frontiers | Frontiers in Environmental Science

EDITORIAL
published: 24 May 2022
doi: 10.3389/fenvs.2022.825002

Editorial: "Urban Ecosystem Service Assessments"

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Keywords: urban ecosystem, ecosystem service impact, nature based solutions (NbS), landscape design, urban sustainability

Editorial on the Research Topic

"Urban Ecosystem Service Assessments"

The urban area can be defined as a social-ecological-technological system, where the interaction between ecological, economic, and social aspects are relevant and interconnected. Urban sustainability and liveability depend on services derived from the combination of natural capital and human-derived capital (Tan et al., 2020). Hence, it is important to assess Urban Ecosystem Services (UES) by focusing on the relationship between natural capital and the urban context, including built and human capital, to support new urban policies and inspire good strategies for urban planning and management (Gómez-Baggethun et al., 2013; Tan et al., 2020). In this perspective, the aim of the Research Topic *"Urban Ecosystem Service Assessments,"* which collects seven articles ("RT studies" hereinafter), is to propose technology transfer (that arises from feedback) between the scientific world and public and private operators that manage the territory, suggesting land-use projects to harmonize economic investments with biodiversity valorisation to improve UES.

Mainly, the first step is to refresh the vision of UES, which mostly refers to the semi-natural or natural ecosystem in an urban area, with the broader vision of the UES comprising the former group as well as all urban services that are prevalent in cities. Therefore, to better address the UES assessment, it is important to deepen the knowledge on human behavior and how natural capital is used in association with housing, transport, health, education, telecommunication and other urban elements. For example, the RT study by Taylor et al. carried out in ecology of parks in four cities (Auckland and Wellington in New Zealand, and Melbourne and Sydney in Australia) suggested that the urban park use by humans is not linked with biodiversity of urban parks. Indeed, urban parks can differ, but they serve similar functions for people—the main drivers of park use for urban residents being diversity of experiences available and the accessibility and/or proximity of natural spaces to locations where people spend their time. Good planning and placement of parks in cities could afford serendipitous interactions with nature, and potentially offer opportunities to benefit residents' well-being and encourage more sustainable practices. Moreover, the associations between perceived (rather than actual) biodiversity and psychological well-being suggested that the perception of park visitors affected the quality of their experience and their willingness to return to urban parks.

Therefore, the capacity of an urban ecosystem to produce services do not depend only on the presence of natural capital but also from its accessibility. The connection between UES source areas and end-users is mediated by social structures such as built infrastructure and institutions defining access to land (Gómez-Baggethun et al., 2013; Andersson et al., 2021).

In UES it is important to focus on urban patterns characterized by composition (how many elements and types are present) and configuration (spatial arrangement) of natural capital and built and social capital. UES assessments capable in evaluating the right urban patterns are important to

Edited and reviewed by:
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Specialty section:
This article was submitted to Land Use Dynamics, a section of the journal Frontiers in Environmental Science

Received: *29 November 2021*
Accepted: *05 May 2022*
Published: *24 May 2022*

Citation:
Semeraro T and Buccolieri R (2022) Editorial: "Urban Ecosystem Service Assessments". Front. Environ. Sci. 10:825002. doi: 10.3389/fenvs.2022.825002

support public administrators in finding the right dimension between natural capital and human-derived capital. In this direction, the RT article by Menteşe and Tezer reports on one application of UES Impact Assessment in landscape design carried out in Istanbul, Turkey. The study highlighted how the UES concept can be employed in spatial planning, development, and/or decision-making process by using a specific technique called the "matrix model." Such a technique allows to estimate the UES capacity of a given area, taking into consideration land-use and land-cover pattern. The methodology proposed was efficiently used to evaluate and interpret how an investment or a plan can impact UES capacity on a given area linking the quantitative impact of ecological outcomes and potential human benefits.

The use of an internationally defined "matrix model" for UES assessment is promising and may require further investigation on a local scale (Gó mez-Baggethun et al., 2013). In fact, from the RT article by Sevianu et al., reporting on an UES assessment carried out in a peri-urban forest area, it emerged that the UES provided by a forest was strongly related to the stand structural heterogeneity of trees (age, heights), and the forestry management practices from the past decades would need a deepened local consideration and assessment.

