



Socio-environmental impacts of the Minha Casa Minha Vida (My House My Life) Category 1 housing developments in the city of Uberaba-MG

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ABSTRACT

The objective of this study is to find out the socio-environmental damage caused by the implementation of the three *Minha Casa Minha Vida - PMCMV* (Brazilian Social Housing Program) subdivisions in the city of Uberaba-MG (Brazil), as well as to understand the dynamics of the program in the city, taking into account the urban planning. For this purpose, a comparative analysis will be carried out between the implementation of the developments destined to the first income category (Category 1) and the urban macrozoning, the social interest zones and the urban perimeter. We will also use the ITDP and LabCidades Urban Insertion Assessment working method for PMCMV category 1 developments and McHarg's (1969) Suitability Analysis work method in the three subdivisions studied. The PMCMV has been widely criticized during its years in force, one of the main criticisms being the prominence of the private market and how this affects the location of developments and access to urbanized land. In order to understand how this protagonism affects the city, its inhabitants and urban planning in Uberaba, we observed that none of the three subdivisions studied performed satisfactorily after applying the research methods. They do not have acceptable access to public transport, urban facilities, commerce and services, and they are located in areas with potential environmental risks, which already have consequences for the city.

KEY WORDS: Social housing. Environmental impacts. Urban insertion.

1 INTRODUCTION

The *Minha Casa Minha Vida* (My House, My Life) program (PMCMV) has guided Brazilian housing production in recent years, attracting much criticism and undergoing several changes. Much of the criticism is based on the role of the private market in the process, in which the promotion of social housing is reduced to the provision of housing, without urban policies to adapt these allocations to urban planning and without the effective participation of the municipal government (CARVALHO ESTEPHAN, 2016). The lack of control over housing policy by public authorities is a consequence of the market logic that guides housing production, turning urban space and social housing itself into a commodity (ZACCARA AND MASTRODI, 2016). Developers seek profit from this housing production, transferring the possibility of profit to the acquisition of cheaper land and the expansion of the scale of development (MELCHIORS, 2016). Carvalho and Stephan (2016) reinforce that the lack of criteria in the implementation of social housing in Brazil is a trend in many cities, where private interests prevail over social welfare, resulting in low-income populations not having access to urban infrastructure and being excluded to peripheral neighborhoods. The PMCMV itself has created, albeit unintentionally, a process of land appreciation (FERREIRA, 2012) that benefits landlords, harms residents, and further reinforces the exclusion of low-income populations from already consolidated areas. The structure of the program perpetuates socio-spatial segregation, failing to integrate and include allotments in the urban fabric (ZACCARA E MASTRODI 2016).

The relationship between the agents of the program and the fulfillment of their roles is flawed in the planning and execution phases of the projects, which causes delays in the delivery of the units and the transfer of funds, among other problems (RAMOS E NOIA, 2016). These shortcomings can be seen in the city of Uberaba-MG, a medium-sized city located in the Triângulo Mineiro. Uberaba's growth has been based on a center-periphery pattern, characterized by the privatization of large areas in order to increase the value of the real estate market, as a result of the strong dynamics of agribusiness in the region and the expansion of

urban settlement, which has led the poorest population to areas with less infrastructure and on the outskirts of the city (DONOSO, MALUF, MOREIRA 2012). The PMCMV developments follow the same logic as the city's urban sprawl, being located on the outskirts of the city.

The city is also characterized by a lack of open spaces, which is more precarious in the suburbs, where qualified spaces are scarce. In general, open spaces function more as spaces of flow and transition than as spaces of permanence, not organized in a system and functioning in isolation (DONUFO, MALUF, MOREIRA, 2012) (MALUF, DONOSO, VALICENTE and OLIVEIRA JÚNIOR 2014). This lack of open space systems is exacerbated by the design of the allotments, which don't offer any space for leisure, and by the small size of the plots of the units, which are often still used as extensions of the house, making it even more difficult for the residents to access leisure activities. The proximity between the urban fabric and the remaining riverside vegetation is one of the consequences of the implementation of developments on the edge of the city (MALUF, DONOSO, VALICENTE and OLIVEIRA JÚNIOR, 2014). And this, along with the practice of developers to allocate institutional areas and green spaces close to permanent conservation areas and highways, in order not to deal with the rugged topography, means that these recreational areas have no real meaning for the population. The difficulty of implementing these areas and the lack of leisure spaces within the plot turn the permanent protection areas into an extension of the residential area (MALUF, DONOSO, VALICENTE and OLIVEIRA JÚNIOR, 2014).

