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GEOMORPHOLOGICAL MAPPING FOR URBAN SLOPES AND MASS MOVEMENTS IN THE CITY OF BRANQUINHA, ALAGOAS

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ABSTRACT
Hillsides in urban areas are not easy tasks to map. This phenomenology requires that the researcher has techniques to characterize conditions such as the topography, geology and climatology of the area in question. Disasters can be caused by natural phenomena associated, at first, with more global events such as earthquakes, tsunamis, volcanic eruptions and hurricanes, but can also occur due to more localized processes and phenomena, such as floods, drought/drought, mass movements, among others. These processes may also be associated or induced by human activities, mainly due to disordered occupation. Thus, this article had as general objective to map risk areas in the city of Branquinha, Alagoas from mass slippage. As a method, Tricart's Ecodynamics (1977) was the reference.Na metodologia foram trabalhadas atividades de campo, entrevistas com moradores e aplicação de questionários. As a final proposal of the research, a graph was constructed to facilitate the understanding of the socio-environmental situation of the residents and the preparation of a synthesis map of the areas of slippage that proposes stability measures for these environments.
Keywords: Public outlaw, risk areas, public policies.

MAPEAMENTO GEOMORFOLÓGICO PARA AS ENCOSTAS URBANAS E MOVIMENTOS DE MASSAS NA CIDADE DE BRANQUINHA, ALAGOAS

RESUMO
As encostas em áreas urbanas não são tarefas fáceis de mapear. Essa fenomenologia necessita que o pesquisador tenha técnicas para caracterizar condicionantes como a topografia, geologia e climatologia da área em questão. Desastres podem ser provocados por fenômenos naturais associados, num primeiro momento, a eventos mais globais como terremotos, tsunamis, erupções vulcânicas e furacões, mas podem ocorrer também em função de processos e fenômenos mais localizados, como inundações, seca/estiagem, movimentos de massa, entre outros. Esses processos podem também estar associados ou ser induzidos pelas atividades humanas, principalmente devido a ocupação desordenada. Desta forma, este artigo teve como objetivo geral mapear áreas de risco na cidade de Branquinha, Alagoas advindo de escorregamento de massas. Como método a Ecodinâmica de Tricart (1977) foi a referência. Na metodologia foram

trabalhadas atividades de campo, entrevistas com moradores e aplicação de questionários. Como proposta final da pesquisa foi construído um gráfico para facilitar o entendimento da situação socioambiental dos moradores e a confecção de um mapa-síntese das áreas de escorregamento que propõe medidas de estabilidades para esses ambientes.
Palavras - chave: Descaso público, áreas de risco, políticas públicas.

INTRODUCTION

Mass slips are often in the media in news involving road interdiction, material losses and even human life. We can cite as an example what occurred on February 15, 2022 in the mountainous region of Rio de Janeiro, the city of Petrópolis in a single day rained about 250 mm, leaving hundreds of people homeless, homeless and 233 in deaths. These heavy rains were the main variable for landslide occurrences throughout the Petrópolis region.

In this sense, to analyze erosive processes we need to know the physical-natural characteristics of the area, geological, geomorphological, hydrological and climatic variables are necessary to point out where a natural disaster may occur, be it flood, flood, flooding, drought, drought, mass slippage, etc.

With this, the research aims to analyze two areas the Street Prado Omena and the Alto São Simeão Neighborhood of the city Of Branquinha, located in the forest area of Alagoas. The choice was made due to the areas suffering constantly with erosive processes, in this case, mass slipping. In addition to knowing the components of the physical environment, urbanization also needs to be taken into account, the irregular occupation in vulnerable areas whether on the banks of water slides or slopes also accelerates this erosive process. In the forest area, many houses are built in these fragile environments and without any infrastructure.

One of the physical components that result in the change of the relief forms and consequently disasters of mass slipping is precipitation. In Branquinha, the rains are concentrated from May to August, and the residents themselves report that it is the period that the mass landslides are manifested, especially in Prado Omena Street and in the Alto São Simeão neighborhood.

Therefore, precipitation, when interacting with other elements of the landscape (geology, geomorphology, water resources), and by the use and occupation of urban soil, contribute to aggravate or not the occurrence of slips. According to Monteiro (1976, p. 46) who stresses that atmospheric behavior, integrated with other regional spheres and natural processes, organizes climatic spaces from the higher scales towards the lower ones.

