

A New Model for a New Nature: Position of Urban Living Labs in Urban Problems

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ABSTRACT

Smart city applications, evolving from technological to socially inclusive, aim to prioritize sustainability and livability. Despite growing interest, a lack of standardized definitions and planning methodologies hinders smart city development. Urban living labs (ULLs), on the other hand, play a pivotal role in implementing smart city solutions, acting as testing grounds for technologies and policies. Their integration into local government practices is essential. However, ULLs in Turkiye, such as the Basaksehir Living Lab and Istanbul Planning Agency, focus on local problem-solving and sustainable development. While ULLs hold promise, it is unclear if they can entirely replace existing urban governance models. Research is needed to assess their effectiveness. Effective collaboration between national and local governments is essential for comprehensive urban planning. Addressing these challenges, the article emphasizes the interaction between ULL and local government by analyzing Istanbul's landscape transformation process and management system as a model for other countries.

KEYWORDS

Istanbul, Landscape Management, Living Labs, Smart Cities, Sustainable Development, Urban Challenges, Urban Governance, Urban Landscape, Urban Living Labs (ULL)

INTRODUCTION

In the present era, technological advancements are transforming how local governments operate, leading to substantial changes in their functioning. Information technologies, big data analytics, the Internet of Things (IoT), and artificial intelligence are enhancing local government operations' efficiency (Bason, 2010; Barns, 2018; Scholl & Kemp, 2016). In this context, smart city applications represent one of the most prominent examples of technological transformation (Barns, 2018; Batagan, 2011; Batty et al., 2012; Yigitcanlar & Velibeyoglu, 2008). The concept of smart cities has evolved from the 1990s to the present day (Sengers et al., 2016). Initially, the focus was on digital and technological aspects, with information and communications technology (ICT) being the key element of urban intelligence. Later, the importance of human capital in urban development was recognized as

a primary factor (Cowley & Caprotti, 2019; Sengers et al., 2016) because being smart is not just about technology, but also about being socially inclusive (Caragliu et al., 2011; Tranos & Gertner, 2012). Because of technological advancements, smart cities aim to enhance livability and sustainability and prioritize citizens. Smart cities not only focus on technological infrastructure but also emphasize the importance of green and sustainable environments (Batagan, 2011; Batty et al., 2012).

A wide gap between theory and practice has emerged owing to a lack of uniformity in the definition and the concept of smart cities. A severe lack of planning methodologies that support the evaluation models of smartness levels also exists (Caragliu et al., 2011; Kourtit et al., 2012; Lombardi et al., 2012; Srivastava & Vakali, 2012). However, a model that can identify the boundaries of each action and integrate them into a holistic view would be an effective tool for planners and decision-makers (Dirks & Keeling, 2009; Kanter & Litow, 2009). A planning scheme based on the specific local context features and smart good practices could outline paths and guidelines for complete smart planning (Barns, 2018). In other respects, urban living labs (ULLs) play a crucial role in implementing smart city applications. They are essential for the successful deployment of such technologies. The integration of ULLs into local government practices is supported by various similar and distinct studies worldwide (Menny et al., 2018). In this article we address how smart cities can leverage technological advancements, examine the preservation and improvement of urban landscapes, and focus on the sustainable development of green spaces, particularly in large cities like Istanbul. Thus, the article's theoretical framework revolves around whether ULLs can provide solutions to urban problems. In the subsequent sections of the article, we explore solutions provided by ULLs to urban problems in Istanbul, using Istanbul's urban landscaping management and assessment as an example.

Simultaneously, for cities to achieve sustainability objectives, planning and preserving urban landscapes are essential processes. By carefully considering the design and maintenance of the urban environment, cities can promote environmentally friendly practices and create a more livable community for their residents (Colding & Barthel, 2017). Green spaces enhance the quality of life in urban areas, maintain environmental balance, and contribute to human well-being. However, urban landscaping has brought up a few concerns that must be addressed. These issues include the loss of green spaces, environmental degradation, and limitations on cities' capacity to cope with climate change-related challenges (Colding & Barthel, 2017; OECD, 2020; UN-Habitat, 2016). Integrating ULLs into local government practices in Turkey has led to the proliferation of sustainable and smart applications. For instance, the Basaksehir Living Lab, established under the authority of Basaksehir Municipality, focuses on addressing the daily problems of residents and seeks to deliver sustainable and immediate solutions (BLL, 2023). Similarly, the Istanbul Planning Agency (IPA), affiliated with the Istanbul Metropolitan Municipality (IMM), serves as a lab; it concentrates on solving local problems within the city (IPA, 2023). These approaches contribute to sustainable development and future-oriented solutions for Turkey's and Istanbul's urban issues, potentially setting an example for other cities. However, can a ULL be the answer for urban-related problems or urban landscape issues? On the contrary, ULLs are not yet predictable in the real world to achieve the cities' global goals and urban and human problem-related solutions. However, we firmly believe that coordinating a ULL model with local government actions is the new approach for smart cities and sustainable development.

Consequently, we recommend emphasizing the importance of urban living labs and responding to whether it can be a new management model for the changing issues over time at global, national, and urban scales. To emphasize the interaction between ULL and local government, we analyze Istanbul's landscape transformation process and management system as a model for other countries.

A NEW UNDERSTANDING OF URBAN PROBLEMS: CAN URBAN LIVING LABS BE THE ANSWER?

The political aspects of planning have been changed since modernism by disregarding social and democratic character in historically developed European cities (Badach & Dymnicka, 2017). This situation has brought awareness about the issues in urban planning, such as participation, comprehensiveness, and openness, leading to the prioritization of these issues in the urban planning agenda. In addition, governance also involves vertical coordination between different levels of government and horizontal coordination between local governments (Borzel, 2012; Burkeley & Castan Broto, 2013; Murphy, 2012). However, defining governance with the perspective of smart cities is necessary to show challenges in the technological era. Meijer and Bolivar (2016) evaluated the concept of smart governance in four different dimensions—the government of a smart city, smart decision-making, smart administration, and smart urban collaboration—to show the need for government transformation to make cities smarter. Other researchers (Barns, 2018; Garcia, 2012; Schuurman et al., 2012) emphasized this need for transformation by stating that sophisticated information technologies and innovative networks can better serve citizens and communities in smart governance systems.

