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Participatory Approaches to Landscape Planning in Urban Fringe Areas: A Systematic Review of Community Co-Design and Institutional Governance Frameworks

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ABSTRACT

This paper provides a systematic review of participatory landscape planning in urban fringe areas, focusing on community co-design and institutional governance frameworks. Urban fringes are regions where urban expansion intersects with rural and agricultural systems. These areas present complex challenges due to the involvement of multiple stakeholders and the complexity of ecological networks. The review evaluates the effectiveness and applicability of methods such as participatory rural appraisal (PRA), participatory geographic information systems (GIS), landscape design workshops, and participatory scenario modeling. These methods promote community participation and generate planning outcomes related to local environments and sustainability. The review reveals a surge in global interest in participatory planning practices since 2010, particularly in Europe, East Asia, and Latin America. Additionally, the findings indicate that forms of participatory governance, such as collaborative and co-governance models, are crucial for success in these dynamic landscapes. The study underscores the importance of integrating local knowledge and institutional prerequisites into future urban fringe area planning. This review deepens our understanding of the role of community co-design in landscape planning and offers insights for strengthening more inclusive, adaptive, and resilient governance in urban fringe regions.

Keywords: Participatory Landscape Planning, Urban Fringe Areas, Community Co-Design, Institutional Governance, Participatory Tools

INTRODUCTION

Urban Fringe Landscapes: Planning Challenges and Opportunities

Urban fringe landscapes, also known as peri-urban areas, are characterized by high dynamics and complexity where urban expansion interacts with rural, agricultural, and natural systems. These landscapes are ecologically complex hybrid ecosystems that provide a wide array of goods and services, such as biodiversity, habitats, water regulation, soil fertility, and carbon sequestration. However, they are also subject to fragmentation, invasion by alien species, and degradation (Li et al., 2021). A functional zoning study of the Jiangning District in Nanjing, for example, shows widespread trade-offs between provisioning services (e.g., agriculture) and supporting services (e.g., habitat conservation), as well as clear spatial patches of ecological value requiring fine-scale planning

interventions (Xu & Duan, 2024). Similarly, studies of highly urbanizing Chinese peripheries demonstrate stage- and place-responsive land transformation trajectories, wherein agricultural mosaics transform into sprawling built landscapes, thereby creating threefold ecoviolations that impact hydrological cycles and habitat connectivity. This ecological complexity is further complicated by spatial heterogeneity, including patches of farmland, remnant forests, wetlands, and scattered settlements, as well as peri-urban infrastructures such as roads, energy installations, and waste disposal sites. The resulting mosaic landscape does not lend itself to neat categories but rather to fine-grained spatial analysis and integrative planning frameworks that balance multifunctionality with ecological resilience.Zakariya et al developed a conceptual framework for evaluating the characteristics of rural landscapes (Zakariya et al., 2019). This framework can be used for tourism development in rural and suburban areas and supports the integrated planning required for these complex landscapes. As demonstrated by participatory mapping studies in Mindanao, Philippines, indigenous communities actively incorporate cultural and ecological insights into planning efforts, which can provide important information for planning such mixed landscapes(Boongaling et al., 2023).

Meanwhile, the socio-political aspects that contribute to the difficulty of planning are exacerbating the complications of urban planning on the urban fringe. Population inflows and shifts in land use put pressure on governance systems, community identities, and institutions. Peri-urban governance is often characterized by disjointed power where urban, regional, and rural administrations intersect rather than two administrations, and they struggle with decisions about land conversion, infrastructure siting, and ecosystem protection (Ravetz & Sahana, 2025). Socially and demographically, the peripheries accommodate a variety of actors, including long-time residents, recent arrivals, commuters, NGOs, and municipalities, each with their own specific needs, values, and power dynamics. In Europe, VUCA (volatile, uncertain, contested, and ambiguous) is often used to characterize situations in peri-urban regions due to their constantly changing demographics, institutional responsibilities, and policy priorities. The multifunctionality of land, including urban residential land, land for food production, land for recreation, and green space, results in complex trade-off relations between ecosystem services, economic activities, and social justice. Governance research highlights that spatial fragmentation increases when ill-defined planning jurisdictions overlap in terms of land use types (e.g., food production units, conservation areas, and residential areas) (PLUREL, Peri-cene). This calls for adaptive governance regimes that can navigate institutional pluralism, accommodate clashing claims, and facilitate meaningful community engagement in the co-design of land use futures.

Rationale for Participatory Landscape Planning

As urban fringe areas become battlegrounds for competing land uses, managing multiple values—such as ecological, cultural, recreational, and economic—requires planning processes that integrate diverse stakeholder perspectives. Traditional top-down planning often overlooks potential community values. When land use decisions prioritize a single objective, such as conservation or development, conflicts or resistance may arise. Participatory approaches address this issue by actively engaging local stakeholders in defining and negotiating land values. This process reveals issues that are often overlooked, such as aesthetic attachments to place, livelihood needs, and cultural heritage. Additionally, design discipline research indicates that co-designing environments fosters innovative, contextually appropriate landscape solutions because stakeholders who contribute meaningfully are more likely to support and sustain implementation outcomes. In urban fringe areas, the fragmentation and mixing of land uses can exacerbate perceived incompatibilities. Participatory design provides flexible tools, such as design and scenario workshops and GIS-mediated discussions, to balance multiple ecosystem services and social functions. Thani et al studied the impact of urban landscape morphology on temperature distribution in hot and humid urban centers (Thani et al., 2013). Their research provides insights for urban planning in similar areas and informs participatory approaches in such climatic conditions. Elgakar adds that integrating equine sector planning in peri-urban areas can promote multifunctional land use, and that this approach can benefit from participatory methods, particularly in urban fringe areas where land functions often overlap (Elgakar, 2012).These tools bridge the gap between technical and experiential knowledge (Pak & Verbeke, 2015).

