



Research

# Form and function in ecologizing spatial planning: learnings from Bogotá, Colombia

[Germán A. Quimbayo Ruiz](#)<sup>1,2</sup> , [Matti Salo](#)<sup>3</sup> , [Juha Hiedanpää](#)<sup>3</sup>  and [Juha Kotilainen](#)<sup>4</sup> 

**ABSTRACT.** We explore the emergence of ecological concerns in urban planning in Bogotá, Colombia. Although ecologizing urban planning practices has been a recurrent theme in Bogotá for around three decades, the sustainability problems the city is facing remain addressed in a rather abstract way. We analyze urban and spatial planning by triangulating data from interviews with local stakeholders, a close reading of policy documents, and participant observations. Our examination of the evolving idea of urban nature revealed how ecological considerations circulating in the urban planning processes form the core of the idea of nature in the city. However, this approach has been more focused on form than content, subordinating social-ecological processes and ecosystem functions to the profit-driven and spatially discrete development of urban space. Moving beyond the implementation-failure approach, a more radical rethinking and reworking of planning is needed, incorporating new democratic practices in which the history and paths of situated urban ecologies can be traced, identified, and even mapped.

**Key Words:** *Colombia; social-ecological systems; spatial planning; urban ecologies; urban planning*

## INTRODUCTION

In this paper, we follow the evolution of the idea of urban nature in Bogotá, Colombia, from the 1990s to the present, and analyze how planners and related actors have sought to incorporate ecological considerations, i.e., the science of ecology, in their practices. We aim at providing a thorough understanding of how spatial and urban planning practices have been ecologized, i.e., how ecological ideas have become operationalized in them. By examining the successes, failures, and contradictions inherent in the planning processes, we seek to identify theoretical justifications for rethinking and reworking current planning practices and concepts (cf. Metzger 2018). We seek to answer two main questions: (1) In what ways have ecological concerns been incorporated into urban planning practices in Bogotá since the 1990s? (2) What is the role of situated urban ecologies in urban planning in Bogotá?

Latin America and the Caribbean (LAC) is one of the world's most biologically diverse regions and at the same time one of the most urbanized (Pauchard and Barbosa 2013). Consequently, the region's ecological and cultural features make the interweaving of its urban processes and nature unique (Sedrez 2013). However, social and economic inequalities have influenced how the local social-ecological processes are understood in planning practices, resulting in shortcomings of environmental governance (Dobbs et al. 2019). In Colombia, there has been a growing interest in the role of urban nature in spatial planning (Mejía 2017) because of the country's complex and diverse geographies and intricate sociopolitical settings (Carrizosa 2014). For instance, the concepts of ecological structures and ecological connectivity have been crucial in framing the urban and regional ecologies in the urban planning practice (Gallini and Castro 2015).

The current international sustainability discourse emphasizes the need to apply nature-based solutions in climate change adaptation in cities (Frantzeskaki et al. 2019). Spatial planning is seen as a

tool to ensure this (Haase et al. 2017). In addition, the ecosystem approach and the concept of ecosystem services have been introduced, tested, and practiced supporting this process. We argue that these environmental conceptions and policy imperatives have conquered their institutional niche in planning processes internationally and become constitutive of the idea of urban nature. Nevertheless, even the most exemplary urban land-use and development planning practices frequently fail to provide adequate solutions to the current urban challenges. The urban sustainability pursuits that have built on a combination of green (nature-based) and grey (technological) solutions have regularly reinforced urban inequalities in relation to questions of nature values, access to nature, and access to other urban resources (Wachsmuth and Angelo 2018).

In the LAC context, Colombia boasts one of the most advanced and inspiring spatial planning legislations (e.g., Law 388 1997 for territorial development; República de Colombia 1997) and urban planning systems (Roszbach and Montandon 2017). Narratives of the Colombian "urban miracle" have commonly circulated among urban planners at international urban planning fora, referring to best practices learned in cities such as Medellín and Bogotá (Leite et al. 2020, Berney 2010). However, actual solutions to current urban challenges in public transportation and the use of public space have been in short supply (Franz 2018, Montero 2020). The challenges of spatial planning in Bogotá have been studied from the perspective of urban planners (Salazar Ferro 2007) or as critiques of the concept of urban subcenters (*centralidades urbanas*) and their implications for metropolitan urban growth (Beuf 2016). With few exceptions (Ándrade et al. 2013), ecological considerations have remained external or absent.

