Chapter 6
Urban Biodiversity Hotspots: Harnessing the Conservation Potential of Yards in Brazilian Tropical Cities

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Abstract Residential yards are a common land use in tropical cities, and often poorly planned in terms of biodiversity conservation. One of the most striking features of tropical cities is deep social inequality: poor neighborhoods are often devoid of basic infrastructure, including parks. The social inequity is also reflected in the vegetation cover in residential landscapes: most upper and middle-income neighborhoods contain abundant and high-quality vegetation, meaning they have more shrubs, trees and greater species diversity compared to low-income neighborhoods, where cement reigns. Accelerated urbanization of the more than 5500 Brazilian cities may benefit from a conservation strategy that includes increasing support for biodiversity in urban ecosystems. In this chapter, drawing on a field study in two Brazilian urban areas, we report on the potential contribution of residential yards to both the conservation of

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tropical urban biodiversity and to improving food security for those in lower socio-economic groups. The introduction of vegetation into urban residential yards improves access to nature and its resulting social and environmental benefits. However, the area available for vegetation is threatened by increases in building footprint area in residential neighborhoods. Avoiding the so-called "tyranny of small decisions", whereby the collective impact of individual householders' yard management scales up to negatively affect biodiversity and ecosystem services, may require an integrated effort on the part of city governments, universities and other research institutions.

Keywords Urban biodiversity · Urban flora · Urban ecology · Environmental planning · Urban planning · Yards · Tropical cities · Biodiversity · Brazilian cities · Home gardens

Outside the gate of the outer yard there is a large garden of about four acres with a wall all round it. It is full of beautiful trees—pears, pomegranates, and the most delicious apples. There are luscious figs also, and olives in full growth. The fruits never rot nor fail all the year round, neither winter nor summer, for the air is so soft that a new crop ripens before the old has dropped. Pear grows on pear, apple on apple, and fig on fig, and so also with the grapes, for there is an excellent vineyard: on the level ground of a part of this, the grapes are being made into raisins; in another part they are being gathered; some are

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being trodden in the wine tubs, others further on have shed their blossom and are beginning to show fruit, others again are just changing colour. In the furthest part of the ground there are beautifully arranged beds of flowers that are in bloom all the year round.

The Odyssey, book VII (Homer, approximately 800 B.C.).

1 Introduction

Urbanization and its impacts on biodiversity are global in scale (Goddard et al., 2021; Spotswood et al., 2021; Santangelo et al., 2022; Beridze et al., 2023; Caizergues et al., 2024; Moroń et al., 2024). Urban ecology supports planning decisions based on an environmental perspective, but urban ecology remains an emerging science in tropical countries (Angeoletto et al., 2019; Albertin et al., 2020). In parallel, with the ongoing mass extinction of species, (Ceballos & Ehrlich, 2002; Ceballos & Ehrlich, 2018), traditional approaches of protecting areas once described as pristine or 'natural' areas may be insufficient for conservation and biodiversity goals. Cities, especially tropical ones, can also act as biological conservation spaces (Rumble et al., 2019; Fellowes et al., 2020; Angeoletto et al., 2020). Well-planned growing cities can act as reservoirs of biodiversity (Angeoletto, 2012; Lambert and Schell, 2023; Beridze et al., 2023).

Most urban ecology studies have been carried out in cities in the Global North (Shackleton et al., 2021; Angeoletto et al., 2023). However, most megadiverse are located in the tropics (Macgregor-Fors & Escobar-Ibáñez, 2017). Megadiverse is a term used to refer to the 20 most biodiverse countries in the world. That group of 20 countries cover approximately 29% of the Earth's land surface and contain much of its biodiversity. They are home to more than half of all currently listed threatened species (Bacon et al., 2019). Tropical countries are also characterized by the rapid growth of their cities (Macgregor-Fors & Escobar-Ibáñez, 2017). Tropical cities also exhibit deep inequality. This social inequity also materializes in growing biodiversity inequity: the economically poor neighbourhoods in tropical cities generally have less greenspace, which implies poorer support for biodiversity and less access to the benefits of nature (Angeoletto et al., 2017; Macgregor-Fors & Escobar-Ibáñez, 2017; Souza et al., 2023; Albertin et al., 2023), including crime reduction (Arantes et al., 2024).

