

## PERSPECTIVE

# In defence of urban community gardens

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## Abstract

1. With the boom in urban living has come a boom in urban gardening. In particular, urban community gardening is an increasingly popular form of horticultural production, community involvement and connection to nature. Through the establishment and management of community gardens, biodiversity can flourish, with community gardens as 'hotspots' of flora and fauna within the urban matrix. Gardeners can deeply connect with the natural elements of gardens and thus learn about and gain appreciation for the natural world. Such interactions can combat the loss of nature experiences in cities. Despite their benefits for nature and for people, community gardens are threatened ecosystems as often temporary fixtures in city landscapes due to lack of land tenure and policy protection.
2. In this perspective, we recognize community gardens as an important ecosystem in urban conservation and argue for the defence of urban community gardens by city policy. We formalize this activity and the value of these ecosystems with scientific evidence from ecological and social-ecological research in 39 community gardens in Berlin and Munich, Germany.
3. Although our data reveal that these gardens support large amounts of biodiversity and catalyse human-nature connections, a lack of comprehensive documentation of social-ecological benefits at the city level can make community gardens vulnerable to urban planning threats; we have seen losses of multiple research sites in the last 4 years of biodiversity research.
4. *Policy implications:* To protect community gardens now and for future urban generations, we call for systematic and comprehensive data collection on community gardening activities and policy support for these urban ecosystems. Some cities are starting to do this and this can be scaled out. We argue for the recognition of urban community gardens as a physical land use and also of the gardeners themselves as important habitat managers and stewards of urban biodiversity.

## KEYWORDS

biodiversity, political ecology, social-ecological systems, urban agriculture, urban green space, urbanization

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## 1 | URBAN GARDENS ARE ENDANGERED ECOSYSTEMS

Biodiversity conservation, human health and social well-being—increasingly we know that these are intertwined. With a majority of people living in cities and towns today, and the area of urban land cover expanding, the ‘city’ is becoming a focal point of where nature and people meet, and a conversation about how human needs can parallel the needs of nature is critical (Standish et al., 2013).

An urban ecosystem in which we see this dialogue play out is urban gardens, generally described as horticultural systems in which food and flower production dominates alongside other social and recreation activities (Kingsley et al., 2021; McClintock, 2014). Urban gardens are considered important refuges for declining native plant species (Segar et al., 2022) and are recognized for contributions to animal habitat through the provision of food and nesting resources (Felderhoff et al., 2023; Goddard et al., 2010; Majewska & Altizer, 2018). In addition, urban gardens contribute to the health and well-being of city residents through stress reduction (Marsh et al., 2021), community cohesion (Clarke et al., 2023) and fresh fruit and vegetable production (Alaimo et al., 2008) that improves physical health (Kunpeuk et al., 2020). People learn about the natural world through plant cultivation and multisensory experiences in urban gardens (Hand et al., 2016; Lin et al., 2018). Gardens are where humans and nature intensively interact (Soga & Gaston, 2020) and arguably, influence one another through enhanced connection to nature (Marsh et al., 2021) and biodiversity stewardship (Mumaw & Mata, 2022).

And yet, urban gardens—particularly urban community gardens that are managed collectively by groups of individuals and/or households with shared resources and land (Mintz & McManus, 2014)—are threatened ecosystems that are still largely overlooked in urban planning and nature conservation. Often located in dense urban areas, urban community gardens hold a particular significance as they provide green space for multiple gardeners who may not have a garden of their own. With their explicit focus on community, urban community gardens can act as a nexus of and multiplier of nature- and biodiversity-based social and ecological activities within and beyond the surrounding neighbourhood. Despite their role in biodiversity conservation, environmental education and human health, urban community gardens are increasingly demolished from cities and towns worldwide (Spilková & Vágner, 2016). Pocket community gardens between apartment blocks, community gardens along highway and railway easements, and the once ‘guerrilla’ gardens that arose out of collective neighbourhood movements—these are continually removed from densifying and expanding urban landscapes. Lack of knowledge about the ecological and monetary value of goods and services that urban gardens provide, and a subsequent paucity of political and economic protection (Arnold & Rogé, 2018), make them vulnerable to extreme real estate pressure, social inequality and resource scarcity (Schmelzkopf, 2002; Wakefield et al., 2007). Furthermore, community gardens are often not part of green space planning, rather implemented as an ‘intermediate use’ and therefore

not necessarily recognized as a valuable land use that should be politically protected (Diaz et al., 2018).

