- Tree pruning
- Tree watering
- Pest management
Conclusions

• **Opportunities for re-use** include, e.g.,
  
  • Building of UF-NBS inventories
  • Classification and assessment tools
  • Knowledge-based applications
  • Implementation of decision-support systems
Thank you for your attention.