Although many urban theories and scholarly approaches to planning and development have been imported into the LAC region from abroad (Valencia 2013), stakeholders have not been

<sup>1</sup>Grupo de Investigación Geografía y Ordenamiento Territorial (GEOT), Universidad Pedagógica y Tecnológica de Colombia (UPTC), <sup>2</sup>Grupo de Investigación Estudios sobre la Problemática Urbano-Regional de Colombia (GEOURBE), Universidad Nacional de Colombia (Bogotá, Colombia), <sup>3</sup>Luonnontieteellinen keskus (Luke) / Natural Resources Institute Finland (Luke), Turku, Finland, <sup>4</sup>University of Eastern Finland, Department of Geographical and Historical Studies

mere spectators or passive adopters of foreign ideas (Chapple et al. 2012). Since the 1930s various approaches to urban, regional, and development planning have been adapted and reinterpreted by decision makers and stakeholders following the evolution of country-level and international concerns from infrastructure construction (1930s–1940s) and economic geography (1950s–1970s) to political-economic issues (1980–1990s) and (environmental) governance (1990s–2010s). Most recently, urban planning has become embedded in the sustainability discourse (Angotti and Irazábal 2017). Against this background, our approach builds on contemporary theories on urbanization processes (Buckley and Strauss 2016, Robinson and Roy 2016, Caldeira 2017, Arboleda 2020). Furthermore, we discuss our results on ecologizing urban planning in Bogotá within this broader body of land-use literature emerging from the LAC's political, societal, and environmental context.

### CONCEPTUAL APPROACH

Spatial planning is not only a technical procedure and political process (Murdoch 2006), but it is also a professional practice, field of ideas (Mehmood 2010), and a mastership requiring both specific professional skills and experiential understanding of sociocultural and institutional settings, a modernist art par excellence (Metzger 2018). Although nature and the city were for long two separate domains in urban planning, urban environments undoubtedly bring together natural features, geographical histories, and natural and social processes (Harvey 1996, Swyngedouw 1996). When Ian McHarg (1969) published his influential work *Design with Nature*, it marked a pathway for a practice labeled “Ecological Design.” McHarg’s work is still a reference for contemporary approaches to ecological planning, including those that have more recently incorporated, for instance, the ecosystem approach, ecosystem services (BenDor et al. 2017), and nature-based solutions (Frantzeskaki et al. 2019, Herrmann-Pillath et al. 2022).

It is evident that ecology as a science is present in contemporary planning, with its principles being used as a foundation for environmental imperatives such as climate change mitigation and adaptation measures on global and local urban sustainability agendas (Roberts et al. 2009). Nevertheless, legislation, administrative requirements, and power structures may impede the ability of planners and decision makers to interpret ecological concepts and science-based environmental imperatives derived from them. Consequently, the science of ecology may not be as effective and impactful as the policy intention behind these imperatives may presume. Similarly, strategies that are labeled “green” or ecologically oriented, in practice, often intertwine nature, capital, society, and technology in complex ways (Wachsmuth and Angelo 2018). Moreover, conservation-driven approaches and nature-based solutions have frequently maintained and even legitimized land-use decisions that reinforce urban inequalities and environmental problems (Haase et al. 2017, Kotsila et al. 2021).

When ecological structures and functions are experienced and reflected upon in their specific geo-historical contexts and human-nature situations, these local significances become situated ecologies (Ernstson and Sörlin 2019). Based on Haraway’s (1988) notion of situated knowledge, situated urban ecology is a concept that refers to practical knowledge of how a particular piece of urban nature is understood to work. Consequently, situated urban

ecology may be defined as the action-oriented meanings attributed to the ecological features within a specific urban context (cf. Knaps et al. 2022). Situated urban ecologies, as a step toward more concrete embodiments of a sense of place, have the potential to give situational and practical content to formal planning (cf. Stedman 2016). This is exemplified by knowledge of how vegetation regulates water runoff and the microclimate, or how patch dynamics, connectivity, and edge effects operate in relation to human and other species’ lives in urban settings.

The lack of shared concepts and their understanding represents a significant barrier to the effective practice of situated urban ecologies in planning (cf. Hardy et al. 2022). Our research focuses on the absence of a common practical understanding of some key ecological conceptions and situated urban ecologies among planners and in the planning process. In our analysis, we identify key ecological concepts employed by experts and elucidate the associated conflicting rationalities, interests, and values that affect the procedural aspects of urban planning practice (Ernstson 2013). Although the vocabularies and ideas aligned with the international environmental discourse have influenced urban and regional planning in the LAC region, the meanings, goals, and outcomes of what is meant by “sustainable,” “green,” or “ecological” remain contested (Anguelovski et al. 2019, Glitz Mayrink et al. 2021, Ariza-Montobbio et al. 2022).

