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# Civic Universities and Their Impact on Green Infrastructure Governance in Cities: A Principles-Based Framework for Human Well-Being

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## Abstract

*The fast growth of the human population and its preference for living in urban areas pose a great challenge on governance to find solutions addressing urban resilience and sustainability objectives. In the transition toward resilient cities, the concept of ecosystem services offered by natural systems is considered an efficient tool of interconnection between the components of natural capital and the well-being of human communities. This paper presents and discusses the main components of a conceptual framework designed to guide the urban planning and governance response to the urban ecosystem services concept implementation. The role universities can play to benefit students, professors and societies is discussed. Mapping the natural systems and identifying and evaluating the range of services they provide by involving different socio-economic actors (including those in the field of development and implementation of environmental and economic policies, urban plans and urban development strategies) are presented as crucial preliminary steps to raise awareness, identify trade-offs and prioritize urban planning goals. The relevance of the scientific knowledge and expertise in defining actions and alternative options toward resilient cities, conditions and means of concept implementations, and accountability of urban planning are discussed. The proposed framework in this paper may help universities to frame and strengthen their strategic partnerships with the decision-makers and other relevant stakeholders in urban areas, promote renewed curricula and different forms of active civic engagement and produce human capital assets in the field of the governance of urban green infrastructure in the region.*

**Keywords:** urban ecosystem services, universities, civic engagement, resilient cities, sustainability, blue-green infrastructure.

**JEL Classification:** I300.

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## 1. Introduction

More than half of the world's human population (55%, UN, 2019) live in urban areas. The share of the population living in cities and the number and size of cities will continue to grow (UN, 2019). A major consequence of urbanization is an increased environmental degradation with potential adverse impacts on natural habitats and biodiversity. Inadequately governed urban areas combined with unsustainable production and consumption patterns and a failure of public institutions to raise awareness and consider the benefits provided by nature in strategic documents can impair sustainability due to urban sprawl, pollution and environmental degradation (Kronenberg, 2015, Gavrilidis et al., 2017).

Historically, urbanization has been closely linked to economic growth, poverty reduction and human development (Bairoch, 1988, Grübler & Fisk, 2013). However, urban dwellers face greater exposure to environmental hazards (e.g., pollution, climate change) and health and well-being disparities (Gaigbe-Togbe, 2015, Sicard et al., 2021). Sustainable Development Goal 11 is a commitment to make cities inclusive, safe, resilient and sustainable (UN, 2015). Sustainable urbanization requires that cities preserve a healthy environment in the city and surrounding areas (UN, 2019).

McPhearson et al. (2015) reported the ecosystem services concept as a flexible concept, able to bridge science, planning and governance in the process of transition toward resilience. It may help translate complex functions and processes of ecosystems into indicators for urban planning and governance (Inostroza, 2017). Ecosystem services are outputs, conditions, or processes of natural systems that directly or indirectly, consciously or unconsciously, benefit humans or enhance social well-fare (Costanza et al., 1998, MEA, 2005). Services offered by the green-blue ecological structures of the urban areas (e.g., parks, gardens, forests, lakes, rivers, meadows, green roofs, farmed areas, street trees) are defined as urban ecosystem services (Gómez-Baggethun & Barton, 2013).

Based on the Millennium Ecosystem Assessment (MEA, 2005) and The Economics of Ecosystems and Biodiversity (TEEB, 2011), there are four categories of ecosystem services: provision, regulating, supporting and cultural services. An entire range of services is listed under these categories, including food production, regulation of river and water flows, a decrease of rainfall speed, regulation of urban temperature, noise reduction, air purification, moderation of climate extremes, pollination, seed dispersion, biodiversity and habitats, recreation, affective and cognitive development, animal watching (Gómez-Baggethun & Barton, 2013, Shrestha et al., 2021). This means that cities become places where not only first-class public and private services (e.g., education, health, cultural, information, transportation services, supply of goods etc.) are available, but also the highest quality of ecosystem services are provided by the green-blue infrastructure.

During the last decade, there is a growing interest in the research issues related to urban ecology, from the interactions between organisms and their environment to the evolutionary, social and economic consequences they have at different spatial scales (Barot et al., 2019, Shrestha et al., 2021). Additionally, we noticed a growing

interest in putting ecosystem services into the urban planning and governance practice. However, the operationalization of the ecosystem services concept still faces serious limitations and has limited influence on the urban planning and governance practice (Haase et al., 2014, Higgins et al., 2019).

Planning for the delivery of ecosystem services to urban dwellers should consider different scenarios for the future growth of urban centres and challenges raised by unavoidable social and environmental changes. In this process, the participatory approach from a cross-disciplinary and cross-sectorial perspective can play an important role. It may help understand the complexity of socio-ecological systems, raise awareness and implement the appropriate, effective and socially certified solutions. In this context, we aim to propose a general framework to guide governance toward resilient and sustainable cities. We focus on the relationship between the ecosystem services concept and governance. Universities may play a role in successive phases of the decision-making process, and the practical opportunities and challenges for their institutional development are highlighted.