The beginning of the rainy season increases the risks of flooding, flooding and landslides. There are clear signs to identify when a landslide is occurring. Residents with common sense report electricity poles, fences and trees that are on the slopes begin to lean, indicating that the terrain is moving. Another sign is wall; floor and steps of the stairs of the residences appear constant cracks.

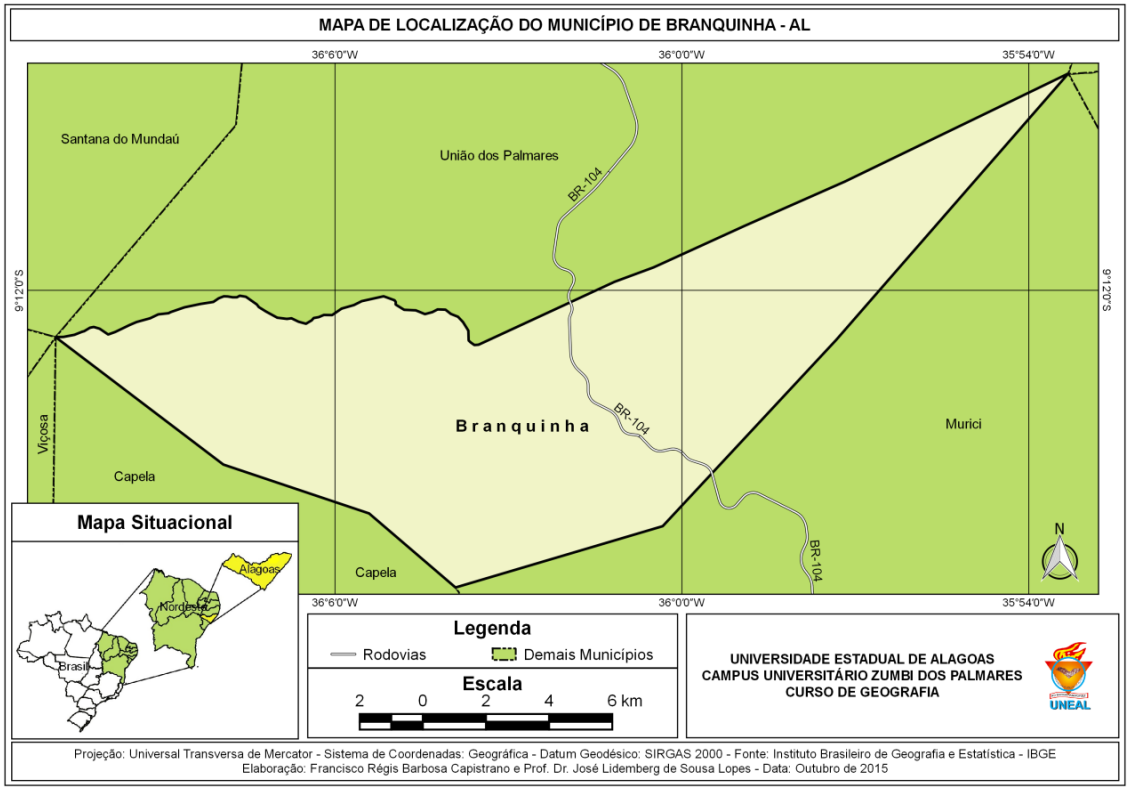
According to the city, there is little and knows about the history of the municipality of Branquinha. Due to the last flood in 2010 on the Mundaú River that reached a large proportion of the city. Even the city hall where these documents were, there was the loss of many documents and records, which would facilitate the preparation of the research.

According to the Encyclopedia of Alagoan Municipalities (ALAGOAS, 2012). Branquinha is approximately 70 km from the capital of Alagoas. The municipality of

Branquinha began its colonization around 1870. Newly arrived residents from other regions have been installing small sites. The growth of Branquinha occurred around 1955, when local leaders fought for its emancipation. Its political emancipation occurred under Law No. 2,446, of May 18, 1962, being officially inserted as a municipality on August 3 of the same year, with dismembered territory of Murici.

Branquinha is located to the north with the municipality of União dos Palmares, to the south with Capela, to the east with Murici and to the west with Capela, and has 10. 583 inhabitants according to the last census (Map 1).

Map 1 - Location of the municipality of Branquinha, Alagoas



Elaborated: Francisco Régis Barbosa Capistrano and José Lidemberg de Sousa Lopes, 2015.

The concern to map this phenomenon (mass slippage in urban area), with emphasis on the city of Branquinha, started due to wanderings around the city when it was noticed that many families, with no option in choosing the place of residence, ended up fixating on risk areas and heavily susceptible environments, becoming vulnerable to landslides.