2 OBJECTIVES

The main objective is to understand the socio-environmental damage caused by the development of the allotments studied. In addition, we aim to understand the dynamics of the Minha Casa Minha Vida program in the city of Uberaba-MG, seeking to understand the implementation of the Category 1 allotments in the city and how they relate to the macro-zoning and expansion and the ZEIS.

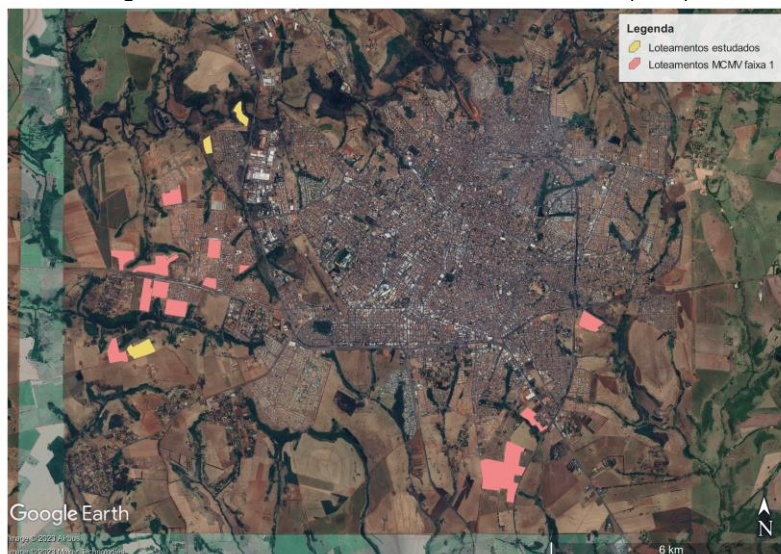
3 METHODS

In order to analyze the PMCMV in the city of Uberaba, we will have two phases. The first will deal with urban planning and the use of urban planning instruments in the city, comparing changes in urban zoning with changes in the Master Plan, along with urban expansion and the city's urban limits with the implementation of the PMCMV Category 1 allotments. This analysis will seek to understand whether the allotments have had any impact on the city's urban planning, whether they have been implemented on the city boundary, and whether the ZEIS has been used. From this analysis we will also be able to see how these developments behave in the city, in which zones they are located and other urban aspects.

In the second phase, we will analyze three specific subdivisions (Figure 1), Alfredo Freire IV stage 1, Alfredo Freire stage 2 and Parque dos Girassóis IV. This phase will include two analyses: the urban insertion analysis, using the Urban Insertion Assessment Tool for PMCMV Category 1 developments, developed by LabCidade in partnership with ITDP Brasil, where we

will analyze access to transportation, supply of urban facilities, commerce and services, and integration with the urban environment in these subdivisions. The other analysis will be of environmental factors, using the methodology proposed by McHarg for analyzing the appropriation of urban land use. The studied allotments were chosen for several reasons. The main one is the atypical length of time it took to build them. All three were contracted in 2013, but Parque dos Girassóis IV will not delivery the keys until 2021, and Alfredo Freire IV is still paralyzed.

Figure 1 - Uberaba-MG - PMCMV allotment locations (2023)



Source: Information taken from the Housing Management System (BR) and image taken from Google Earth with highlights by the author (2023)

1.1 Urban macro-zoning analysis

To analyze the urban planning, we will use the maps available on the website of the city's Urban Planning Department (UPD) and the DWG base map of the city, also provided by the UPD. We will also use the information available on SisHab, along with Google Earth's historical imagery tool, as a source to determine where all PMCMV first category allotments were used in the city. From these maps we will make two analyses, the first will be an analysis of the evolution of the urban boundary, comparing it with the allotment developments over time, and the second will be a comparative analysis between the allotment developments and the urban macro-zoning of Uberaba. They will be divided according to the changes in the Master Plan. One map will show the 2006 version of the Master Plan and developments made in 2009 and 2010, and the other will show the 2014 version of the Master Plan and developments contracted in 2013 and 2014.

