

Possible Gardens and the waters in the city: research and teaching

Jardins Possíveis e as águas na cidade: pesquisa e ensino

Jardines Posibles y las aguas en la ciudad: investigación y docencia

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Abstract

Water is an essential element of life but it is neglected in cities. Understanding its importance in space production for life, the article purpose is to discuss how research and teaching of architecture and urbanism has the potential to contribute to this debate. This discussion starts from questions raised by the multispecies research Possible Gardens that understand that it is necessary to overcome the anthropocentric character of projects. Some ideas are mobilized for the proposed discussion: possible gardens, multispecies, cosmopolitics, rights granted to non-humans. It is presented how gardens contribute to make water perceived in city, from everyday life, with special interest in its agency and its importance for drainage. From this understanding,



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didactic experiments are presented to propose projects that place water as central. As a conclusion, it brings the importance of everyday spaces for water cycles, the need to expand water imaginaries and points to cosmopolitical assemblies as an example.

Keywords: Multispecies; Possible Gardens; Cosmopolitics; Teaching; Research.

Resumo

A água é um elemento essencial da vida, mas é muito negligenciada nas cidades. Entendendo sua importância na produção do espaço para a vida, a proposta do artigo é discutir como a pesquisa e o ensino de arquitetura e urbanismo tem potencial para contribuir com esse debate. Essa discussão parte dos questionamentos levantados pela pesquisa multiespécies Jardins Possíveis, que traz o entendimento de que é necessário superar o caráter antropocêntrico dos projetos urbanos. Algumas ideias são mobilizadas para a discussão proposta: jardins possíveis, multiespécies, cosmopolítica, direitos concedidos a não humanos. São apresentados como os jardins contribuem para fazer perceber, a partir do cotidiano, a água na cidade, com especial interesse em sua agência e sua importância para a drenagem. A partir desse entendimento são apresentados experimentos didáticos para propor projetos que coloquem a água como central. Como conclusão, traz a importância dos espaços cotidianos para os ciclos hídricos, a necessidade de expandir os imaginários da água e aponta para as assembleias cosmopolíticas como exemplo.

Palavras-chave: Multiespécies; Jardins Possíveis; Cosmopolítica; Ensino; Pesquisa.

Resumen

El agua es un elemento esencial para la vida, pero en las ciudades se descuida. Entendiendo su importancia en la producción de espacio para la vida, el propósito del artículo es discutir cómo la investigación y la enseñanza de la arquitectura y urbanismo tienen el potencial de contribuir a este debate. Esta discusión parte de las cuestiones planteadas por la investigación multiespécies Jardines Posibles, que trae la comprensión de que es necesario superar el carácter antropocéntrico de los proyectos urbanos. Se movilizan algunas ideas para la discusión: jardines posibles, multiespécies, cosmopolítica, derechos concedidos a los no humanos. Se presentan cómo los jardines contribuyen a hacer percibir el agua en la ciudad, desde la vida cotidiana, con especial interés en su agencia y su importancia para el drenaje. A partir de esta comprensión, se presentan experimentos didácticos para proponer proyectos que coloquen el agua como central. Como conclusión, se aporta la importancia de los espacios cotidianos para los ciclos del agua, la necesidad de ampliar los imaginarios del agua y se señala como ejemplo las asambleas cosmopolíticas.

Palabras clave: Multiespécies; Jardines Posibles; Cosmopolítica; Educación; Investigacion.



Introduction

ater is essential for life on the planet; for humans and other living beings, it is an inseparable part of their bodies. Water also makes up the majority of the spaces where we live. Human settlements, especially cities, which have spread across the planet and fuelled the Anthropocene, have their origins intimately dependent on rivers. However, water is often neglected by the humans who build cities.