As scientists studying these ecosystems, we have seen the loss of many community gardens in which we work, due to land use conversion into housing, schools and other recreational uses. We have written reports and letters to defend community gardens to provide to cities or landlords. We have prepared presentations for city councils or nature conservation organizations to communicate our findings on the value of gardens. We have participated in rallies and demonstrations to defend gardens. Despite these attempts to defend the gardens, scraps of debris and orphaned plants have become the remains of what was once a research station as a community garden is deconstructed, bulldozed and erased by pavement. We perceive this loss of a valuable habitat as a tragedy.

In this perspective, we call for the defence of urban community gardens by city policy and call for the recognition of community gardens as an important ecosystem in urban conservation initiatives and urban planning. We formalize this activity and the ecological value of these ecosystems with scientific evidence from years of ecological, social-ecological and participatory research in 39 community gardens in which we work and base our experiences and arguments on. We focus on public urban community gardens because they may be one of the most insecure urban green spaces and urban agricultural activities and, thus, the most threatened by demolition or repurpose (Arnold & Rogé, 2018; Diaz et al., 2018). Furthermore, these are also spaces where we see the most potential to optimize synergies between biodiversity conservation and human–nature relationships in the city (Majewska & Altizer, 2018; Segar et al., 2022; Soga et al., 2017). We use data from community gardens in Berlin and Munich, Germany, to provide evidence that these ecosystems can play a role in nature conservation goals alongside urban food growing and health-related outcomes (Garcia et al., 2018), and boost human–nature interactions to address multiple social and environmental crises. In part, this occurs through our collaborative research with gardeners. We argue that we need to recognize not only urban community gardens in the physical land use sense but also the gardeners themselves as important habitat managers and stewards of biodiversity in cities. This argument supports grassroots initiatives by community gardeners that call for decision-makers in politics, planning and administration to support the importance of urban community gardens for urban nature and contributing to city livability through legislation (e.g., Urban Gardening Manifest, 2014; <https://urbangardeningmanifest.de/>). When these gardens are recognized through appropriate legal status and integrated into urban green space planning, their value can be amplified.

## 2 | CURRENT STATUS OF COMMUNITY GARDENS: A CASE OF BERLIN AND MUNICH, GERMANY

Urban community gardens are not only at risk of giving way to other forms of use, but are also often limited in their ecological and social

potential due to their spatial and temporal context (Diaz et al., 2018). This has relevance to urban planning strategies and policies that can advocate for the protection and implementation of community gardens. In the course of our research over the last 4 years (2020–2023), we have developed a network of 39 community gardens in Berlin and Munich (<https://www.wildbienenforschung.de/>), the current status of which we briefly present as a case study. In 2021, we also surveyed the community gardens to gain insight into their age, current land use situation, spatial size of the gardening area and participation of gardeners (Supporting Information, Appendix 1). We received written informed consent via email, where the community gardens agreed to participate in the research. Participation in the survey was fully voluntary, anonymous and questions could be skipped. All self-reported data from the garden organizations does not have person-identifying information to draw conclusions about individual gardeners. The approval of an ethics committee is not required for such research in Germany and was therefore not obtained. We also contacted gardeners in 2023 about the current land use situation (i.e. if the garden is secure or not; future outlook for the next 5 years). Based on the responses of 23 community gardens, we report on the current status of these community gardens in Berlin and Munich.