On the other hand, Bajracharya and Khan (2020) cited growing literature on the need for collaborative planning, including improved communication and understanding, support for local development projects, and creative multidisciplinary problem-solving to deal with urban governance challenges. However, Westerlund and Leminen (2018) argued that ULLs have emerged as a collaborative planning and experimentation form aimed at addressing the challenges and opportunities of urbanization. Additionally, ULLs can be seen as complements or alternatives to traditional top-down approaches in urban governance that have been criticized for their limited participation, lack of innovation, and focus on short-term goals. Considered as a new form or approach to governance, ULLs create an ecosystem where technologies and policies are tested, developed, and scaled, encouraging real-world experiments and user-centered innovation (Leminen et al., 2017; Veeckman & Temmerman, 2021; Westerlund & Leminen, 2018). ULLs can also promote an innovation and experimentation culture that may be beneficial for cities seeking to address complex and evolving urban challenges, such as climate change and the loss of landscape value (Westerlund & Leminen, 2018). However, to tackle complex urban challenges and develop sustainable solutions, ULLs bring together various stakeholders, including citizens, businesses, academia, and local governments. ULLs involve citizens and other stakeholders in the cocreation process, enabling the generation of solutions that are more sensitive to the needs and preferences of the local community (Veeckman & Temmerman, 2021;; Hossain et al., 2019).

Although ULLs are seen as a new model or approach, precisely defining their place in urban planning is challenging. One of the reasons for their proliferation is the potential to provide solutions to urban problems, but as of yet, no assessment of whether they have generated correct and successful solutions has been completed. In a research study that includes a comparative analysis of two urban living labs in Turkey, Yilmaz and Ertekin (2022a) identified the shortcomings of these labs and proposed revisions. These recommendations include the development of labs to generate quick solutions while addressing global and local issues and actively participating in urban planning. Yilmaz and Ertekin (2022a) also highlighted the needs for strengthening collaboration with local governments to find solutions to local problems and for emphasizing transparency in the process. Local governments are part of the extensive stakeholder network within ULLs, but this does not necessarily indicate how they are used in urban planning. Therefore, it is necessary to first define the problem, describe the ULL perspective, and explore how solutions can be generated within this context. Subsequent subsections of this paper include a literature review to define global and urban problems.

Global Scale

The climate crisis is the one big issue that the world should consider for the future, especially in densely packed urban areas. Mitigating climate change and coping with its inevitable consequences are the forces that are shaping the world's growing urban areas. The pace of urbanization today is unprecedented, with an increase of almost five times the urban population between 1950 and 2011 (Un-Habitat, 2018). The Organisation for Economic Co-operation and Development (OECD) highlighted that 48% of the world's population lived in cities in 2015 and predicted city population growth from 3.5 billion (2015) to 5 billion in 2050, with more than a 40% increase (OECD, 2019). According to Mattoni et al. (2015), this increase in urbanization shows sudden and various transformations in cities. This transformation is a multilevel method for evaluating and designing the renewal and smart cities' integration (Mattoni et al., 2015). Apart from population growth, the number of cities with populations greater than 1 million increased from 75 in 1950 to 548 in 2018, and the projected number will be 706 in 2030 (Un-Habitat, 2018). However, these numbers showed that even in 2018, there were more cities with populations of more than 1 million than the projection (Un-Habitat, 2018).

While large cities and urban populations increase, sustainable development goals (SDGs) and adapting to the climate crisis are becoming the century's issues. SDGs consist of 17 targets to "plan an action for people, the Earth, and prosperity," challenging that "no one will be left behind" (Komiyama & Yamada, 2018). Rather than providing a remedy for lagging cities, the smart city is rewriting already vital urban social and spatial inequalities in new ways by privileging free-market, technology-centered, and expert-driven forms of urban planning and governance, forcing cities to compete for rare resources (Shelton & Lodato, 2019). The Conference of the Parties (COP 21) also was held on the climate crisis, global warming, and environmental impacts on humans (Komiyama & Yamada, 2018). However, both actions are dedicated to similar topics nonetheless. Challenges include overcoming pollution for ecology and the global environment, managing sufficient resources, and creating an interactive world in which everyone can participate. Today, the world faces numerous global crises, such as droughts, wildfires, and floods, owing to the impact of heat waves. Significant forested areas were lost in Greece because of wildfires in July. Similarly, forest fires affected numerous cities and living spaces in Canada, Spain, Portugal, and Switzerland (ITU Vakfi, 2023). These interconnected disasters underline the pressure on the environment. The rapid growth of cities, coupled with a faster-than-anticipated increase in population, is indeed intensifying pressure on natural areas at a global scale. Especially in the era of global issues such as the climate crisis, how countries take action becomes crucial. In the present era, the most important aspect is the ability to act collectively so that cities and all of us can have a sustainable future.

In the context of Turkey, the situation is parallel. The 2019 population census showed that Turkey's total population is 83.48 million (The World Bank, 2019). Approximately 45% of this population resides in urban areas, with around 20% living in Istanbul (TUIK, 2022). These figures highlight the critical position of Istanbul within Turkey. As a city constantly requiring more urbanization, housing, and job opportunities, how can it respond to global challenges effectively? Turkey is among the countries affected by global disasters and forest fires. The increasing frequency of flood disasters is a pressing issue resulting from the climate crisis. Alongside the flood disasters in the Western Black Sea region in July, Istanbul also experienced flood disasters in September. This situation underscores the need for urgent solutions to problems arising from urbanization. Urgent actions are required to minimize the impacts of natural disasters such as forest fires, floods, and earthquakes. Every country must develop a new planning agreement in light of the climate crisis. Rapid urbanization, rapid population growth, and unplanned development, although being among Turkey's major urban problems, have transcended from being local issues to global problems owing to the reality of the climate crisis (ITU Vakfi, 2023).

On the other hand, the population issue brings pollution problems owing to intensive use or overuse of protected land. To unravel all these concerns, developing landscape management is essential for the future of cities. Afterward, addressing the management complexity and moving forward in a common

framework are among the requirements for protecting the landscape. In this context, embracing a tool, a model, and an approach to seek solutions to global problems in the technological age is necessary. In today's world, the use of smart city applications and urban living labs has become indispensable for the progress of cities. Identifying the shortcomings of existing systems and determining how they can operate more efficiently are critical steps.

National and Urban Scale

Living labs have different goals and ways of working; various actors initiate them and form different partnerships (Bulkeley et al., 2017). Living labs have no uniform definition (Schliwa, 2013). Some scholars and organizations define them as partnerships between sectors (ENoLL, 2021) in which universities play a crucial role (Evans & Karvonen, 2010), whereas others see living labs more as pilot and demonstration projects that function as supportive tools for private actors and industry, helping them commercialize their services, products and technology (Kommonen & Botero, 2013). Living labs can be considered as both an arena (i.e., geographically or institutionally bounded spaces) and an approach for intentional, collaborative experimentation of researchers, citizens, companies, and local governments (Schliwa, 2013). Numerous projects related to ULLs are being developed, but there is still no clear understanding of their ultimate role in urban governance. Whether ULLs represent an entirely new phenomenon that will replace other forms of participation, collaboration, experimentation, learning, and governance in cities is uncertain. Nystrom et al. (2014) underlined the importance of understanding participants' different roles and patterns in living labs, as it can aid in the construction, use, and orchestration of such environments (Nystrom et al., 2014).

