GC Revista Nacional de Gerenciamento de Cidades
National Journal of City Management

ISSN 2318-8472, v. 12, n. 86, 2024

Permacultural Planning of the Florindo Tabachi Housing Complex Green Area Set in Ribeirão Marrecas Stream in Dracena, SP

Fernanda Nascimento Rigolo
Geography Master's Student at UNESP, Brazil
Fernanda.rigolo@unesp.br

Fernando Sérgio Okimoto
PhD Professor, UNESP, Brazil
Fs.okimoto@unesp.br

GC Revista Nacional de Gerenciamento de Cidades
National Journal of City Management

ISSN 2318-8472, v. 12, n. 86, 2024

SUMMARY

This work aims to present permaculture planning for the Florindo Tabachi Housing Complex Green Area in Dracena, SP. To this end, a literature survey was carried out, having the necessary themes for this proposal's application, presenting issues related to the poorly planned urbanization problem, leading to the production of spaces that pollute water courses, and from this to sustainable methodologies that promote solutions for this issue. Topics such as sponge cities, permaculture, agroecology, bioconstruction and placemaking were discussed, themes that together propose sustainable and participatory urban development. To understand the area of activity, a questionnaire was used with Dracena residents and in particular the residents of the neighborhood and the region where the proposal was implemented. Environmental, social, and economic bias was also analyzed.

KEYWORDS: Permaculture; Social Housing; Sustainability

1 INTRODUCTION

Most cities on the national scene are small, nevertheless, there still remains little research carried out on the reality of these cities, mainly regarding their urban space and socioeconomic dynamics. It is known that the urbanization of cities has touched off the discussion about man's relationship with nature, with an emphasis on his relationship with watercourses. Based on this principle, this work seeks to promote a democratic, sustainable, accessible, quality space through permaculture planning, which generates income for Florindo Tabachi Housing Complex residents in Dracena, SP as well.

To this end, a literature survey was carried out, having the necessary themes for this proposal's application, presenting issues related to the poorly planned urbanization problem, leading to the production of spaces that pollute water courses, and from this to sustainable methodologies that promote solutions for this issue. Topics such as sponge cities, permaculture, agroecology, bioconstruction and placemaking were discussed, themes that together propose sustainable and participatory urban development.

In order to fulfill the objective of this work, in addition to the literature survey, studies were produced to understand the socioeconomic fragility of the neighborhood's residents. A questionnaire was used with the local population with the local population so that the project could thus meet local demand. Furthermore, the environmental bias was analyzed of the region in which the proposal was implemented.

2 OBJECTIVES

The objective of this work was to identify the current situation of urbanization and social issues in the Florindo Tabachi Housing Complex in Dracena, SP and propose permaculture planning in the green area at the end of the neighborhood.

To achieve this objective, the following were carried out:

- Studies of the main and transversal themes of the area of activity;
- Understand the location on an urban and socio-environmental scale;
- Permaculture planning of the selected area.

ISSN 2318-8472, v. 12, n. 86, 2024

3 METHODOLOGY

To achieve the aforementioned objectives, it was necessary to carry out a literature review conceptualizing the topic and its functionalities, prepare maps based on Google Earth to present and understand the study area, to apply a questionnaire with neighborhood residents to understand how they relate to the area in question and to understand how they fit into economic and social issues. Finally, a permaculture design is proposed.

3.1 THEORETICAL FOUNDATION

To understand the problem and the solution proposed at the end, it is essential to resort to theoretical foundations to establish the necessary conceptual bases.

3.1.1 Urbanization and Urban Degradation

Humankind's relationship with water and nature was an essential factor in its evolution and consequently in the historical and geographical configuration of urban space. Humankind once had a more symbiotic relationship with nature but with the search for technological, social, and capital evolution and development, humans begin to see watercourses as an obstacle to urban growth. Inevitably, they seek to move away from this element of nature, which, currently, has generated several socio-environmental problems that reveal an increasingly unsustainable manner of production.

It is a fact that contemporary cities are the scene of social, economic, and environmental problems. In developing countries, these conflicts are more intense since social disparities and scarce financial and consequently technical resources are not sufficient to resolve urban infrastructure problems linked to environmental management.

Costa (2006) points out countless Brazilian urban centers emerged via the river system. In addition to drinking water, rivers and seas offered control of the territory, food, the possibility of movement of people and goods, hydraulic energy, leisure, and thus, fluvial systems were gradually transformed into urban landscapes. However, from the 1950s onwards, urban rivers faced major transformations following a population shift from the country to the city, thus generating intense urbanization.

Conflicts between river processes and urbanization processes result in drastic changes in the environmental structure of rivers, which can even lead to the complete disappearance of water courses from the urban landscape (COSTA, 2006).

Pinheiro (2017) states that because of urbanization, environmental effects that used to regulate the natural ecosystem start to produce undesirable effects in the urban environment, for example, pollution, channelization and occupation of watercourses and their floodplain areas, associated with soil sealing, causing floods.