## 2.1 | Age and land use

Short-lived and temporary community gardens will likely have different habitat features, plant composition, and may have a different conservation value than older community gardens (Ong et al., 2022). Furthermore, a lack of long-term perspective may reduce the motivation of the community garden to engage with and connect with the surrounding neighbourhood, reducing spillover neighbourhood social cohesion benefits (Clarke et al., 2023). For the majority of the 23 community gardens that responded, the lease or land use agreement was indefinite. Six gardens had a notice period of only 3 months, or at the end of each year, in the case that they must leave the area. Seven gardens reported a limited lease between 3 months and 10 years; for one garden, 25 years. Only seven gardens have existed for more than 10 years, whereas six gardens have existed for less than 5 years. Many of the community gardens in our work are established as intermediate land uses on, for example vacant lots that have other future planning purposes for housing, recreation or commercial land use. This means that the status of a garden can change rather quickly in a matter of a few years as planning agendas are implemented and lease agreements end. Indeed, we have found that since 2021, five of the 39 gardens in which we work have been evicted or removed, replaced by housing, schools, sports complexes and social services as a crisis response (here, a Ukrainian refugee camp). An additional five gardens reported that they are facing relocation or removal. These results parallel other findings in other contexts, where, for example 30% of 445 community gardens across the USA and Canada face land tenure security challenges (Drake & Lawson, 2015).

## 2.2 | Size and participation

Though research suggests a positive relationship between the size of a garden and its biodiversity (i.e. a species-area relationship; MacArthur & Wilson, 1976), urban community gardens frequently encounter spatial limits as they are often situated in areas in between buildings or may occupy residual spaces that remain after prioritized construction plans are implemented. Limited space for community gardens could constrain biodiversity and restrict participation to a limited number of gardeners. In our community gardens, the size of gardens as well as the number of participating gardeners varied. Of the gardens surveyed, 16 gardens were <10,000 m<sup>2</sup> in size, seven were <1,000 m<sup>2</sup>. In most of the gardens, there are less than 50 active gardeners (15 gardens), with an average of 30 gardeners. Some gardens are managed by a few participating gardeners, with less than 10 gardeners (three gardens), while some gardens are managed by larger gardening communities, with more than 100 participating gardeners (three gardens). Below we discuss that, even if small in the number of 'official' participants, community gardens as semi-public green spaces can welcome and engage with the broader public. Furthermore, they create the stage to train multipliers to do such communication and outreach work.

## 2.3 | Status

To gain an overview of the status of community gardens in Berlin and Munich, we conducted desk research searching online databases, and we corresponded by email and telephone with city ministries and garden organizations (City of Berlin Senate Department for Mobility, Transport, Climate Protection and the Environment, City of Munich Department of Urban Planning and Building Regulations, anstiftung e.V., Stiftungsinitiative Urbane Gärten München, Green City e.V.). Overall, we found it a challenge to obtain cohesive, comprehensive and useful summary information regarding the status quo of urban community gardens from these municipal authorities or organizations across both cities. In Berlin, notable strides are being made to document and communicate the locations and the activities of community gardens in the city and to create a network of urban community gardens (<https://www.berlin.de/gemeinschaftsgaertnern/>). However, there remains a general lack of systematically collected and comprehensive data on the reasons for the closure or relocation of urban community gardens. In addition to the community gardens in which we work, 12 additional gardens in Berlin have closed or relocated in the last 3 years, and the reasons behind their closure remain unknown due to the lack of available data. A lack of public data and documentation on garden status suggests a lack of recognition of community gardens in urban planning, as well as their dependence on grassroots initiatives and the social participation of individuals. A lack of comprehensive data can pose a notable barrier to understanding the extent of the pressure on these urban green spaces in these cities.

We argue that city-level data are essential to inform urban planning processes and governance strategies that may support the

protection, preservation and new instalment of community gardens in cities to realize their benefits. If cities do not systematically document the status of community gardens, and data are missing on the status of gardens, their land use arrangement, the biodiversity they support, how many people participate, etc., then it is easier to justify their removal should other more 'lucrative' and commodifiable land uses arise. Although current conditions may limit certain social and environmental benefits for some of these community gardens, they support the diversity of plant and animal species and provide a space for experiencing nature in urban environments. We turn to this topic to justify and defend their existence.