### MATERIALS AND METHODS

The methodological approach was qualitative and interdisciplinary. Most of the fieldwork to collect data concerning planning over the *Sabana de Bogotá*, the larger territory of the city of Bogotá, was carried out by the first author in 2017–2018. The research examined Bogotá as a case study of how planning practices address urban nature and ecology in rural, undeveloped, and urban-rural fringes of the metropolitan area. The study encompasses a temporal span from the 1990s to the present, with a focus on planning policies and practices. This is achieved through the triangulation of data from interviews with local stakeholders, policy documents, and participant observations. Our research builds on qualitative methods and also draws on some ethnographic tools and strategy. A content analysis, described in detail below, was applied to the full dataset.

The selection strategy of the interviewees was to identify key spatial and urban planning experts involved in planning processes in Bogotá over the past 30 years. Therefore, the first author approached professionals working as officers, planners, and urban ecology experts, but also environmental leaders who had previously worked as staff in state agencies in a joint effort with community-based projects. The first group of interviewees consisted of former and current officers at state agencies in the Capital District (including heads of office), professional planners, and experts in urban ecology with academic and non-academic training. The second group consisted of environmental leaders who had previously worked within joint efforts of the public administration and local communities to advance local community-based projects.

As a result, a total of 32 interviews were conducted. The interviewees were from various social and cultural backgrounds, mostly white/mestizo and mestizo, and we had two more male than female interviewees. To analyze the interview data and transcribe excerpts from it, upon consent of the interviewees, recorded audios from the interview sessions were retrieved. The

interview responses are anonymized. Of the total of the interviews, 12 were semi-structured and thematic, exploring the role of ecological concerns in planning practices. Twenty interviews were unstructured and carried out as individual and group interviews. The purpose of the unstructured interviews was to complement the interpretation derived from the field experiences and thematic interviews. Both types of interviews were analyzed by categorizing and organizing the data thematically according to issues that were deemed theoretically important for planning in an urbanized context. We paid special attention to the ways in which urban nature appeared in the interviews.

Participant observations were made during meetings and public events (N = 11) related to spatial planning and organized by civil society organizations and state agencies. The participant observations were focused on the expressions and articulations of ecological concerns in urban planning practices. In the analysis, the topic of ecological concerns was isolated from broader discussions during the observed meetings and events.

We also collected a large body of technical and policy documents addressing the city region's urban planning. The documents spanned the period from 1970 to 2018. We compiled the main body of documents from public and private archives in the city of Bogotá. The first author was given access to the private archives by the interviewees, who indicated the existence of such archives. In cases of managing this sort of data, access was granted because of the trust and collaboration established between the first author and the interviewees. Publicly available documents were also searched on the Internet. To find the documents on the Internet, we used the Spanish term *Ordenamiento Territorial* (which translates as spatial planning) and *Bogotá* as key words. We were able to collect a total of 118 documents from the physical and digital archives. These documents are concerned with urban, metropolitan, and environmental planning, as well as urban biodiversity and urban ecology. The documents were thematically organized by coding their content and using the ATLAS.ti software to facilitate their management. Finally, a brief consultation of additional documentary sources on the Internet and observations in the field to update previous information collected in the field was carried out between 2021 and 2024.

## RESULTS

### Ecological structure as a key planning concept

The land-use legislation, guidelines, and planning in Bogotá incorporate numerous ecological concepts and criteria. The analyzed documents for this article contain approximately 430 distinct terms related to ecology, geology, geomorphology, and hydrology. However, most of these terms appeared in the body of data only once. Others were used interchangeably or disparately to mean “the environment”, such as *ambiente*, *medio ambiente*, or *medio ambiente natural*. Still others constituted key vocabulary across the texts, including terms like *estructuras ecológicas*; (ecological structures) and *conectividad ecológica* (ecological connectivity). This ecological terminology stems mainly from the established international parlance as adapted through the national universities and research institutes providing technical and scientific information regarding the ecosystem features of the *Sabana de Bogotá* region.

The *Sabana de Bogotá's* ecosystem was declared of national ecological interest in 1993, and environmental and planning initiatives in Bogotá have been aligned with the principles from the National Constitution of 1991 (República de Colombia 1993a, 1993b) regarding the organization of planning through different governmental and institutional levels of the National Environmental System (*Sistema Nacional Ambiental*, SINA). This system is coordinated by the Colombian Ministry of the Environment. At a district-municipal level, constitutional principles on spatial planning and the environment are set through the Capital District legislation such as Decree 1421 from 1993, changed recently by Law 2116 from 2021. Likewise, SINA applies the municipal planning legislation such as Law 152 from 1994 that concerns the Municipal Development Plans (PDD) issued by each district or local government for its four-year term, as well as Law 388 from 1997 concerning the Municipal Land-Use Plans.