## 2. Aims of the Research

Considering the context presented above and the challenges urban planners face dealing with the complexity and multidisciplinary of issues that need to be considered and addressed for achieving the goal of sustainable and resilient cities, this paper aims to propose a general conceptual framework to guide the decision-making process and governance in urban areas.

Given the multitude and the diversity of approaches and actors involved, we believe that a general integrated framework for the decision-making cycle, based on the participatory process, could promote the integration of ecology, society, policy and urban governance. The framework we propose is also meant to guide universities as they develop new institutional practices to exploit their innovative capacity and potential for active engagement, while directly addressing local needs.

## 3. Research Methods

We present the results of an interdisciplinary research, which is based on theoretical approaches developed around the concepts of ecosystem services, participatory governance and civic universities. We focus on the relationship between the ecosystem services concept and the area of governance and public policy. We grouped the issues of urban planning and governance into four clusters, which may guide the response to urban ecosystem concept implementation. To define the clusters of issues, we adapted the approach promoted by the Convention of Biological Diversity in the Report of the Open-Ended Working Group on the Post-2020 Global Biodiversity Framework on its First Meeting, Nairobi, 2019 (CBG/WG, 2020). The four clusters are: i) identify the main goals and targets for urban management, ii) define actions and alternative options, iii) identify conditions and means of implementations, iv) analyse the planning and accountability. The stakeholder involvement was considered a cross-cutting issue. The role of the civic

university and practical challenges for their institutional development are discussed in relation to the clusters mentioned above.

## 4. Findings

Understanding the complex interactions between humans and nature and getting aware of the benefits nature provides for human well-being is a critical preliminary condition to achieve sustainable development and resilient cities (Barot et al., 2019). The ecosystem service concept proved practical to help conceptualize complex human-environment interactions and bridge science, planning, and governance (Inostroza, 2017, McPhearson et al., 2015). However, the operationalization of this concept is deeply conditioned by its integration in the decision-making process and urban planning (Hansen et al., 2015). The scientific literature acknowledges that there is a gap between the knowledge in the field of urban ecosystem services, the expectations of citizens and the perception of urban practitioners, which still allows shrinking and deterioration of urban green infrastructure, with consequences for the development of sustainable and resilient cities.

To guide the urban planning and governance response to urban ecosystem services concept implementation, we propose an integrated framework, adapted based on the Potential Elements on Structure and Scope of the Post-2020 Global Biodiversity Framework (CBG/WG, 2020) and concepts defined in the literature (e.g., Reichert et al., 2015). An entire range of issues the urban planners face in the decision-making process for sustainable and resilient cities was grouped into clusters of issues, as presented in Figure 1. Public participation (stakeholder involvement) was considered a cross-cutting issue.

Within the proposed framework, we emphasize the role the civic universities may play in the process, not only as stakeholders but also in solving issues in the four clusters. Partnerships between relevant stakeholders (including those in the field of development and implementation of environmental, biodiversity conservation and economic policies, urban plans and development strategies) and civic universities may boost both the universities' innovation capacity and effectiveness of governance towards sustainable and resilient cities in the context of rapid changes (Figure 2).

### *4.1. Identify Goals and Targets for Urban Planning*

To make the theory of ecosystem services accessible for practical support of the decision-making, universities may play an essential role (Figure 1). They help urban planners establish clear, measurable and easy-to-communicate-and-understand goals and targets (CBG/WG, 2020) for resilient cities in a particular social, economic and environmental context. Frequently, it is hard for urban planners to identify and prioritise the desired governance goals and outcomes for their cities due to the high complexity of the urban socio-ecological systems and interconnected nature of the context and objectives. A holistic understanding of the different pillars of sustainable development and various competencies and skills are needed (Taylor et al., 2021). Besides, as social certification and compliance with the decision are critical components for effective governance, the priorities have to be based on value-focus

thinking of an entire range of stakeholders using a multi-criteria decision analysis (Reichert et al., 2015). Among other conditions, this laborious process needs qualified human resources and multi- and trans-disciplinary approaches. The involvement of universities (students and professors with different scientific backgrounds) is an opportunity (Figure 2).