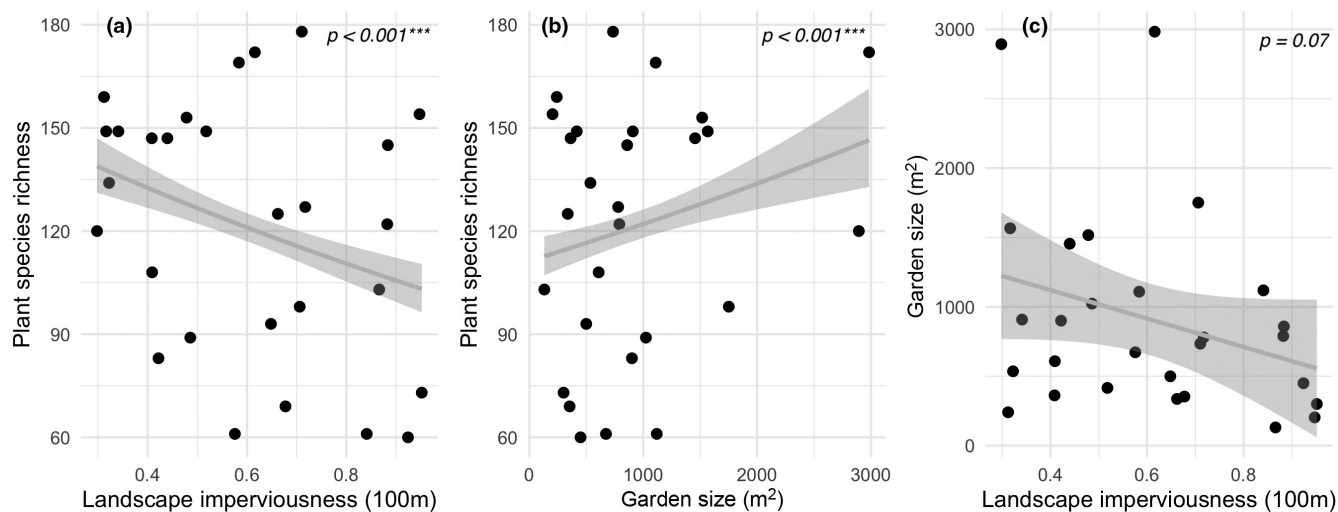
### 3 | URBAN COMMUNITY GARDENS ARE BIODIVERSITY HOTSPOTS

Urban community gardens can be 'green' stepping stones in the landscape by supporting connectivity among green spaces (Egerer et al., 2020), and thereby can be important ecosystems for species ecology and conservation (Goddard et al., 2010). In our research, we have documented plant and insect pollinator biodiversity for 3 years. We have systematically documented the species richness of cultivated plants (crops, ornamentals) and wild plants (native plants, weeds, spontaneous plants and naturally spread plants) in our study areas in the gardens (Seitz et al., 2022). We found that community gardens host a high diversity of cultivated plants, which support urban food production, and a high diversity of wild plants, which can contribute to plant diversity and population stabilization in the urban landscape. In these spaces, cultivated and wild plant species

coexist in the spirit of 'land sharing', potentially reconciling trade-offs between conservation (of species) and production (of food; Seitz et al., 2022).

We documented more than 793 different herbaceous plant species (excluding grasses, ferns, mosses and seedlings) in the 39 community gardens in Berlin ( $n=606$  plant species) and Munich ( $n=543$ ) over 3 years of field samplings every month during the summer growing season (April–September). During each sampling, we measured plant species identity, coverage and composition within randomly placed  $1 \times 1$ -m plots within a  $20 \times 20$ -m plot.

Alongside plants growing in gardens for urban food production (e.g. tomatoes, strawberries, squash, beet), these gardens harbour plants that are protected at the city to EU level and represent a diverse natural history of garden flora. In Berlin, the number of wild species found in 2020 to 2022 ( $n=341$ ) corresponds to 23% of the total wild species described on the City's Red List, including 36 threatened wild species (Red List categories 'extinct' [0], 'critically endangered' [1], 'endangered' [2], 'vulnerable' [3], 'unknown threat duration' [G], 'extremely rare' [R], 'near threatened' [V]), and an average of 122 plant total plant species per garden. In Munich, 10% ( $n=294$ ) of the total wild species on the Red List were found in 2021 to 2022, including 43 threatened wild plant species (Red List categories 0–3, G, R, V), with an average of 103 plant species per garden. In both cities, community gardens in landscapes with higher surrounding imperviousness are generally smaller. Yet, in Berlin, larger gardens have more 'rarer' plant species of low observed frequency (sensu Ong et al., 2022) and vegetation cover. In Munich, larger gardens have higher plant community diversity and higher total wild and cultivated plant species numbers (Figure 1; Conitz et al.,