Although the PDDs have been regarded as an important instrument for planning, ecological considerations and environmental imperatives were presented more explicitly in the Master Plan for Land Use (*Plan de Ordenamiento Territorial*, POT) in 2000. The POT has become the main reference for guiding urban planning in the city and the formulation of specific projects for each government administration. It has a maximum time horizon of 12 years, but the 2004 POT (Alcaldía Mayor de Bogotá 2004) was in force until 2021, after several failed updating attempts due to political and legal disputes. The PDD is prepared for each term of government office, and its relationship with the POT is that it defines the budgets for implementing projects or land-use measures during each government's term of rule. Finally, the POT must be aligned with other spatial planning mechanisms like the Watershed Plans (POMCA, acronym in Spanish).

The POT also defines three planning components, general, urban, and rural, as well as a set of spatial structures (*estructuras territoriales*) as landscape-oriented tools to planning related to social care, economy, cultural heritage, and ecosystems for the development of urban-regional life. Structures generally refer to the arrangement of the components of a complex whole, reflected for example in the Main Ecological Structure (MES) concept, which is the most important example of a spatial structure in our case. The MES is intended to depict the spatial arrangement of the ecosystem elements of the Bogotá region.

The MES, as a scientific-political concept, was initially introduced by the Dutch-Colombian ecologist Thomas van der Hammen (1998) in his study called the *Environmental Plan of the Upper Bogotá River Basin: Analysis and Orientations for Land Management*. The plan was prepared for the environmental authority of the Regional Autonomous Corporation (CAR) of Cundinamarca, the environmental authority for rural land in Bogotá when the city region was preparing its first POT around the year 2000. The environmental plan suggests that the MES could establish a network of natural reserves of *paramos* (high Andean ecosystems) and forests, special management zones, and biological corridors. Additionally, it designates areas for agriculture and livestock to minimize the negative environmental impacts of these activities. Thomas van der Hammen suggested that the MES be considered as an integral and mandatory component of the plan in the medium term for all official and private entities.

To be approved, the POT needs the CAR first to agree on environmental matters of regional importance, which implies that the concept of the MES became the first ecologically significant explicit input for the spatial planning of the city region. The ecological aspects of the POT process not only started the ecologizing of urban planning but also unleashed a long-term urban development-nature conservation conflict at the city's northern edge. After strong political and legal disputes between the District Administration and the CAR, the Ministry of the Environment intervened, based on insights from a commissioned panel of experts (cf. Osorio Ardila 2019). Its decision was that the POT needed to comply with the Ministry's decision in favor of protecting areas on the northern edge of the city that support important ecological processes.

The concept of the MES is currently widely used by environmental scientists and experts, and it has also been explicitly included in spatial planning and planning instruments such as the POT. The MES's incorporation in the POT would ideally provide a spatial ecological tool for promoting a regional ecosystem balance and better land occupation practices. Additionally, the MES consists of a set of biotic and abiotic elements that support the essential ecological processes of the territory. Civil society organizations and environmental activists have also mobilized the MES concept for various purposes (Quimbayo Ruiz 2018). Likewise, certain ecological concepts built on the MES dominate the analyzed documents and interviews. They include "ecological structures" (*estructuras ecológicas*) and terms related to ecological connectivity (e.g., *conectividad ecológica*, *conectividad biológica*, *conectividad funcional*). The primary motivation for using these concepts was to prioritize the role of the District's protected areas system, which was first established in the POT. A renowned biologist and environmental expert from the Bogotá region explained the origin of the MES concept in an interview:

[About the MES] *What Professor van der Hammen did not say was that the ecological structure was not completely his idea, but it was an idea rejected in the Netherlands in the 1980s. ... He took part in it [its development] in the Netherlands, but it was rejected ... It ended up being called "Green Networks" ... or perhaps there was another idea called the main ecological structure, and that was brought to Colombia ... But let's say that Professor van der Hammen adapted and applied it, having a basin as a unit of study ... it is very interesting ... It shows two land-use elements in one: a natural basin on a planning element for land use ... That document on the study of the ecological structure is a milestone.* (Interviewee #10)

Also, another renowned expert biologist, who has offered not only scholarly expertise but also social influence in the defense of wetlands, argued even more incisively about the understanding of the concept of the MES:

*All the reviews I've done, and everything that's been said, everybody talks about the ecological structure. But for me, that work is barely sketched. In my view, what did van der Hammen do? He created that concept and let's say he socialized it. He made it known. But he also said this work was unfinished, and all of that still remained to be done. Indeed, I've checked it. For me, it's always*

*frustrating. For example, when I worked on the Acueducto [Bogotá's Water Company], one of my weapons to convince the engineers was "the ecological structure," but what is that? Where is it? What is it like? One only has a map outline, but what does [the map] contain? ... That's what you have to work on ... You have to show people: well what is the ecological structure about [referring to a work that the interviewee has been doing with another colleague]? (Interviewee #9)*