In the context of Turkey, ULL is a new term in urban planning. Only three living labs are deployed across the country, and one of them is located in Istanbul, established under the authority of Basaksehir Municipality. Basaksehir Living Lab (BLL) is a unique collaboration platform between stakeholders, including the municipality, residents, businesses, and academic institutions (BLL, 2023). Within the scope of BLL projects, it enables the production and testing of new technologies and carries out implementation projects within the boundaries of Basaksehir Municipality (BLL, 2023). In the urban context, implementing 25 tasks across 370 organizations has yet to be met with limited success (Yilmaz & Ertekin, 2022b). Three projects completed the implementation process in the lab. This number highlights the need for further research into the factors impeding the successful completion of these tasks and the development of targeted interventions to address these barriers (Yilmaz & Ertekin, 2022b). The innovative infrastructure project encompasses deploying advanced waste management systems, intelligent paving blocks to assist visually impaired individuals, and an advanced cyclist parking system (Yilmaz & Ertekin, 2022b). This initiative is being implemented in the Basaksehir district and is poised to revolutionize how Turkey approaches urban development. The BLL produced, tested, and implemented these projects through collaboration and participation techniques. Although there are few completed projects, the number of engaged users in BLL organizations is noteworthy (Yilmaz & Ertekin, 2022b).

Additionally, the lab participates in projects within the European Union, providing pilot areas for implementation activities through partnerships. By applying the newly developed technological approaches produced within the lab to the city at the building or neighborhood scale, the BLL seeks to address local problems while also displaying approaches that generate solutions on a global scale in line with the SDGs. Furthermore, with priority given to spatial implementation through pilot projects, infrastructure is being prepared to serve as an example for the district and city where the lab is located and other cities and countries (Yilmaz & Ertekin, 2022b).

Nevertheless, Turkey and Istanbul have faced significant urban problems owing to rapid population growth, out-migration, and suboptimal management decisions. The rapid urbanization process has led to the depletion of natural areas. Istanbul, which boasts forests in the northern region and numerous drinking water sources, is at risk of losing its productive lands, water resources, and forested areas. To address these challenges, the IMM has expanded its collaboration efforts by establishing urban

laboratories and has taken steps toward finding solutions to urban issues (IMM, 2020; Yilmaz & Ertekin, 2022b). The Istanbul Planning Agency (IPA), for example, is a unit established under the municipality to enhance IMM's strategies, foster collaborations, and address urban issues (IPA, 2023). Its priority areas of assignment include education, technology, and urban planning. It embarks on planning activities ranging from a larger planning scale to a design scale, focusing on social policies, urban problems, and strategical planning (IPA, 2023). These labs, which do not have implementation authority, also serve as research and experience labs for local governments. They provide support to local government in areas such as generating problem-focused data, managing participation processes, and developing recommendations and strategies for implementation projects.

However, alongside all of these actions, a significant governance issue has emerged in Turkey that is one of the primary problems at the regional and urban levels. This governance issue points to a jurisdictional complexity. For example, although forested areas, nature reserves, and national parks fall under the responsibility of the Ministry of Agriculture and Forestry, environmental protection and the management of protected areas are the responsibility of the Ministry of Environment, Urbanization, and Climate Change. Similarly, city parks under the name "Millet Bahcesi" are under the jurisdiction of the Ministry of Environment, Urbanization, and Climate Change, but other city parks fall under the responsibility of local governments. This governance issue also indicates the absence of comprehensive planning in the country. Therefore, to preserve green spaces and protect nature to be comprehensive and sustainable, national and local governments must collaborate effectively. However, political conflicts in Turkey often hinder such collaboration. Such measures can help ensure that urban planning in Turkey is more inclusive, equitable, and sustainable; they also contribute to the long-term well-being of cities and residents. ULLs, on the other hand, have the potential to be a new model for urban governance by enabling collaborative, inclusive, and participatory approaches to urban planning and development. However, more than independent efforts by local governments are needed because bridging the gap between complex management models necessitates solid interinstitutional communication. Cooperation between local and national governments and prompt action are imperative within both global and local agendas (Yilmaz & Ertekin, 2022b).

At this point, we believe that establishing a relationship between labs, local government, and smart cities rather than defining regional and urban landscape problems can provide solutions to all problems. Therefore, in the following sections, we address the development of the ULL model through landscape management and its association with local governments.

METHODOLOGICAL APPROACH

Living labs have started to exchange experiences and best practices within the European Network of Living Labs. Obvious and expected synergies and expected values with a living lab network are, of course, opportunities for sharing knowledge and resources. The existing living lab model has several principles, including empowerment of users, openness, realism, continuity, influence, and spontaneity (Yilmaz & Ertekin, 2022a). The living lab model was designed to be user-centric, collaborative, and adaptable. It prioritizes the active involvement of users and stakeholders, openness to diverse perspectives, testing in real-world conditions, ongoing development, the influence of participants, and fostering creative and spontaneous interactions. These principles collectively contribute to the success of living labs as engines of innovation and problem-solving (Bulkeley et al., 2018; Leminen et al., 2018).

Empowerment of users emphasizes involving end users or citizens actively in the innovation and development process. Because the prominent role of living labs is "to engage and empower users to participate in the generation of valuable and sustainable assets," (pp.196) people who will ultimately use or benefit from a product, service, or solution are given a central role in shaping and cocreating it (Corelabs, 2007; Veeckman & Temmerman, 2021;; Sorensen & Torfing, 2011). Their insights, feedback, and needs are valuable contributions to innovation (Bekker & Long, 2000). Although

living labs emphasize user involvement, there may still be marginalized or underrepresented groups whose voices need to be adequately heard. Therefore, *inclusivity* is an essential principle to empower users in the process. Ensuring that empowerment and openness extend to all population segments is essential to avoid potential biases in innovation outcomes (Winden et al., 2013).

Openness can be related to open innovation (Chesbrough, 2006; Chesbrough & Appleyard, 2007), crowdsourcing and involving lead users (Von Hippel, 1986; Von Hippel & Katz, 2002). Living labs are characterized by their openness to various stakeholders, including individuals, businesses, research institutions, and government bodies. They create an environment in which different actors can collaborate, share ideas, and work together to find innovative solutions (Hawken & Petit, 2020).