**FIGURE 1** Visualized relationships among plant species richness, landscape imperviousness (within 100m buffers surrounding gardens) and garden size ( $m^2$ ) across 30 community gardens in Berlin and Munich, Germany. Generalized linear models (GLMs) with Poisson (a, b) and Gaussian distributions (c) found significant negative relationships between landscape imperviousness surrounding the gardens (100m) and the richness of plant species observed in the gardens (a;  $p < 0.001$ ), and a positive relationship between garden size ( $m^2$ ) and plant species richness (b;  $p < 0.001$ ). The size of the garden shows a negative trend with the imperviousness of the landscape (c;  $p = 0.07$ ). Graphs show the model visualization for the regression trend and were created using the ggplot function and method 'glm' in the ggplot2 package (Wickham, 2016).

unpublished). The term 'wild' here refers to its appearance in the field during our data collection, regardless of whether it originally was, for example a cultivated plant species.

Although the status of the Red List usually refers to wild populations, our data show the potential of gardens as habitats for rare and threatened species. In both cities, we found threatened species of agroecosystems and sandy and loamy fields (Berlin: for example *Anthemis arvensis*, *Galium spurium*, *Lathyrus tuberosus*; Munich: *Agrostemma githago*, *Hypochaeris maculata*, *Iberis amara*) and ruderal areas and roadsides in villages (Berlin: *Althaea officinalis*, *Lamium maculatum*, *Verbena officinalis*; Munich: *Berteroa incana*, *Anthriscus caucalis*, *Picris hieracioides* subsp. *hieracioides*; Jäger et al., 2017; Parolly & Rohwer, 2019). These plants have often become rare through intensification of management and habitat loss, but survive as 'relics' of a formerly agro-rural or ruderal landscape. They may, in part, thrive under extensive management in community gardens, potentially also benefiting from organic cultivation without herbicides. Even if these species occurred in only one or two community gardens and their populations were small, they show that urban community gardens can provide habitat for rare and endangered species that may not survive under land use practices in surrounding agricultural and rural areas.

We also found a total of 99 'non-native' herbaceous plant species classified for Germany and one EU-classified 'invasive' plant species, the tree of heaven (*Ailanthus altissima*), in community gardens in Berlin ( $n=290$  without status; Buttler et al., 2018). The relatively high number of non-native plant species can be attributed to anthropogenic disturbances and propagule pressure in cities (Keller et al., 2011), including gardening practices. The introduction of non-native flora can be problematic for biodiversity and ecosystems when native species are negatively affected by habitat competition or hybridization, and plant pollinator networks are disrupted (Keller et al., 2011). However, this threat has only been posed by about 4% of all registered neophytes in Germany (Nehring et al., 2013). These species also can play an important ecological role in supporting pollinators in urban areas (Staab et al., 2020).

Biodiversity research has extensively studied how urban community gardens support pollinators (Baldock et al., 2019), particularly wild bee species (Baldock et al., 2015). In our Berlin 2020 surveys, we found more than 100 species of wild bee from 26 genera, representing approximately 40% of the species in the city. In addition, we documented 24 wild bee species that are on Berlin's Red List. We have also detected rarer species in gardens, such as *Anthophora furcata*, which is the only oligolectic digging bee that prefers *Stachys* species, planted in gardens for their diverse medicinal properties. This species is also one of the few that can excavate its brood cells in rotting wood (Felderhoff et al., 2023). Functional diversity in bee biology illustrates why garden factors, such as plant diversity and nesting material availability, in community gardens are so important, especially for specialist wild bees. By providing a variety of resources for wild bees, community gardens can support specific wild bee species with different functional traits, including a diversity of pollen collection, nesting