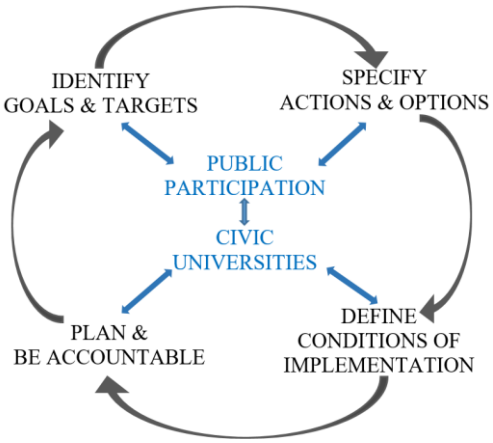


**Figure 1. A conceptual framework for the operationalization of ecosystem services concept showing the clusters of issues the decision-makers face in the process of urban planning and governance.** The central position of public participation underlines the cross-cutting nature of this cluster. Civic universities may play a role not only as stakeholders, but also in solving issues in the other four clusters (for details please see sections 4.1-4.5).

*Source*: Authors' contribution.

During the last decades, universities are placing a renewed emphasis on the importance of service and community engagement, and are more and more open to address local society challenges (Bowman et al., 2010). A continuous institutional process for active civic engagement, including initiatives as OpenLabs and Service learning (an engaged form of learning), is under development. Acknowledging their educational and societal benefits, several international programmes (e.g., Erasmus +, Horizon 2020) fostering such initiatives become active and functional.

Engaging students in identifying, assessing, and raising awareness on the ecosystem services and benefits the blue-green urban areas supply to societies offers students not only the chance to apply practically the theoretical knowledge, but also to increase their professional capacity, stimulate critical thinking, and develop skills and competencies (Balsiger 2015, Argento et al., 2020).

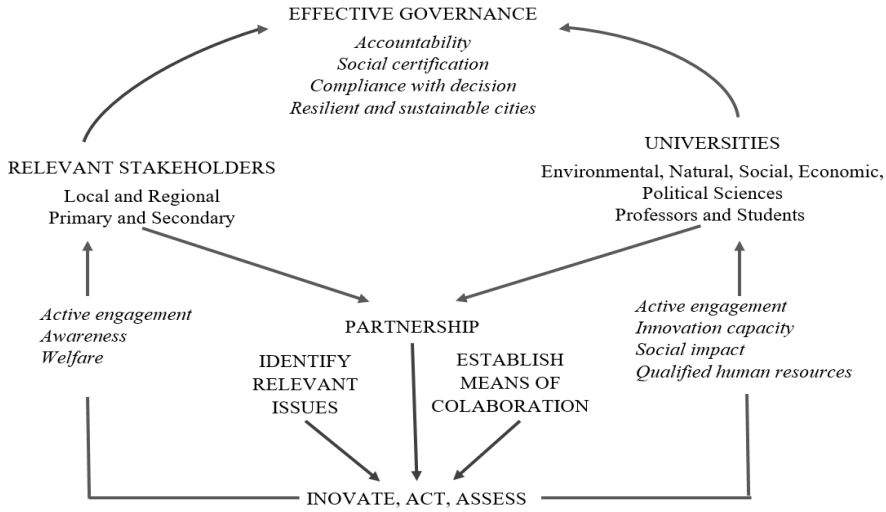


**Figure 2. The role played by partnerships between relevant stakeholders and civic universities for effective governance towards sustainable and resilient cities**. The added values of cooperation are marked in italics.
*Source*: Authors' contribution.

The level of qualification of the human resources produced by the civic universities is enhanced, allowing further support for operationalization of urban ecosystem services and targeting of policies in the context of rapid change. The innovation capacity, self-confidence, pro-social orientation and willingness to act as volunteers to solve socially relevant problems of adults who have been actively involved in engaged learning activities, are enhanced in the benefit of universities, employers, urban planners, and people well-being (Bowman et al., 2010, Fenn et al., 2021). Active engagement increases the impact the universities have on society and brings supplementary added value for urban planners. Universities may synthetize current understandings and knowledge on urban blue-green areas relative to the resilience and sustainability-related ecosystem services outcome from a cross-sectoral and cross-disciplinary perspective. This is a preliminary condition for the identification and prioritisation of the context-based development goals and targets (e.g., good air and water quality; good quality of ecological structure; good accessibility to green-blue spaces; high biodiversity; wisely used green structures, good health of inhabitants; good recreational services; deliver essential ecosystem services for inhabitants, etc.), and raising awareness and active engagement of inhabitants in the decision-making process for sustainable cities (Figure 2).