Residential yards (or *quintais*, in Portuguese, from the Latin *quintanale*, an open space adjacent to a house) are private spaces that can contain, to varying degrees, lawns, planting areas with ornamental vegetation, vegetable gardens, water sources and trees (Loram et al., 2008). There have been few studies on the extent of yards in tropical cities, and evidence from Leon, Nicaragua, suggests that around 85% of that city is made up of private greenspace (Gonzalez-Garcia & Sal, 2008). These spaces therefore contain environmental resources and host a high potential for conservation of urban biodiversity. Yard vegetation, especially trees, provides support for a wide range of animals, of both invertebrate and vertebrate taxa (Loram et al., 2008; Angeoletto et al., 2012; Bailey et al., 2019; Lima, 2022). They can also

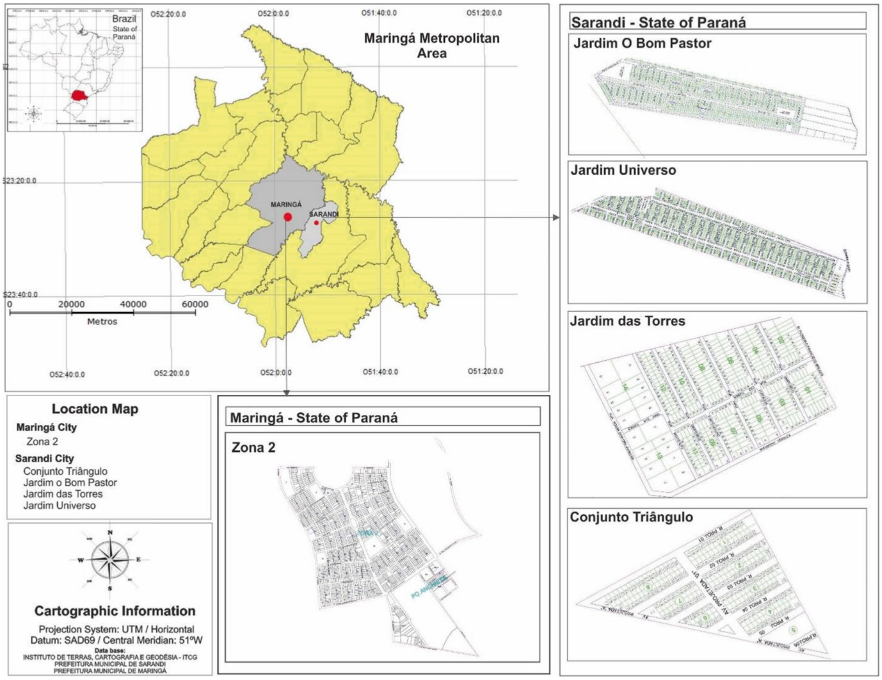

Fig. 6.1 Study area and research context, including selected researched neighborhoods

facilitate urban farming and improve food security for low-income families by providing a space for vegetable gardens and fruit trees (Gallaher et al., 2013). However, urban yards are *invisible spaces: Tropical* city governments are usually unaware of their most important (and basic) characteristics such as area, or percentage of unpaved soil and flora. These data are fundamental in order to plan yards and fully enable their social and environmental potential (Angeoletto et al., 2017; Sierra-Guerrero & Amarillo-Suárez, 2017).