Focusing on real-world settings (*realism*) is the most distinguishing characteristic of living labs compared with open and user-centric approaches (Yilmaz & Ertekin, 2022a). Living labs is a concept that focuses on creating real-world conditions for testing and experimentation of innovations. It aims to replicate authentic settings that closely mimic the actual environment in which the innovations will be used. This approach allows for accurate testing of the innovations under circumstances that reflect their intended use, thereby leading to a better understanding of their potential benefits and drawbacks. By providing a platform for testing and experimentation in authentic environments, living labs can help accelerate the development and adoption of new technologies and solutions (Bulkeley et al., 2017; 2018; Leminen et al., 2018; Yilmaz & Ertekin, 2022a). Living labs encourage *spontaneous* interactions and creativity. They are not overly rigid or formal but allow flexibility in how users and stakeholders engage with the innovation process. This flexibility can lead to unexpected and innovative outcomes (Bulkeley et al., 2017; 2018; Leminen et al., 2018; Yilmaz & Ertekin, 2022a). Living labs prioritize real-world testing and spontaneity, both of which can sometimes lead to a lack of methodological rigor in evaluating the effectiveness of innovations. Balancing the need for real-world conditions with rigorous evaluation methods is a continuous challenge (Westerlund & Leminen, 2018).

Living labs operate over an extended period rather than being short-term projects. *Continuity* allows for ongoing testing, refinement, and adaptation of innovations. It acknowledges that the development of solutions is an iterative process (Bergvall-Kåreborn & Ståhlbröst, 2009; Yilmaz & Ertekin, 2022a).

Living labs provide a platform for users and stakeholders to *influence* the direction of innovation. Their feedback and suggestions can shape the development process, ensuring that the final product or solution aligns with their needs and expectations (Juujärvi & Pesso, 2018; Yilmaz & Ertekin, 2022a).

Although the existing living lab model encompasses several valuable principles for innovation and problem-solving, certain limitations and potential areas for improvement are worth considering. One challenge is ensuring the long-term *sustainability and scalability* of living labs. Although living labs produce innovative solutions in specific contexts, scaling these solutions to broader regions or communities can be challenging. Addressing scalability issues requires careful planning and coordination. Although living labs often operate over extended periods, maintaining momentum and resources for ongoing projects can take time. Finding ways to secure sustainable funding and resources is crucial.

Additionally, more standardized methods are needed to measure and evaluate living lab's impact and success, facilitating comparisons and effectively identifying best practices. Effective governance and coordination mechanisms are essential as living labs involve multiple stakeholders. Ensuring all parties have a say in decision-making while avoiding conflicts or power imbalances can be complex. Living labs deal with sensitive user data, so ensuring privacy and data security is paramount. Developing clear protocols for data handling, consent, and protection is essential to maintain user trust. Navigating the regulatory landscape can be complex, especially when dealing with innovative technologies or services. Ensuring that living labs comply with relevant regulations and standards is essential. Although there are opportunities for knowledge sharing within living lab networks, ensuring that insights and best practices are effectively disseminated and adopted across different regions and domains is an ongoing challenge.

Consequently, although the living lab model offers a user-centric and collaborative approach to innovation, addressing these limitations and challenges can help enhance the effectiveness and impact of living lab initiatives. Continuous adaptation and improvement are crucial to realizing the full potential of this approach in solving real-world problems.

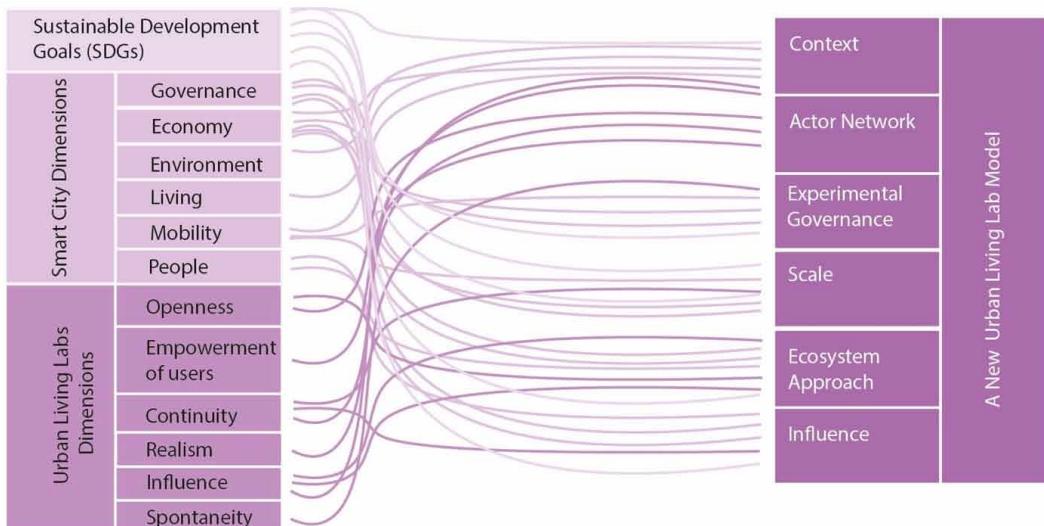
In this context, establishing a framework for living labs that not only seeks solutions to regional and local problems but also addresses global issues is necessary. This framework should include greater involvement from local governments and establish regulations or standards. One notable absence within existing lab models is an evaluation system, which is, in fact, one of the most critical criteria that substantiate the accuracy and promote the dissemination of knowledge. An evaluation system can also facilitate the production of more practical and expedient solutions. Furthermore, the concept of scale, which is not currently included in the existing model, holds significance for urban research and studies. The process of measuring and assessing outreach to a target audience or the impact on a particular area is vital to avoid repeating past mistakes. Within this scope, it is evident that the current living lab model needs to be reevaluated within the framework of sustainable urban planning and development. In the context of smart cities, proposing a new model is essential to harness the potential of living labs that offer opportunities for creating and implementing specific technological infrastructure.

In the suggested ULL model shown in Figure 1, the context title focuses on the subtitles, such as environmental-based, urban-based, rural-based, socio-capital-based, technology-based, and methodology-based. In addition to underlying which subject the context is related to, what is essential here is to consider global, national, or urban-related problems as the context in a broad perspective. It is underlined that the necessity here is to seek solutions by localizing each scale, whether a global problem or a local one. The context, in fact, also emphasizes how experts should handle the subject. At this point, the second title, actor-network, appears in action. The actor-network title defines the role of the planner/designer, describes the user's position, and determines the short-medium-long-term process of the steps to be taken.