Novotny (2003) points out that the impacts of urbanization on water can be divided into four main classes: 1. Hydrological problems, in which, natural hydrology and urban water

ISSN 2318-8472, v. 12, n. 86, 2024

course ecological patterns are compromised due to changes in river basins and natural drainage; 2. Ecological habitat fragmentation, preventing the development and repopulation of biota in water resources; 3. Landscape impairment, contributing to a social and economic devaluation of the population residing in the vicinity of these water elements, resulting from the transformation of streams and rivers through pollution or channeling of these elements; 4. Water body pollution, which may occur through diffuse pollution brought by rainwater runoff over paved areas of the river basin, domestic sewage dumping, or the improper disposal of solid waste in the watercourse bed.

3.1.2 Sponge Cities

Drainage systems aim to direct rainwater disposal from microdrainage systems to macrodrainage systems. It is known that with poorly planned city growth, watercourses are compromised. They are often excluded from territorial planning and consequently are piped or paved, which can lead to flooding, due to the high surface soil sealing levels. These in turn, generate a negative impact on urban water management. From this perspective, and also in the theme of sustainable urbanism, a viable solution to this problem is Sponge Cities (MENEZES et al., 2022).

Fogeiro (2019) conceptualizes them as spaces capable of integrating urban water management into urban planning policies and projects. Menezes et al. (2022, qtd. in Januszkiewicz and Golebieski 2019) points out that the main objective of Sponge Cities is to “regulate” the water cycle and get as close as possible to the natural hydrological cycle. This design methodology must consider adequate planning and structures to implement, maintain and adapt infrastructure systems to collect, store, purify, drain and manage excess rainwater.

Sponge cities are open and continuous green spaces, which can contain anything from interconnected waterways to canals or lakes seeking to filter the water. This system results in an increase in biodiversity in the urban environment.

Sponge cities also cover economic issues, seeking to raise awareness among the population to have prudent water consumption. This methodology seeks to apply concepts for water recycling, especially wastewater, with techniques ranging from awareness campaigns to fees in relation to water consumption (FOGEIRO, 2019).

3.1.3 Permaculture

With the aim of promoting ecological improvements in space use, enhancing and privileging local elements, permaculture emerges as a sustainable solution to organize and divide a place into zones and sectors, in search of developing an efficient energy and production cycle.

This territorial planning methodology emerged with university professor of environmental psychology Bill Mollison and his student David Holmgren, in the 1960s, in Australia, when there was intense mechanization of crops and heavy use of pesticides. To

ISSN 2318-8472, v. 12, n. 86, 2024

counter this aggressive and polluting process to the soil and nature, Mollison and Holmgren sought in ancestral knowledge, from traditional people, technologies for a harmonious coexistence between man and nature, adding modern technologies, originating permaculture, an interdisciplinary methodology that integrates traditional and modern knowledge and aims to organize human presence in natural environment (MAGRINI, 2009).

With diverse and dynamic planning methods, Permaculture promotes biodiversity, natural stability, and the health of ecosystems. It also stimulates healthy food production, promotes ecological housing construction, and catches energy through renewable sources. In this sense, drawing and design emerge as a set of elements to encourage innovative and environmentally sustainable solutions, adapted to the location (NEME, 2014).

When seeking to plan a territory in a sustainable way, permaculture presents itself with ethical foundations and principles of conduct. Divided into three key ethics and twelve principles.

Three Key Ethics of Permaculture (HOLMGREN, 2007):

1. Earth Care (soils, forests and water).

2. People Care (taking care of yourself, relatives and community).

3. Fair Shares (establish consumption and reproduction limits and redistribute the surplus).

Twelve Permaculture Planning Principles (HOLMGREN, 2007):

1 – Observe and interact: good design depends on a harmonious relationship between nature and people. Careful observation provides design inspiration.

2 – Catch and store energy: capture local flows of renewable and non-renewable forms of energy.

3 – Obtain a yield: any system must be planned to provide self-sufficiency at all levels.

4 – Apply self-regulation and accept feedback: with a better understanding of how positive and negative feedback works in nature, we can design systems that are more self-regulating.

5 – Use renewable resources and services: permaculture design must make the best possible use of natural services that do not involve consumption.

6 – Produce no waste: recognize the creative reuse of waste as the essence of a life with minimal impact on the earth.

7 – Design from pattern to detail: pattern recognition is the result of applying the first principle.

8 – Integrate rather than segregate: permaculture can be seen as taking part of a long tradition of concepts that emphasize mutualistic and symbiotic interrelationships.

9 – Use small and slow solutions: systems must be designed to perform functions on the smallest scale that is practical and efficient in using energy for that function.

10 – Use and value diversity: diversity as the result of the balance and tension existing in nature between variety and possibility on the one hand, and productivity and strength on the other.

11 – Use edges and value the marginal: the value and contribution of the edges and the marginal and invisible aspects of any system must only be recognized and preserved.

12 – Creatively use and respond to change: carry out design taking into account changes in a deliberate and cooperative way and respond creatively or adapt the design to large-scale changes in the system that are beyond our control and influence.

Holmgren (2013) states that the first six principles will consider production systems from the bottom-up perspective of elements, organisms, and people, while the others will

ISSN 2318-8472, v. 12, n. 86, 2024

emphasize the top-down perspective of patterns and relationships that tend to emerge through the self-organization and evolution of ecosystems.

For planning to be effective, it is necessary to understand the study area, with all external energies that influence the territory, weather, wind, wind direction, sunlight, noise pollution, etc. So that strategies can be planned, across sectors, to direct or block these energies. In these sectors, the center of the system is composed of the project and possible external influences are created around it (SOARES 1998).