Participatory landscape planning provides solutions that go beyond balancing multiple values to reduce conflicts over land use and increase local stewardship of transition areas. Empirical studies of the urban-rural fringe in Germany reveal conflicts arising when new land uses compete with long-established ones, such as agriculture or industry. These conflicts evolve into "agonistic arenas" characterized by power imbalances that hinder communication aimed at constructive outcomes (Jensen et al., 2018). Rich participation creates safe spaces where stakeholders can voice their concerns, acknowledge trade-offs, and imagine achievable land use futures together, converting adversarial situations into negotiated outcomes. Furthermore, community science partnerships demonstrate that local actors embrace more profound place-based stewardship and resilience when responsible for monitoring or co-management, such as tracking biodiversity or maintaining green infrastructure

(Wolff et al., 2021). Community-engaged stewardship is particularly critical along the urban-rural edge, where institutional stewardship is often lacking or fractured. Including local actors in monitoring systems can strengthen on-the-ground capacity and forge links between governance silos by incorporating local knowledge into policy feedback processes. In this way, participatory landscape planning can serve as a vehicle for conflict transformation and for establishing co-produced institutions of governance that incorporate multiple values and stewardship into long-term planning and management processes.

Research Objectives and Review Scope

This review attempts to answer fundamental questions about participatory landscape planning in urban fringe areas-a dynamic mosaic where urban, rural, and ecological systems intersect. As urban sprawl increasingly encroaches on rural areas, it becomes crucial to explore participatory options for managing the transition to a more urban landscape that considers competing land use demands and ensures the sustainability of ecosystem services. This review seeks to answer the following questions: Which techniques are best for public participation in urban fringe landscape planning? How are community co-design conceptualized and operationalized? What governance frameworks enable or inhibit participatory planning in this context?

This first step maps the range of participatory approaches used in different urban fringe contexts and landscapes, represented by the diverse elements of the urban-rural interface, peri-urban areas, exurbia, and edgelands (Figure 1; Table 1). The urban-rural interface is of particular concern given its fragmented governance approach and diverse stakeholder interests, which often cause land-use conflicts (Antrop, 2005). Furthermore, peri-urban regions exhibit hybrid landscapes characterized by rural and urban features. Collaborative workshops, design charrettes, and participatory geographic information systems (GIS) tools have proven successful in involving local actors in urban planning processes (Zasada et al., 2011). These tools facilitate the inclusion of traditional knowledge and ensure participatory planning that considers the local ecological and social dimensions of land use. Considering these participatory mechanisms in light of peri-urban dynamics, our work aims to highlight processes through which equitable and inclusive decision-making can be realized.

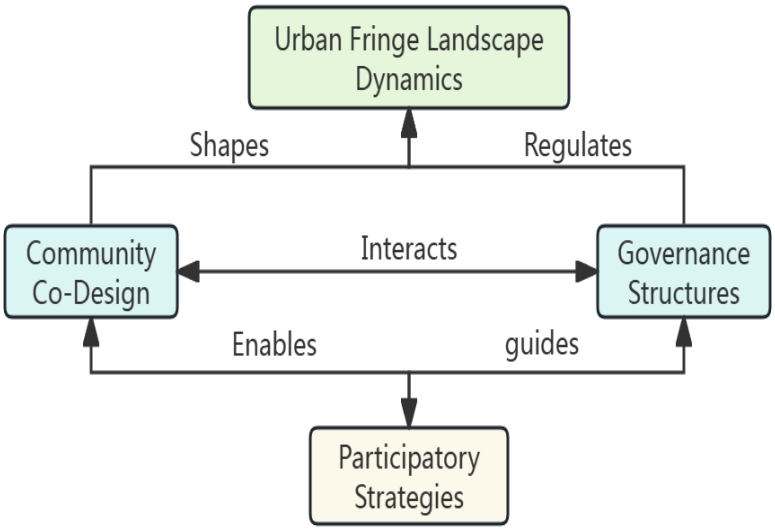

Figure 1. Conceptual model linking community co-design, governance structures, and urban fringe landscape dynamics

Second, the review will address the conceptualization and operationalization of community co-design in peri-urban contexts. The paper discusses how co-design enables collaborative landscape creation and incorporates stakeholder information to develop socially and ecologically resilient solutions. However, the practicalities of co-design in fractured landscapes shaped by dispersion in space and various land use systems present substantial operational challenges. Governance mechanisms may hinder or facilitate such co-design processes. Figure 1 shows a conceptual framework that illustrates how governance structures direct and constrain community involvement, thereby mediating the outcomes of participatory processes. The review also considers institutional arrangements that can facilitate or impede participatory planning, particularly in places with shared governance among layers of government (municipal, regional, and sometimes national) in urban fringe landscapes. Participatory approaches are often limited by top-down regulatory structures, a lack of coordination between agencies, and power imbalances (Sharp & Clark, 2013). This meta-analysis evaluates these barriers and investigates whether adaptive governance can mitigate them by providing more flexibility and inclusivity so all

relevant actors can participate.In conclusion, this review aims to: First, it aims to reveal the range of participatory methods in the context of urban fringe planning. Second, it aims to discuss the implementation of community co-design. Third, it aims to evaluate the forms of governance that influence these methods. The systematic review examines interlinked participatory planning and synthesizes its dimensions to provide a practical understanding of how it can be woven together to facilitate dynamism in the urban fringe landscape, achieving sustainability and enhancing community stewardship.

