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CITÉRES,
Université de Tours, Paris, 28 November 2026

Draft Paper

The Social Shaping of Urban Biodiversity: Expert Controversies and Political Dilemmas in the Green City

Key points:

- The dynamics of knowledge-policy translation on urban biodiversity is complicated by the uncertain boundaries of its biological processes:
  - *Reductionism:* Like climate change the 'success' of the issue on the transnational public agenda triggers forms of 'biodiversity reductionism' (everything is caused by or is causing biodiversity-related problems)
  - *Ambivalence:* invisible to non-experts, many processes can be reframed in very different and often conflictual ways
- Becoming urban, biodiversity becomes part of the discourse on the green modernization of the 'sustainable city', thus moving away from a problem of 'loss' to become a problem of abundance and valorization
- Given the domination of natural sciences in the field, the social dimensions of urban expertise are vitiated by a naïve ecological functionalism transferred to society and politics
- There's a however a tradition of collaboration between environmental sociologists and ecologists that can be revitalized to investigate the social aspects of biodiversity

Introduction

In recent decades, urban biodiversity has emerged as a key issue in biodiversity studies (Nilon et al. 2017; Knapp et al. 2021). Although as a scientific object it has a long story (Kowarik, 2023), the impressive amount of scholarship emerged in the last few years is suggesting a success of the concept, an expansion of the field and of the domain of policy application. However, the more urban biodiversity becomes widespread in the scientific realm as much as in policy documents or public discourses, the more the identification of clear boundaries become problematic. The complexity of the term 'biological diversity' in the city makes of it a contentious issue, where several disciplines and areas of expertise are concurring to define it and to construct it. This process of scientific expansion follows in some ways the evolution of climate change (Dunlap and Brulle, 2015). While initially a domain restricted to natural sciences such as biology, ecology or environmental engineering nowadays biodiversity is an issue investigated by other disciplines as different as economics, urban planning, sociology and anthropology.
While traditionally emerged within the field of environmental conservation, and mainly conceived as a property of remote, rural or wild areas, current policy documents and public discourses are putting biodiversity at the center of urban strategies. This is visible in the doubling of scientific publications – both in general and in urban journals (see in the Annex, Rega-Brodsky, 2022), as much as in the policy documents, and in a multilevel diffusion, from the international to the local level. Reports on

urban ecosystems of the Intergovernmental Panel on Biodiversity and Ecosystem Services (IPBES), the approval of the Nature Restoration Law in 2024 as part of the European Green New Deal, or the establishment of targets like 'Bring nature back to urban spaces' within the EU Strategy for 2030[1] including the Green City Accord (GCA) involving mayor in 'making cities cleaner and healthier, these are all examples of the growing relevance of urban biodiversity.

At the same time, the wide success of urban biodiversity interrogates its scientific status as much as its capacity to impact politically. The widespread recognition of the importance of urban biodiversity also shows some ambivalences, partly due to the complexity of the definition as much as to the operational declinations and selective processes through which it can be translated into a policy goal with clear boundaries that allow to assess, control and calculate its existence, both in terms of conservation or loss.

But a new paradox is emerging. Becoming urban, biodiversity moves beyond the critical domain of a problem framed as 'loss' or 'extinction' and is at the center of urban governance and the new logics of ecological modernization (Spaargaren and Mol, 1992). Near discourses on conservation, new discourses about the valorization emerge, following processes of economization (Asdal, 2023). Urban biodiversity becomes at times an 'eco-system service', or in other cases commodity enriching new forms of commodification (soil consumption, financialization of nature).