The first human settlement's origin was precisely in the region located between two river basins. The Fertile Crescent is the region between two rivers, the Tigris and the Euphrates, and they are of fundamental importance to the urban scenario: without them, it would have been impossible to develop agriculture, which provided the material support for the first cities formation (Pinsky, 2001). At this time, the process of domesticating or familiarizing plants and animals and human intervention in hydrological cycles began. It is precisely this fact that historically marks the beginning of our Western civilization.

With the development of modern Western cities, hydrological cycles were neglected in producing urban space. The water was seen as an enemy to be tamed, a place where wastes go, hidden under the streets and forgotten (Herzog, 2013). In the Latin American context, coloniality reinforces this understanding by erasing non-hegemonic Cosmo visions (Mignolo, 2003), such as black and indigenous ones and the everyday narratives. Today, water is remembered primarily for the disasters resulting from human action on this critical agent. The narrative that emerges is that of a "villain" that must be fought. A relevant issue in this sense is the circulation preponderance as a priority urban function and the consequent transformations of city spaces to favor it, which makes the transformation of valley bottoms into sanitary avenues commonplace (Herzog, 2013). The memory and the river presence are therefore erased from the city and associated with urban problems.

Teaching and research in architecture schools play an essential role in this scenario by opening the possibility of training professionals attentive to river basins and building possibilities for action from other perspectives. The proposal here is to broaden these perspectives by discussing an example of how this contribution can be made, opening debates. This discussion is based on the questions raised by the Possible Gardens research, particularly regarding urban design and planning and considering everyday spaces shaped by the agency of other beings, including water. This study aims to understand, based on the gardens, which territorialized multispecies worlds exist and how this take place in the city, making everyday narratives perceptible and possible (Berardi, 2019) and invisible memories that have the potential to expand imaginaries.

Several possible gardens were discovered where humans and non-humans shape their spaces in a double affectation (Stengers, 2018) with multiple, little hierarchical agencies without a human preponderance. From there, the following

question was formulated: how can this understanding contribute to the practice of architecture and urbanism? As a way of experimenting, project disciplines were proposed that understand and explore the possibility of extending subjectivity and forms of otherness to other beings, based on the assumption built up in the research that it is necessary to overcome the anthropocentric character for spaces to be truly ecological.

Methodological didactic experiments developed at UFMG's School of Architecture will be presented on critically proposing projects capable of contributing to hydrological cycles by placing water as a central element based on its agency and not just "at the service" of man. They explore the multispecies perspective discovered in the field research and the city rights extended to other beings. It encourages students to reflect on how to design more environmentally fair cities for all, contributing to developing professionals more committed to dealing with environmental collapse².

From river territories to gardens and from gardens to another way of imagining water.

The research

The Possible Gardens research aims to understand the multispecies worlds and how this takes place in the city, making invisible everyday narratives perceptible, among them those of water. It was developed from water territories and the understanding of river basins as essential to the design of urban spaces. It followed the next methodology: understanding the garden historically, the initial proposition of the term Possible Garden, carrying out a comparative case study of multiple cases, analyzing the data, reconstructing the meaning of the Possible Garden based on discoveries in the field and its contribution to thinking about the urban (Bragança, 2023b).

The research was developed at three points in the Arrudas River basin: upstream in the Barreiro neighborhoods, Centro and Lagoinha areas, and downstream in the São Geraldo neighborhoods (Figure 1). These areas were chosen because they are points with different characteristics where there are essential natural elements for the urban ecosystem and many socio-environmental conflicts between the rivers and human occupation.

The Arrudas is Belo Horizonte's most important watercourse, where the city's settlement was structured. However, given the characteristics of the highly irrigated and hilly site and the hygienist urban planning model, the primary road system often occupies the valley bottoms. Methodologically, the study area is

The socio-environmental and climate crises are realities in world cities. Latour and Stengers (2018) reject the word crisis because it gives the impression of transience and uses collapse. Accordingly, this article will use the term.



Multispecies anthropological studies take as their starting point that the dichotomy between nature and culture must be overcome (Latour, 2020). The term multispecies will be understood from Anna Tsing (2019).