Table 1. Definitions and typologies of urban fringe areas in landscape literature

Typology Category	**Definition and Characteristics**
Urban–Rural Interface	Transitional zone where urban and rural areas meet, characterized by mixed land uses and dynamic spatial interactions.
Peri-Urban Areas	Regions experiencing scattered and dispersive urban growth, leading to hybrid landscapes with fragmented urban and rural characteristics.
Exurban Zones	Low-density areas beyond suburban regions, often characterized by residential development with limited urban infrastructure.
Edgelands	Liminal spaces at the edges of populated areas, often containing a mix of natural and built environments, including infrastructure and industrial sites.
Wildland–Urban Interface (WUI)	Zones where human development meets undeveloped wildland, posing challenges related to fire risk and ecological conservation.

METHODOLOGY

Review Design and Data Sources

This systematic review aimed to synthesize the available literature on participatory planning practices in urban fringe areas related to community co-design and institutional governance frameworks. We used a wide-reaching search methodology to search several academic databases (Scopus, Web of Science, and ScienceDirect) and relevant gray literature sources, including EU policy reports, to ensure an inclusive study selection process. Keywords such as "urban fringe," "peri-urban," "urban-rural interface," "participatory planning," "co-design," "landscape governance," and "institutional frameworks" were combined to ensure retrieval of as many relevant articles as possible. We further developed this approach to include studies related to participation or participatory techniques in peri-urban areas. Search terms: The search used the following terms: ("urbanization dynamics" OR "rural-urban transitions" OR "urban-rural transitions" OR "agrarian transitions") AND ("urbanization process dynamics" OR "urban-rural transformation" OR "rural-urban transition models") AND ("urbanization and rural landscapes" OR "urbanization and rural transformation") AND ("urban and rural dynamics" OR "grain structure transformation" OR "rural-urban transition process") AND "city-rural" TO "population" AND "urbanization transition" OR "city transition" AND "population health" AND "place transition" AND "cityscape transition" AND "rural landscape transition" AND "urban-rural economy".28/2019, excluding studies without a focus on transition dynamics between urban and rural landscapes.In addition to academic databases, gray literature sources were considered, including European Commission reports from the EU that provide evidence-based insights into landscape governance and participatory practices in Europe. This gray literature supplements academic literature by offering policy-relevant insights into landscape planning in urban fringe settings. Systematic reviews were conducted according to the Preferred Reporting Items for Systematic Reviews and Meta-analyses (PRISMA) guidelines to ensure transparency and reproducibility. The data were examined for conceptual trends, including the types of participatory strategies used, how community co-design is conceptualized, and the frameworks that underpin or constrain co-creation. This review synthesized the findings to identify similarities, gaps, and new trends in participatory landscape planning.

Selection Criteria and Screening

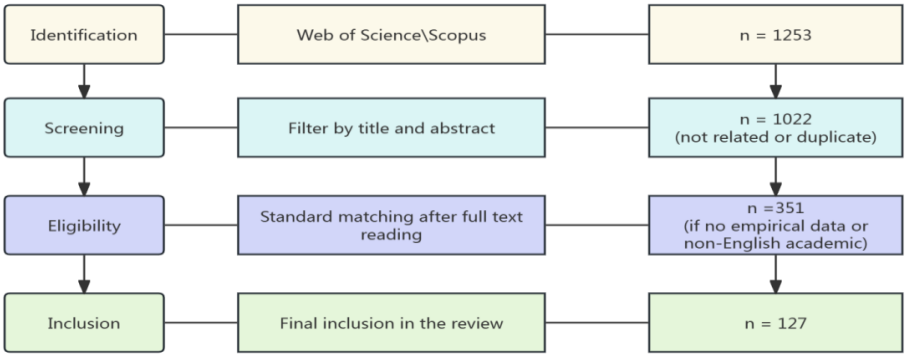

Figure 2. PRISMA diagram showing literature identification, screening, and inclusion steps

The screening process for the review was based on strict inclusion criteria to ensure relevance to participatory landscape planning in peri-urban regions. As shown in Figure 2, the initial identification phase involved extensive searches of Web of Science and Scopus, yielding 1,253 papers. Following the first screening phase, 1,022 articles were excluded: Of these, 248 were excluded because they were not relevant to the peri-urban context and 774 were excluded because they were duplicates. Eligible studies were then reviewed based on those conducted between 2000 and 2024 to determine the current knowledge and use of PP. We looked for studies in peri-urban areas using participatory action methods. Studies had to address the social and institutional aspects of landscape planning because these aspects are necessary for understanding the effectiveness of co-design processes in the complex, multi-actor situations that characterize the urban periphery. These inclusion criteria ensured that the selected studies aligned with the primary aims of this review: addressing the interplay of community involvement and organizational governance. Filtering was also conducted based on whether the content focused more on concrete data or related to academic standards in English. For example, articles without direct empirical support or that were not in English were excluded. This procedure resulted in 351 relevant studies, as shown in Figure 2. Studies that did not fulfill the predetermined criteria concerning the participatory process and condition scores or that addressed only ecological aspects and did not cover social and governance dimensions were excluded. The final stage of the inclusion process included 127 studies, all of which were considered for in-depth thematic coding and synthesis. As depicted in Figure 2, these studies extensively reflected on how participatory procedures are employed in peri-urban areas, including the social dynamics of participation and institutional setups that facilitate or prevent successful landscape planning.

