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A systemic framework based on the One Health approach to assess the performance of Nature-based Solutions in urban areas

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Nature-based Solutions (NbS) in urban areas can be solutions that simultaneously enable adaptation to climate change, preserve biodiversity, and ensure human health and well-being. Since NbS are open systems, their behavior is highly dependent on their interactions with the environment, which are particularly complex and diverse in the urban ecosystem. The dynamics of the urban socio-ecosystem are driven by humans who create new flows, new interactions and further redefine natural ecological processes.

Urban NbS have the potential to deliver multiple benefits, such as cooling air, regulating the water cycle, capturing pollutants, producing biomass, contributing to the creation of ecological corridors, providing spaces for socialization and recreational activities, and improving quality of life. However, in the literature, their effectiveness is mainly assessed through siloed approaches, making it fragmented and unnuanced, with the outcomes rarely studied together. Following this, we develop a systemic framework, based on the “One Health” approach, to assess NbS as complex systems having interactions with biodiversity, microclimate, and humans. A well-performing NbS is assumed to be a solution in which biodiversity and humans are healthy in a mitigated microclimate. Through this systemic analysis, several outcomes of a NbS are studied together and links can be identified between the underlying processes, as synergies or antagonisms.

This work presents the One Health assessment framework. It is based on semantic work to define the system and conceptualize the One Health approach. It was supplemented by a literature review of studies developing other systemic frameworks and studies on the impacts of NbS. In addition, the framework was first developed for a particular type of urban NbS, green spaces, in order to focus on solutions based on the same objects – lawn, shrub, and tree –, and therefore, with mostly identical ecological functions.

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