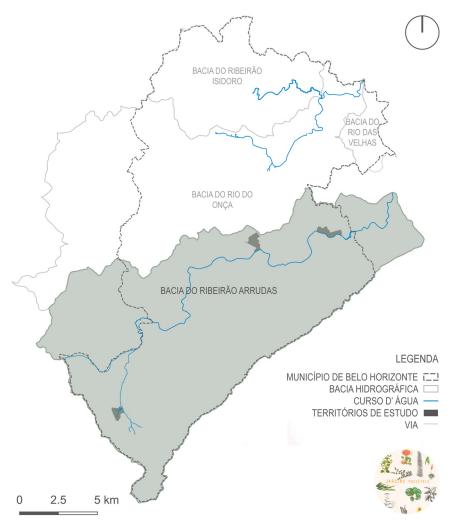


Figure 1 - Research areas. Source: The author (2021).

located along this river, precisely in the valley bottoms and on the nearest half slope, at points with urban occupation typical of residential neighborhoods and which feel the consequences of environmental disequilibrium.

The research was carried out, and the discoveries in the field structured taking into account the relational territories built by humans and non-humans, the main morphological elements of the watershed present - hilltops, any springs, mouths, watercourses/drainage lines, and water dividers - and the relief units (Carvalho, 2001) - convex, flat floodplains and concave surfaces (Figure 2).

A total of 900 quantitative interviews were carried out, as well as ethnographic interviews based on participant observation and photographic surveys. The sample for the ethnographic interviews was proportional and stratified by relief unit. There were 65 interviews in the São Geraldo neighborhoods, 15 in Barreiro, and 12 in Lagoinha³.

³ The primary data collected and the questionnaires used in the survey can be accessed in the following repository: https://www.frontiersin.org/articles/10.3389/fenvs.2023.1234178/full#supplementary-material



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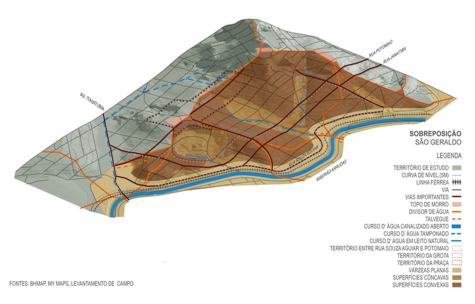


Figure 2: Study territory in São Geraldo. Source: The author (2021).

From these river territories, the methodological path to the gardens was followed on the understanding that other worlds, where the dichotomy of human and nonhuman is insignificant, exist (Mignolo, 2003) and are historically constructed in memory, in the cracks of hegemonic planning, in the face of modern coloniality.

In a classical conception of the garden, it is understood as a microcosm of the infinite, the representation of a world, a cosmology (Mongin, 2013). This understanding is essential for the arguments in the research and replicated in the didactic design experiments. Therefore, what cosmoperceptions⁴ remain in the territory today, even if they don't represent a single macrocosm but spatialized fragments? What is the power of these spaces in producing contemporary cities and revealing possible invisibilities?

The relationship with the water source has been essential to the garden since its origins. Gardens had a utilitarian, delightful, and medicinal character, but above all, a sacred character related to water. "The metaphor of the garden as a place of encounter with spirituality has always been related to the idea of paradise, and all these paradises become a garden where water flows (Magalhães, 2015, p.75)."

Brazilian history, which places only European-inspired gardens as legitimate, makes clear the attempt to construct a modern vision of the country and the coloniality that legitimizes the European imaginary. In this sense, civility was needed to polish the local roughness, i.e., the polish was white and European, while the roughness linked to poverty and evil was black, Indian, and mestizo (Sodré, 1999). However, the typical Brazilian colonial garden was a mix of the backyard, vegetable garden,

The term cosmoperception was developed by Nigerian author Oyèrónkę Oyěwùmí (2018), in dialogue with the term cosmovision, to distinguish between the production of knowledge and the perception of reality by different peoples. According to the author, the disseminated term, cosmovision, creates a hypertrophy of vision to other senses.