2.3 Coding and Thematic Categorization

We were originally interested in how urban fringe landscape approaches engage local people. To discuss the level of engagement concerning the three types of landscape issues, we created a complex coding framework covering three main areas of interest: level of participation, tools used for implementation, and institutional framework. This framework is presented in the next section. The level of involvement was divided into three tiers: informing, consulting, and co-deciding. These tiers reflect the level of community participation in decision-making processes. In "informing" studies, information is disseminated to a community group without engaging them in decision-making, often in a top-down manner. Engagement is a more interactive process that includes collecting input from citizens, although final authorization remains with officials. Co-deciding is the most advanced form of participation, involving stakeholder and community members in decision-making. This coding system classifies studies according to the extent of involvement, ranging from the passive dissemination of information to the active participation in co-design sessions and governance (Gaete Cruz et al., 2022). Table 2 shows the engagement tools used at each level of participation, including community workshops and digital platforms, and how they contribute to different levels of engagement with local residents, stakeholders, and planners.The second coding dimension addressed the planning methods used in participatory landscape planning, including Participatory Rural Appraisal (PRA), Public Participation Geographic Information Systems (PPGIS), charrettes, and role-playing. These instruments were used to engage different stakeholder groups and support various participatory planning methods. For instance, charrettes and co-design workshops are collaborative tools that engage designers, residents, and other stakeholders in collaborative planning processes, particularly in conjunction with co-governance or collaborative governance models. Methods such as PPGIS support spatial data gathering and processing for public consultation, especially in digitally and geographically abundant planning processes (Türken & Eyüboğlu, 2021). Role-playing and participatory budgeting approaches have also been identified as useful for engaging citizens in decision-making processes by providing opportunities for them to play roles or allocate resources within participatory governance mechanisms. The institutional

framework classified the studies by governance typologies, including formal policy, grassroots governance, and hybrid approaches representing power relations and governance systems for participatory planning initiatives. Studies using grassroots governance correspond to a bottom-up process. Hybrid dimensions indicate combining a top-down approach to governance with community-led actions to address the complexities of urban fringe planning. Using the coding schedule in Table 2 allowed for a more systematic approach to classifying the large number of participatory practices and governance arrangements highlighted in the literature and facilitated an understanding of their effects and outcomes in peri-urban situations.

Table 2. Coding matrix of participatory tools, actor groups, and governance typologies

Participatory Tool	Actor Groups Involved	Governance Typology
Community Workshops	Local residents, community organizations	Collaborative governance
Public Consultations	Citizens, local authorities	Consultative governance
Co-Design Sessions	Designers, residents, local stakeholders	Co-governance
Participatory Budgeting	Citizens, local government	Participatory governance
Digital Platforms	General public, digital platform users	E-governance

FINDINGS

Trends in Participatory Landscape Planning in Urban Fringe Areas

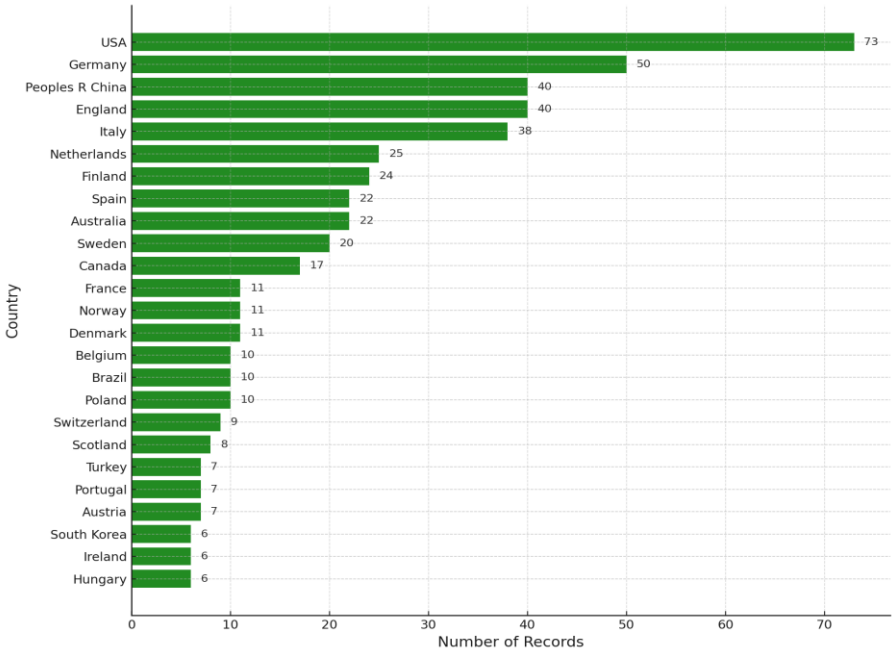

Figure 3. Spatial and temporal distribution of participatory landscape planning case studies (2010-2024)