After preparing the sectorization of the project area, it is necessary to establish zones. In zoning, the internal energies of the system will be highlighted. This stage seeks to achieve greater energy efficiency and controlling the production of waste, avoiding pollution or contamination, and seeking high productivity and recycling of resources (SOARES 1998). These zones are divided between Zone 0 and Zone 5, where Zone 0 would be a central point of the project and Zone 5 the most distant and least visited:

Zone 0 – House, warehouse, other buildings.
Zone 1 – Herbs, greenhouse and cold frames, vegetable garden, compost.
Zone 2 – Small livestock, orchards.
Zone 3 – Main crops.
Zone 4 – Livestock pasture, agroforestry.
Zone 5 – Forest, Permanent Preservation Area.

3.1.4 Agroecology

The concept of agroecology is introduced by seeking solutions and development strategies that aim to reorient production processes linked to lower environmental impact and sustainable social development. It is a recent term with a broad definition. Caporal (2009) points out that this concept does not seek to solve all the problems generated by the anthropic actions of our production and consumption models, nor does it hope to be the solution to the problems caused by globalized economic structures (CAPORAL, p. 13, 2009). It is a model that seeks to guide more sustainable rural development, contributing to greater socio-environmental and economic sustainability for different agroecosystems. This sustainable agriculture is based on a system capable of integration, meeting the following criteria:

1. Low dependence on commercial inputs.
2. Use of locally accessible renewable resources.
3. Use of beneficial or benign impacts of the local environment.
4. Acceptance and/or tolerance of local conditions, rather than dependence on intense changes or attempts to control the environment.
5. Long-term maintenance of production capacity.
6. Preservation of biological and cultural diversity.
7. Use of the knowledge and culture of the local population.
8. Production of goods for domestic consumption before producing for export (GLIESSMAN, 1900 qtd. in CAPORAL, p. 28 and 29 2009).

Coutinho (2010) points out that agroecology reemerges as a productive alternative by preventing the deterioration of natural resources and promoting socially fair, economically viable and ecologically appropriate agriculture.

Agroecology associated with food and nutritional security and the solidarity economy make up the concepts of an inclusive, ecological, and productive city.

GC Revista Nacional de Gerenciamento de Cidades
National Journal of City Management

ISSN 2318-8472, v. 12, n. 86, 2024

3.1.5 Civil Bioconstruction

The search for sustainable city planning only gained strength at the II World Conference for Development and Environment – Rio 92, enabling investment in research in the construction sector in search of efficient construction solutions, introducing the concepts of ecology and sustainable development (KRZYZANOWSKI, 2005).

The techniques applied in Bioconstruction prioritize the use of natural materials and popular technologies, and the use of ecological materials, reducing the impact on the environment through the adaptation of techniques from ancestral architecture. Its main characteristic is local materials usage, enabling reducing manufacturing and transportation costs, building housing at a reduced cost and with greater energy efficiency (VIEIRA, 2015, p. 17, qtd. in SOARES, 2005).

Bioconstruction can be applied under 3 aspects: in the construction itself, in the relationship with the environment, and in user safety. Its bioconstructed systems are diverse, some of the main construction techniques are:

Bamboo, a renewable, biodegradable and energy-efficient natural resource, having a still small application in civil construction in Brazil, and very restricted to academia, has immeasurable potential when taking into account the evolution of treatment processes, production, economic relevance (Azzin and Ciaramello, 1971; Embaye et al., 2005), environmental and sociocultural (Ramanayake, 2006). It can be used in the manufacture of partition panels, linings, floors, moldings, frames, furniture and coverings.

Superadobe, or bagged earth, a simple construction technique that uses basically two elements: clayey soil and polypropylene bags. The bags are filled with soil and undergo a compression process, which can be manual or mechanical, before being positioned on top of each other, forming structures that will serve as walls for construction.

Adobe, traditional from the central west and southeast region of Brazil, are bricks made from earth. It uses the same type of earth as wattle and daub, but the bricks are produced before being used in the walls.

COB, a technique that uses soil with up to 40 to 50% clay, above that it is necessary to add a little sand. It consists of a mass made from a mixture of earth and dry straw, the mixture is fireproof and highly resistant to ground movements. Allows the building to be shaped like a large sculpture.

Rammed Earth, one of the most used construction systems in ancient times, this technique is considered the most solid construction system in raw earth. It consists of building walls using a form made of boards, wood or metal sheets, arranged parallel to each other and attached to the pillars of the work. These forms are filled with pure earth, or mixed with dry straw, which is then pounded with a manual pestle, compacting the earth.

Soil cement, the technique uses a mixture of 10 parts of earth to 1 part of cement. This amount of cement, combined with the pressing procedure, added to the necessary proportion of earth, allows the mass to be compacted into the shape of the bricks. Soil cement bricks are

ISSN 2318-8472, v. 12, n. 86, 2024

not fired like common bricks, therefore they do not consume fuel during their manufacture, generating less impact on the environment.

Pau a Pique, a traditional wattle and daub technique from the north and northeast of Brazil, uses clayey soil with at least 40% clay. This technique is the most widespread in Brazil, due to its simplicity and ease of use.