Moreover, the controversial definitions of the value of urban biodiversity at times move beyond goals naturalistic goals to involve social critiques about how democratic the green/sustainable city is and how much processes of green gentrification contributes to processes of social exclusion, thus reframing simplistic win-win schemes about environmental and social values (Gould and Lewis, 2017). Indeed, the dominance of natural sciences on the topic produces many appeals to urban biodiversity as a goal which requires 'social acceptance', as much as new participatory platforms for co-creation of 'nature-based solutions' involving citizens and laypeople. Some cases of nature restoration in the city have indeed involved a variety of figures from technical experts, laypeople, environmental activists and planners, although the contribution has been far from purely technocratic or quiet, involving frequent cases of contention (Lachmund, 2013). The type of expertise mobilized changes in various ways what is the core definition of biodiversity, but also its social and political translation.

As an example, conservation ecologists mostly propose an idea of urban biodiversity that 'protects' currently existing urban voids where nature has spontaneously arisen (dismissed urban factories or railway stations). More frequently, urban planners usually promote biodiversity as part of new modernization projects of urban expansion that triggers aforementioned processes of green growth and gentrification.

On this last point, the problem of professional expertise in urban biodiversity encounters in various way the presence of lay expertise represented by citizens and civic groups inhabiting green spaces and interested in having a voice on the way urban biodiversity is either 'protected' or 'designed'.

So, if biodiversity is becoming a key issue in urban politics, two key questions emerged for a sociology of expertise:

- What's the relation between specific type of expertise and (democratic) politics?
- How is the problem of urban biodiversity (de)politicized by the main collective actors populating the new 'sustainable' smart city?

[1] https://environment.ec.europa.eu/strategy/biodiversity-strategy-2030_en

This paper tries to analyze the 'boundary work' (Gyerin, 1999) performed along the line between experts and social actors involved in the construction of the issue 'urban biodiversity' as much as to understand the political challenges it faces.

1. The Social Construction of Urban Biodiversity:

Recent trends in biodiversity studies have shown evidence of how urban spaces are becoming a key site for biological diversity, both for adaptation and evolution of a variety of organisms, from bacteria to plants and animals. Notwithstanding, like traditional social studies on biodiversity (Hannigan, 2020; Gustafsson, 2018), its urban variant reproduces some interesting dilemmas and contradictions regarding the meaning of 'nature' as much as its 'defense', 'conservation' or 'valorization'. Especially, urban biodiversity has emerged as a specific trend in the study of biodiversity that challenge previous definitions of the 'biodiversity crisis' (Hannigan, 2020). Indeed, the discovery of urban biodiversity takes place in the space of abundance, the one of big urban settings and global cities where traditional boundaries are blurred: 'natural' and 'artificial' environment; biodiversity loss and abundance.

The emergence of the 'biodiversity crisis' is however far from cold and quiet. At its origin, biodiversity was indeed introduced as a new 'scientific problem' as much as intrinsically promoting an ethical call to action to protect 'biodiversity' from its 'loss' (Takacs, 1996).

The problem of urban biodiversity deals not only with the mechanisms and the processes mobilized by traditional biodiversity studies focused on the preservation of diversity of genes, habitats and species from human intervention, but it interrogates the boundaries (Gyerin, 1999) between nature and society, expertise and democratic politics in the ecological crisis.

Urban biodiversity is a field that indeed crosses the scientific and the policy field. Although originally a domain of ecologists and biologists turning 'urban' (Kowarik, 2023) it has become a field populated by a variety of actors: environmental, engineers, urban planners to economists and more recently, social scientists. A growing literature is showing how the urbanization of nature (or the re-naturalization of the city) is at the center of several trends (from conservation to transformation).

Urban policy and planning are showing that especially since the aftermath of the Earth Summit on 'Sustainable Development' in Rio de Janeiro in 1992 – where biodiversity was mentioned for the first time on a policy document - a paradigmatic shift has taken place from cities conceived as enemies of nature to key actors of sustainable development (Angelo, Wachsmut, 2020). These processes have progressively produced more stringent regulations on the preservation of habitats, protection of species as much as they have actively sponsored urban plans and projects inspired by principles of green regeneration that more and more frequently include the issue of climate change and biodiversity as an asset (like the Green City Accord in the European Union).