The global spread and prevailing trends in the duration of participatory landscape planning in urban fringe areas are clear. This type of planning is increasingly results-oriented and has been investigated in a variety of regions. Figure 3 shows a large concentration of CS in Europe, East Asia, and Latin America, as well as a significant increase in the number of PPs after 2010. The USA, Germany, and China are the countries that have produced the most studies, covering the majority of the total publications. The Netherlands, the UK, and Sweden, in particular, are characterized by intensive involvement in landscape planning due to their long traditions of public involvement in urban and rural development. These regions emphasize the importance of cooperation and governance approaches in co-design processes and participatory frameworks to engage various stakeholders in developing peri-urban spaces (Türken & Eyüboğlu, 2021). In East Asia, China has experienced an impressive rise in participatory studies, particularly in peri-urban areas undergoing rapid urbanization, as

government awareness of the public's contributions and the proliferation of digital platforms for public engagement have grown. Figure 3 shows an increase in the importance of participatory landscape planning after 2010. This hints at a growing global awareness of the importance of community co-design and institutions in complex urban fringe contexts. This shift toward inclusive, participatory approaches is particularly evident in Latin America, where urban fringe areas are undergoing rapid urbanization and facing environmental issues such as deforestation and loss of agricultural land. In 2024, Rahman, Maulud, and Ab Rahman reviewed the role of digital twins and 3D city models in enhancing decision-making (Rahman et al., 2024). This concept can be incorporated into participatory landscape planning to improve urban fringe management. Miller, Vogt, and others suggest integrating analytical and participatory approaches in land resource management, which is consistent with the growing interest in participatory landscape planning in different contexts around the world (Miller et al., 2009). Brazilian and Argentinian research reveals how participatory budgeting and digital technologies have shaped a collective voice in landscape decision-making among various stakeholders, often within the framework of participatory governance. This trajectory parallels larger movements toward governance models whereby conventional top-down planning methods are supplemented-or even replaced- by bottom-up co-governance modalities that integrate ecological sustainability, social equity, and economic development in peri-urban areas. These regional examples suggest the growing adoption of participatory landscape planning in various political and institutional settings, indicating a broader global shift towards more collaborative and inclusive governance.

Community Co-Design Strategies and Tools

Community co-design approaches are at the heart of participatory landscape planning. These approaches aim to include local knowledge, preferences, and values in the planning process. Various tools have been designed for these processes, including Participatory Rural Appraisal (PRA), Participatory Geographic Information Systems (PPGIS), landscape charrettes, and participatory scenario modeling. These tools allow for engagement with differing degrees of effectiveness and context dependence. In 2024, Aziz and Jaafar explored speech deletion strategies in the speech of children with autism. They emphasized the importance of understanding communication needs in participatory planning, which may be useful when involving members of different communities, including those with special needs, in the co-design process. A comparative summary of related co-design tools and processes is presented in Table III, which organizes the tools according to their features and provides example studies.This is in line with Participatory Rural Appraisal (PRA), an established technique that focuses on locally driven analysis of land resources and use. Using qualitative methods, such as interviews, focus groups, and mapping exercises, communities can identify issues and opportunities in their areas. PRA is especially relevant in rural and peri-urban areas, where local knowledge is important for achieving innovations in sustainable land use planning. Participatory GIS (PPGIS) is an integration of geographic information systems and participatory approaches that enables a community to map and display its preferences, concerns, and land uses spatially. PPGIS strengthens the link between spatial data and community knowledge, and it is particularly useful for solving complex environmental problems in peri-urban contexts(Kahila-Tani et al., 2019). Additionally, case studies from Finland and Spain illustrate that PPGIS is a useful tool for collecting spatial data from various stakeholders and is invaluable for public engagement in planning. Landscape charrettes, a commonly used tool, are group workshops in which stakeholders (e.g., residents and designers) collaborate to develop and discuss design proposals for urban fringe landscapes. Idris et al. examined the dynamics of landscape changes in areas surrounding firefly ecotourism sites (Idris et al., 2021). They demonstrated how participatory strategies can balance ecological conservation and community engagement in suburban tourism development. Zhou and Li introduced a web-based environmental narrative analysis and visualization tool that complements participatory geographic information systems (PPGIS)(Zhou & Li, 2018). This tool provides richer, more narrative-driven insights into the local ecological and social contexts of urban fringe area planning.Additionally, Subramaniam and Woods evaluated digital life storybooks and concluded that they offer an innovative way for vulnerable groups, such as the elderly, to participate in participatory processes (Subramaniam & Woods, 2016). They have been found useful for facilitating creative solutions and the negotiation process, particularly where differing interests and values must be balanced. Finally, participatory scenario modeling allows communities to actively participate in modeling alternative landscape development scenarios in terms of their environmental, social, and economic impacts. This is particularly true for climate change adaptation and mitigation, where long-range planning and scenario testing are necessary to achieve the desired results.

Table 3. Comparative summary of co-design tools, processes, and project outcomes

Co-Design Tool / Process	**Key Features**

Visual Collaborative Methods (VCMs)	Utilizes arts-based tools like sketching, mapping, and modeling to facilitate communication and ideation.
Participatory GIS (PGIS)	Combines geographic information systems with participatory methods to map community knowledge and preferences.
Participatory Budgeting	Involves community members in decision-making processes to allocate public funds for local projects.
Co-Design Workshops	Engages stakeholders in collaborative design sessions to co-create solutions.
Digital Platforms for E-Participation	Employs online tools to facilitate remote participation and feedback collection.