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orchard, and flower garden and always incorporated water (Magalhães, 2015). The division that separated the garden, yard, and house came with modernization, and even then, it didn't completely dominate the spaces. The possible gardens in this research are a memory of these colonial gardens, like those that previously existed in Curral Del Rei and exist today in Belo Horizonte and throughout Brazil. They escape ordinances and correspond to the majority. They are multispecies everyday spaces that mix indigenous and black knowledge about water, flora, and fauna (Bragança, 2023a).

European colonization also brought Enlightenment thinking, the belief in human superiority over other beings, and later European superiority over other ontologies. The colonizing process subtracted the agency of non-humans, who were displaced into the field of nature and became an object to be dominated by a human subject. But this agency has not disappeared and is manifesting itself. The research made us recognize the agencies of non-humans and how they are incorporated into the construction of garden spaces in a less hierarchical and conflictual way.

In another approach, from the Latin American space, coloniality was not inscribed in an empty space of meaning. For this reason, "more than resistance, what we have is r-existence, because one does not simply react to the action of others, but rather that something pre-exists and it is from this existence that one R-Exists. I exist, therefore I resist" (Mignolo, 2003, p.215). Researching the gardens and territories of water, their existence, their forms, and their ways of being built were prerogatives for questioning the urban project on its anthropocentric and colonial bases.

Belo Horizonte has always had a conflictual relationship with watercourses. The presence of the Arrudas River was an advantage pointed out by the building commission for its installation in Curral Del Rei. However, the initial Enlightenment project already planned to channel it and its tributaries in the middle course, which was not the case upstream and downstream. It was designed to sanitize the city and keep it water-free, considered a disease vector. The justifications were flooding, traffic, pollution, and an ideal of modernization. With the city's industrialization, river basins were no longer integral elements of the landscape but obstacles to development.

However, the possible gardens researched are territories of "topobiorelational" symbioses present in cities with the potential to recreate them when made visible. In this sense, it is possible to criticize hegemonic planning as a critique of the visibility regime and, therefore, a critique of an anthropocentric form of power. Every day, gardens build multispecies spaces. But the ideas of nature, ecology, and sustainable development direct the imaginary disseminated in our society, environmental struggles, public policies, and urban projects. Ecology, in a way, aims to defend the rights of non-humans included in nature. However, disseminating an idea of nature instead of the human, consolidated in modernity, colonizes imaginaries. How can gardens contribute to decolonizing these imaginaries? What other possible worlds do they point to? How is water thought of and perceived in possible gardens?

Water and the possible gardens

If the systematized articulation between urban and environmental issues is recent (Costa, 2008), in the gardens, this articulation happens as a practice, producing socio-spatial arrangements. The gardens appeared in 50.74% of the studied areas, making us realize how river territories are present in cities.

When comparing areas with and without gardens, considering plots and remaining areas, gardens account for 30.02 percent of the area permeable. If the streets and the territory's total area are included, this rises to 21.97%. The presence of gardens, even if not on all plots, guarantees permeability above the minimum rate (20%) required by law.

The perception of water and the recognition of this agent are present in 69.23% of the ethnographic ⁵ interviews. It varies according to the relief units. The Grota, the thalweg of the buffered creeks, and then the flat floodplain are the territories where the perception of water, the river, and natural cycles is most constant, as well as their most direct relationship with the gardens studied. On convex surfaces, this perception is much lower.

The hydrological cycles were mentioned in 75% of the interviews in the flat floodplain. It was mentioned by 91.66% of the interviewees in the Grota. It is a perceived and mostly positive agency. On the concave surface of the thalweg of the buffered creek, this perception occurred in 100% of the interviews, although they were negative. When asked about the water on the convex surfaces, answers such as "I can't say" were frequent. The agency of water is less intense and, therefore, less perceived in convex territories.