1.2 Urban insertion assessment tool for the Minha Casa Minha Vida Program's First category developments - ITDP Brasil and LabCidade

The tool was developed by ITDP Brasil, in collaboration with LabCidade, with the aim of providing objective parameters for the evaluation of PMCMV Category 1 housing developments before they are approved and built (ITDP BRASIL, 2015). It is divided into three themes and 16 indicators (Figure 1), and each indicator has evaluation parameters that allow it to be classified as good, acceptable, or inadequate. As sources of data, we used the Google Maps route tool, the 'BUSU' application of Uberaba City Hall, which provides information on the timetables and routes of the city's public buses, site visits and Google Earth.

Table 1- List of themes and indicators in the urban integration assessment methodology (2023)

Theme	Indicator
1. Public transportation	1. Transportation option
	2. Transport frequency
2. Range of commercial and service facilities	3. Everyday uses
	4. Occasional uses
	5. Sporadic use
3. Urban design and integration	6. Relationship with surroundings
	7. Size of the courts
	8. Openness to public spaces
	9. Pedestrian circulation network

Source: ITDP, 2015. Prepared by the author.

Indicator 1 evaluates the number of public transportation routes available within 1 km of the center of the subdivision, and there must be at least 3 routes to be considered acceptable. Indicator 2 evaluates the hours of operation and frequency of service of the routes listed in Indicator 1. At least one route must operate at least 17 hours per day with a frequency of less than 20 minutes at peak times to be considered acceptable.

Theme 2 evaluates the presence of commerce, services and urban amenities. Each indicator has its specific uses divided into mandatory and complementary, and to be considered acceptable it is necessary for all mandatory uses to be present and a certain amount of complementary uses. In Indicator 3, to be considered present, these uses must be accessible within 1 km on foot. In indicator 4, up to 1.4 km on foot or up to 30 minutes by public transport. And in indicator 5, up to 60 minutes by public transportation.

Indicator 6 indicates the percentage of the perimeter of the development that has contact with the effective urban environment, which must be equal to or greater than 40% to be considered acceptable. Indicator 7 indicates the average perimeter of the blocks, which must be less than 800 meters to be considered acceptable. Indicator 8 indicates the number of openings for public space on public-private boundaries that are longer than 25 meters. To be considered acceptable, there must be an average of 2 or more openings per 100 meters. Finally, Indicator 9 assesses the pedestrian circulation network, both within the development and on the paths that connect to the bus stops and mandatory uses in Indicator 3. To be considered acceptable, there must be qualified circulation space, public lighting, and tree planting both in the development and on the routes leading to public transportation stops.