METHODOLOGY

The work was based on an exploratory study, and the method of analysis is that of the General System Theory, in which the basis was in charge of the Ecodynamics of Jean Tricart, 1977, which subdivides vulnerable areas into: stable, integrated and strongly instable environments. There is also the analysis of the integrated landscape as a geographical category.

The definition of vulnerable areas is closely related to fragile environments, in which Jean Tricart called Ecodynamics, that is, an integrative approach of society with nature,

> An Ecodynamics is characterized by a certain dynamics of the environment that has more or less imperative repercussions on biosensors. Generally, morph dynamics is the determining element [...]. [...] morph dynamics depends on the climate, the topography, the rocky material. It allows the integration of these various parameters. The concept of ecodynamic units is integrated into the concept of ecosystem. It is based on the logical instrument of system, and focuses on the mutual relations between the various components of dynamics and flows, of energy/matter in the environment (TRICART, 1977, p. 32).

Conceptualizing and defining vulnerable areas in relation to their environmental fragility and using this Tricart approach is of paramount importance to understand how the analyzed areas can be classified. As a result, vulnerable areas in urban areas are located in regions with weaknesses in the occurrence of natural events – intense or not – caused, of course, by heavy rains and strong winds (gale), as well as by anthropic actions to the detriment of dwellings in inappropriate environmental areas, such as easily flooded terrain, steep slopes and waterproofing and inadequate use of urban soils, in addition to the processes of deforestation, degradation and erosion of soils due to urbanization and inefficient urban drainage systems.

The methodological procedures for collecting information and data for the research began with the literature review, field study for the application of 20 semi-structured questionnaires, and informal interviews with families in the areas that are suffering from mass slips.

The questions indicated in the questionnaire were related to the time they lived in the researched area, education level, income, whether the interviewees knew what slippage, mass and natural disasters were, etc. Another methodological activity was the use of software for the making of maps. In cabinet, the first activity will be Google Earth. After this analysis and the georeferenced clipping of the research areas, the team will go in the field to understand what happened in the satellite images and the actual found in the analyzed points. For the preparation of the maps presented for the final response of this project we will use Mercator's Universal Transverse flat projection, the geographic coordinate system (angular) and the Sirgas 2000 geodesic datum (Geocentric Reference System for the Americas), datum officially adopted in Brazil. In *QGIS software*.

In addition to these previous methodological tools, photographic records were made to monitor landslides during drought and rainfall for the research.

CONCEPTUAL TESSITURA

The vulnerability of areas whether social or environmental can more or less strongly affect the functioning of human societies and ecosystems. Modern societies finally seem to understand that socio-environmental risks are initially individual; every moment of life can survive threats or dangers; they are associated with various anthropic activities (construction of cities without planning, paving of streets and avenues, agriculture without adequate techniques among others).

Goudie (1994), points out that the slopes occupy a large part of the landscapes and, within the framework of the river basins, they provide water and sediment to the river channels. With this, knowing the slopes with regard to its dynamics, erosive processes and its conditioning factors will be essential to understand the slides that occur in the

urban area of the city of Branquinha in Alagoas. This research has an indispensable importancional nature for the planning and environmental management for the management agencies, from the most diverse spheres (Municipal, State and Union).

Therefore, mass slipping is understood as common phenomena in the Brazilian reality that can cause irreversible damage. These phenomena are one of the main agents of landscape modification, being related to processes of land surface wear with the removal and transport of mineral grains, and are responsible, with other natural processes, for the continuous modeling of relief forms (SOUZA et al. 2011).

According to Guerra and Marçal (2012, p. 93), the concern with the environmental and social issue can be translated by the search for balance in the relationship between the various components that the natural environment establishes among themselves and their ability to respond to the different disturbances imposed on them by the forms of activity of society on nature.

Sunkel and Leal (1985, p. 6-7) point out that the environmental problem faces the challenges related to the stocks of material and energy resources and the fundamental issue of their long-term use, which requires a revaluation of the territorial, regional and spatial dimension. We had not been cautious about the physical dimension of the economic problem, that is, that in reality the monetary flows used by economists were ultimately the consequence of change in the natural environment as well as in the built environment. [...] Thus, the environmental perspective is for us one of the fundamental bases of this new critique of economic theory.

Among the most common natural processes in Brazil are mass movement, floods, droughts and droughts, and erosive slipping processes are those that are most concerned by the number of fatalities it has generated in recent decades. However, there is no prospect of this situation being modified in the short term, since due to the growing socioeconomic inequality associated with social vulnerability, the occupation of slopes without the necessary care tends to increase, leading to a consequent increase in the number of accidents of this nature.