The positive aspects are related to memories, cultural management, the existence of springs in the city, and the contribution of water to plant growth. The interaction of the gardens with the water cycle is also perceived mainly on concave surfaces and valley bottoms.

The negative aspects are related to flooding and pollution. Most interviewees consider river channeling a positive factor, as it "reduces flooding" and "stops the stench." But it is also cited as a way of "throwing the problem away." The changes brought about by urbanization are cited with suspicion. The devastation of streamside vegetation is a cause for regret: "I said goodbye to the trees of my childhood." Urbanization and the damming of rivers are also questioned: "Is this [asphalt] good for us?"

There is a contradiction in the perception and management of water and its interference in the land and climate. The rains and the river are seen as "a blessing for the plants, for the animals" and as "a villain in the cities" because

Some of the ethnographic interviews will be inserted in inverted commas throughout the text.



"the rain washes everything away" and "when the river fills up, it becomes a catastrophe." The experience of natural cycles is essential in organizing gardens and life. Expressions such as "it's rained less" and "it's harder for the garden to look nice because water is expensive" are quoted in the interviews and reveal the various material and symbolic losses caused mainly by urbanization, which has dismantled the relationships that contributed to the existence of both gardens and, above all, a way of life.

The relief units (Carvalho, 2001) help to explain surface flows and their effects on the territory. The perception of this process in the interviews confirms that where the river and waters are physically present, and their agency is transparent, this perception is more optimistic, especially in the case of springs. There is a relevance to gardens as preservation, memory of water, and the use of springs are incorporated into planting and care territories. In areas where the body of water is buffered and its presence is ignored in legislation, the negative aspects prevail, which is apparent in the São Geraldo stream slope.

Whether through tradition or less use of modern techniques, ecological techniques of cultural water management are prevalent. This can be found in the damming of rainwater, which promotes infiltration in public gardens, the construction of cisterns, the prevention of landslides with plants with networked roots, and the use of springs for irrigation. The multispecies relationships that develop highlight some aspects of practices that have genuinely ecological implications. Water, animals, and plants are seen as partners and friends, not objects.

The use of words related to water to define gardens also appeared. The expressions "spring garden," "swamp," "water house," and "spring" were used. The memory of water and its perception as a present and active element in the territory is a structuring element evident in these names.

By associating memory, humans and non-humans, everyday themes are incorporated, and the distinct memory landscapes built by women and men, plants, animals, water, land, their emotions and imagination, and their organic and inorganic constitutions, are approached, as understood in this study. The composition of the vegetation, the water, and the animals brings back memories of the Atlantic Forest and the high-altitude *cerrado* that once occupied this place. They make the river and the forest that urbanization has taken away consciousness in the imagination and vocabulary. People produce their space daily by mobilizing essential knowledge and building cosmopolitical worlds, just like non-humans. The possible gardens territorialize the memories of water and are a microcosm created from the interaction of these friends.

The city is a place of disputes over the future and narratives. Architecture and urbanism, although they can't be effectively defined, involve a relationship of power and politics insofar as, when designing, elements are chosen to be represented, signs are displaced and created, details are allowed to be omitted, conventions

are created, and spaces are reorganized. Based on the possible gardens, how can teaching contribute by considering the agencies of other beings' multispecies spaces and expanding the imaginaries of water in projects?

Some experiences in architectural teaching

As an investigative experience, three subjects with common methodological principles will be presented.

The first principle is the proposition of non-humans as project agents, not project objects. Understanding and respecting the agency of these actors, which is present in the everyday spaces of gardens and therefore possible, is essential for the environmental issue as a means of overcoming an anthropocentric practice. Stengers' (2018) cosmopolitical proposal is taken here as a way of thinking about what kind of political circle we will be able to constitute if we can think about politics beyond the elements usually associated with it, such as representation, language, and consensus, and what kinds of divergences these elements mask, as well as how we can include non-humans as agents in the political arena. In the case of water, the projects start from understanding its agency and territories: concave surface, convex surface, and flat floodplain, which, as demonstrated in the research, build different relationships and understandings with humans.