### **Situated urban ecologies in planning**

Regarding the role of the ecological elements that constitute the MES, such as hills, wetlands, and rivers, the first of the two biologists remarked:

*Bogotá is the knowledge center of Colombia. And it has the largest number of universities of environmental sciences ... This has helped many professors and students become aware of the wetlands ... It is no coincidence that there is a center of thought formed by a group of universities ... Some of the [social] leaders started making promises to nature .... that click ... I don't know if that person knew then about the wetlands. Those clicks were accompanied by technical arguments ... And with those technical arguments, it was easier to convince the community. Then there is another outbreak, groups of young people using electronic means ... They mobilize opinions .... Then they [the young people] form networks ... They're part of the debates.* (Interviewee #10)

The MES is employed to engage and mobilize citizens through community-based work, citizen science initiatives, and the dissemination of ecological knowledge via social media. Multiple individual and organized actors have contributed to the understanding and practice of ecologizing planning, and not only planners. Public debates about the POT have involved grassroots movements, practitioners, and scholars. These debates have taken place through hearings and citizen meetings convened by either the Municipality or environmental organizations.

The content of the MES is further defined by the local communities who have incorporated ecological ideas and imagination derived from the structure. The integration of urbanized spaces with the surroundings and rural spaces is initiated through the use of local ecological knowledge, resulting in the emergence of situated urban ecologies. A former expert officer from the District's Environmental Office (SDA) pointed this out by saying that before 2000, during the formulation process of the first POT:

*The environmental [concern] was taken [seriously by decision makers and within organizations and institutions] after the communities mobilized ... The environmental [concern] in the city was [the advocacy of] wetlands and the participatory urban agendas, and in the rural areas it was peasant mobilization.* (Interviewee #11)

This expert officer previously worked for a state agency in a joint effort with local communities. Her statement confirms the central role of environmental organizations and local communities in applying ecological ideas in spatial planning debates (Quimbayo Ruiz 2018). Moreover, the peasant communities of the District,

their organizations, and leaders, for instance, have been active in using a repertoire of socio-spatial strategies to cope with the negative effects of urbanization in their everyday life and in addressing sustainability concerns from this position (Quimbayo Ruiz et al. 2020).

Scholars and intellectuals in ecology and environmental management also supported the incorporation of ecological ideas into urban planning. The processes of social mobilization and their underlying ecological considerations were influenced by the specific urban ecosystems in the District that were identified as having potential for ecological restoration interventions. Situated urban ecologies were a crucial element in promoting more comprehensive urban-regional planning between the city and its surroundings, including water, food, and energy provision. The role of situated urban ecologies emerged from regional discussions developed by the Regional Planning Board (*Mesa de Planificación Bogotá-Cundinamarca*). The establishment of the board coincided with a consensus to safeguard areas vital for Bogotá's water, food, and energy provision, or even to ensure they were secure against armed threats (Peña 2016). Integration efforts between the city and its surrounding region began in the 2000s.

In this process, the concept of the MES and related issues became more visible and were later enthusiastically included in planning agendas not only in the Capital District but in the regional and national levels. This relatively positive institutional environment for the inclusion of ecological considerations has existed during the 2000s and most of the 2010s until the present day. Indeed, there was an influence from the mainstreaming of the MES when the POT was evaluated for its first short-term modification in 2003. A former head of the District's Planning Office confirmed that, "... [our] POT was basically based on the MES principles ..." (Interviewee #8).

Yet, the lack of commitment by planners to ecological planning measures in Bogotá and the surrounding region has been a significant challenge. Moreover, the understanding of urban ecology varies considerably between different sectoral administrations. Although planning has become increasingly ecologized, at least on paper and in official declarations, political commitment has been abandoned amidst the volatile local political setting (Escallón Arango 2014, Gilbert 2015, Eaton 2020). For example, during the tenure of Mayor Gustavo Petro (2012–2015), there was an explicit intention to address socio-spatial segregation in Bogotá when implementing climate change mitigation and adaptation requirements. However, this intention was strongly contested by political and economic powers that influence urban development and infrastructure (Zeiderman 2016).

The constant politically motivated changes in national, regional, and district administrations have resulted in some environmental policy initiatives being later disputed or distorted. Furthermore, within the complex local bureaucratic system, ecological concerns have been subordinated to urban development and infrastructure plans. Urban-regional and metropolitan planning between the District and its surrounding region have been caught in a political and administrative quagmire and to profit-driven urban development (Thibert and Osorio 2014). Below, we proceed to examine the impediments to the integration of ecological considerations into urban planning in Bogotá, as evidenced by our research materials.