While these institutional programs also mentioned the importance of citizen engagement and participation, trying to promote processes of participation, spontaneous, grassroots initiatives have emerged at the urban level, claiming for greener areas and new practices of greening. Many studies have documented a variety of initiatives and forms of collective action, from community gardening to contentious forms of environmental action – occupation or regeneration of abandoned areas and urban voids (Aalto and Ernstson, 2017). In this regard, these initiatives partly contribute to stimulate attention and participation on issues of biodiversity through the protection of green areas or habitats from human intervention while also promoting a 'right to nature' that keeps together discourses on the quality of social relations and environmental justice (Blok, 2022). In this case, bottom-up perspectives and narratives on the value of urban green can reframe the ecological crisis also contesting processes of social exclusion triggered by the previously mentioned processes of urban regeneration and the so-called 'green gentrification' (Gould and Lewis, 2017).

In this sense, the new urban biodiversity policy inspired by 'nature-based solutions' can be reframed through different meanings and forms of justification. Whether it can be framed in terms of keeping together environmental care and social justice or as an ensemble of 'eco-system services', a 'natural

capital' (Costanza, 1997), 'biodiversity' becomes a quite different issue in terms of values and meanings.
One of the key challenges of urban biodiversity policies is the definition of the issue at stake: the high complexity of the concept makes problematic to conceive it as a unequivocal object of inquiry and of policy.
As an example, in suggesting the motivations for conserving urban biodiversity, biologist Donald C. Dearborn and ecologist Salit Kark talks about the 'conservation dilemma in urban spaces' (Dearborn and Kark, 2008): in choices regarding resource allocation for the protection of biodiversity, why should we privilege cities over rural areas? Four out of the seven reasons why urban biodiversity should be protected involve 'human variables': ethical responsibility toward the planet, the improvement of human well-being, providing environmental education through connecting people with nature in the city and provide eco-system services.
But also in this case, urban biodiversity involves multidimensional processes that extend from ecology to sociology: it defines the needs not only to defend biological diversity that inhabits urban settings, where exactly the borders between natural and artificial become blurred, but also to improve human well-being and to educate people.
While for longtime the city has been perceived as negative for nature, recent studies have shown how urban spaces can become favorable habitats for a variety of species to adapt, reproduce and even evolve (Schilthuizen, 2018).
Several are the implications of this shift for environmental social sciences and especially for an urban-environmental sociology. Traditional debates in ecology and the social sciences have emphasized the interconnection between ecological and sociological variables at the basis of what was called a 'biodiversity loss' but without moving beyond a traditional 'human ecology' paradigm (Machlis, 1992, see fig.1).

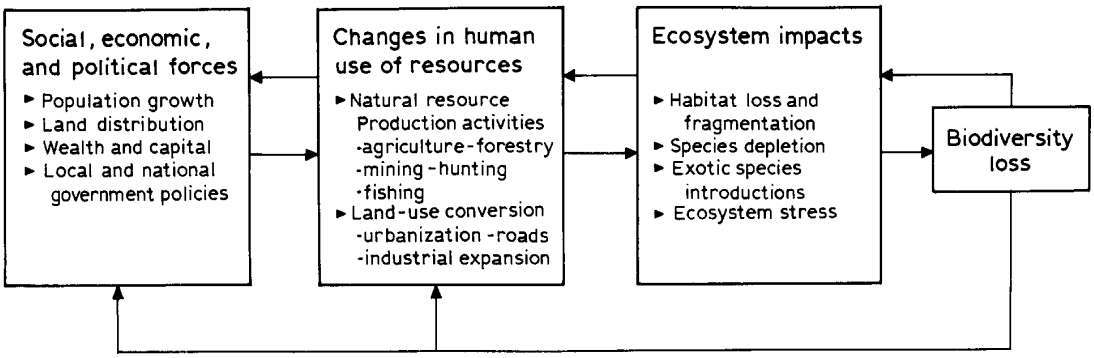

Fig. 1. Conceptual model of human-caused biodiversity loss.