In the context of work, social vulnerability according to Confalonieri (2003, p. 200) says that the concept has been used to characterize social groups that are most affected by environmental stress, including climate-related. However, Mendonça (2004, p. 141) reports that the living conditions of the population began to play an important role in the constitution and understanding of urban environmental problems and revealed, at the same time, clear differences between the formal city and the informal city.

Dauphiné (2001) makes it very clear that vulnerability reveals the fragility of a system as a whole and its ability to overcome the crisis caused by oil. The ability of a complex system (a city, for example) to re-establish itself and improve its reactivation after disasters is now taken into account in determining vulnerability; it is called resilience, in reference to ecology, which with this word defines the capacity of a system to adapt to the changes resulting from a crisis and improve its capacity to respond in view of future disasters (VEYRET, 2007, p. 42).

According to marandola jr. and hogan (2005), the socioeconomic characteristics of populations in risk areas are a fundamental component when we are discussing social vulnerability. They also claim that "[...] factors such as income distribution, schooling, race, type of occupation, among others [...] should receive attention along with the

classical demographic variables" (MARANDOLA JR. and HOGAN, 2005, p. 41).

Based on this reality, preventive action of public or private initiative is necessary, providing families living in at-risk areas with conditions to "live with risks, safely".

According to the Brazilian Atlas of Natural Disasters (UFSC, 2013), making explicit here in the research that the data obtained were between the years 1991 and 2012. To date not updated, showing the lack of interest in this subject by government agencies, Alagoas has counted in relation to natural disasters and droughts, gradual and abrupt floods, marine, fluvial and linear erosions are adverse events, some recurrent that caused disasters in the State of Alagoas in the period of 22 years (1991-2012). These adverse events total 799 official records related to natural disasters in Alagoas, in the period analyzed, with Branquinha recording 2 events related to drought and drought and 3 floods, totaling 5 natural disaster events. However, the https://s2id.mi.gov.br/ site (BRASIL, 2020) has more detailed hists of the Brazilian states, and the municipalities, and Branquinha between 2003 and 2016 were recorded 2 events, divided into 1 event in 2008 related to Flood and in 2013 related to drought.

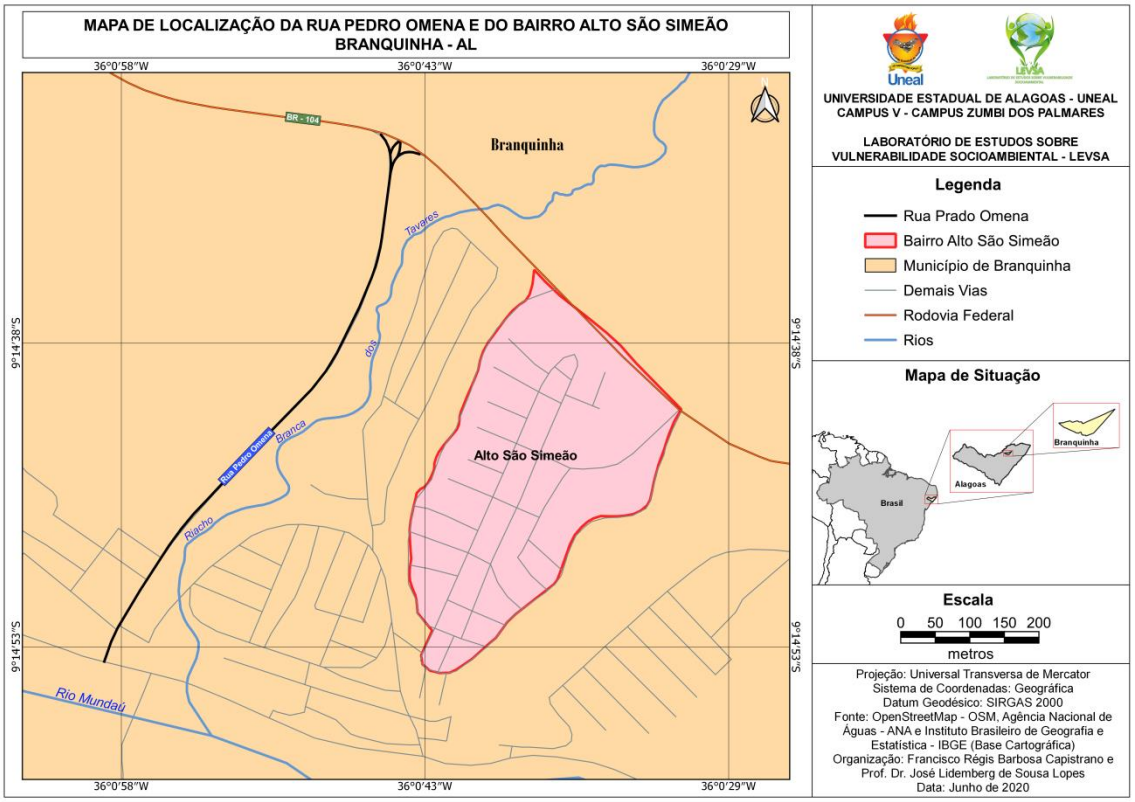
With this, all the references cited in this project are related to this phenomenon (mass slippage in urban area), risk areas and strongly fragile environments, becoming vulnerable to landslides in the city of Branquinha, Alagoas.