and social behaviours (Felderhoff et al., 2023). In extending our work to Munich, we found approximately 120 wild bee species in total and approximately 80 species per city (Neumann et al., in preparation). For Berlin, this is about 30% of the wild bee species that occur (Saure, 2005), for Bavaria 15% (Bayerisches Landesamt für Umwelt [Hrsg.], 2021). In Munich, we found species including *Coelioxys lanceolata*, a cuckoo bee which parasitises on *Megachile nigriventris* (Westrich, 2018) and is listed as 'highly threatened' on the Bavarian Red List of threatened species (Bayerisches Landesamt für Umwelt [Hrsg.], 2021). We found an individual of *C. lanceolata* in Ottobrunn Community Garden (Neumann et al., in preparation), a garden consisting mainly of raised beds and seemingly unfavourable to biodiversity. The garden has gravel and heterogeneous ground cover and is surrounded by a mix of coniferous and deciduous trees and shrubs (Figure 2); this habitat seems to have provided resources for this species. The Ottobrunn Community Garden was removed in late 2022 and, with it, vanished a habitat for this rare species (Figure 2b).

In studying flower–insect visitor interactions, our research suggests that increasing the richness of flower species in gardens can contribute to the overall stability of the flower visitor ecological network, and this is regardless of urban landscape context (Schmack & Egerer, 2023). We also found that flower visitors shift in their dominance throughout the growing season, with non-bee flower visitors such as ants and flies important in early spring and bee pollinators important visitors later in summer. Therefore, urban community gardens that provide a rich assortment of plant species can offer a variety of flowering plants that bloom at different times throughout the year—from spring ephemerals to ivy in autumn—to ensure a continuous availability of nectar and pollen that support the needs of various species of bees and non-bee insects.

#### 4 | URBAN COMMUNITY GARDENS ARE SPACES FOR HUMAN-NATURE INTERACTIONS AND BIODIVERSITY STEWARDSHIP

Regular nature exposure can foster a meaningful connection between humans and the natural world (Chawla, 2020; Soga & Gaston, 2016; Turner et al., 2004) and personal experiences with nature can be a significant driver of pro-biodiversity behaviour (Soga & Gaston, 2020, 2023). Moreover, sensory contact with nature can be increased by nature conservation actions that enhance visible biodiversity (e.g. planting wildflower meadows to support insects), which can thereby increase people's sense of connection to nature (Hamlin & Richardson, 2022). However, the 'extinction of experience' (Pyle, 2003; Soga & Gaston, 2016) proposes that city residents are increasingly losing opportunities to engage with natural environments. Urban community gardens can counteract this loss by acting as urban spaces that facilitate positive experiences in nature and promote ecological awareness





**FIGURE 2** Community Garden Ottobrunn in eastern Munich was located in a residential and business district. Images shown before (a) and after (b), the garden was demolished to erect an Ukrainian refugee camp in 2022. This example illustrates how there are often trade-offs in temporary land uses. The community garden had diverse early spring blooming trees and shrubs, such as willow for pollinators in its periphery (c), as well as an assortment of vegetables, fruits and herbs that grow in raised beds (d). Photos: Astrid E. Neumann (a, b) and Monika Egerer (c, d).

among gardeners and possibly the adjacent neighbourhood (Lin et al., 2018). This function may be of particular importance in densely inhabited areas of the city where residents may not have access to a private garden of their own. Community gardens in these areas are often small and can have long waiting lists to join the garden community. Thus, we recognize that not all residents can have direct nature experiences through gardening, as only a select few may be active gardeners. However, gardeners are often multipliers of garden benefits. Gardeners can create and manage a biodiverse semi-public green oasis that facilitates broader public engagement with natural elements in the city. Moreover, in our system, we have found that this biodiversity stewardship is often accompanied by educational outreach activities that go beyond the gardener community itself and engage the broader public. This includes organizing workshops on, for example seed saving, medicinal herbs, healthy cooking, canning and preserving, as well as collaborating with schools and kindergartens that are invited to the community garden for educational field trips. Thus, through such educational outreach activities, community gardens transform into a collaborative, experiential and inclusive space for all to learn with and from one another. Our observations correspond with work that shows the high willingness to give back to the community in community gardeners (Ohmer et al., 2009).