### **Form without function? Obstacles to ecologizing planning**

The interviewees shared the belief that the existing policy instruments could help in achieving sustainable spatial planning practices in Colombia. Some experts showed knowledge sensitivity toward the environmental aspects of planning, including ecological issues. For example, an urban lawyer who was formerly the main officer of both the District Office of Planning and the District Office of Housing commented on a common assumption among practitioners in making environmental criteria explicit in the planning practice: "There is no such thing as environmental spatial planning (*ordenamiento territorial ambiental*). Spatial planning (*ordenamiento territorial*) is already environmental" (Interviewee #2).

According to this interviewee #2, it can be assumed that there is a general understanding that all spatial planning is inherently environmental, and, therefore, ecologically aware. However, our research indicates that planning in the Bogotá region has been "ecologized" primarily in terms of rhetoric rather than practice. Another interviewee, who is a prominent Colombian environmental expert with a dissemination role and with working background as a regional environmental planning consultant with a focus on climate change adaptation, said:

*... [in the Bogotá region] there are institutional and legal successes [in environmental planning and action] at certain moments, but they are marginal experiences ... How can we make these [experiences] public policy? (Interviewee #3)*

This statement succinctly encompasses what has happened in the recent history of spatial planning. Yet, it does not reveal the social and political entanglements of why ecologizing urban planning remains based on marginal experiences that fail to give rise to a coherent spatial policy. District policies have been embedded in a volatile political landscape and suffer from the lack of a long-term shared vision, enduring from one administration to another. This issue was repeatedly underlined in our interviews, and even the current officers (by the time of the interview) acknowledged it very straightforwardly:

*... each [District] administration comes with its different approach, which is very irresponsible ... This city has used these [environmental] issues to please others, but when one sees the interests that have served to block things out, it's very sad. They [former planners] managed to introduce a plan, but would not implement it ... (Interviewee #1)*

This lack of a long-term shared vision across administrations is parallel with the constantly high staff turnover rate at state agencies, which has led to a loss of institutional memory.

Planning tools in relevant legislation have had an impact on administrative decision making. For instance, during interviews, two individuals who previously held high-level positions in planning agencies at the district and national levels (Bogotá's Planning Office and Ministry of the Environment, respectively) argued that the formal planning system was excessively inflexible, defining and establishing conservation or productive zoning polygons in a way that reproduced a "silo" management approach and reinforced nature and non-nature divides. Interviewees who had previously worked in state agencies described how they followed technical guidelines to establish protected areas in order

to advance ecological objectives. However, they also prioritized the allocation of problematic high-impact activities, such as the District's infamous *Doña Juana* landfill (Ortíz Díaz 2019) or resource extraction such as quarrying activities in marginalized urban-rural fringes (Ordoñez et al. 2013, Quimbayo Ruiz et al. 2020).

From a critical perspective, it can be argued that the adopted planning approach has subordinated ecological processes to profit-driven urban development. Some consulted experts suggest that this is not accidental or a sign of ignorance but rather a volitional policy act typical to many sectorial interests, such as real estate and transportation infrastructure, with influence and power in partisan politics. This has hindered ecosystem protection and management, leading to endless legal disputes (Palacio Acosta et al. 2018). The lack of clarity in planning rules has created an uncertain scenario for ecologizing planning, which is further compounded by conflicts of interest and the long-term constraints of the current institutional setting.

This issue is particularly noticeable in urban-regional ecosystem planning and management, as administrative organizations from the district, regional, and national levels often espousing different political views and planning interests clash constantly because of their overlapping territorial roles. The three best known examples are the recovery of the Bogotá River and its basin; the management and conservation of the Eastern Forest Reserve (*Cerros Orientales de Bogotá*); and the “Thomas van der Hammen” Reserve. In 2000, the Ministry of the Environment established the mentioned reserve on the northern edge of the city as an important element of the urban and regional conservation measures. However, the consolidation of the reserve has been subject to many administrative and legal obstacles because of the pressure of real estate interests that exert influence on the state and authorities. One of the main ecology experts consulted for this research confirmed that “Nature in Bogotá has become a lawsuit object” (Unstructured interview #12).

## DISCUSSION

### Against situated ecologies

As shown above, in the early 2000s, the concept of the MES provided by ecologists and other experts allowed for a rethinking of how to ecologize planning in Bogotá. However, when put in practice, the MES was also instrumentalized and stripped of its original scientific meaning. Furthermore, a proposal for a new action plan led by Enrique Peñalosa's District administration (2016–2019) contested the concept of the MES and prioritized a “democratic use of public space” (SDP 2019). According to local experts and commentators, this “democratization” was rather an attempt from Peñalosa's administration to promote land speculation and justify the future urban development from major real estate operations (Mutis 2019; Osorio Ardila and Quimbayo Ruiz 2019). The proposal was ultimately discarded after the following administration was elected in 2019.