The information shared here is not applicable where there are sins in abundance. For example, participatory rural appraisal (PRA) is more applicable in rural and low-tech areas, while participatory GIS (PPGIS) and digital tools, such as e-participation platforms, are more effective in urban or ICT-accessible areas. These methods' efficacy also lies in the extent to which they facilitate participation. For instance, co-design workshops not only consult communities on alternatives but also share decision-making power, allowing for more active participation than PRA, in which communities are only consulted and decisions are made elsewhere (Aziz & Jaafar, 2024). Furthermore, the application of these tools should take into account contextual considerations given their specificity to various cultural, technological, and institutional contexts. The variety of co-design tools reflects the adaptive and accommodating capacity of participatory landscape planning. These tools provide a dialogue that incorporates multiple stakeholder views and shapes solutions that are locally meaningful and viable.

Institutional Governance Structures

In the context of land-use planning in peri-urban landscapes, governance settings significantly affect participation outcomes. These models generally fall into three categories: top-down formalized participation, bottom-up community-led planning, and multi-level governance platforms that include different stakeholders.

Top-Down Formalized Participation:

In these models, higher-level authorities (such as state or municipal governments or planning agencies) initiate and dominate decision-making processes. These models typically have structured consultative mechanisms, public hearings, and independent advisory committees that receive input from local stakeholders. While these approaches can align planning with broader policy goals, they can also hinder community engagement and the integration of local knowledge(Ceschin & Gaziulusoy, 2016). For instance, research on urban planning in Lecce, Italy, found that incorporating bottom-up feedback into top-down approaches can align community interests with institutional goals. This can lead to a decrease in conflicts and improved performance of urban regeneration plans (Rossi et al., 2021).

Bottom-Up, Community-Led Planning

This approach focuses on people making their own decisions. This approach is encouraging because it empowers communities to identify and fulfill their needs and desires regarding a dwelling place on their own terms. These participatory models may produce contextually sensitive and sustainable results. However, they may face barriers such as limited funds, expertise, and conflicts with formal planning requirements. Nevertheless, such direct actions by communities have been successful in different settings, resulting in social acceptance and resilience. For example, urban community gardens often transition from a top-down inception to community-driven maintenance, demonstrating the dynamic nature of participatory governance.

Multi-level Governance Platforms

Multi-level governance platforms incorporate different actors from multiple levels within government, such as local communities, NGOs, planners, and landowners. These platforms enable joint decision-making and resource sharing to manage multi-administrative issues. In urban fringe areas where varied uses and interests converge, models of governance like these are best suited. One example from metropolitan Adelaide, Australia, demonstrated how multi-level governance can promote policy coherence and responsiveness by fostering collaboration between government and non-governmental actors (Fors et al., 2021).

In summary, the performance of governance regimes in urban fringe landscape planning depends on the context, objectives, and stakeholders. Shen et al. examined the adaptive reuse of port heritage and urban waterfront regeneration in Zhuzhou City, China (Shen et al., 2023). They emphasized the importance of integrating heritage protection and urban regeneration, which is a valuable concept for institutional governance in urban fringe areas. Hara et al. examined the challenges that landfill development on the urban fringe of the

Manila metropolitan area poses for governance (Hara et al., 2008). They emphasized the need for adaptive governance strategies in areas facing rapid urbanization and environmental issues. Top-down modes provide strategic direction and regulatory control, while bottom-up modes ensure that practical experience is considered. Multi-level governance structures provide a participatory process that can accommodate competing interests and facilitate sustainable planning outcomes.

Table 4. Actor–institution network diagram across governance types in reviewed cases

Governance Model	Actors Involved	Example Case(s)
Top-down formalized participation	Municipal authorities, urban planners	Municipal-driven consultations in peri-urban planning
Bottom-up community-led planning	Local community members, community groups	Community workshops in Lecce, Italy
Multi-level governance platforms	NGOs, planners, landowners, municipal representatives	Multi-stakeholder platforms in multi-institutional contexts
Collaborative governance (hybrid)	Government, NGOs, community, private sector actors	Geo-information participatory platforms in Suriname