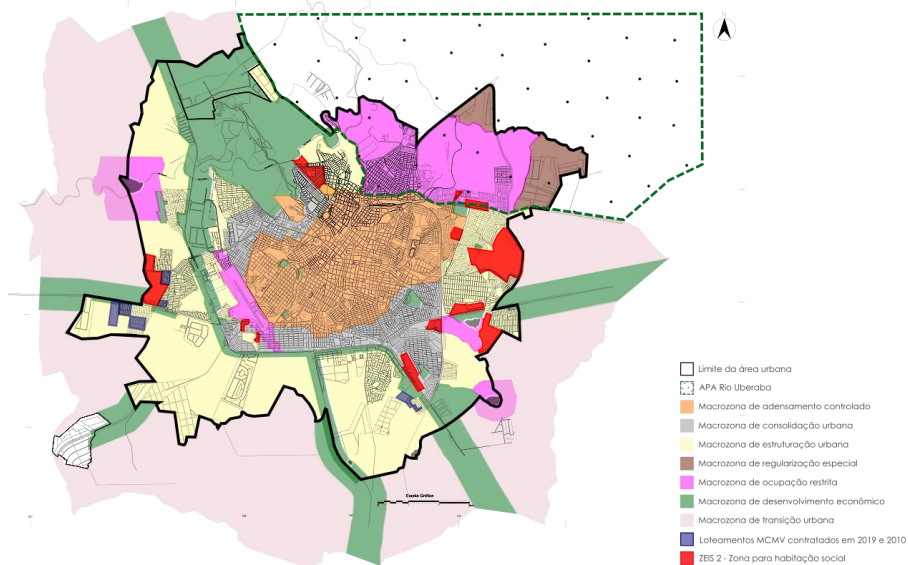
1.3 Suitability analysis

The methodology consists of three parts. First, we characterize the subdivisions, where we assess the hydrography, vegetation, and topography of the site. Then we create parameters to assess the level of sensitivity for each of these maps, dividing them into low, medium and high sensitivity. Finally, we overlaid the sensitivity maps to create an overall sensitivity map and perform the necessary analysis. As a database, we used the Mapbiomas project for the vegetation maps, along with satellite images from Google Earth, Google Engine and Qgis to develop the topographic maps, and the DWG map of the city available on the Uberaba City Hall website for the hydrographic maps. The classification criteria are high sensitivity for the APP of watercourses and areas of flooded fields, which cannot be occupied according to the Brazilian Forestry Code (BRASIL, 2012), slope greater than 30%, where subdivision is prohibited (BRASIL, 1979) and less than 3%, which is not recommended for residential use (VALENTE, 1996); medium sensitivity for areas with remnant vegetation and a slope of 15 to 30%, because although these areas are suitable for housing, it is necessary to pay attention to the technical solutions required; and low sensitivity for areas not belonging to the other two categories.

4 RESULTS

If we look at the urban zoning of Uberaba, we see that there wasn't much difference in the urban perimeter between the Complementary Law and its amendment. In fact, the limit of the urban zone was reduced. However, if we analyze whether these allotments are located in the urban area defined in the urban plan, we see that not all of them follow this logic. If we compare the urban macro-zoning of the city and ZEIS 2, which consists of underutilized areas intended for the promotion of social housing (UBERABA, 2006), with the PMCMV developments contracted in 2009 and 2010 (Figure 2), we see that all the MCMV allotments contracted in 2009 and 2010 are located in the urban structuring macro-zone. None of them are in ZEIS 2, and not all of them are in areas adjacent to the urban fabric, but they are all on the edge of the urban zone.

Figure 2 - Uberaba-MG - Urban Macrozoning in 2006 with PMCMV implementations in 2009 and 2010 (2022)

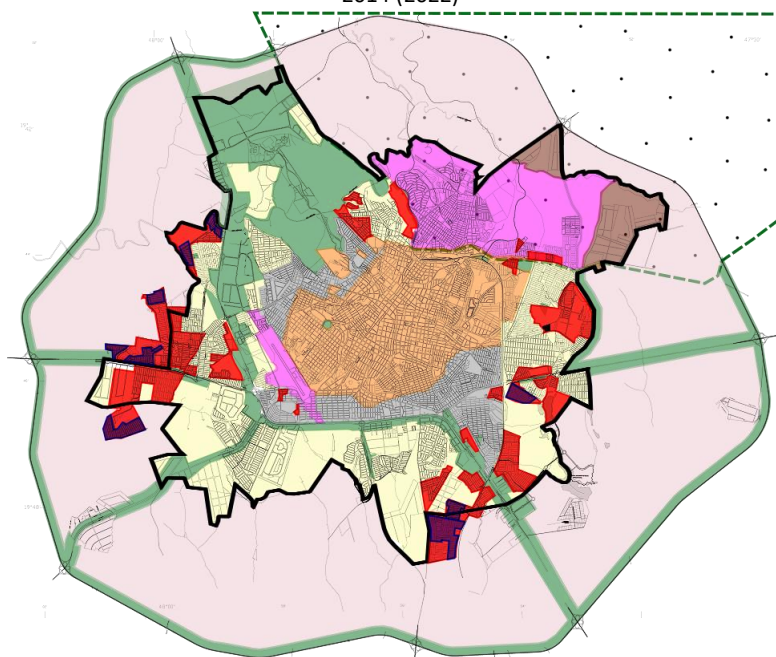


Source: Data taken from SisHab, PMU and Google Earth. Prepared by the author.

Although the urban structuring macrozone is suitable for residential use, interventions are needed to ensure that the growth of these areas is sustainable, since, as defined in the Master Plan, they are not fully integrated into the urban fabric of the city and often lack urban facilities. This can mean that the inhabitants of these areas have difficulties in accessing public services, transport, etc.

The 2014 amendment to the Master Plan Law brought some changes to authorized uses of the Urban Transition Macrozone. In this macrozone, residential subdivisions are allowed, provided that at least 60% of the saleable area is dedicated to housing programs, and it can even be classified as ZEIS, and the developer must carry out the necessary road works for access and the implementation of community facilities (UBERABA, 2014). It is worth noting that the Urban Transition Macrozone is not on the edge of the urban zone of the city, so the meaning of the empty ZEIS is completely lost when they are implemented in these places. The allotments contracted in 2013 and 2014 are now present not only in the Structuring Macrozone, but also in the Urban Transition Macrozone (Figure 3), reflecting the change in legislation regarding the Transition Macrozone. Unlike the allotments contracted in 2009 and 2010, these are all located in ZEIS. However, most of them are outside the city's perimeter and in the macrozone of urban transition.