3.1.6 Social Technologies: Placemaking

Emmendoerfer et al. (2020) state that the term placemaking began to be refined in the 1970s, by William H. Whyte, following the Project for Public Spaces (PPS) organization. Placemaking involves the need to build sustainable places that last and reflect the lifestyle of the local population.

In the 1990s, economist Fred Kent founded Project for Public Spaces, a non-profit organization dedicated to helping people create and maintain public spaces and strengthen communities, working directly with placemaking. (FULLER and SUTTI, 2021). For the authors, the term can be translated as "making or building places", where “places” are public spaces that encourage interactions between people themselves and between people and the city, promoting healthier communities.

This methodology is a model of sustainable local development, undergoing constant improvement and evolution, based on urban dynamics and rapid market changes, associated with new information technologies, institutional, social, economic, environmental and cultural relationships, which occur in cities (EMMENDOERFER et al. 2020).

Placemaking is a process centered on people and their needs, aspirations, desires, and visions, which makes it necessary for the local community to participate (MOREIRA, 2021). Since its mainstay is community participation, placemaking ends up comprising urban planning and design issues, public and community management, and public space information and programming. Fuller and Sutti (2021) conclude that it is a tool that identifies and catalyzes public space potential.

Therefore, although many of the environmental problems faced in cities arise from how land is used and occupied over time, this literature survey demonstrates that it is possible to use the landscape as an element to encourage environmental conservation and recovery, associating itself with the needs and desires of the community, applying concepts and techniques from sponge cities, permaculture and agroecology, with the use of sustainable materials as proposed in bioconstruction.

3.2 SOCIAL AND ENVIRONMENTAL PROFILE

The proposed intervention area of this work (figure 1) is located between the Ribeirão Marrecas Stream and the end of the Florindo Tabachi Housing Complex, which in turn is located in the southwestern portion of the municipality of Dracena. The location was not included with adequate urban planning for its implementation. It is a site without adequate mobility for

ISSN 2318-8472, v. 12, n. 86, 2024

pedestrians, since the land is located between two rural areas, the only access to the city is via an unpaved highway and, as can be seen in figure 1, the Permanent Preservation Area is not protected as required by law.

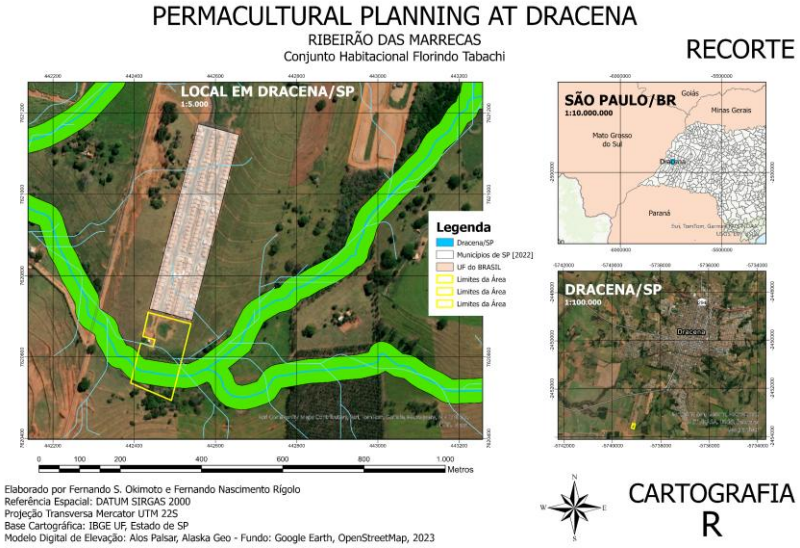

Figure 1 – Area of operation map cutout. Produced by the authors.

This city area is understood as a mostly residential area, with no provision for businesses in the surrounding neighborhoods. Furthermore, it is a more economically fragile region located in the southwest region of the city where the implementation of Social Interest Housing Complexes takes place.

For a better understanding of the study area, the following presents studies of insolation and ventilation, rainfall and temperature data, in addition to the topography of the selected terrain.

3.2.1 Climogram analysis to understand the microclimate of the city of Dracena

The city of Dracena is located at a latitude of -21.482778, and longitude of -51.532778, with characteristics of a sub-humid tropical climate. The municipality has a hot and rainy period between October and March and a milder and drier period, between April and September, with high temperatures not being rare, causing thermal discomfort to the population (PROJETEEE, 2021).

The municipality has a Climatological Station that began operating in August 2006 with support from FAPESP (São Paulo State Research Support Foundation). The Climatological Station is located within the Campus of the São Paulo State University (UNESP) at an altitude of 421m, latitude of - 21.483333 and longitude of -51.866667. On a daily basis, the station is responsible for capturing and analyzing climatic elements such as: temperature, relative humidity, rainfall, wind speed, etc. (UNESP, 2019).

ISSN 2318-8472, v. 12, n. 86, 2024

Mascaró and Mascaró (2009) point out that macroclimatic data are obtained from climatological stations and describe the general climate of a region, giving details of precipitation, temperature, humidity, winds, cloudiness and sunshine.

Figure 2 shows the data collected by the Climatological Station of UNESP in Dracena. Data obtained between January 2010 and December 2021 were collected and analyzed. Data analysis was done by constructing the city's climogram, in Rstudio software implemented with the Ggplot2 package. Average temperature and monthly precipitation data from the city of Dracena (SP) were used.