Relatively little is known about residential yard vegetation in tropical cities with respect to species and space for additional vegetation, and how those vary by social groups. Angeoletto et al. (2011) researched yard vegetation in two neighboring Southern Brazilian tropical cities: Maringá and Sarandi, in the State of Paraná (Fig. 6.1). While these cities are geographically adjacent, Maringá and Sarandi are economically very different (Fig. 6.1). Maringá (23°25’30”S 51°56’20”W), with a population of 423,666 inhabitants, has a GDP per capita of R$ 41,569.88 and a very high Human Development Index (HDI, 0.808) which ranges from 0 (low development) to a high of 1 indicating long and healthy lives, being knowledgeable, and having a decent standard of living. Sarandi (23°26’38”S 51°52’26”W), with a population of 100,242 inhabitants, has a GDP per capita of R$ 15,469.55 and an average HDI of 0.605 (Angeoletto, 2012). This socio-spatial arrangement is typical of Brazilian cities, which segregates middle and upper-income residents from low-income families (Vercezi, 2018). With the hypothesis

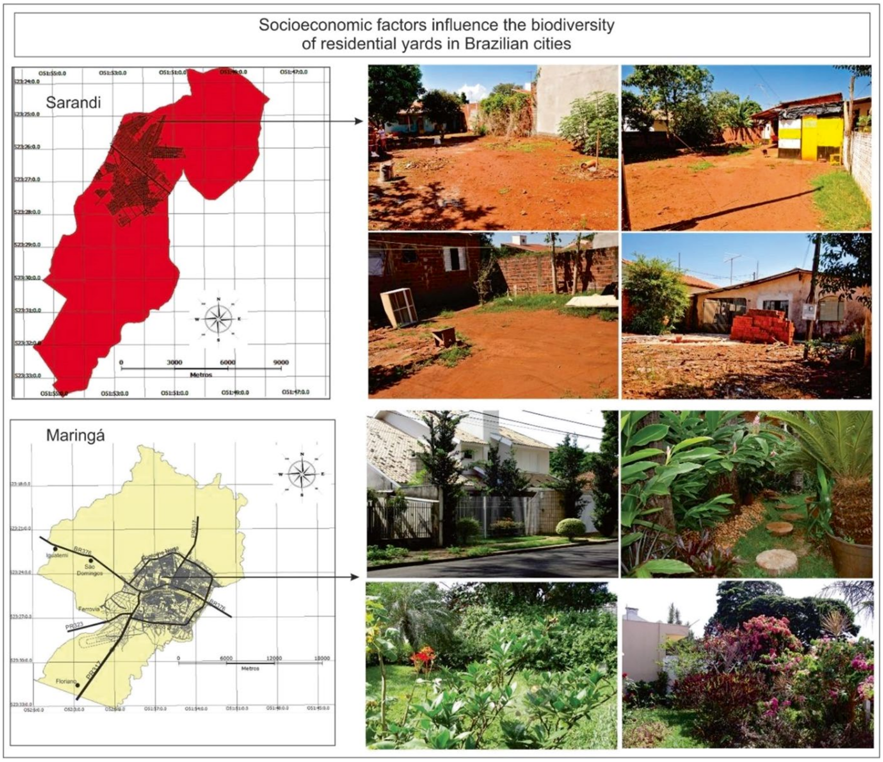

Fig. 6.2 Tropical cities display enormous gaps between the poor and the rich. This social inequity is paired with biodiversity inequity, and exemplified in Sarandi and Maringá

that yards in low-income neighborhoods contained lower plant diversity than those found in upper-middle-income neighborhoods, the researchers collected vegetation data from 299 yards from four low-income neighborhoods in Sarandi (*Jardim Universal, Jardim Bom Pastor, Jardim das Torres and Conjunto Triângulo*) and 261 yards of an upper-middle-income neighborhood in Maringá (*Zona 02*). The researchers showed that the yards of the upper-middle-income neighborhood had more trees and bushes and were more biodiverse than the yards of the low-income neighborhoods in Sarandi. For example, they identified 197 plant species in the low-income neighborhoods and 381 plant species in the upper-middle-income neighborhood (Figs. 6.1 and 6.2).

Angeoletto et al. (2011) later developed a research and action project in the same four low-income neighborhoods of Sarandi. The main objective of the project was to increase the number of fruit trees in the yards. They estimated the planting potential, which was the number of trees that could be introduced into the yards in these neighborhoods, from data on the average area of unpaved soil and the average number of trees in the yards.