Figure 3 - Uberaba-MG - Urban Macrozoning in 2014 with PMCMV implementations from 2013 and 2014 (2022)



Source: Data taken from SisHab, PMU and Google Earth. Prepared by the author.

4.1 Alfredo Freire IV Stage 1

The Alfredo Freire IV Stage 1 allotment has 252 units contracted and none delivered. It was contracted in 2013 and has experienced various problems during its execution, with work being suspended since 2020, when the contract with the last construction company was suspended (ALVES, 2020). The classification of the Alfredo Freire IV Stage 01 allotment, after applying the Urban Insertion Assessment Tool, was not satisfactory (Table 2). Only three indicators were considered good and the rest were considered inadequate.

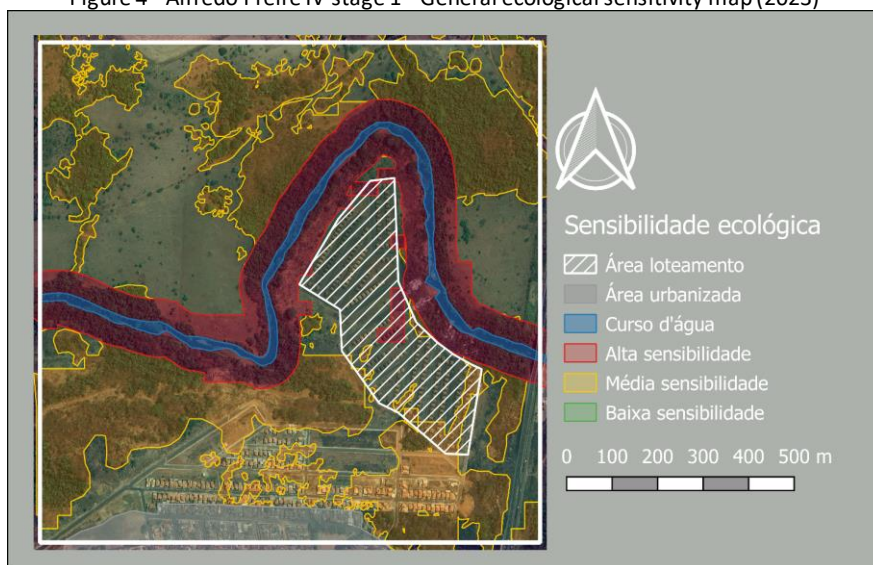
Table 2- Alfredo Freire IV stage 01 - Urban integration assessment (2023)

Theme	Indicator	Rating
1. Public transportation	1. Transportation option	Inadequate
	2. Frequency of transportation	Inadequate
2. Range of commercial and service facilities	3. Everyday use	Inadequate
	4. Occasional use	Inadequate
	5. Sporadic use	Good
3. Urban design and integration	6. Relationship with surroundings	Inadequate
	7. Size of the courts	Good
	8. Openness to public spaces	Good
	9. Pedestrian circulation network	Inadequate

Source: ITDP (2015). Prepared by the author.

In the ecological sensitivity analysis (Figure 4), we can see that although the majority of the allotment area itself is classified as low sensitivity, the immediate surroundings have many areas of medium and high sensitivity. Both because of the remaining vegetation and the watercourse app, and because of the high slope, in the case of medium sensitivity.

Figure 4 - Alfredo Freire IV stage 1 - General ecological sensitivity map (2023)



Source: Google Earth (2010), Mapbiomas (2022), IDE - systems (2023). Compiled and modified by the author.

4.2 Alfredo Freire IV Stage 2

The Alfredo Freire IV subdivision - Stage 2 has 288 units and has the same problems as Stage 1. Although they are considered different subdivisions, all their negotiations are done together and construction is also at a standstill. While not ideal, the rating of Alfredo Freire IV stage 02 is already better than that of stage 01 (Figure 3). The same three indicators were rated as good, two as acceptable and four as inadequate. This allotment is better integrated into the existing urban network, since it is adjacent to the Alfredo Freire neighborhood, as we can see in indicators 6 and 7, thus requiring less time to get to the neighborhood's facilities and bus stops. However, although the Alfredo Freire Neighborhood has been present in the city for a long time, some of the uses of Theme 2 are not present and the frequency of public transport is not ideal.