While Machlis' scheme is indeed correct in his general attempt to summarize some key variables, it has the limits to put in the same box variables dealing with societal and environmental dynamics, emphasizing ecological functions but underestimating or avoiding typical 'political-economic' variables (societal power relations, micro-macro mechanisms of competition among social groups or structural actors). Part of the intuitions of the political economy paradigm (Schnaiberg, 1980; Schnaiberg and Gould, 1994) is indeed relevant to explain the current reframing of biodiversity from a problem of 'scarcity' or 'loss' to a problem of 'abundance'.
What is in the meantime making of urban biodiversity a source of extraction and economic valorization?
A paradoxical effect of a success of the concept of 'biodiversity' has indeed not only concentrated scientific and economic resources on its protection, but it has discovered in biodiversity a source of value and further 'business as usual'. This was clearly visible with the biotechnological revolution

and the rise of transnational conflicts on property rights between Global North multinationals and Global South communities hosting the richest natural reserves and biodiversity hotspots.
But other processes contributed to the urban extension of biodiversity. The more biodiversity was presented and discussed at international environmental summits, subjected to policy regulation through specific epistemic communities like the Intergovernmental Platform on Biodiversity and Eco-System Services (IPBES), or at a more local level, integrated in local urban plans, the more biodiversity expanded and embraced new issues and dimensions of social life.
Specifically, being the city the space of urban growth, urban biodiversity gets caught in a process of concept stretching as much as the idea of a 'sustainable city'. For this reason, as soon as urban biodiversity becomes a widely recognized issue, the more the issue of 'biodiversity loss', moves from a simple issue of protection to promotion.
In this case, a key goal for sociology is to assess the boundaries between what is 'natural' and 'social', which mechanisms produce a monopoly or distribution of expertise and which potentials or obstacles are at stake for its democratization. At the same time, this entails also a redefinition of the relations between 'right of nature' and 'rights to nature' in the city (Gilbert and Phillips, 2003).
If there's no one-best way to protect biodiversity in the city, what is crucial is to detect a consensus around which type of biodiversity specific actors (lay or expert) choose to protect or promote. Requiring a specific set of policies, biodiversity is inevitably subject to democratic debate and pluralism, both within the realm of scientific experts (disciplinary background, area of expertise) as well as stakeholders (civic groups, political representatives, business groups). Key aspects in both democratic and scientific processes are thus transparency, consensus and representation.
Even appeals to citizens participation on urban biodiversity cannot be reduced to top-down activities of scientific popularization or vague forms of communication of the cultural value of biodiversity. While there's a long tradition of documented experiences under the label of 'citizen science' linked to the tradition of environmental protectionism and conservationism, with citizens usually mobilizing in groups of amateurs to monitor and protect species, also political ecology has targeted problems related to urban biodiversity in terms of social justice. When urban biodiversity is becoming a source of urban valorization to make green cities 'cool', the 'luxury effect' can implicitly produce processes of social exclusion triggered by green gentrification. For this reason, the social dimensions of biodiversity cannot be investigated without considering the problem of power relations (Pascual, 2021)

2. Expert knowledge and Urban Biodiversity: Epistemic and Political challenges

Biodiversity is an 'umbrella concept' that includes in many cases and processes that are invisible or difficult to be observed by laypeople. The first definitions of biodiversity emerged between the 1970s and the 1980s with the rise of the field of 'conservation biology'. Biologist Paul Ehrlich played a key role in the institutional establishment of the first academic center, the Center for Conservation Biology (CBB) at the Department of Biological Sciences at Stanford University in 1984. Key milestones in the legitimation of biodiversity as a global environmental problem were especially international summits that put biodiversity crisis on the global agenda of international organizations, such as the UN Earth Summit in Rio de Janeiro in 1992.
In 1992, biodiversity was defined indeed by the Convention on Biological Diversity (CBD) as "the variability among living organisms from all sources including, inter alia, terrestrial, marine and other aquatic ecosystems and the ecological complexes of which they are parts; this includes diversity within species, between species and of ecosystems" (Secretariat of the CBD [1992] 2011:4).
But notwithstanding its scientific and public success, the definition was since the beginning not only an object of scientific inquiry but also proposing an ethic of living as much as a call to action (cf. Næss 1988; Rolstone III 1988). In the 1980s, a new crisis discipline was established within biology: conservation biology (Hannigan 2022). "Conservation biologists described their discipline as