By 2021, a new POT proposal was issued by Mayor Claudia López's administration. López was elected largely because of her commitment to an Environmental Pact for Bogotá, led by a coalition of environmental movements and organizations (*Compromiso Ambiental por Bogotá*). The López administration retook the MES in the new POT (Alcaldía Mayor de Bogotá 2021) while stating that through this planning tool, Bogotá will be made

greener by 2035 (“*Reverdecer Bogotá*”). Although the purpose was to use ecological criteria as a means for social and ecological recovery in a post-pandemic scenario, local experts and activists have pointed at the persistence of planning instruments posing a potential threat to the ecological commons (Salazar Ferro 2021). The process of designing and implementing the new POT in 2021 was not exempt from sectoral political controversies, including an unsuccessful lawsuit in 2022 due to political contention from the Mayor's political rivals, claiming procedural aspects.

### Neglected complexity and its consequences

Paraphrasing Carrizosa (2014), although Colombia, including the Bogotá region, harbors some of the most complex and diverse ecosystems in the world, planning is carried out by a handful of people. It is easier to set an institutional vocabulary to ecologize planning than to fill it with operational and effective content, because practically meaningful vocabulary and effective implementation together may change the status quo. One example of form without content is the “paper” parks idea (cf. Dudley and Stolton 1999), but this can also be reflected in the example of the MES and its protected areas. In a volatile political setting and socio-spatially segregated and fragmented urban space with considerable land-use challenges, the narrowness of the planning practice may also reinforce a narrow view of land use. This can be seen as a continuation of the (neo)colonial project that also incorporates an emphasis on modernity (cf. Quijano 2007) that may be harmful to local people's uses of the urban space, including urban nature.

The urban planning context in Bogotá illustrates how complexity is addressed in specific geo-historical contexts. Based on our empirical evidence, we will now discuss why a more radical rethinking and reworking of current ecological planning practices and concepts is needed (Metzger 2018). An evaluation of Bogotá's context using the “implementation-failure” framework reveals that local governance and social-ecological entanglements are often overlooked (Sundaresan 2019). This situation has two outcomes: first, a failure to address the unbalanced political power among rights holders and stakeholders who struggle to plan and control the city; and second, an opportunity to continue ecologizing the planning practices in ways that better consider and manage the conflicting visions regarding the desired outcomes of urban planning. These ideas will be further developed in the remaining part of this section.

### Governance and distributed knowledge: ways forward

Planning theory and practice should move the knowledge interest beyond the role of the state and government institutions toward the roles of networks, power, and knowledge in situational dynamics in planning practices (Lewis and Ernstson 2019). In a study of the establishment of the “Thomas van der Hammen” protected forest reserve in northern Bogotá, Osorio Ardila (2019, 2020) points out that in controversies over urban ecology, conceptualizations of nature are at odds, with implications for democratic participation in planning practices.

We challenge the common assumption that planning is solely the responsibility of planners. Our research in Bogotá as well as studies in other contexts (Taylor 2016, Lewis and Ernstson 2019) show that planning practice involves a wide range of actors, networks, and spaces, as well as power dynamics, conflicting interests, and diverse expressions of values related to urban ecology. For example, although it was not the focus of our

analysis, legal expertise has been mobilized by a variety of actors in Bogotá. As a result, legal experts and judges often influence and dictate how urban projects should be implemented by mayors or local administrators (Sotomayor et al. 2023). This situation can also affect environmental policies (Quimbayo Ruiz 2021). Therefore, incorporating ecological considerations into urban planning in Bogotá brings to the fore also a diverse and ever-changing combination of local government narratives, practices, and techniques. Planners and social organizations have played a crucial role in pushing planning practices toward the integration of ecological criteria in urban planning and, especially, decision making. The urban ecologies specific to the certain environmental conditions and life circumstances call for a novel type of collective efforts to address these issues.

First, instead of holding the idea of consensus as a goal of urban planning, it might be better to consider conflict as opening an avenue for new democratic practices. In this way, the historical meanings of situated urban ecologies can potentially be traced, identified, and mapped (Osorio Ardila 2019). Through the perceptions and experiences of planners and stakeholders and concerned inhabitants, situated urban ecologies represent concrete embodiments of a sense of a place, or a concrete geographical space. As such, all have the potential to give content to the form of planning (cf. Stedman 2016). It is then that democratic practices are achieved through respecting political differences and dissent (Brown and Tregidga 2017), and long-term visions in planning can be achieved (Koskimaa et al. 2021). The lack of a common language and understanding does not form barriers to an effective inclusion of situated urban ecologies, but invites thoroughgoing democratic practice (cf. Hardy et al. 2022). Participatory policy planning and decision making should make conflicts visible, allowing the use of various vocabularies, ecological evidence, and making visible the inherently political nature of urban land use (cf. Salo et al. 2023).