## *4.2. Define Actions and Alternative Options*

The practice-oriented approach of the framework we propose demonstrates the social relevance of research in universities. It offers students a better understanding of the structure and function of social-ecological systems, complex interactions across scales and contexts, and nature's contribution to people. It is intended to

increase students' knowledge and abilities to identify, tackle and develop their own ideas concerning socially acknowledged needs. The multi-functionality of blue-green urban infrastructure serves as a key concept for solving resource-use conflicts, emphasizing trade-offs between different environmental, social and economic values that natural habitats networks provide in cities. The problems are approached from different perspectives. Based on stakeholders' values and preferences (what is important to stakeholders, what are the acceptable trade-offs) on one side, and the scientific facts (data and knowledge, previous experiences, best/ traditional practices) on the other side, predictions and scenarios analysis may be developed in order to capture the uncertainty of the future and raise awareness (Reichert et al., 2015). The stakeholders – universities' partnerships may assist in the identification of alternative, viable options that simultaneously provide environmental, social and economic benefits towards achieving the established goals and targets and help build resilience (Figure 1). To reveal how close the implemented actions bring urban planners to the established goals, sets of indicators, indices, attributes, or measurable variables (metrics) must be defined. They are meant to explicitly describe the relevant consequences of a decision or action implementation and measure the success or failure towards achieving shared goals. The level of noise or fine dust particles in the air, the number of square meters of green spaces per inhabitant, the minutes spent to the nearest green space, species richness, charismatic species, the number of human respiratory and mental disorders, the hours per week spent in green areas, the number of jobs offered by parks are only a few examples of such indices.

### *4.3. Conditions of Implementation*

The success of achieving the established goals is conditioned by appropriate institutional infrastructure and capacity development at institutional and systemic levels (CBD/WG, 2020). Several issues are clustered under this header. They depend on the particular social, environmental and political context and, among others, may include: resource mobilization, financial mechanisms, trained actors (including managers and decision-makers), data mobilization and access to data, knowledge management, improved knowledge (facts, predictions, scenarios) and capacity to process and utilize the existing data and knowledge, technical and scientific cooperation, technology transfer, contextualization, communication, awareness-raising, social certification of decisions (CBD/WG 2020, Reichert et al., 2015). All of these raise practical challenges for universities and their curricula that have to address the skills and competencies needed for professionals in the field of sustainable urban planning and to identify effective pedagogic practices that could help educate future professionals (Taylor et al., 2021). They call for long-life training programmes and deeper cooperation across disciplines. As the management targets the coupled human-natural systems, scientists, students and professors from various environmental, natural, and human sciences are an integral part of this approach. Equally, those from the field of economic and political sciences are directly involved in solving issues related to economic valuation of ecosystem services, cost-benefit analyses, planning and accountability for sustainable development of resilient cities

(see Figure 2). Integrating sustainability in higher education programmes, and collaboration of professionals from different fields based on holistic, integrated approach are needed for understanding various aspects of interactions and functioning of coupled nature-social urban systems, simulating co-production of sustainability knowledge and finding novel and constructive ways of solving complex problems (Balsiger, 2015, Argento et al., 2020, Taylor et al., 2021).

### *4.4. Planning and Accountability*

The development of coherent, evidence-based policies that link territorial development to innovation and higher education is essential to operationalize the goals and make the achievement of goals measurable. The progress, the best management actions, the gaps and barriers have to be identified and tackled before the reiteration of any decision cycle. Monitoring and reporting play a crucial role in achieving flexible and effective governance (CBG/WG, 2020). In the process of policies, plans and strategies assessment, multi-stakeholder dialogues are central. However, addressing such challenges requires transforming the way a range of responsible sectors work together towards shared goals, understanding how sectors collaborate and finding solutions for more efficient, effective and equitable cooperation acknowledging similarities and differences across contexts. Research in this field remains critical (Hinton et al., 2021).

### *4.5. Public Participation*

The four clusters of issues presented in Figure 1 and discussed above are closely interlinked. The participation of different stakeholders in implementing the ecosystem services concept in urban planning and governance could act as an overarching principle that applies to the entirety of the framework (CBG/WG, 2020). A wide range of stakeholder categories, from local communities up to regional and national authorities, civil society and the private sector, have a role in the general framework. These actors may take on-the-ground action, which could greatly enhance implementation if better recognized, encouraged, and supported. Moreover, the literature revealed both the short and long-term impact of university volunteering and participating in engaged forms of learning (e.g., service-learning). A generally positive relationship between students' civic engagement and mental health, when mediated by service self-efficacy, was revealed (Fenn et al., 2021, Shrestha et al., 2021). Indirect effects on several forms of well-being during their adulthood include personal growth, purpose in life, environmental mastery, and life satisfaction (Bowman et al., 2010).

## 5. Conclusions

This paper is based on a theoretical approach. It highlights that to achieve the overall goal of resilient and sustainable cities, governance has to be grounded on an ecosystemic, holistic and integrated conceptual framework, acknowledging the benefits of nature to humans, collective expertise, and different actors' role from a cross-sectoral and cross-disciplinary perspective. Deeper cooperation across relevant

stakeholders and disciplines and the development of collaboratively designed curricula at the intersection of innovation and education remain challenging goals. Enhanced service and community engagement allow new outlooks on the universities' relevance for society. More studies are needed to frame the collaborative design and improve outcomes.

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