Moreover, experimental governance refers to the decision-making process, the collaboration and participation process, the implementation process, the evaluation and cocreation process, and the rethinking process. In this case, a process definition is made for each priority defined in the context. The determination of the process also responds to many principles, such as transparency and openness in governance. On the other hand, scale refers to the scale of the project, impact limits/scale, participation scale, and collaboration scale. In fact, with technological help, the scale concept has also begun to increase, and its sphere of influence has expanded. Although we have yet to catch up with the speed of technological reflections and their impact on cities, the scale definition in the model aims to reveal the effect of the reflections.

On the other hand, the ecosystem approach emphasizes that this effect can be spatial and social. Education level is evaluated with the subheadings of application level, participation level, infrastructure level, entrepreneur level, and collaboration level. It underlines that the entrepreneurship network will be important in urban studies and education in participation and cooperation processes. Finally, influence refers to openness and flexibility. In principle, it underlines the entire process's transparent, open, and flexible management.

In the model, SDGs represent global-scale problems. The model can quickly adapt to any approach of global importance. Smart City Governance is related to actor-network, experimental governance, and influence in the new ULL model. The subheadings of governance, participation in decision-making, public and social services, transparent government, political strategies, and perspectives are among the six main headings in the smart city dimension. The Smart City Governance is associated with the smart economy, context, ecosystem approach, experimental governance, and actor-network. The concepts of living, environment, people, and mobility also took place in the new ULL model as context, process, scale, and level. Smart cities dimensions address cities to be smarter with technology. This approach includes measurement and evaluation criteria, such as quality in cities, tourist attraction,

Figure 1. Suggested model for ULLs

production, and innovative approaches. It adopts the method of easy evaluation of cities under six headings and ranking and scoring with this evaluation. It is a question of whether it focuses on the problems encountered in the cities or whether decisions are taken according to the locals' priorities. Also, the implementations are carried out within the framework of priorities. A similar problem emerges on the global agenda as well. The question of how to resolve specific preferences—national, urban, or local—is debated, and these debates often need to be answered.

Although the current ULL model focuses on urban problems, it has yet to expand and remains inadequate. The principles of openness, empowerment of users, continuity, realism, influence, and spontaneity in the current ULL model are not at a level to solve local problems or are not at a level to localize global issues. It pays attention to the diversity of actors, the role of user and designer, and cooperation and entrepreneurial relations. The dimension of participation is broad, but its relationship with urban planning still needs to be established. It is associated with technological infrastructure and innovations. In this framework, establishing a connection between the existing potential and urban planning is necessary. The new ULL model proposed in the research has been reconsidered in the urban planning dimension by associating it with the smart city, the global agenda, and the current ULL. The model, which can be a solution and adaptable for any country with a top-down or bottom-up management style, is balanced with the implementation process and success. However, there are differences in decision-making processes. In addition to all these processes, in the case of Turkey, which has a top-down management system, a different system proposal for ULL is outside the requirements, but it is essential to include it in the management system. Therefore, the immediate response here is to enable the benefits of ULL to be used in urban planning and to raise awareness of the concern.

Data Collection and Data Analysis

We tested how the suggested model can address the issues mentioned in this article using landscape management and green area analyses in Istanbul. In this context, the research methodology for the article involves a multifaceted approach to investigate the role of ULLs in Istanbul's urban development context. Delving into the integration of ULLs within Istanbul, we discovered that the connections and interactions between labs and local government are essential aspects to entail data analysis and to

evaluate the effectiveness of ULL-generated data and its integration into local governance practices. We aimed to discern the impact and contributions of ULLs in addressing urban challenges.

Furthermore, the suggested model aims to address the identified shortcomings and enhance ULLs' efficacy. The research methodology underscores the significance of a focused evaluation of the ULL model, pinpointing its weaknesses and highlighting how the proposed new model can potentially rectify these issues.

Research Questions and Objectives

The following question guided the overall research process: Can ULLs be the solution for urban problems? To provide comprehensive answers to our research question and reach meaningful conclusions, we gathered relevant data and skillfully analyzed it using a geographic information system (GIS). The knowledge and insights gained throughout this process robustly supported our findings.

Data Collection

To gather pertinent information, we used various sources, such as government reports, official statistics, and Istanbul-specific datasets. The research relied on diverse and reliable data sources, including the IMM. The primary data were initially collected in the year 2022.

Spatial Analysis

The collected data underwent extensive analysis using GIS software, such as ArcGIS and ArcPro. GIS analysis examined the land governance model, landscape patterns, and green system in Istanbul.

In the next section, we address how ULLs can potentially contribute to solving global problems.

SEEKING SOLUTIONS THROUGH LANDSCAPE MANAGEMENT IN ISTANBUL: ARE ULLS THE SOLUTION?

For us to provide a clearer understanding of local government operations and to emphasize the potential of ULLs in addressing urban challenges, beginning with a schematic representation of a local government's function is beneficial. Highlighting where issues arise in the current operational model was also essential because this can offer valuable insights.

In Istanbul, the distribution of green areas is far from homogeneous, thus emphasizing the need for accessible green spaces for all citizens. However, the deficiency of nature-based solutions in urban planning limits this accessibility. Therefore, decisions made by the IMM often apply to restricted areas. Cooperation and the application of new methods are imperative in addressing this issue. Considering green areas as part of the ecosystem, not just meeting urban standards, is crucial. Urban green areas and natural landscapes should be evaluated simultaneously as part of a broader ecosystem. Local governments should involve citizens in the process through education and awareness-building, leading to informed decision-making. The current planning approach in Istanbul remains hierarchical and predominantly top-down. To empower Istanbulites to make informed decisions for their future, a comprehensive approach is necessary, focusing on education, information, and citizen inclusion. The urban sprawl and district size, rather than population density, contribute to uneven green area distribution. Therefore, flexibility and new methods are essential in urban interventions.

Despite potential and weaknesses in current governance model in Turkey and Istanbul, strong cooperation and integrated management are often lacking at each level of governance. Budget constraints can also impede collaboration with other local administrations, universities, and private companies. ULLs offer a potential solution by facilitating collaborations and providing methods or spaces to address these challenges. This proposal initiates a reevaluation, redesign, and reimagining of cities.

In the context of urban landscape, Figure 2 illustrates the roles and authorities of national and local governments within the planning system, reflecting the current situation. At the national level, eight different departments are involved in decision-making and implementation, whereas at the local level, only two exist. Note that there are varying levels of authority within each section, often overlapping spatially, suggesting a collaborative planning approach. However, this collaboration predominantly follows a top-down approach, which may hinder efforts to address global-scale issues.