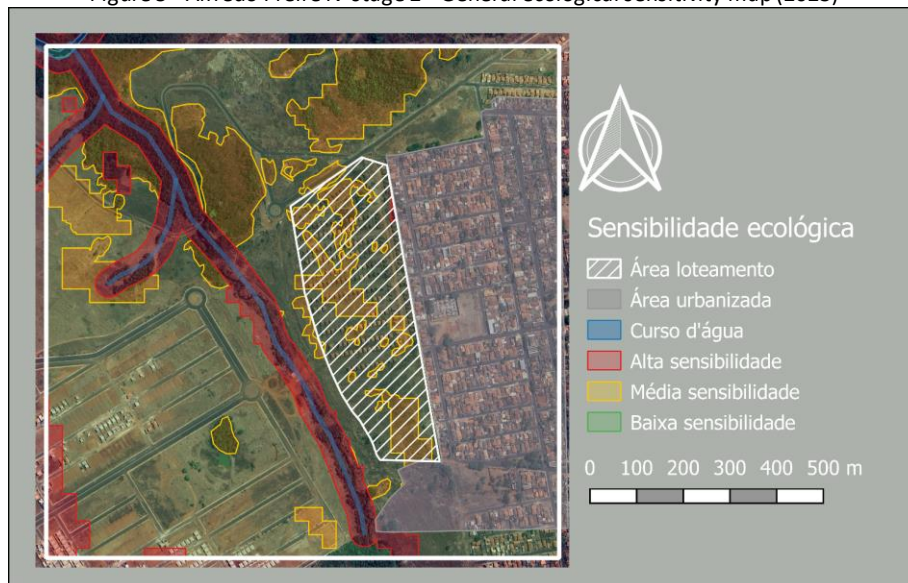
Table 3- Alfredo Freire IV stage 02 - Urban integration assessment (2023)

Theme	Indicator	Rating
1. Public transportation	1. Transportation option	Inadequate
	2. Frequency of transportation	Inadequate
2. Range of commercial and service facilities	3. Everyday uses	Acceptable
	4. Occasional use	Inadequate
	5. Sporadic use	Good
3. Urban design and integration	6. Relationship with surroundings	Acceptable
	7. Size of the courts	Good
	8. Openness to public spaces	Good
	9. Pedestrian circulation network	Inadequate

Source: ITDP (2015). Prepared by the author.

Like stage 1, stage 2 of Alfredo Freire IV (Figure 5) is also close to a watercourse, but with a smaller width. There are some areas in the subdivision with medium sensitivity due to the high slope and remaining vegetation.

Figure 5 - Alfredo Freire IV stage 2 - General ecological sensitivity map (2023)



Source: Google Earth (2010), Mapbiomas (2022), IDE - systems (2023). Compiled and modified by the author.

4.3 Parque dos Girassóis IV

The Parque dos Girassóis IV subdivision was also contracted in 2013 and has 490 housing units. Like Alfredo Freire IV, this project has experienced some problems. In 2021, the work was completed and delivery began at the end of the year (COHAGRA, 2021) (SI SHAB, 2022). Although the overall assessment of Alfredo Freire IV Stage 1 and Parque dos Girassóis IV (Table 4) is the same, Parque dos Girassóis generally has an even lower performance. Travel times are longer and it is more disconnected from the urban fabric. The fact that it can only be accessed through Parque dos Girassóis III, which in turn can only be accessed through a single avenue 1.2 km long, greatly increases the time it takes to get to urban, commercial and service facilities. This avenue is not qualified, with broken sidewalks, lack of sidewalks on both sides of the street in some sections, and lack of lighting designed for pedestrians.