Table 6.1 Number of yards, unpaved soil and planting potential for four low-income neighborhoods of Sarandi. Potential for new trees was calculated based on Angeoletto et al. (2011)

Neighborhood	# of yards	Mean number of trees per yard	Area of soil available for planting	Planting potential per yard	Potential for new trees	Planting interventions in (yards)	Total number of seedlings planted
Jardim Bom Pastor	384	3.7	104.2 m^2	7.9	3034	267	774
Jardim universal	571	4.4	107.6 m^2	7.5	4283	452	1400
Conjunto Triângulo	181	2.6	70 m^2	5.2	941	76	182
Jardim das Torres	144	8.1	264.6 m^2	21.3	3067	97	710
Total	**1280**	–	–	–	**11,325**	**888**	**3066**

Source: Angeoletto et al. (2011)

Based on the average number of trees per yard in the four neighborhoods, and the land available for planting, (Angeoletto et al., 2011) estimated the planting potential for the neighborhoods investigated in Sarandi, and for the Zona 02 neighborhood. For that calculation, they developed the eq. $PP = \{[sp\ (m^2)/9m^2] - anty\}$, where: PP = planting potential; sp = soil available for planting; and anty = average number of trees per yard, considering 9 m^2 as the area suitable for the growth of a tree seedling. The authors calculated that in the 1,280 yards of those four low-income neighborhoods 11,325 trees could be introduced (Table 6.1).

The authors visited all 1,280 homes in the four neighborhoods, offering the residents fruit tree seedlings from 11 species. Although 888 (~70%) families agreed to introduce new trees in their yards, the average number of introduced seedlings was far below the planting potential. Of the 11,325 potential new trees, only 27% (3,066) were actually introduced in their yards (Table 6.1).

Those results revealed a substantial gap: most households allowed more trees to be introduced into their backyards, but in far fewer numbers than planting potentials. Given the benefits of free fruit trees, these results motivated further inquiry. The families of the four neighborhoods visited have a reasonable amount of soil available for planting (yards with 70 m^2 to 264 m^2 of available soil), so why did not low-income families implement a higher level of free fruit trees planting into their backyards? In this chapter, we address that question.

2 Materials and Methods

Research on the ecology and biological diversity of cities is necessarily interdisciplinary, combining theories and methods from the natural sciences and social sciences for data collection and interpretation (Rumble et al., 2019). In order to understand the reasons for the low engagement of Sarandi neighborhoods with the planting interventions, we collected and analyzed qualitative data on the management of yards and their flora examined previously by Angeoletto et al., 2011, using Grounded Theory. The Grounded Theory method, is a type of content analysis that consists of data collection through interviews that are recorded and later transcribed. The researcher does not start the study with an already formulated hypothesis. Instead, the researcher seeks to gather a volume of information about the phenomenon that they wish to understand. Then they analyze this information, and the researcher elaborates a theory that explains the phenomenon studied (Taylor et al., 2015).

The transcribed interviews were carefully analyzed, sentence by sentence. A series of codes were extracted from that text, which can be words or expressions. With the same word or groups of words, more than one code can be generated. Similar codes were gathered in concepts, and these in turn in categories (concepts and categories can also be words or expressions). Diagrams are made with the codes, concepts and categories. The categories serve as the basis for the construction of the theory that elucidates the phenomenon that is being investigated (Allan, 2003; Kelle, 2007).

Data collection and analysis was carried out until a theoretical saturation occured, that is, when the researcher notes a repetition and absence of new data. No new codes emerge. Consequently, there is no set number of interviews in advance. Gross and Lane (2007), for example, in a study on the meaning of gardens to people, reached theoretical saturation with 18 interviews. Interviews start with guiding questions, and new questions can be added during the data collection process as new ideas emerge and more is learned about the underlying process (Bousso & Angelo, 2001; Veronese & Oliveira, 2006; Gross & Lane, 2007). The interviews began with guiding questions and new questions could be added during the data collection process.