In our case study, the motivation and engagement of community gardeners in educational outreach activities may also be illustrated by the gardeners' ongoing support of our research. We worked with gardeners using a citizen science approach to investigate the relationship between garden characteristics, pollinator diversity and fruit development. Our goal was to test whether an increase in yield could be an incentive for pollinator-friendly gardening, and to engage gardeners in scientific research in their community gardens,

providing ownership in pro-pollinator activities and pollination ecology research. We observed intense care and willingness to monitor plant development until the end of the project, even though many gardeners harvested very few fruits from the plants they observed and reported that fruits were stolen by visitors. It seems that the gardeners' motivation to actively engage in pro-pollinator activities in their gardens, for example by participating in a scientific research project, goes beyond harvest success (Karlebowski et al., in preparation; Sturm et al., 2021). When surveying these gardeners on their motivation to participate in the citizen science project—an indicator of pro-pollinator behaviour itself—we found the importance of positive nature experiences that are based on nature-relatedness as well as emotions. Specifically, gardeners who felt joy and fascination for pollinators were more likely to express the intention to support pollinators, and that the joy of seeing a pollinator was a predictor of actively participating in our citizen science project (Sturm et al., 2021). Thus, citizen science with community gardeners may provide an important approach through which we can further support and activate gardeners to become central actors in nature conservation projects.

## 5 | THE SPILLOVER BENEFITS OF COMMUNITY GARDENS THROUGHOUT THE CITY

Community gardens can promote multiple ecosystem service provision from food production to human wellbeing (Garcia et al., 2018; Jha et al., 2023) and can positively influence the broader urban social-ecological landscape through social functions (Hou, 2017; Lovell & Taylor, 2013) that increase their longevity and social sustainability

(McClintock & Simpson, 2018). Community gardens can even help foster broader community cohesion (Kingsley et al., 2019) and cross-cultural understanding (Hou, 2017). Often, such social benefits of community gardens around community engagement and empowerment can outweigh the simple food production benefits of community gardens, increasing their social value in neighbourhood communities (Alaimo et al., 2017). Such multifunctional spaces in cities bring people and ideas together on how to respond to urban problems such as inequality, green gentrification or common green space loss. As we have argued elsewhere (Egerer & Fairbairn, 2018), gardens can be 'realms of possibility and reimagination' of the urban landscape.

In future research, we are now using community gardens as living laboratories to explore the potential of collaborative research in nature conservation, and thereby, build the legitimacy of community gardens in city-wide conservation efforts. Here, we investigate how we can use what we have learned from community garden research to develop conservation interventions that go beyond the garden gate to implement across city neighbourhoods. In doing so, we can support community gardens as leaders in biodiversity stewardship and urban nature conservation. An important part of this work is to work with the gardeners themselves to discuss the potential of different nature conservation interventions. Second, we are collaborating with various environmental organizations and multiple neighbourhoods to implement these 'garden-tested' interventions with neighbourhood residents, thus broadening our garden-based research and recommendations to the city level, to other urban ecosystems. Through this work, we aim to justify, elevate and defend the role of community gardens in urban nature conservation action and specifically as spaces where we can broaden research findings and amplify the impact of nature conservation across the city.

## 6 | CONCLUSIONS

The continued development of the urban environment and the propensity for economic growth should mean that we should not be surprised by the loss of community gardens. Loss can be seen as a 'natural' part of urbanization processes, where community gardens may not contribute to society within the logics of a capitalist system. Urban political ecologists have characterized urbanization processes by capital accumulation and the externalization of nature and dichotomization of land use, and uneven physical and socioeconomic development (Brenner & Theodore, 2002; Harvey, 1989). The enclosure of common city spaces in pursuit of capital accumulation often dispossesses and marginalizes underprivileged groups (De Angelis, 2003; Sevilla-buitrago, 2014, 2015). Community gardening is a largely incommensurable good that cannot be easily quantified within a neoliberal economic paradigm, leading to classic struggles of community gardens to persist and maintain their commons in the city (Barraclough, 2009; Irazabal & Punja, 2009; Staeheli et al., 2002). Urban landscapes often reproduce the dichotomy of nature versus society, of land sparing, of externalizing nature from

society (Marx, 1976). Even trends in 'biophilic cities' that propose internalizing nature in city infrastructure (Kellert, 2018) remain largely hypothetical, and old Garden City planning ideas of the 1800s may now be reflected in private green rather than in the commons (Livesey, 2011). Therefore, despite the many benefits and ecosystem services that community gardens provide (Jha et al., 2023), community gardening remains one contested land use in city planning (Ferrari et al., 2023).