Table 4- Parque dos Girassóis - Evaluation of urban integration (2023)

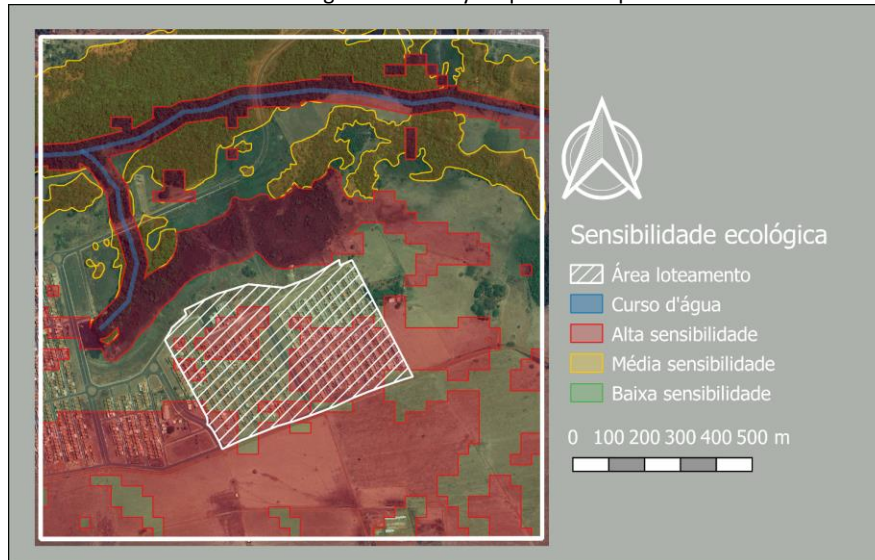
Theme	Indicator	Rating
1. Public transportation	1. Transportation option	Inadequate
	2. Frequency of transportation	Inadequate
2. Range of commercial and service facilities	3. Everyday use	Inadequate
	4. Occasional use	Inadequate
	5. Sporadic use	Good
3. Urban design and integration	6. Relationship with surroundings	Inadequate
	7. Size of the courts	Good
	8. Openness to public spaces	Good
	9. Pedestrian circulation network	Inadequate

Source: ITDP (2015). Prepared by the author.

The ecological sensitivity assessment (Figure 6) shows the complex slope of the allotment. Most of the slopes are less than 3%, which is not favorable for settlement (VALENTE, 1996), since the soil can have low resistance, as well as hindering urban drainage. We also have

the flooded field area, which is a swamp area with perennial watercourses and preserved vegetation.

Figure 6 - Uberaba-MG - General ecological sensitivity maps of the Pq. dos Girassóis subdivision (2023)



Source: Google Earth (2010), Mapbiomas (2022), IDE - systems (2023). Compiled and modified by the author.

5 CONCLUSION

The model for the creation of social housing allotments in the city of Uberaba, as well as the changes in legislation, favors the appearance of urban vacancies. The modification of the Master Plan, which allows the creation of allotments and ZEIS in the transitional zone, outside the urban area of the city, reinforces the actions of the real estate market, which is always looking for the cheapest land, so that allotments are more profitable for it. The cheapest land, however, is linked to the lack of urban infrastructure, as we have seen in the analysis of the urban insertion of allotments. Meanwhile, the existing urban voids in the urban area are valued due to real estate speculation, which reinforces the profitability of this practice for builders and developers. The issue of the implantation of allotments on the edges of the city is very relevant to the urban structure of the city, going beyond the allotments themselves. According to Fabiani (2020), the city of Uberaba has many urban voids and underused and underoccupied plots in the more central areas of the city, such as the Controlled Densification and Urban Consolidation Macrozones. The sprawling growth of the city means that the facilities in these already consolidated areas are left unused, and at the same time the city needs to make new investments to bring infrastructure to the outlying areas.

The result of Theme 2 "Supply of Facilities, Commerce and Services" of the ITDP Brasil Urban Integration Assessment Tool shows exactly this lack of infrastructure in the subdivisions. Basic elements, such as a day-care center and health units with emergency care, considered mandatory by the methodology, are not approved in the parameters is serious. In the case of both Alfredo Freire IV Stage 2 and Parque dos Girassóis IV, the construction of the municipal daycare center began before the allotments were handed over, anticipating the increase in

demand for these allotments and the need for these facilities. However, none of them has been completed. In Parque dos Girassóis IV, construction began in March 2021, with delivery scheduled for January 2023. The houses began to be delivered at the end of 2021, and the children's education center has not yet been completed. The results of Indicator 06 (Relationship with surroundings) for both Alfredo Freire IV Phase 1 and Parque dos Girassóis IV show that these allotments are disconnected from the actual urban context.