Our guiding interview questions were the following:

- What does your yard mean to you?
- How do you use it (what do you do in your yard)?
- What types of plants (in terms of use and botanical type) do you prefer to grow?
- What plans do you have for your yard in the near future?

To deepen our understanding of the differences in plant uses and soil management in the yards of families from different socioeconomic classes, we applied the same method in the upper-middle-income neighborhood *Zona 02*, and compared the results obtained at both ends of this social gradient. To facilitate comparison, we merged the four low-income neighborhoods of Sarandi (*Jardim Universal, Jardim Bom Pastor, Jardim das Torres and Conjunto Triângulo*) into a single block, which we call the *Sarandi low-income neighborhoods* (Fig. 6.2).

3 Results

In the *low-income Sarandi* block, we reached theoretical saturation at 51 interviews. The age of the interviewees ranged from 19 to 86 years of age. From the interviews, we obtained 25 codes, grouped into 12 concepts and eight categories (Table 6.2). In the upper-middle-income neighborhood Zona 02, we reached theoretical saturation at 45 interviews. The age of the interviewees ranged from 22 to 83 years of age. From the interviews, we obtained 24 codes, grouped into nine concepts, and these, in turn, were grouped into seven categories (Table 6.2).

Yards Survey results indicated that yards in the low-income neighborhoods are considered multifunctional spaces. They allow neighbors to have moments of leisure and relaxation through gardening activities and are also useful to strengthen social relations with other residents of the neighborhood. Yards are perceived as fragments of nature around the house. As nature, they are sites of several biophilic manifestations (Table 6.2).

The intention to increase built area, with the consequent decrease of space for planting is evident among the low-income families. According to categories A6 and A7, the poor families of the Sarandi neighborhoods manage the flora in their yards in two ways: maintaining some vegetation, preferably herbaceous and shrubby species; and avoiding the introduction of trees in the yards, because they plan to build (Table 6.2).

On the other hand, interviews with upper-middle-income families reveal an interest in planting new species, which in turn indicates the intention of increasing plant diversity in their yards (Category A5; Table 6.3).

In summary, low-income families within the study areas have low biodiversity in their backyards, and they are reluctant to increase it. These families instead often wish to increase the size of their homes, and they are particularly opposed to the introduction of trees. Families oppose trees even though they have a greater capacity to support fauna, and their fruits can enhance food security. At the other end of the social gradient in our study, upper middle-class families have backyards with greater coverage (Fig. 6.2), and want to expand it (Table 6.2).

Table 6.2 The residents of the low-income neighborhoods plan to increase the built area of their homes

Codes	Concepts	Categories
A. Yards; recreation spaces	1. Yards: recreation spaces	A1. Yards: multifunctional spaces
B. Yards are part of nature	2. Biophilic manifestations	A2. Yards: places for contact with nature
C. I like the yard because it's a sunny space	2. Biophilic manifestations	A2. Yards: places for contact with nature
D. Yards without plants are yards without life	2. Biophilic manifestations	A2. Yards: places for contact with nature
E. Pleasure seeing pets	2. Biophilic manifestations	A2. Yards: places for contact with nature

(continued)

Table 6.2 (continued)