In conclusion, one can be inspired by the Senegalese conservationist Baba Dioum: 'In the end, we will conserve only what we love; we will love only what we understand, and we will understand only what we are taught'. This is why, as ecologists trying to understand the drivers of community garden biodiversity and the (social-) ecological dynamics of these gardens, with the loss of each community garden, there is a feeling of tragedy. When one knows and better understands the plants and animals that use these ecosystems and call these systems home, one realizes that this is a loss for nature conservation. When one hears the stories of people who communicate their love for their gardens and their appreciation for fellow community gardeners, but also how these spaces are their oasis in the city, one may realize the loss of these spaces for people and society. Urban community gardens are places where one can teach children, students and friends about the natural world; about ecology and conservation; about agriculture and food production. Community gardens are creative and experimental places where, through digging in the dirt, in trying out new plants to grow, in exchanging ideas with neighbours, one learns about wildlife, cultivated life, oneself and others.

Ecologists continue to ask what the role of nature conservation is in the city and where nature conservation should occur in urban landscapes that are explicitly designed for people. Urban community gardens are an excellent system where goals around the needs of nature and the needs of people intersect. Cities continue to densify and expand; asphalt predominates and engulfs the soil; community gardens are lost. The reason for the defence of community gardens and limiting the extinction of community gardens is clear: Scientific evidence shows the ecological and social value of community gardening in the city. The defence of community gardens is critical: Many community gardens with insecure land tenure are endangered and need to be protected. Thus, a more important question is rather *how to defend community gardens*. How can we collaboratively create ethical and equitable environmental governance arrangements at multiple social and institutional levels to recognize community gardens as an important land use, recognize community gardeners as important biodiversity stewards, and justify community garden existence in land use planning?

Institutional structures are needed to put community gardens on the map in urban planning. Enhanced data collection on the status of gardens is needed to address current limitations in obtaining information on urban community garden activities. A systematic and comprehensive data collection system would support a better understanding of the social, environmental and economic contributions of urban community gardens, ultimately supporting the

development of these habitats and strategies to ensure the long-term sustainability of urban community gardens. Additionally, due to space limitations and a low number of urban community garden projects, urban community gardening may be the privilege of few people and communities. New concepts are needed to deliberately integrate community gardens into urban planning and allocate dedicated areas for their inclusion in the neighbourhood, and thus facilitate equitable and inclusive access to community gardening initiatives and spaces for all urban residents. Although gardeners' autonomy in decision-making for garden management is key, the administration and maintenance of community gardens additionally requires institutional support, such as long-term use contracts to ensure sustainability of gardening initiatives. Finally, transdisciplinary research is needed that gives scientists and gardeners a role in this process and can amplify research to practical conservation interventions beyond community gardens.

### AUTHOR CONTRIBUTIONS

All authors conceived the ideas and designed the methodology. All authors collected parts of the data and analysed these respective data. Monika Egerer led the writing of the manuscript. All authors critically contributed to the drafts and gave their final approval for publication.

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### CONFLICT OF INTEREST STATEMENT

The authors have no conflicts of interest. Since acceptance of the paper, Monika Egerer has become an Associate Editor of *People and Nature* but was not involved in the submission and peer review process of the paper.

### DATA AVAILABILITY STATEMENT

Referenced data can be found in published papers cited or will be found in future published papers currently under review (e.g. Neumann et al., in review). Data are available on dryad or can be made available upon reasonable request. See: <https://doi.org/10.5061/dryad.r4xgxd2mm>.

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## SUPPORTING INFORMATION

Additional supporting information can be found online in the Supporting Information section at the end of this article.

**Appendix 1.** Garden Management Survey—Urban Gardens Project 2021.

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