DISCUSSION

Success Factors and Constraints in Participatory Practice

Participation in landscape planning on the urban fringe depends on various factors that either facilitate or hinder performance. The success of these processes is often attributed to building trust and maintaining transparency in facilitation. Institutional support plays a vital role in maintaining sustainable and credible participatory practices. Trust among participants is crucial for a successful participatory planning process, creating an environment of cooperation and open communication. Transparent facilitation in the form of distinct, participatory processes also increases trust. This enables all stakeholders to feel heard and ensures that decisions are made fairly. Additionally, sustained institutional support is essential for providing the necessary resources and commitment for sustained community involvement during the planning stages. These findings correlate with those of the success-failure matrix, in which trust and transparent facilitation emerged as nurturing factors in participatory processes (Table 5). Furthermore, strong institutional backing, including long-term funding and commitment, prevents the planning process from being disrupted by short-term project cycles, as mentioned in the matrix's success factors for institutional support. Nevertheless, despite the conducive environment, several obstacles limit the effectiveness of participation. One of the biggest is tokenism, which is contributing just enough to achieve the appearance of inclusion, but not the reality. This becomes inevitable when stakeholders are involved in the planning process merely for show, not for power. Spatial mismatches are also critical — situations in which planning scales do not correspond to the lived realities of local populations, causing plans to be out of touch with their needs (McCall & Dunn, 2021). Kalantari et al emphasized the importance of vertical farming in high-density urban areas (Kalantari et al., 2020). Vertical farming can address spatial mismatch issues and ensure food security in suburban landscapes, providing solutions for sustainable development. The matrix pinpoints spatial mismatches between planning scales as a key reason for failure (Table 5). Institutions and planning tools are significantly biased toward technocratic approaches, which can marginalize the local knowledge and understanding that are critical for the development of effective, contextually relevant plans. Technocratic approaches can also result in solutions that emphasize expertise, which can lead to less effective planning in urban fringe areas. This aligns with the factors of failure shown in the matrix: an expert-only approach and technocratic bias can affect the power and suitability of planning results.

Table 5. Success–failure matrix of participatory planning outcomes in urban fringe contexts

Dimension	Success Factors	Failure Factors
Process Quality	Trust-building; Transparent facilitation	Tokenism (symbolic participation)
Spatial Fit	Context-specific design	Spatial mismatches in planning scales
Institutional Support	Long-term commitment; Stable funding	Institutional fragmentation; Short cycles
Technical Integration	Co-designed tools; Local capacity building	Technocratic bias (expert-only approaches)

Participation as Governance Innovation

Co-design has evolved from a participatory process into a transformative tool that shapes governance arrangements and planning outcomes in urban areas. As both a process and an institutional innovation, co-design has the potential to reconfigure roles, accountabilities, and values within the landscape planning process. At its core, co-design fosters a sense of locality and community in the co-planning process by bringing diverse perspectives to the table for discussion with local community members, planners, and public authorities. This collaboration enables the development of more inclusive, context-specific, and sustainable landscapes because it recognizes and incorporates local knowledge into planning processes. The co-design approach also shifts the focus from traditional models of governance, diminishing the role of decision-making and increasing horizontal collaboration rather than conventional top-down control. This model empowers local communities and other non-institutional actors, sharing with them the responsibility for decision-making, which leads to greater legitimacy and success in planning.The responsibilities of planners, local authorities, and local communities are reorganized, moving away from past patterns of expert-based urban planning (Hersperger et al., 2021). This holds all stakeholders accountable and allows decisions to be made based on the interests of the entire community as opposed to just an institution or authority. However, co-design also reforms the roles and structures of accountability, shaping the values written into landscapes. Since urban fringe areas typically encompass diverse ecological, cultural, and social settings, co-design fosters alternative landscape values that highlight aspects such as sustainability, inclusiveness, and cultural heritage. This overlooked aspect of existing planning models is essential for the long-term resilience of urban fringe landscapes, which are characterized by natural ecosystems and human communities that require adaptive strategies. Recognizing the varied needs and aspirations of stakeholders enables co-design to support a landscape vision that is operationally, socially, and environmentally meaningful. In conclusion, co-design is considered a method and a governance innovation in landscape planning, particularly among a few planners. It facilitates participatory approaches in which actors adapt to multiple roles, reorient accountability structures, and influence the emergence of new landscape values. These contributions are key to achieving more inclusive, adaptive, and sustainable planning processes that empower all parties involved, including laypeople and experts, to influence the future of urban fringe landscapes.

Research Gaps and Methodological Reflections

Although participatory landscape planning in peri-urban areas shows much potential, there are important gaps in the current literature and practice. One of the main obstacles is stakeholders' weak and sporadic involvement in the planning stage. While first-time participation often leads to success, a lack of continued participation undermines the success of such initiatives. Second, the absence of engagement tools during the planning, design, and implementation stages creates a discrepancy between the limited scope of short-term planning and the need for long-term sustainable urban landscapes. Furthermore, without long-term engagement, it is difficult to track the effects of participatory processes, thus making it impossible to assess whether participatory decisions lead to the desired landscapes. These findings underscore the need for a comprehensive understanding framework that ensures continued stakeholder engagement and feedback loops, addressing the entire planning life cycle(Hersperger et al., 2021). Another significant absence is the partial inclusion of ecological data in participatory processes. The ecologically delicate situation of the urban fringe is a standard aspect of the urban landscape. However, planning models often neglect fundamental landscape ecological concepts, such as habitat connectivity, biodiversity, and ecological corridors. This form of neglect can lead to unsustainable planning results that lack resilience to upcoming ecological challenges. AEPIC is a way of thinking, doing, and seeing designed to help individuals and communities in environmental justice (EJ) struggles through participatory planning processes. Although social inclusion is increasingly acknowledged as a concern, planning is typically ineffective at sufficiently involving minorities, which leads to the reinforcement of social inequities. There is an urgent need for models that are intentionally designed to reach these communities and meet their needs. These gaps must be filled to ensure that participatory planning processes are inclusive, ecologically sustainable, and socially equitable.

Table 6. Gaps and improvement opportunities in participatory urban fringe landscape research

Research Gap or Limitation	Improvement Opportunity
Limited Long-Term Engagement	Develop frameworks for sustained participation across planning, design, and implementation phases.
Fragmented Integration of Landscape Ecological Concepts	Incorporate landscape ecological concepts throughout all steps of the planning process.
Lack of Social Inclusion in Participation Processes	Design participation processes that are inclusive of marginalized groups and adapted to their needs.