The second principle involves the research presentation and the concepts discussion: possible garden, multispecies, cosmopolitics, rights granted to non-humans, sustainability and urban ecology.

Another tool uses trigger questions, which must be answered spatially, based on counterfactual thinking (Senos, 2008). This type of imaginative thinking is characterized by conditional "what if" sentences that provoke hypothetical alternatives to reality, usually elaborated spontaneously after negative situations to extrapolate possibilities and think outside the box. This exercise broadens possibilities by breaking the initial link with pre-established conceptual and spatial patterns.

The first subject, Integrated Planning for Architecture and Urbanism-PIAU, is compulsory in the 7th term and taught by urban design professors. It aims to integrate urban plans and projects based on installing a metro line in the Barreiro region. The abovementioned assumptions are discussed in a seven-semester thematic class on urban drainage. In addition to presenting water agencies, which are generally understood as natural disasters, floods are related to how urbanization plays to plug rivers and to water's reaction to this urbanization, as seen in the gardens. The cycles of our plateau rivers are widely discussed. Based on this, ways of relating to these cycles in similar projects are presented. Students

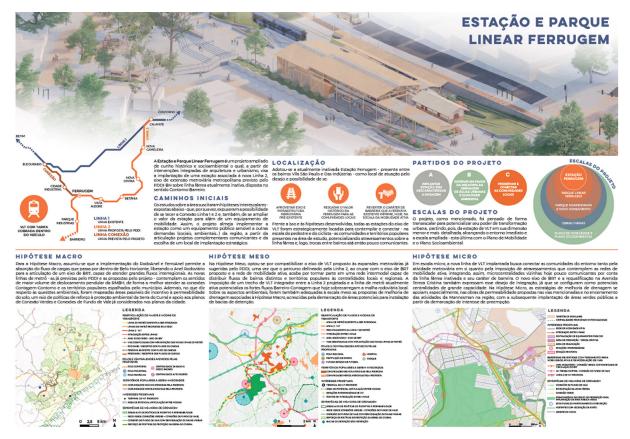


Figure 3: Hypothesis with drainage plan. Source: The author (2022).

are encouraged to critically look at some of the classic tools of urban planning and design, such as diagnostics, and to think about less imposing relational projects with water. The drainage plans resulting from several of the projects are pretty exciting. Although they have already known elements, they are spatialized in ways that create a dialogue between urbanization and water (Figure 3).

The second subject, PRJ087 ARCHITECTURE PROJECT: How to Think about Nature and the City (60h), was proposed as a cosmopolitical hypothesis of how other agents could be included in the project based on the idea of memory and the multispecies of possible gardens, proposing a multispecies project.

Some architectural and urban planning tools were used: urban and environmental legislation, planning, and urban design. In addition to people, non-human agents were considered: plants, animals, water, relief, climate, winds, and insolation. The students were initially divided into five groups. Each group had to map the chosen space based on one of the abovementioned agents. The instruments used were the interviews, the research gardens, and a collective mapping carried out by the students with residents already involved in the research. To develop design hypotheses, they had to answer the questions: what if it was for water? What if it