This urban sprawl is one of the causes of the proliferation of urban voids, along with the lack of governance in urban legislation, such as the authorization of subdivision in areas that are not continuous with the urban network and the modification of the size of plots considered urban voids (FABIANI, 2020). It is mainly up to the municipal authorities to develop strategies to manage these urban voids and to control the growth of the city, since this type of growth is damaging to the urban fabric. Urban sprawl, in addition to the costly expenses already mentioned and the inadequate access to urban facilities and public transport that people who live far from the center have, also reduces the density of the urban area, one of the possible causes of the emptying of the central area (FABIANI, 2020). A process that Uberaba is already facing. According to Fabiani (2020), the application of public policy instruments can bring good results in the medium and short term. However, it is also necessary that the revision of the Master Plan includes specific guidelines regarding the growth of the city and urban gaps, and outlines control measures so that their application can be verified.

Due to the size and impact that this type of project has on the urban fabric, it is necessary to think about social housing projects in an integrated and multidisciplinary way, taking into account the consequences that they may have on the environment in which they are inserted. The assessment of the socio-environmental impact before the implementation phase and the creation of an environmental management system are extremely important if we want to maintain more sustainable cities. Although there are a number of authors who discuss this issue, what we see in practice is that these indicators are not used. In the social housing in Uberaba and in Brazil, what we see is that the same model is reproduced, without taking into account the cultural and environmental aspects and the comfort of the users who will use these spaces. If we look at the allotments studied in Uberaba, we can already see some of the environmental impacts, although they are recent and two of them have not yet been completed or delivered. In Parque dos Girassóis IV (Figure 7) (Figure 8) it is possible to see the water seeping out of the ground and puddling on the access road to the allotment, which crosses the flooded field area mentioned in the environmental analysis, even though there was no rain on the day the photos were taken.

Figure 7 - Uberaba-MG: Access avenue to Parque dos Girassóis III and IV (2023)



Source: from the author (2023)

It is possible to observe the lack of urban facilities in the Parque dos Girassóis, as well as problems related to the quality of the buildings. Although it is a new subdivision, which only began to be delivered in 2021, During a visit to the site, we noticed several damaged sidewalks (Figure 8), access ramps leading to vacant lots without sidewalks, and several holes in the asphalt. Wooded areas near the allotment and unoccupied plots are used as dumping grounds. There are puddles and mud on the avenues and intersections, making some ramps inaccessible and making it difficult to move around on foot.

Figure 8 - Uberaba-MG: Alfredo Freire IV - Rain damage (2023)



Source: from the author (2023)

The Alfredo Freire IV neighborhood (Figure 9), which was built after the Minha Casa Minha Vida subdivision was contracted and construction began, has experienced problems in

recent years during the rainy season, when houses had to be closed and put on alert due to the collapse of a retaining wall (PRATA, 2022). The area with this rainfall problem is one of the surrounding areas where the slope is classified as medium, being between 15 and 30%. This could be one of the reasons for the fall, since, as mentioned above, although these areas can be occupied, technical solutions must be created to avoid future problems.

Figure 9 - Uberaba-MG: Avenida do Parque dos Girassóis IV (2023)



Source: from the author (2023)

The allotments have not been occupied, so there is no way to observe the quality of construction and the strength of the materials, but we can see that the allotments appear to be completely abandoned, fenced and guarded. In Stage 1, visible from the highway (Figure 8), it is possible to see the undergrowth taking over the streets and houses. Although there is no photographic record, the author's direct observation over the years has shown the near completion of the work, followed by its abandonment and gradual theft of objects. Today, there are almost no solar panels on the roofs of the houses, which used to be present in almost all of them. Some tanks, doors, and windows have also been removed. The Alfredo Freire IV subdivision and everything that has happened over the years does not represent Brazilian housing policy or the reality of social housing in the city of Uberaba, but it does represent a cross-section of its consequences. The prominence of construction companies, the lack of construction quality, urban inequality, and the pressure of private interests on local organizations are some of the various criticisms that the PMCMV has faced during much of its existence, and these subdivisions are, in a way, a glimpse of the consequences they have caused in Brazilian cities. Recognizing the importance of the program is fundamental, but we must always take a critical look at social and urban policies. In addition to this criticism, these policies need to be revised so that cases like Alfredo Freire IV's are not repeated.

Figure 10 - Uberaba-MG - Allotment Alfredo Freire IV stage 1 seen from the BR-050 highway (2022)



Source: from the author (2022)

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