‘mission-oriented’. Their mission [was] not merely to document the deterioration of Earth’s diversity but to develop and promote the tools that would reverse that deterioration” (Takacs 1996:35).
The scientific discovery of biodiversity loss thus tells us not only of a sum of issues that moves from extinction rates to biological classification, but also of a big concept that summarize a variety of processes under the same label.
While this discourse shift overcome the single-issue legislation focusing on specific areas, species, genes, ecosystems, and while gaining the more and more a policy legitimacy – with the establishment of an intergovernmental panel on biodiversity and eco-system services (IPBES) in 2012 – the concept itself became an object of contention. One of the key aspects is that ‘given the enormity of the problem, reliable information is difficult, if not impossible to assemble’ (Hannigan, 2023, 165).
Not only the issue attracted criticism over its public relevance[2] but also the political translation of the scientific evidence of biodiversity loss became problematic.
Notwithstanding its global relevance as “the latest ‘big’ environmental issue, comparable to acid rain, ozone depletion and climate change” (Valiverronen, 1999), biodiversity indeed faces both epistemic and political challenges.
As Lorimer (2006) assesses, biodiversity is ‘constituted by a set of objects and processes revealed to us by an all-seeing, disembodied natural science’. This introduces a problem of technocratic monopoly over the issue: in many cases processes are observed, monitored and perceived only by a restricted community of experts and scientists, thus making the issue ‘a cold one’, relatively ignored by political representatives and common citizens.
This is indeed not only epistemic, but also a political challenge as Guyer and Richards (1996) explains: ‘Like an iceberg – most of it is hidden from view, and (like the underwater portion of an iceberg) indefinite in shape and extent’.
The global scale of the problems as much as the discourse diffusion about biodiversity, becoming an object of inquiry far beyond the discipline of biology or ecology, made of the issue a new argument for applications and research in fields as different as medicine, biotechnology or economics.
The all-encompassing feature of the discourse on biodiversity is producing what also on climate change is called ‘climate reductionism’ (Hulme, 2011). Not only very distinct phenomena in the city are treated under the label of ‘urban biodiversity’ (green regeneration of real estate, land remediation, protection of wild areas or pollinators, bird or frog conservation from invasive species), but the tools put in place to pursue the goal of biodiversity in the city involves a very different set of expertise, and technical instruments as much as a consequent variety of democratic tools.
Whether we treat urban biodiversity as a set of resource in the form of ‘ecosystem services’, as a natural capital, a nature’s contribution to people, as an issue concerning the existential rights of species, the frame changes the nature of the issue at stake.
Thus, a focus on the means and goals redefines the boundaries between knowledge and policy, looking at the problem that is specifically at stake, pinpointing the monopoly and distribution of expertise, what paradigms are highlighting or hiding, and the goals that should be pursued (see Fig.2)

[2] On the *Washington Post* he argued ‘We don’t need to save endangered species. Extinction is part of the evolution’ (quoted in Hannigan, 2023) https://www.washingtonpost.com/outlook/we-dont-need-to-save-endangered-species-extinction-is-part-of-evolution/2017/11/21/57fc5658-cdb4-11e7-a1a3-0d1e45a6de3d_story.html