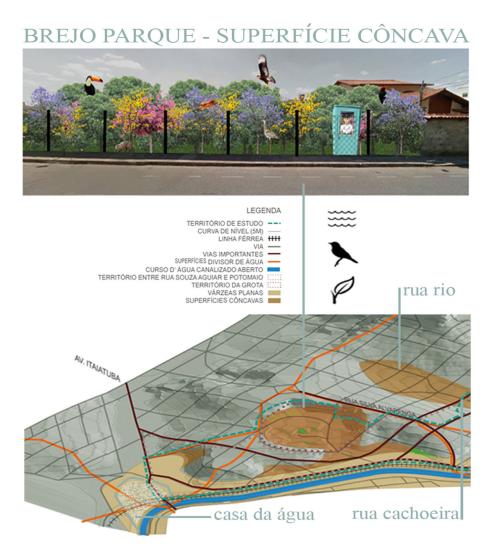


Figure 4 - Design hypothesis water group. Source: The author (2019).

was for animals? What if it was for plants? What if it was for the sun, the terrain, the soil, the wind? What if it was for people? It was a premise of the proposals to understand that they were inserted in the city and that the city should be part of the project presented. So, it was impossible to subtract humans and their spaces altogether (Figure 4).

The second exercise involved forming four groups, with one student from each previous group. In this way, a new proposal had to be made based on the earlier hypotheses. The proposal was to build a cosmopolitical assembly between the worlds discovered and those previously proposed, with each student representing one of them. Without pretending to be unified, the students were encouraged to think about spatial decisions based on territorial disputes over the desires and possibilities of each agent and the entanglement of these agents and these disputes, which are very present in garden spaces.

The third subject, "What if it were for water?", an elective subject with a 30-hour workload, was proposed as an offshoot of the previous subject, thinking only about water and humans.

What was exercised in the disciplines is the question: is it possible to think of a "city for all" as signaled in the gardens? In the design experiments, it was not uncommon for the "right to the city" for people and the environmental struggles or the "right to the city" for other beings to be placed on opposing sides, creating rivalries that only reinforce the problems and prevent the enlargement of the political circle as initially proposed. This exclusionary antagonism rivals potentially similar allies in urban disputes, weakening both camps. One of the most significant difficulties faced was giving water a voice and creating ways for these beings to participate. In the case of the disciplines, this was done through research, collective cartography, assembly, and representation by a human being.

CONCLUDING REMARKS

Research and teaching are essential in educating architecture and urban planning professionals on how water is considered in projects.

The existence of everyday spaces, such as gardens built out of affection and memory, contributes to hydrological cycles by maintaining permeable spaces beyond urban planning legislation. By making other relational worlds perceptible, territorialized multispecies collectives, illuminating differently the regime of visibility of architecture and urbanism, the Possible Gardens research has expanded imaginaries. Designing spaces interconnected with anthropocentric humanism or the market is insufficient for these worlds. This opens up multispecies possibilities, even if utopian, for thinking about other projects.

The students did the exercise of thinking about cosmopolitics, which corresponds to experiments in political and spatial reinvention that recognize multispecies collectives. This is a path for architects. The relief units collaborate in this exercise by highlighting the relationship with water and guiding projects.

The methodological hypothesis is that for non-humans to have their otherness included in the projects, as in the gardens, it is necessary to create assemblies in the urban proposals and mechanisms for the participation of other beings in these disputes, which have yet to be developed. However, we must be aware that the assemblies remain human or, at best, representative. Another point is to be mindful that it is essential to understand what not to do when opening up space for non-human agencies.

We must recognize the limits of this experience. It's not just architects who decide on plans and projects. Property developments, financial capital, circulation, and productive functions define spaces. The increase in population and the demand for consumption also lead us towards more environmental catastrophes, highlighting a certain utopianism in the proposal.

But far from being a conclusive experience, both the subject and the methodological hypotheses raised are aimed at tensioning and broadening hegemonic narratives. The discussion, rather than providing solutions, helps to construct other questions. In an act of resistance, it is necessary to raise these cosmopolitical possibilities of architecture and urbanism and make them persevere, as was done in the Possible Gardens research. Reactivate what survives in everyday life and memory and has the potential to contribute to a resistant imaginary in the face of the challenges of thinking about water in cities. This is just one investigative example; I hope the provocation is exemplary for many others.

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