Urban forests and agricultural areas hold significant potential in Istanbul, with fertile soil, but they face challenges owing to planning decisions that put forested areas in the periphery and north of the city at risk. This issue extends to agricultural fields, driven by rapid population growth. Preserving and improving the current situation, while tackling global-scale problems, are crucial steps for Istanbul's future. While the Environmental Plan recognizes Istanbul's substantial capacity, it also emphasizes the need to improve management methods for specific areas. Unfortunately, areas where local governments lack authority fall under national government control. This situation restricts the use of local governments' knowledge and citizen input, potentially complicating global efforts. Effective governance should involve leveraging local strengths and knowledge.

Protected areas face similar challenges, with many of them losing their landscape quality. The distinction between active and passive green areas, as defined by the Spatial Planning Code, is crucial. Active green areas cater to active use by citizens and are essential for recreation and leisure, whereas passive green areas, although not initially intended for public use, are increasingly used for various activities. This trend, contrary to biodiversity conservation concerns, can harm protected areas.

Issues related to citizen voices, transparency in decision-making and implementation, and factors influencing urban governance come under scrutiny. Examining population density by comparing passive green areas in different districts of Istanbul is necessary to define urban landscape characteristics, sizes, and management typologies. The population distribution reveals that while the need for urban green spaces is high in Istanbul, distribution is uneven across the city. The center of the city underscores the need for improvements, driven not only by population density but also by urban sprawl and district sizes.

The proposed ULL model encourages a new approach to address these challenges. It highlights the need to address issues at various scales, from urban to global, and emphasizes the importance of localization in finding solutions. The suggested model introduces concepts, such as actor-network, experimental governance, scale, and influence, to define ULL roles, processes, and impacts.

From the perspective of the urban landscape, Figure 2 reveals national and local governments' authorities in the planning system, and the analysis reflects only the current situation. There are eight different departments at the national level in decision-maker and implementer, whereas at the local level, there are only two. However, there are different levels of authority in each section that overlap spatially. However, this does not have to be interpreted weakly; it can be understood as collaborative planning. Unfortunately, this collaboration reflects top-down understanding, which can be a problem to struggle with global-scale solutions. Although urban forest areas are among the most significant potentials of Istanbul, with the advantage of soil fertility, urban agricultural areas can also be calculated as potential. The forest areas in the city periphery and the north are in danger of disappearing with the planning decisions. The same is valid for agricultural fields. This is an inevitable problem faced by the rapidly developing metropolitan city, whose population increases rapidly. However, this problem has not yet reached an unchangeable situation. While we discussed the struggling with the global-scale problems discussed in the first section, we discovered that preserving and even improving the current situation is indispensable for the future of Istanbul. While the Environmental Plan underlines the vital capacity of Istanbul, it is an indication that Istanbul can be self-sufficient in natural-sourced solutions. However, the main issue here is the management methods of specific fields. These areas are where the local government has no power to dominate; the national government controls them. This control of national government means not benefiting from the local governments' knowledge and experiences in the local environment and the citizens. Of course, this situation can bring difficulties in the global

struggle. What is needed for solid governance is to take advantage of the local and strengthen the local. The same can be said for protected areas. These areas also suffer the same problems. The protected areas, which seem to be in large numbers, stand losing their landscape quality.

According to the Spatial Planning Code, there are two types of green areas: passive (Figure 3) and active (Figure 4). However, active green areas are classified as playgrounds, parks, botanical gardens, zoos, picnic areas, and recreational areas (public sports areas, urban forests, natural parks, and timber forests) where citizens, tourists, and those living in near or far surroundings benefit actively. On the other hand, passive green areas are classified as forests, traffic islands, cemeteries, and woodlands where, under normal conditions, they are seen as open spaces that are not considered public spaces with any users. However, because of the need for more green space in today's conditions, the citizens also use passive green for daily activities. Therefore, contrary to the worldwide concern about biodiversity conservation, the daily use of protected areas brings destruction.

Therefore, examining the population by comparing passive green areas for a starter is necessary to define urban landscape characteristics, sizes, and management typologies in Istanbul. Figure 3 focuses on population and passive green areas in each district of Istanbul, and Figure 4 shows active green areas. Unfortunately, the population is too high in Istanbul to reach the needs for urban green areas. However, the center of the city underlines the need for improvements. Where the population is less in the city, more green areas can be observed. Still, this does not come from density calculations. It is more about the urban sprawl and district cover sizes. This situation also shows that green areas are not homogeneously distributed in the city. Inevitably, the distribution of green in the city is expected to be accessible to all. Notwithstanding, the situation cannot be met owing to the deficiency of nature-based solutions in urban planning. Therefore, the decisions taken by the IMM as a local government in Istanbul are specific to restricted areas. Here, the necessity of cooperation and applying a new method to the city comes to the fore.