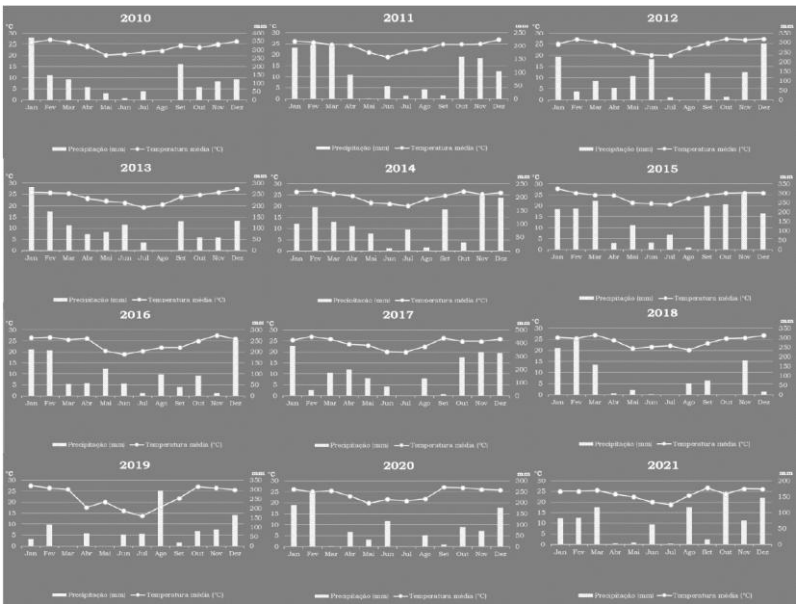

Figure 2 – Dracena Climogram - 2010 to 2021. Source: UNESP Dracena Climatological Station (2021). Produced by the authors.

From these data it is possible to observe that the city has a period of heavy rain between October and March associated with higher average temperatures. With these data it is still possible to conclude, as Mascaró and Mascaró (2009) point out that with the intensification of urbanization in the city and consequently greater paving of the soil and deforestation, average temperatures rose in the summer periods, as well as precipitation became more frequently intense during this period. In relation to the winter period, it is possible to observe changes in the rainfall regime throughout the studied period, as a comparative example, 2018 presented a very low rainfall index between April and July, compared to previous years, the year 2019 presented the lowest average temperatures in the winter period, as well as lower rainfall in the summer period.

3.2.2 Insolation and Ventilation Analysis of the Terrain Profile

Figure 3 demonstrates the result of the insolation and ventilation analysis for the proposed land. It is possible to understand that the predominant winds in this region occur from Southwest (SO) to Northeast (NE), with a predominance of winds coming from the Permanent Preservation Area region towards the interior of the housing complex. Regarding insolation, it

ISSN 2318-8472, v. 12, n. 86, 2024

is observed that the land in question has high solar incidence at all hours of the day, as it is completely unprotected by vegetation.

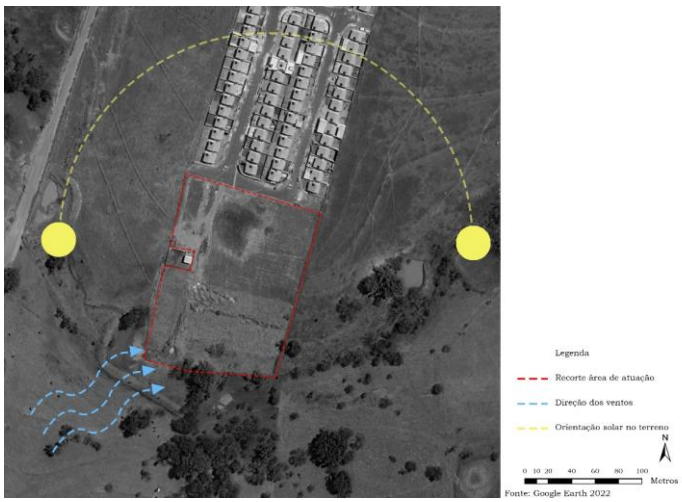

Figure 3 – Insolation and Ventilation Analysis Map of the Operation Area. Produced by the authors.

3.2.3 Topographic Analysis of the Terrain Profile

Regarding the topography of the site, it is possible to observe that in the contour lines, the curves are far from each other providing a terrain with areas of gentle slopes. In the selected area the curves have a difference of only 3 meters distributed in such a way that it does not produce a steep terrain.

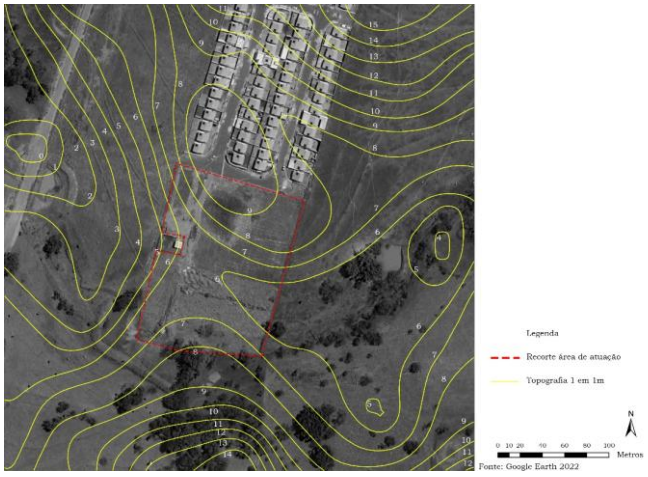

Figure 4 – Topographic Map of the Operation Area. Produced by the authors.