Fig.2 The Social Construction of Urban Biodiversity		***Goals – Logic of Action***	
		Conservation	**Transformation**
Means – Source of Authority	**Knowledge (*Technocratic Arena*)**	Conservation ecology Biology Natural sciences	Engineering Architecture Urban planning Urban Design
	Legitimacy (*Democratic Arena*)	Public Stakeholders Civil Society Organizations	Private Stakeholders Business groups Political actors Civic groups
Paradigm	**Human Ecology (*Conflict of Functions*)**	Prevention of species extinction Protection from natural depletion and habitat loss	Green/Blue infrastructures New Land-Use Regeneration of Urban Soil
	Political Economy (*Social Conflict, Power Relations*)	Conflict over conservation/protection	Conflict over land-use, Environmental Social Justice Movements

Problems surrounding urban biodiversity partly renew traditional debates over the challenges of biodiversity to become a salient policy issue as much as new dilemmas regarding which specific biodiversity is at stake (Yearley, 2018).
In many cases, the relations between societal actors and environmental processes introduces challenges related to

1. *Blurred boundaries between discipline, object and normativity*: while the issue at stake needs a multiple, interdisciplinary expertise, further levels complicate the problematization (sub-issues at stake, methods and means, goals). Not only the variety of disciplines can shed light on very different dimensions of the issue, but the more research is conducted the more the boundaries of biodiversity expand, and the controversy extends (Sarewitz, 2004) – e.g. taxonomic researches that discovers new sub-categories of organisms thus finding new species to protect, contradicting initial problems and so on. Moreover, the boundaries between 'normative' and 'empirical' dimensions of an ecological problem change on the field (e.g. in ecological controversies regarding the definition of 'invasive species', the same terms depend on the capacity of species to impose itself on the environment and thus to transform itself in a 'new' species populating the environment)

2. *Legitimate actors and the new participatory governance:* if definitions of biodiversity keep together scientific statements as much as societal values (e.g. 'nature contribution to people' to 'planetary justice'), controversies on urban biodiversity introduces also two key dimensions which falls into the domain of social sciences:

    2.1. the 'rights of nature' in the city that introduce the representational gap of species and eco-systems, their existential rights, their agency and their interests;

    2.2. the 'rights to nature' or the dimension of social justice, equal opportunities in the access to and fruition of green spaces, the right to live in a clean, safe and enjoyable environment and to benefit of nature

While in the second case, the problem of urban biodiversity is a variant of urban conflicts on 'regeneration' of the space, introducing a right to the green city against the luxury effect of green gentrification and its spatial injustice, the second point raise the bar of traditional problems of representation and participation. The issue of 'rights of nature' in the city bring on the table arguments previously discussed in environmental political theory, like new forms of representation that includes subjects that not only are voiceless but also that transcends purely human interests (O'Neill, 2001). These forms of representation, although requiring a specific form of abstraction (as every form of representation) are performed usually by specific groups, either scientific professionals, civil society professionals (namely environmental activists) or laypeople (people that cares about something or a specific being and speak on behalf of it).

Like biodiversity in general, the urban variant faces the problem of the impossibility to allocate scarce economic resources on the entire spectrum of species at risk. Selection processes of what should be prioritized in biodiversity protection does not match with 'objective conditions' but follows the logics of a political process, thus a social construction of an issue.

Moreover, many zones of ignorance characterize the boundaries of biodiversity knowledge. Most of what is known about biodiversity is estimated to be a small portion of potential, still to be discovered biodiversity: 86% of the species on Earth, and 91% in the ocean, still await description (Mora, 2011). Second, the relevance of some species for the political agenda and for public opinion more broadly depends on a set of social and political factors and not only on the capacity of an organism to contribute to people's health or to ecosystem services more broadly.

In many cases, a variety of dimensions explain the capacity of society to protect biodiversity. While not necessarily detached from scientific agenda, environmental lobbying and campaigns are in some cases able to shape public debates over some species as well as its conservation policies (Shibaike, 2022). This means that appeals to the protection of species in many cases depend on the way they are perceived by humans and to resonate with a set of human dimensions like emotions, interests or preferences. Mammals or insects can trigger very different emotions both for psychological or cultural reasons that can reframe them as valuable, nice, disturbing or hostile. In this regard their protection does not depend only on technical reasons – their importance or contribution to biodiversity – but on the capacity of organized groups and collective actors to construct the issue and promote a cause on the public agenda, gaining the support of political allies and to reach a public consensus.