Figure 2. Land governance model of Istanbul

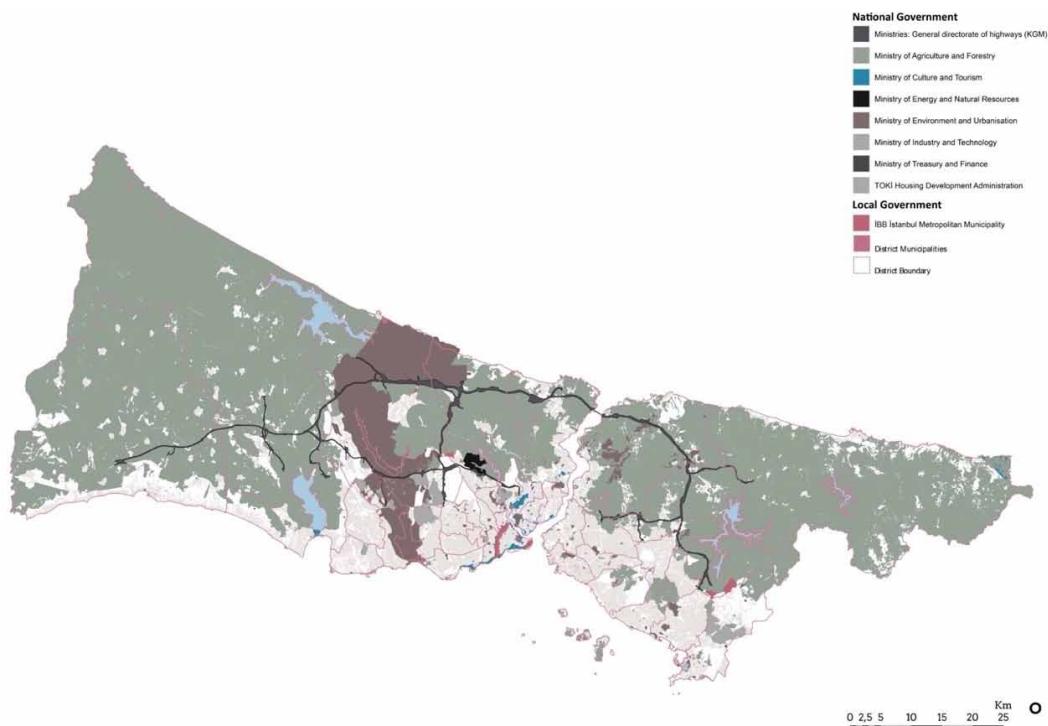
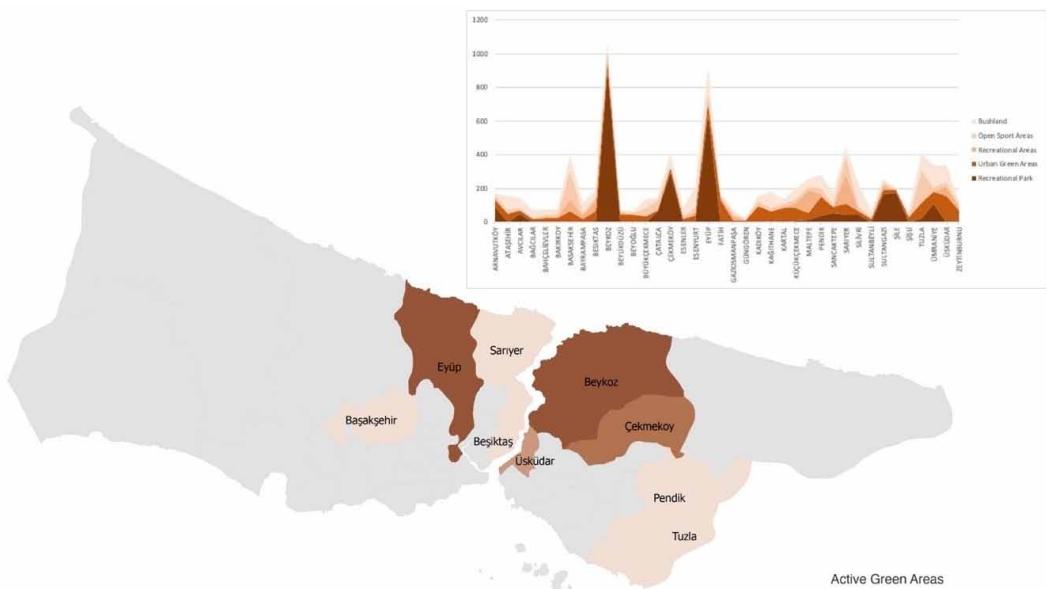
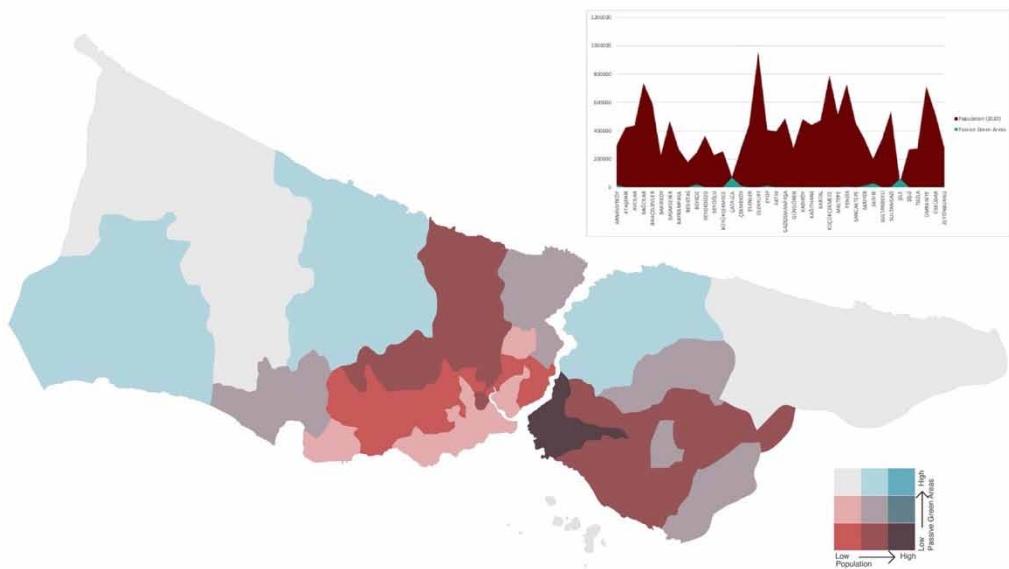


Figure 3. Passive green areas per capita at district level, 2021

Along with green areas being not considered landscape ecosystems, evaluating the active and passive green areas per capita is reasonable only to meet urban standards. However, urban green areas and natural landscapes should be evaluated concurrently as a part of the ecosystem. Even though local governments take notice of citizens' voices and seek an answer to their green needs, they move away from the significant picture. Although there are conservation approaches for natural landscapes, they can be easily ignored owing to political decisions, rapid urbanization, and urban sprawl. As a suggestion, a conservation approach can be offered to reach the local user with the ULL model, to increase the awareness of protection with education, and then to include the local users in the process.

Planning in Istanbul is now hierarchical and largely top-down in the contemporary context. Istanbulites can make the right decisions for their future. However, the approach should do more than include only the citizen participation process. On the contrary, the proper approach should consider the process as a whole that educates, informs, and includes the citizens. Spatial implementations should not be classified as a holistic or fragmented approach in the city. On the contrary, intervention methods should be developed in the most suitable ways. Of course, flexibility is necessary when new methods are on the table. Apart from the ULL structure, the management scheme in Turkey includes a system that needs to be more flexible. The management complexity in Turkey can be counted as an advantage that will pave the way for the development of the ULL model.

The IPA released the Istanbul Vision 2050 Strategy Plan in 2022, highlighting the precarious state of green areas in Istanbul (IPA, 2023). As a recommendation, it emphasized the evaluation of all vacant parcels in Istanbul (Figure 5) as green areas, aiming to increase the per capita green space. Currently, the per capita green space is 7.2 square meters, which can potentially increase to 15 square meters through this approach (IPA, 2023). When viewed as a lab approach, the participatory planning efforts carried out through the IPA studies, which influence IMM's implementation methods, operate differently from existing lab models. Established under the municipality, IPA focuses on urban initiatives and issues within the municipality's areas of implementation. The IPA manages the process collaboratively with city users, enabling it to publish a strategy document that can also address global problems. BLL and Basaksehir Municipality do not operate the same way, however,

Figure 4. Active green areas in Istanbul, 2021

because BLL currently lacks any urban landscape or green-focused initiatives or urban projects for municipal implementation. This indicates that BLL is limited to the living lab model alone. It is crucial to enhance the existing lab model and take steps in collaboration with local governments, as demonstrated in the IPA example.