3.2.4 Final Analysis of the Terrain Profile

GC Revista Nacional de Gerenciamento de Cidades
National Journal of City Management

ISSN 2318-8472, v. 12, n. 86, 2024

Following these analyses, a final product is obtained, represented in figure 5, where it is possible to understand the analysis of the land as a whole, presenting the Permanent Preservation Area (APP), and how it fits into the proposed outline.

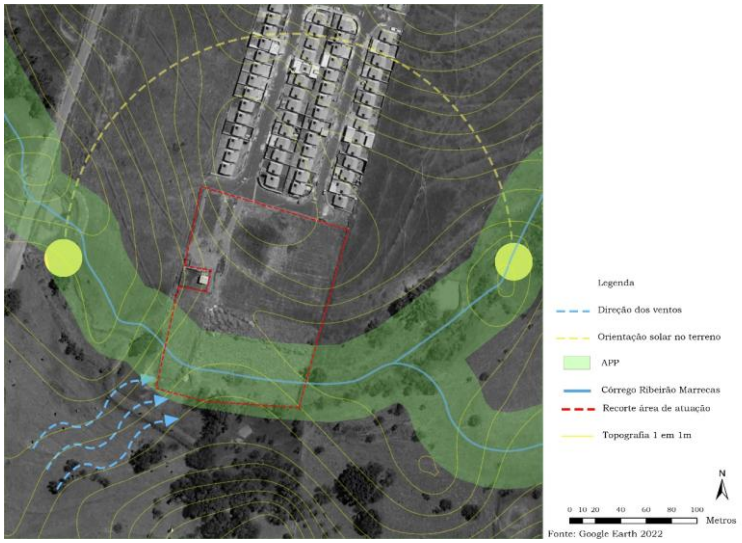

Figure 5 – Analysis Results Map of the Intervention Area. Produced by the authors.

4 RESULTS

To obtain the final product, as already mentioned, a questionnaire was carried out with Dracena residents and especially the neighborhood under study so there could be a basis for the permaculture proposal, which is presented after the results of the questionnaire.

Questionnaire

The research included the development of a questionnaire with the aim of elucidating characteristics and thoughts about the Florindo Tabachi Housing Complex. It is a semi-structured interview, in which the individual answered a sequence of questions, whether closed, with answers predetermined by the authors, or open, in which the interviewee has the freedom to answer the questions (BATISTA; MATOS; NASCIMENTO, 2017). A total of 40 participants took part in the research.

Structured into two parts, this interview was divided into the first part to understand the interviewees socioeconomically, and it was found that 65% were women and 35% men. When asked about age, the answers were divided into 55% identifying themselves as between 18-30 years old, followed by 25% between 40-50 years old, 10% 30-40 years old, 7.5% 50-60 years old and 2.5% aged 60 or over. Regarding the education of the interviewees, 40% were college graduates, 22.5% had completed high school, 20% had not yet completed their college education, 7.5% had completed elementary education and 7.5% had not completed elementary education and 2.5% with incomplete high school education. Finally, the income of these interviewees was reported: 40% earn 0-1 minimum wage, 27.5% 1-2 minimum wages, 17.5% 2-3 minimum wages and 15% 3 or more minimum wages.

GC Revista Nacional de Gerenciamento de Cidades
National Journal of City Management

ISSN 2318-8472, v. 12, n. 86, 2024

For the second part, those who did not live in the Florindo Tabachi Housing Complex were excluded, resulting in 62.5% living in Dracena/SP but in another neighborhood, 17.5% not living in Dracena but working in the city, and 20% living in Dracena in the neighborhood in question. As a result, residents pointed out that they consider the neighborhood to be excellent, but when asked about the disadvantages of the neighborhood, issues related to the lack of adequate urban planning were pointed out, from poor lighting, difficulty of accessing the city from the neighborhood, absence of public facilities in the neighborhood. When asked about work, the majority of those interviewed said they had found themselves at some stage in their lives without work and with no one to help them, all of them responded positively to the question “Do you believe that community work for extra income would have helped?”. When asked about the area at the back of the neighborhood, and whether they knew there was a stream there, the answers were 80% negative, and only 20% demonstrated that they knew about the existence of this place.

Zoneamento

With this, it was possible to carry out permaculture planning of the selected land. For this, local conditions and the results obtained through the questionnaire were considered. Thus, 5 planned zones are proposed for this location, dividing the areas according to needs and intensity of use of these locations. Figure 6 shows the distribution of these 5 zones.