Therefore, UES assessment does not have to be focused only on presence of natural and semi-natural park in the urban area and surrounding, but at the biophysical structure and processes associated with the natural capital (Tan et al., 2020). In the urban context, the natural capital is implemented through the realization of Nature Based Solutions (NbS) which are expressions of semi-natural areas realized with financial and social capital. Towards this prospective, an interesting aspect regarding the UES impact assessment is connected to the capacity to quantify the effect of NbS developed in a new urbanization, as highlighted by the RT study of Tan et al. carried out through a spatially explicit modelling approach using Singapore's newest nature-centric Tengah town as a case study. The proposed nature-centric town was projected to include NbS but producing a substantial decline in the provision of all UES with respect to the initial conditions of the area because of the removal of large natural vegetation cover. However, the nature-centric town compared favourably against three older towns that have been constructed in Singapore, showing the best performance for four out of six UES considered in the study. Therefore, the NbS incorporation into urban design can help to achieve enhanced performance in providing UES. This shows that the urban sustainability should be interpreted in relative way, and it should be intended to do the same thing differently for improving the quality of life by reducing impacts on the environment and biodiversity through new urban solutions and a new vision of cities.

Studies from this Research Topic also shows that citizen involvement can be useful to refresh the concept of UES and its classification frameworks currently developed in consideration of new generations' vision of the relationship between humans and biodiversity, which can improve new ideas and the capacity of humans to obtain benefits and goods from biodiversity. A participatory study carried out in Lilongwe city, Malawi, Sub-Saharan Africa, and presented by presented by the RT article of Guenat et al., reported that stakeholders identified an additional suite of societal benefits that do not directly map onto current UES frameworks, such as the generation of financial income and the provision of employment opportunities. Financial considerations are a paramount issue in greenspace planning, conservation, and management, and prioritisation of economic growth will inevitably result in complex trade-offs with other societal and environmental benefits. Including financial consideration in urban services suggests a deep untapped knowledge of connections between natural capital and human-derived capital towards new approaches for UES assessments. The RT article by Sevianu et al., within a study carried out in the project implemented in Romania, presented a feedback action between project design and public consultation, showing that involvement of citizens could be also focused on the design of NbS, like feedback strategies to improve the ecology project in urban and peri-urban areas developed by experts.

Also, the new technologies and scientific knowledge will be important to refresh the conceptual framework of UES and the realization of new NbS with multifunctional features (Tan et al., 2020). For example, the RT article by Semeraro et al. showed that dendrochemistry could produce new benefits and goods by nature in biomonitoring the quality of urban cities over time using green spaces. Thus, the urban ecosystem can be useful in areas characterized by strong industrial activity to assess the health effects of these activities and to apply the right mitigation actions. Naturally, the design activity of vegetation requires interaction between urban designers and other experts, to understand the potential vegetation/trees that can be used along with their spatial distributions that would be useful for the analysis. In this case, the urban ecosystem is thought not only as a park for free time and psycho-physical benefit for the human but as a new element of the cities to support a bigger group of the UES like monitoring activity of the air quality and urban planning efficiency.

The UES vision in the realization of NbS can be developed also in consideration of the new social and health challenges the urban population must face, for example the COVID-19 pandemic. In this sense, the RT review article by Flies et al. deepens the link between biodiversity and microbiome, which is important for human immunity and health. Key actions are needed to deepen this knowledge considering how microbial abundance and microbiome composition impact human health and the immunological mechanisms driving those health effects.

In conclusion, we believe that the present Research Topic provides good points of reflection about different actions that can be developed to better connect the dependence of human well-being on nature in a more holistic vision, and to enhance the UES concept and its applications (Tan et al., 2020).

The UES with its broader vision highlighted through the different studies collected here suggest the UES assessment requires a transdisciplinary approach with a strong synergy involving communication, sharing ideas, information, and

data exchanges between different studies of the same discipline and between different disciplines, as well as interaction between different stakeholders like the urban designers, decision-makers and citizens (Gó mez-Baggethun et al., 2013).

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AUTHOR CONTRIBUTIONS

All authors listed have made a substantial, direct, and intellectual contribution to the work and approved it for publication.

Conflict of Interest: The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

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