Codes	Concepts	Categories
F. Pleasure growing flowers	2. Biophilic manifestations	A2. Yards: places for contact with nature
G. The green of plants is relaxing	2. Biophilic manifestations	A2. Yards: places for contact with nature
H. All plants deserve attention, whatever their use	2. Biophilic manifestations	A2. Yards: places for contact with nature
I. I like to follow the life cycle of plants	2. Biophilic manifestations	A2. Yards: places for contact with nature
J. Yards absorb rainwater	3. Perception of ecosystems services	A3. Yards: conserve nature
K. Planting is therapeutic	4. Therapeutic activity	A1. Yards: multifunctional spaces A4. Gardening is a kind of therapy
L. Yards: areas for planting fruits and vegetables	5. Urban agriculture in yards	A1. Yards: multifunctional spaces
M. Yards: areas for growing herbs	5. Urban agriculture in yards	A1. Yards: multifunctional spaces
N. Yards: areas for growing medicinal plants	5. Urban agriculture in yards	A1. Yards: multifunctional spaces
O. I want to grow more food and medicinal plants	5. Urban agriculture in yards	A1. Yards: multifunctional spaces
P. The food I grow is healthier	6. Perception of the quality of homegrow food	A5. Food grown in my yard is healthier
Q. I want to cultivate a "Living Pharmacy"	7. Perception of importance of medicinal plants	A1. Yards: multifunctional spaces
R. I want to keep the plants I have in the yard	8. Biodiversity-friendly yard management	A6. Different forms of management
S. There is no room to plant because I have built in the yard	9. Decrease of the area available for planting in the yard	A6. Different forms of management
T. I will pave part of the yard	9. Decrease of the area available for planting in the yard	A6. Different forms of management
U. I will build / I am building in the yard	9. Decrease of the area available for planting in the yard	A6. Different forms of management
V. I cut down trees to build in the yard	9. Decrease of the area available for planting in the yard	A6. Different forms of management
W. I prefer to grow small species, as trees make construction difficult	10. Preference for small plants	A7. Preference for herbaceous and shrubby plants
X. I am satisfied with the fruit trees I have	11. Reluctant to introduce tree individuals	A7. Preference for herbaceous and shrubby plants
Y. I like to have friends / neighbors / relatives in the yard	12. Socializing with the community	A8. Yards enable socialization

Table 6.3 The residents of the upper-middle-income neighborhoods plan to increase the biodiversity of their yards

Codes	Concepts	Categories
A. Yards: recreation spaces	1. Yards: recreation spaces	A1. Yards: multifunctional spaces
B. Yards are part of nature	2. Biophilic manifestations	A2. Yards: place for contact with nature
C. Yards are places to teach my children/ grandchildren about nature	2. Biophilic manifestations	A2. Yards: place for contact with nature
D. Pleasure seeing pets and wild animals	2. Biophilic manifestations	A2. Yards: place for contact with nature
E. Pleasure growing flowers	2. Biophilic manifestations	A2. Yards: place for contact with nature
F. All plants deserve attention, whatever their use	2. Biophilic manifestations	A2. Yards: place for contact with nature
G. I like to follow the life cycle of plants	2. Biophilic manifestations	A2. Yards: place for contact with nature
H. Yards attract wild animals	3. Perception of ecosystem services	A3. Yards conserve nature
I. Yards absorb rainwater	3. Perception of ecosystem services	A3. Yards conserve nature
J. Pleasure harvesting what was grown	4. Therapeutic activity	A1. Yards: multifunctional spaces A4. Gardening is a form of therapy
K. Planting is relaxing	4. Therapeutic activity	A1. Yards: multifunctional spaces A4. Gardening is a form of therapy
L. Planting is therapeutic	4. Therapeutic activity	A1. Yards: multifunctional spaces A4. Gardening is a form of therapy
M. Yards: Areas for planting fruits and vegetables	5. Urban Agriculture in yards	A1. Yards: multifunctional spaces
N. Yards: Areas for growing herbs	5. Urban Agriculture in yards	A1. Yards: multifunctional spaces
O. Yards: Areas for growing medicinal plants	5. Urban Agriculture in yards	A1. Yards: multifunctional spaces
P. I want to plant more fruit trees, vegetables, medicinal and ornamental plants	6. Interest in planting new species	A5. Intention to increase plant diversity
Q. I want to increase the area of the garden (ornamental plants.	6. Interest in planting new species	A5. Intention to increase plant diversity
R. When it doesn't rain, I water the plants	6. Interest in planting new species	A5. Intention to increase plant diversity
S. Planting is a way to teach my children/ grandchildren about the environment	7. Educational space	A1. Yards: multifunctional spaces

(continued)

Table 6.3 (continued)