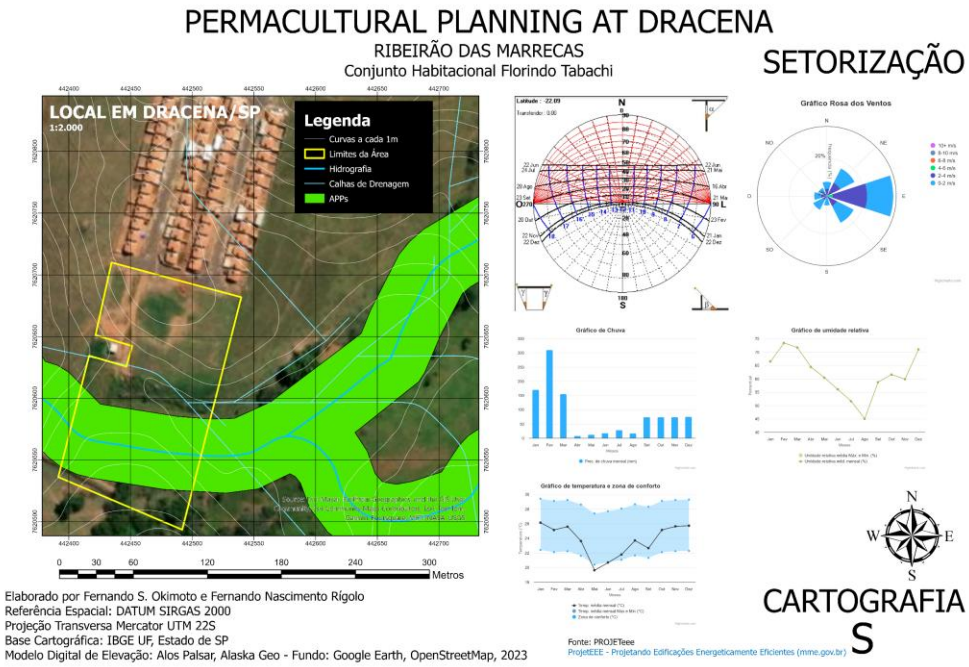

Figure 6 – Zone Distribution for Permaculture Planning. Produced by the authors.

Zone 1 proposes to present two buildings, one dedicated to the basic services of this location, with bathrooms and drinking fountains, and the second, a building dedicated to

ISSN 2318-8472, v. 12, n. 86, 2024

teaching courses and holding community events, helping the neighborhood's population to undertake and generate income from sustainable production. At this stage, it is proposed that buildings be designed with bio-constructed materials, reducing their environmental impact.

Zone 2 is dedicated to the production and cultivation of these ideas, with herb spirals, vegetable gardens, plant nurseries and compost bins. This zone aims to generate income for the local population by growing foods that require greater care and control.

Zone 3 is intended for the cultivation of orchards and larger shrubs, with lower maintenance and care requirements. Furthermore, the place is intended as a space for coexistence and meetings for those who seek closer contact with nature, but which does not access areas with little or no human interference, as proposed in zones 4 and 5.

Zone 4 is dedicated to the implementation of agroforestry, a space with little maintenance, it proposes a transition space between the areas of cultivation and management for income generation and the Permanent Preservation Area, with native and large trees associated with polyculture, or that is, production of different types of plants, diversifying the plantations on site throughout the year or period.

Zone 5 is dedicated to the sector that should not have any interference, proposing the readjustment of the local ecosystem, through reforestation with native vegetation. Figure 7 demonstrates the final result of this permaculture planning.

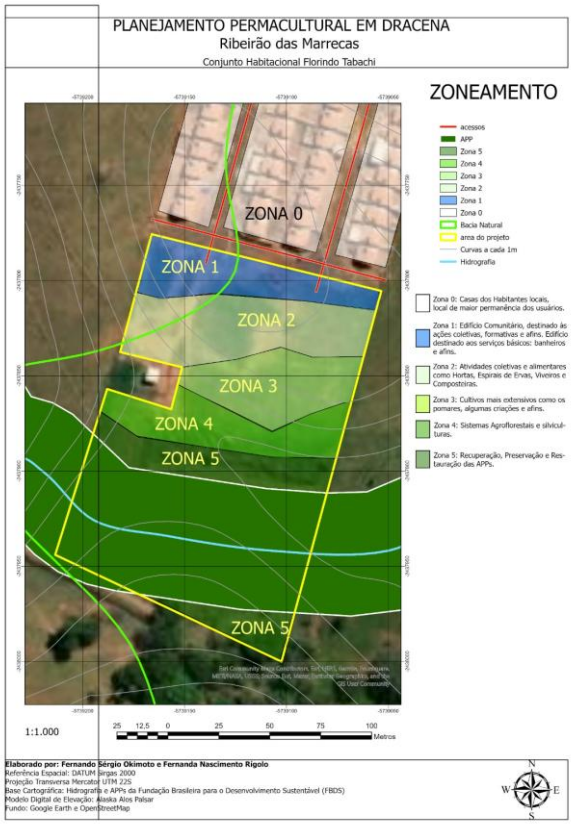

Figure 7 – Permaculture Planning. Produced by the authors.

ISSN 2318-8472, v. 12, n. 86, 2024

5 CONCLUSION

In view of the arguments presented, it is concluded that the way cities are produced in Brazil still takes place without adequate urban planning, segregating social sectors, in this case territorially, as presented in the neighborhood analysis, producing unequal cities, and consequently leading residents to lack assistance from public authorities in various spheres. In search of remedying part of this social exclusion imposed by a poorly planned urban implementation, this permaculture proposal reaches the location to improve not only environmental issues, but mainly it pays attention to meeting the socioeconomic demands of this population, joining placemaking with a space that allows this population to generate income and undertake business in a sustainable, healthy, and communal way.