3. Conclusion: Which Boundaries for Urban Biodiversity?

As an all-encompassing concept that crosses disciplinary and policy boundaries, urban biodiversity defines a set of processes and objects that concern the city as a whole ecosystem. Not only the boundaries of an eco-system are far from evident to experts themselves, but they are manufactured by a complex interaction between areas of expertise and political interests, and thus they require new

knowledge from social and political science to understand the boundary of this 'crisis'. Moreover, in the urban setting, environmental dynamics are particularly shaped by human presence thus reconfiguring new problems of distinguishing the boundary between human and biological interferences, redefining the trading zones between environmental and societal dynamics.

New research on urban biodiversity would benefit from the reflexive knowledge of sociology of expertise especially on two key problems that emerge in the literature mainly in biology and ecology:

Concept stretching and biodiversity reductionism. Already in natural sciences, discourses on urban biodiversity vary consistently depending on the type of scientific expertise mobilized. The same concept of biodiversity is exposed to disciplinary diversity and thus to problems of translation among different actors interested in observing different things within the wide spectrum of processes and elements called 'biodiversity' (Turnhout et al. 2019) – from the micro –microorganismal sphere – to the macro – eco-systemic dynamics. Second, the same object at stake can give rise to very different policy translation, from the conservation to the promotion of spontaneous nature in the city, to the protection of a specific plant, animal, or organism. Not considering the variety and often conflicting knowledge interests in the co-production between experts and social actors promoting a discourse on biodiversity exposes to risks of 'biodiversity reductionism'. As an example, biodiversity goals can be used to promote new forms of soil consumption, and thus designing new buildings inspired by nature-based solutions are ambivalent in their goals.

Naturalizing social and political implications. As a public issue, urban biodiversity does not concern only conflicts of ecological functions – thus reducing ecological degradation to purely naturalistic variables relating species to eco-systems. It concerns also issues of traditional social justice and democratic representation (right to nature as an extension of right to the city), as much as the 'right of nature' in the city. As much as nature is not equally distributed among spaces, it is important to analyze debates on urban biodiversity with the tools of environmental sociology and especially the political economy perspective (Schnaiberg and Gould, 1994). Looking at traditional sociological categories such as spatial inequalities and power relations allows to avoid forms of reductionism in the study of social processes linked to biodiversity – the interaction between humans and nature – and the political goals linked to its promotion or conservation. Reversing a process of biodiversity loss for 'existential rights' of species or promoting biodiversity as an 'eco-system service' that capture CO2 is as important as discussing the legitimacy of a specific source of pollution and the attribution of social responsibility for environmental damages.

A collaboration between sociology and ecology in the study of urban biodiversity policy requires thus starting from the trading zones among discourses and instruments originated in specific disciplinary fields that establish clear boundaries and goals. This sociology of expertise allows to detect the main characteristics of the politics of biodiversity, thus considering the importance of democratic pluralism behind biodiversity: as a collective problem it is shaped by the imageries of specific social groups with diverse, even conflicting interests, ideas, preferences and values. In order to become politically relevant, urban biodiversity needs more research on normative and culturally rooted conceptions embedded in the scientific instruments that inspire any project of political translation. A reflexive capacity to trace and understand the power of boundaries is a key aspect to make issues not only socially meaningful but also politically salient and accountable.