Insufficient Use of Digital Tools for Participation	Leverage digital platforms to enhance engagement and feedback collection in participatory processes.
Need for Holistic and Cyclic Participation Models	Adopt cyclic process models that include analysis, design, implementation, and evaluation phases.

CONCLUSION

Review Contributions and Theoretical Implications

This systematic review sheds light on the evolution of participatory landscape planning in the "open field" of the urban fringe. It reveals patterns of change in this practice, highlighting its dynamic socio-institutional nature and sophisticated epistemological standpoint. Historically, top-down planning has dominated these regions, often neglecting local knowledge and community needs. However, recent changes emphasize participation-oriented tools, such as co-design, in which communities actively participate in planning. These participatory modalities have redefined the roles of stakeholders and contributed to a more democratic planning process. Including a multitude of voices has made planning products richer and added legitimacy and acceptability to decisions. Epistemologically, this development signifies a shift towards experiential and local knowledge, rather than a technocratic paradigm. Integrating community input breaks new ground in planning dogmas and fosters a more comprehensive appreciation of landscapes. This transition has implications for planning theory, pointing to the necessity of theoretical frameworks that incorporate various ways of knowing and being. The review also highlights gaps in the literature, including the lack of long-term tracking of participatory outcomes and the limited representation of marginalized communities outside institutional settings. Addressing these gaps is crucial for advancing the field and contributing to just and sustainable landscape transitions through participatory planning.

Practical Implications for Planners And Policymakers

This review outlines important practical implications for planners and policymakers regarding the incorporation of co-design into statutory planning systems. Integrating co-design into the planning stage provides a unique chance to encourage interest-driven and locally relevant urban development, particularly in urban fringes. Engaging a variety of stakeholders in decision-making allows for the incorporation of local or tacit knowledge and community priorities, which are typically absent from conventional, top-down planning methodologies. Recent research shows that co-design can mediate between expert knowledge and local perspectives, leading to planning outcomes that align with the community's needs. To maximize these benefits, practitioners must develop robust frameworks that incorporate co-design activities throughout the stages of urban development-from planning to implementation and monitoring-to enable continuous and meaningful engagement.

In addition, improved intersectoral collaboration is required to address the complicated challenges rural-urban fringe zones face, which may involve competing land uses. While not the focus of the article, evidence suggests that more inclusive forms of collaborative governance involving a wider range of stakeholders often lead to more integrated and effective planning. These stakeholders may include government institutions, NGOs, and private actors, among others. The city of Bologna's autonomous experimentation in public collaboration for urban commons illustrates how multi-stakeholder participation can facilitate collective stewardship of urban resources and spaces, contributing to more sustainable and resilient urban governance. Institutionalizing such processes makes managing diverse interests possible and ensures the inclusive engagement of involved stakeholders and the prominence and legitimacy of resulting solutions. Lastly, it is essential to ensure that hybrid institutional forms integrating formal and informal decision-making processes become institutionalized in order to bring about more flexible and adaptive planning arrangements. Hybrid governance enables planners to address the dynamic and controversial development of the urban fringe by integrating regulatory and participatory elements. It enables sustained stakeholder involvement and facilitates shared problem-solving, which increases the resilience and sustainability of peri-urban landscapes. Incorporating such governance models into institutional structures can produce more inclusive, flexible, and sustainable urban developments.

Future Research Directions

Based on the results of this review, important research issues have been identified that would contribute to the further implementation and examination of participatory landscape planning in urban peripheries. First, long-term ethnographies of co-design processes are essential for mapping and understanding how participatory practices evolve over time. These approaches offer valuable insights into how participation changes, how

stakeholder relations unfold, and the impact of co-design over time. Power dynamics, social processes, and changing community activity often become more nuanced over time, and sustained engagement is necessary to understand the success or failure of public engagement interventions. This kind of research is necessary to assess the sustainability of co-design and to develop participation methods that lead to long-lasting, meaningful participation at the local level.

Comparatively examining governance models from different regions offers promise in filling this gap and critically assessing the factors that shape successful participatory planning outcomes. By comparing institutional settings, cultural environments, and governance modes, researchers can identify practices and contextual conditions that promote participatory planning in peri-urban landscapes. Cross-comparative research on peri-urban governance may also reveal important information about the intersection and influence of political systems, economies, and societies on the inclusiveness and efficiency of participatory planning frameworks. There may be opportunities to generate flexible governance models tailored to local circumstances that allow for greater participation. These efforts could help policymakers develop more inclusive, responsive, and efficient governance models for urban fringe development.

Lastly, combining participatory monitoring with digital tools, such as civic sensing and Public Participation GIS (PPGIS) 2.0, provides an expanded opportunity to incorporate community involvement in city planning. Digital technologies can improve the capture of real-time data and provide feedback, which facilitates community tracking of the impacts of decisions on the urban environment. These tools could democratize and make more accessible an often-exclusive, lengthy process. However, concerns about inclusion, access, and equity in the digital realm must be addressed to ensure that the use of these tools reflects and empowers all community members, including those who are often marginalized. Researching the integration of these instruments into participatory frameworks could provide insights on enhancing governance in urban fringe planning and empowering communities.

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