6 BIBLIOGRAPHIC REFERENCES

6.3.1 Books

CAPORAL, Francisco Roberto. **Agroecologia: uma nova ciência para apoiar a transição a agriculturas mais sustentáveis.** In: Agroecologia: uma ciência do campo da complexidade. Brasília, p. 111. 2009. ISBN 978-85-60548-38-5.

HOLMGREN, D. **Permacultura: princípios e caminhos além da sustentabilidade.** Porto Alegre: Via Sapiens, 2013.

HOLMGREN, David. **Os Fundamentos da Permacultura**. Versão resumida em português. Santo Antônio do Pinhal, SP: Ecossistemas, 2007. Disponível em: https://www.fca.unesp.br/Home/Extensao/GrupoTimbo/permaculturaFundamentos.pdf .

MASCARÓ, Lúcia e MASCARÓ, Juan José. **Ambiência urbana**: Urban environment. Masquatro. Editora, Porto Alegre, 2009, p. 199

NEME, F. J. P. **Permacultura Urbana**. 1ª Edição, São Paulo, 2014. ISBN 978-85-913080-4-00

SOARES, A. L. J. **Conceitos básicos sobre permacultura**. Brasília : MA/SDR/PNFC, 1998. 53 p.

6.3.2 Dissertations, Theses, and Academic Works

COUTINHO, Maura Neves. **Agricultura urbana: práticas populares e sua inserção em políticas públicas**. Dissertação de Mestrado. Universidade Federal de Minas Gerais. 2010. Disponível em: http://hdl.handle.net/1843/MPBB-87YHD5

FOGEIRO, Jéssica Simões. **Cidade Esponja – Aplicação do Conceito e Métodos no Bairro Marechal Gomes da Costa, Porto**. Mestrado em Arquitetura Paisagista Faculdade de Ciências da Universidade do Porto. 2019. Disponível em: https://repositorio-aberto.up.pt/bitstream/10216/124775/2/370849.pdf

KRZYZANOWSKI, Renato Fávero. **Novas tecnologias em assentamentos humanos: a permacultura como proposta para o planejamento de unidades familiares em Florianopolis.** 2005. 133p. Dissertação (Mestrado em Engenharia deProdução) Programa de Pós Graduação em Engenharia de Produção, UFSC, Florianópolis

MAGRINI, Renato Velloso. **Permacultura e Soluções Urbanas Sustentáveis**. Monografia de Bacharelado em Geografia. Universidade Federal de Uberlândia (UFMG), Uberlândia, 2009.

VIEIRA, Arthur Alves. **Bioconstrução: uma revisão bibliográfica do tema e uma análise descritiva das principais técnicas.** 2015. 49 f., il. Trabalho de Conclusão de Curso (Bacharelado em Gestão Ambiental)—Universidade de

ISSN 2318-8472, v. 12, n. 86, 2024

Brasília, Planaltina-DF, 2015. Disponível em:
https://bdm.unb.br/bitstream/10483/14222/1/2015_ArthurAlvesVieira.pdf

6.3.3 Journal Articles

MMENDOERFER, Magnus Luiz; MEDIOTTE, Elias José; VASCONCELOS, Caio Augusto de Souza; VITÓRIA, José Ricardo; NETO, Alcielis de Paula**.** Placemaking como vetor de desenvolvimento em uma sociedade pós-pandemia. **Revista DELOS**. ISSN-e 1988-5245, Vol. 13, Nº. 37. 2020. Disponível em:
https://dialnet.unirioja.es/servlet/articulo?codigo=7794705

FULLER, Greice Patricia; SUTTI, Alessandra Arantes. Placemaking nas cidades: a transformação do espaço público na sociedade da informação. **Revista de Direito da Cidade,** vol. 13, nº 3. ISSN 2317-7721. pp.1660-1176. 2021. Disponível em: https://www.e-publicacoes.uerj.br/index.php/rdc/article/view/44787/39688

MENEZES, L. A. A. .; FERREIRA, R. M. de V. .; SOUZA, T. M. A. de; CABRAL, J. J. da S. P.; RABBANI, E. R. K. . Sponge city and its compensatory techniques: a systematic literature review. **Research, Society and Development,** [S. l.], v. 11, n. 10, p. e119111032606, 2022. DOI: 10.33448/rsd-v11i10.32606. Disponível em:
https://rsdjournal.org/index.php/rsd/article/view/32606

MOREIRA, Susanna. O que é placemaking? **ArchDaily Brasil**. ISSN 0719-8906. 2021. Disponível em:
https://www.archdaily.com.br/br/960416/o-que-e-placemaking

6.3.4 Climate Data

METEOBLUE. Dados históricos simulados de clima e tempo para Dracena. Disponível em:
https://www.meteoblue.com/pt/tempo/historyclimate/climatemodelled/dracena_brasil_3464426

PROJETEEE. Projetando Edificações Energeticamente Eficientes. 2021. Disponível em:
http://projeteee.mma.gov.br/dados-climaticos/

UNESP, Campus de Dracena. Estação Climatológica. 2019. Disponível em:
https://www.dracena.unesp.br/#!/estacao-climatologica/

UNESP, Campus de Dracena. NOAA-Relatórios de Clima. 2021. Disponível em:
https://www3.dracena.unesp.br/estacao/wlwx/wxnoaaclimatereports.php?yr=2006