Codes	Concepts	Categories
T. Planting is a way to teach my children/ grandchildren about nutrition	7. Educational space	A1. Yards: multifunctional spaces
U. I like to give fruits, vegetables and flowers from my garden to my neighbors/ friends	8. Socializing with the community	A6. Yard enable increased socialization
V. The food I grow is healthier	9. Perception of the quality of homegrown food	A7. Food grown in the yard is healthier
W. The food I grow is pesticide-free	9. Perception of the quality of homegrown food	A7. Food grown in the yard is healthier
X. My fruits and vegetables increase my quality of life	9. Perception of the quality of homegrown food	A7. Food grown in the yard is healthier

4 Discussion

Species conservation for most of humanity is at the local level. In urban areas, this includes back yards. Dunn et al. (2006) argue that current conservation measures in relatively undisturbed areas are insufficient, and that people are more likely to participate in conservation measures when they have direct experience with nature. As a predominately urban species, today most human beings interact with nature primarily through the biological diversity of cities. Yards are places of interaction with nature and collectively account for hundreds of hectares in urban areas of tropical cities.

The biodiversity of yards is significantly influenced by the individual management styles of their owners (Kirkpatrick et al., 2009; Rocha et al., 2018; Lima et al., 2023). In turn, social and economic factors (Galluzzi et al., 2010; Gallaher et al., 2013; Kuras et al., 2020; Avolio et al., 2020) and cultural factors (Angeoletto et al., 2017; Sartori et al., 2019) influence the level of management of residents in yards, as our results show. The residents in the low-income neighborhoods investigated in Sarandi understand the land as a future possibility for increasing the built area of their homes as family size grows.

In several studies, differences in land cover between neighborhoods of different social classes are described as a phenomenon of distributional environmental injustice (Watkins et al., 2017; Gerrish & Watkins, 2018; Grove et al., 2018; Greene et al., 2018). However, our data show opportunities for adding tree canopy in yards among low-income areas that are deliberately not taken due to competing priorities. The refusal to create orchards in their yards (Angeoletto et al., 2011) and our observations allow us to sketch a more precise picture of competing values. There is a challenge between increasing support for biodiversity in tropical cities where this is possible – and in the immense peripheral areas of Brazilian cities, yards are the only space available – and the needs and desires of the residents of these neighborhoods to increase the area of their houses to support growing families.

Our results demonstrate that residents of poor neighborhoods plan more biodiverse backyards: they desire herbaceous plants and shrubs – although they reject the possibility of establishing orchards with many fruit trees in their backyards. There's a rationality here. In poor neighborhoods, the area available for plantations is smaller (from 70 to 104 m^2) than in the upper middle-class neighborhood (264 m^2).

In the interviews, the researchers consistently heard answers like these ones: "my family is growing", "my daughter had a baby", "I need an extra room in the house", "I want to build a barbecue in the backyard. In a nutshell, those are small and precarious houses, and families planned to make their spaces more livable, using their backyards (Angeoletto et al., 2011).

The individual decisions of residents of the low-income neighborhoods investigated with regard to their plans to reduce the yard area available for vegetation is an example of the phenomenon of the *tyranny of small decisions*. This expression was first coined by economist Alfred E. Kahn (1966) to describe economic phenomena in which individual decisions that are small in scope but cumulatively result in an undesirable situation. Odum (1982) adapted the premise to environmental degradation.

Given the potential conflict between homeowner development needs and broader conservation goals, how can the "tyranny of small decisions" be mitigated to improve biodiversity outcomes at a broader scale and reduce their negative effects on biodiversity in residential yards? We present two broad and complementary strategies. The first is through environmental awareness at the homeowner level, and encouraging behaviors and practices at the household scale. Such change may require persistent encouragement and changes in social attitudes which are slow to take hold can be and prone to failure (Philippsen et al., 2017). The second is one of active engagement from local government, education bodies and expert non-governmental organizations. With resources and engagement, changes in citizens' behavior may be relatively rapid (Puppim de Oliveira, 2019).