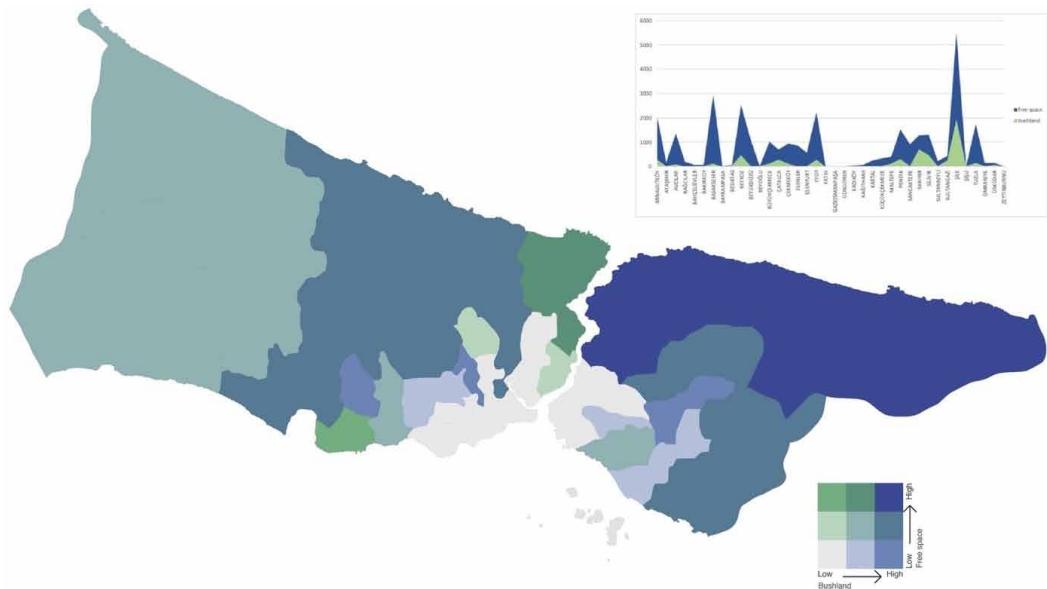
In this context, if changes are adopted within the existing lab model, it is a fact that ULLs can be a response to global, regional, and local problems within the scope of sustainable and comprehensive planning.

CONCLUSION

We discussed the principles and characteristics of ULLs, highlighting their user-centric, collaborative, and adaptable nature. These principles, such as empowerment of users, openness, realism, continuity, influence, and spontaneity, collectively make ULLs effective engines for innovation and problem-solving (Bulkeley et al., 2017; 2018; Veeckman & Temmerman, 2021; Leminen et al., 2017; Westerlund & Leminen, 2018). However, the current ULL model has certain limitations, including challenges related to sustainability, scalability, standardized evaluation methods, governance, data privacy, regulatory compliance, and knowledge dissemination. To address these limitations and enhance ULLs' effectiveness, establishing a framework that not only addresses regional and local issues but also tackles global problems is essential. This framework should involve greater participation from local governments and the establishment of regulations or standards.

One notable absence in the existing ULL models is an evaluation system, which is crucial for substantiating accuracy and promoting knowledge dissemination. An evaluation system can also expedite the production of practical solutions. Additionally, the concept of scale, which is not currently included in the existing model, holds significance for urban research and studies. The process of measuring and assessing outreach to a target audience or the impact on a particular area is vital to avoid repeating past mistakes. In this context, the proposed ULL model emphasizes the need to seek solutions at various scales, from global problems to local ones. It underlines the importance of localizing solutions for different issues and highlights the role of experts in handling these challenges.

Figure 5. Sphere spaces and bushland cover, 2021



The model introduces concepts such as actor-network, experimental governance, scale, and influence, all of which define the roles, processes, and impact of ULLs. The ecosystem approach in the model underscores that the impact of ULLs can be both spatial and social, emphasizing the importance of entrepreneurship networks in urban studies and education. Furthermore, the model addresses Smart City Governance, aligning it with actor-network, experimental governance, and influence, thus integrating ULLs into the broader context of urban development.

Although the existing ULL model primarily focuses on urban problems, it needs expansion and adaptation to address global issues effectively. The principles of openness, user empowerment, continuity, realism, influence, and spontaneity are essential, but may need refinement to localize global problems adequately. Establishing a connection between the existing potential of ULLs and urban planning, especially in the context of smart cities and global agendas, is crucial. The proposed ULL model aims to bridge this gap and offers adaptability for various management styles, whether top-down or bottom-up, to maximize the benefits of ULLs in urban planning and raise awareness of their potential.

Briefly, the problems, such as population growth and rapid urbanization, have been negotiated expressly in Turkey and overlapped with spatial planning. The management dimension, explicitly handled in Istanbul, has drawn attention to the fact that spatial decisions are made by more than one decision-maker. This situation emphasized that the steps taken at the urban scale are handled with institutional structuring without establishing a relationship with global or local problems. As a result, a vicious loop of problems emerges. The experience of the locals is also overlooked, although it is a strength. Users are perceived as fundamental actors in conducting the ecosystem of their everyday life central in the process of creativity, experimentation, and evaluation of technological artifacts (Beuren, 2009; Herrera, 2017).

The distribution of green areas in Istanbul reveals a lack of uniformity, emphasizing the necessity for accessible green spaces for all citizens. However, the absence of nature-based solutions in urban planning hinders such accessibility. As a result, decisions made by the IMM often apply to restricted areas, necessitating cooperation and the adoption of new methods to address this issue. Recognizing green areas as part of a broader ecosystem is crucial, and urban green spaces and natural landscapes

should be evaluated concurrently. The current planning approach in Istanbul remains hierarchical and primarily top-down, necessitating a shift toward a more comprehensive approach that involves education, information dissemination, and citizen inclusion. Population distribution in the city highlights the need for improvements, driven by factors beyond population density, such as urban sprawl and district sizes.

The proposed ULL model introduces a new approach to address these challenges, emphasizing the importance of localization and offering concepts such as actor-network, experimental governance, scale, and influence to define ULL roles and processes. The IPA's efforts in the Vision 2050 Strategy Plan showcase the potential for comprehensive planning and collaboration with local governments. By embracing changes in the lab model, ULLs have the potential to address global, regional, and local problems within the framework of sustainable and inclusive planning.

In further research, we will focus on evaluation and measurement criteria for ULLs' integrated with the urban related issues.

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