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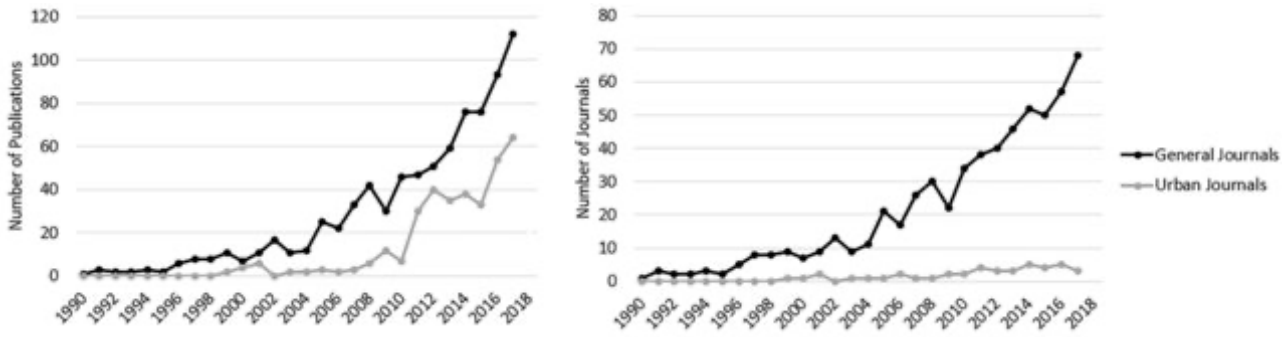
Appendix: Positionality and Empirical Material:

This draft is the outcome of conversations with colleagues within the Ecology section at the Department of Electronics, Information and Bioengineering and involved in projects of urban regeneration inspired by ecological principles and especially aiming at promoting urban biodiversity in public spaces in the city of Milan. As a sociologist, I am part of the National Biodiversity Future Center (NBFC), a national research institution involving researchers all over the country conducting research in various areas of expertise linked to biodiversity. I am especially member of the Spoke 5 specifically dedicated to urban environments. Since March 2023 I have been involved directly in projects of urban regeneration inspired by nature-based solutions and aiming at creating spaces for urban biodiversity in currently existing public parks as much as in new green spaces.
With this position, I have been a participant observer at meetings where institutional representatives and a variety of experts – mainly environmental engineers, urban ecologists, urban planners and designers - discussed urban biodiversity projects, and in parallel with this activity I have conducted a fieldwork on shared community gardens, gathering around 25 interviews with key citizen collectives, institutional authorities and experts working on green spaces and especially on biodiversity.
Parts of the reflections exposed in this paper are the outcome of these observations and conversations.



All publications (n = 1209) and number of unique journals publishing urban biodiversity studies by year and journal focus (urban topical journals and general ecological journals) from 1990–2017 and papers up to May 2018 (from Rega Brodsky, 2022)

Examples of the variety of meanings behind 'urban biodiversity' (cited in Schilthuizen's bestseller 'Darwin comes to Town. How the Urban Jungles drives evolution' (2018))

1-2: Roppongi Hills in Tokyo

3-Vertical Forest in Milan

Bosco Verticale (Vertical Forest): two residential towers planted with 730 trees, 5,000 shrubs and 11,000 herbs.
Both the Bosco Vertical in Milan and the Rappongi Hills in Tokyo are example of how green projects are indeed trigger socially exclusive dynamics

4- Lowline Lab Project in Manhattan

In Manhattan, crowdfunded Lowline Lab is experimenting with creating underground green spaces under poor light conditions. The aim is to convert the abandoned 200 yard long Williamsburg Trolley Terminal underneath Delancey Street into dark cavernous spaces where mosses and ferns may thrive in a subterranean park

5-Hilldegarden, Berlin

In Berlin, a local community is in the process of converting a behemoth of a Nazi-era concrete bunker into a ‘green mountain’, christened, Hilldegarden.

6- Brachen, Berlin

Typical example of spontaneous landscape emerged out of a ‘urban void’ and favoring urban biodiversity

7 -Birds constructing a nest with cigarettes

Example of how species adapt to human-generated, urban problems (wastes)

8. Birds finding new habitats on gas pipelines in Rattlesnakes Canyon (US)

Example of how species adapt to infrastructures that could be framed as environmentally problematic