Second, to materialize planning practices with ecological criteria, it is fundamental to address how the existing modes of land use produce various types of damage to ecosystem conditions. That is, in land use planning it is essential to scrutinize the actual use of power in the urban decision making. Following Cornea et al. (2017), there should be a space to design structurally sensible and functionally effective interventions for a just urban governance. Because of the history of national political conflict and violence, and the persistence of deep social inequalities, Colombia's democratic system has been very restricted in relation to rights and means of effective participation in public affairs (Archila 2006, Velasco 2015).

Third, against this backdrop, in Bogotá and elsewhere, the question not only concerns greening the urban space but also assessing the implications that land-use decisions will have for wider sustainability and urban justice. If such implications do not involve a genuinely democratic planning practice and situated urban ecologies, they may deepen already existing inequalities and conflict in the city region, which are marked by relations of social exclusion along with class, race, and gender lines. Such implications can be tackled only through incremental political creativity. In a relational urban ecology, unique local conditions and nature must also be protagonists in this political endeavor.

Finally, a tension between the value of articulating situated local ecologies and the development of urban infrastructures has always been present in Bogotá's planning discussions. This has been reflected in the current and future implementation of the POT, and even at a regional scale. This is due to the challenges posed by the arrival of a new District administration (Mayor Carlos F. Galán) and new governance schemes, such as the Bogotá-Cundinamarca metropolitan region (Camargo Sierra 2022), in the context of a climate emergency and an ongoing regional water supply crisis scenario. Yet in the Colombian context, there is much to question in infrastructure development because of shortcomings and overt state mismanagement. For decades, the local political elite has diminished the role of ecological values, mobilizing an aspirational narrative of progress and development in favor of for-profit land use and speculation. This calls for further research.

## CONCLUSION

This article has traced the evolution of the concept of urban nature in Bogotá and analyzes how planners and related actors have sought to integrate ecological considerations into their practices. We reconstructed the policy intention to link ecology with planning practice from the 1990s to the present and provided a thorough understanding of how spatial and urban planning practices have been "ecologized." Most importantly, the urban-regional ecological structure has become a key feature of land-use planning.

Our findings indicate that the quality and quantity of scientific ecological knowledge in the Bogotá region do not represent a significant obstacle to ecologizing planning. The content of this structure is gradually taking shape through the incorporation of local situated ecologies. However, the lack of commitment from many of the key stakeholders may be affected by the influence of particular interests, which hinders their operationalization in the planning practice.

Controversies over urban ecology, conceptualizations of nature, and the implications of these conflicts for democratic participation in planning practices are of great concern. Instead of lamenting the lack of a common language and understanding among a variety of stakeholders and actors, ecologizing urban planning relies on the premise that long-term visions in planning can be achieved democratically through respect for political differences and dissent. Genuinely democratic planning practices and situated urban ecologies can challenge existing inequalities and conflicts within planning practices that are characterized by relations of social exclusion along with class, race, and gender lines.

Available empirical evidence shows that there is an urgent need to radically rethink and revise current practices and concepts, particularly with regard to the role of situated local ecologies in planning. The limitations of current planning practice are numerous and include an over-reliance on the pursuit of the highest possible degree of neutrality, which ignores the inherently political nature of planning, which is embedded in conflicting values about different aspects of nature. By acknowledging planning as an unstable assemblage of local governance with its narratives, practices, techniques, and conflicting visions of nature, new democratic practices could be enabled to achieve ecological urban planning in specific geo-historical conditions. This would, of course, lead to more just urban environments.

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#### Author Contributions:

Conceptualization: GAQR; JK; MS; JH  
Methodology: GAQR; JK; MS  
Investigation: GAQR  
Formal analysis: GAQR; JK; MS; JH  
Writing-Original Draft: GAQR; MS; JH; JK  
Writing-Review & Editing: MS; GAQR; JH; JK  
Overall responsibility: GAQR

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#### Data Availability:

The data collected through interviews cannot be disclosed openly because we need to protect the interviewees as we have promised them. To protect people and guarantee community privacy in line with research ethics, the interviewees were anonymized. Furthermore, if a person is cited, their name is changed. The interviews data has been saved in a private repository where the first author is the only person with access to it. The research practice managed to gather documents relevant to normative, technical, and scientific information around urban-regional biodiversity. All the collected material was narrowed down for the scope and analysis of the research article. These documents were complemented with a literature review on empirical research related to Bogotá to provide a potentially different perspective in comparison with and contrast to the findings in the analyzed documents. Besides the interviews, and content analysis of documents, participant observation, and field visits were undertaken. All the observations were recorded in the first author's field diary, which is kept safe and undisclosed.

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