In order to help mitigate the environmental impacts caused by the millions of new homes to be built before the global population stabilizes, ensuring that the environments around houses are not planned as mere appendages of the built area, but instead are seen as areas which can benefit both biodiversity and residents may be beneficial (Dearborn & Kark, 2010; Sierra-Guerrero & Amarillo-Suárez, 2017; Sartori et al., 2019). In most tropical, and specifically in Brazilian cities, this planning is not possible without the contribution of material and technical resources from city governments (Angeoletto et al., 2017; Sierra-Guerrero & Amarillo-Suárez, 2017). This is particularly true in low-income urban areas. Therefore, instead of leaving it to residents to decide whether to vegetate their yard (or indeed to simply pave it), action at the municipal level may support the introduction of as many plant species of varied uses and botanical types as possible. Goddard et al. (2013) proposed government grants for pro-environmental management and for households that installed appropriate technologies (e.g. rainwater collection). The establishment of specific legislation for the protection of backyard vegetation could be a powerful tool for the conservation of those habitats (Cameron, 2023).

However, Brazilian cities have low planning and management capacity and their development is little controlled (Angeoletto et al., 2016; Pena et al., 2017; Gonzaga et al., 2024). Municipal planning bodies in these areas are often unclear about the importance of urban biodiversity, and how to incorporate conservation of biological diversity into planning (Ahmed & Puppim de Oliveira, 2017). For example, master plans for tropical cities rarely include quantitative biodiversity objectives (for example, increasing trees in backyards), which could serve as parameters for measuring planning success (Nilon et al., 2017). When it exists, the planning of green areas in tropical cities is directed towards the creation and maintenance of parks (Rumble et al., 2019). In fact, even in countries whose cities have a greater capacity for planning, residential yards are not a priority. In the UK for instance, garden areas were often ignored by land use statistics and policies until recently (Perry & Nawaz, 2008).

In the face of these difficulties, how can society improve access to diverse and useful flora in tropical cities? The poor planning and management capacity of governments in those cities could be circumvented through partnerships with universities and research institutions. On the other hand, we do recognize that city planning is not only technical, but also political. This means that technicians and managers, the academic world and the political sphere, will not always walk in union toward the same objectives. However, we have seen in Brazil a proliferation of partnerships between universities and public authorities in order to preserve and enhance municipal biodiversity (e.g. Vacchiano et al., 2019; Sant'Anna de Medeiros et al., 2020). Given the accelerated urbanization of Brazil‘s cities, this is undoubtedly an opportunity for positive change.

The abundance of residential yards makes this land use a key element in the ecology of tropical cities (Gonzalez-Garcia & Sal, 2008; Sartori et al., 2019; Angeoletto et al., 2022), and therefore they cannot remain invisible to city governments. The strategies formulated by technicians and managers to increase vegetation coverage in residential yards in Brazilian cities must necessarily be preceded by studies that allow an understanding of the attitudes and intentions of the residents in relation to these spaces. The absence of this information decreases the probability of success of yard planting projects, since, in urban ecosystems, sociological factors usually are as important as biological factors, in determining both biodiversity and its associated influence on human well-being (Ames, 1980). This research shows that, the permanence of the vegetation depends on yard management by the residents, a fact that must be foreseen in these strategies.

The results we presented in this chapter contribute to a holistic approach to encourage research, with attention to the synergies between biophysical, social and institutional factors at the urban scale. We believe that the greatest merit of this approach is its ability to foster more effective management of biodiversity in tropical cities. The traditional approach of creating reserves for nature conservation does not fit with the new realities of urban ecosystems. Instead, urban areas could be habitat to both people and other species through varied yard management.

Urban ecosystems can be problematic, because they generate environmental impacts on a global scale. But they are also part of the solution. Cities generate ideas and solutions that can be exported. Moreover, why not take advantage of and amplify the support of cities for biological diversity? In cities, and particularly in tropical cities, the increase of vegetation and tree cover and its corollary, improved quality of human life and biological conservation, are not exclusionary goals. On the contrary, the maintenance of the current urban pattern of well-vegetated affluent neighborhoods and peripheral neighborhoods dominated by cement is deleterious.

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