RAIN AND SOIL: A SLIPPERY MIXTURE

Urban environmental impacts are a complexity of challenges for geographers, where there has never been talk and researched so much about the relationship between society and nature today. For the research in question, two areas that are in eminent erosive process were analyzed, that is, slope slipping. Because erosive processes are associated with multiple causes, temporal and spatial, although interconnected, hence the concern of analyzing these areas of the urban spot of Branquinha. Studying the urban and its impacts is a challenge, but one that we cannot help but face. Map 2 below shows the pilot areas of the work.

> Urban studies of environmental impact are related to an insufficient knowledge of environmental processes, based on a lame notion of balance and in the absence of a theory of environmental processes integrating the physical, political-social, sociocultural and spatial dimensions. On the other hand, since urbanization is a transformation of society, the environmental impacts promoted by urban agglomerations are, at the same time, a product and process of dynamic and reciprocal transformations of nature and society structured in social classes (COELHO, 2001, p. 21).

Map 2 - Location of the pilot areas of the survey - Prado Omena Street and São Simeão Neighborhood in Branquinha, Alagoas



Elaborated: Francisco Régis Barbosa Capistrano and José Lidemberg de Sousa Lopes, 2020.

Prado Omena Street

Located in the western part of the city, Prado Omena Street is situated on the plain and near the Branca River of Tavares which is a tributary of the Mundaú River and is affected as far as the intensity of precipitation. Thus, in addition to the risk of overflowing the river, there is also the possibility of sliding the slope in front of the residences.

The climate is one of the factors for determining the type of soil, the micro region of Branquinha presents itself with a tropical climate. And when there is an incidence of good drainage and good infiltration favor chemical weathering, especially with regard to the degree of oxidation and promotes reddish colors to the soils, thus resulting in a clay soil, which predominates in one of the main streets, located at the beginning of the city: Prado Omena.

The occurrence of landslides, even in small proportions, coincides with the period of intense and prolonged precipitation, since the water drained and infiltrated will destabilize the slopes. The soil, therefore, absorbs a portion of the water, another part that is infiltrated into the soil is confronted with some impermeable rocks, which causes the soil saturated with moisture that does not support and breaks, triggering the landslide on the slopes.

However, according to the Secretary of the environment, the area does not have enough waste to reach the houses near the hillside, due to the presence of the rock at the base of the hill, which contradicts the version of the residents; because these reported that it has already reached the locality, although it was in smaller proportions.

At the moment when infiltration is prevailing, only the slippage/slipping of mass does not occur with greater intensity, due in some areas to have plots of vegetation cover.

Due to the presence of slope in the area, sliding events are favored by the topographic characteristics of the region. In this way, it praises a great risk to the population living and transiting in the region.

The residences besides being susceptible to floods, because the tributary of the Mundaú River is fixed behind the houses on the left side of the street, there is also the hill suffering the process of erosion and wear and tear by human intervention, on the right side of the street. Trades were established on the right side of the street being totally subject to collapse.

Slips are natural phenomena: they can occur even if the area has its vegetation intact. However, the vegetation itself often mitigates the impact of rain by foliage, and its roots help stabilize the soil. According to Gonçalves e Guerra (2001, p. 193) the vegetation cover is a factor that offers a degree of safety on the slopes. Often erosive processes can be contained or softened if the vegetation cover is dense enough to do so.

Still Brady (1983) leaves that the vegetation decreases the direct impact caused by the rain drop on the ground, decreasing the degree of saturation of the same and, in many situations, decrease the water level of the land, also decreasing the pressure pore in it, which a process is causing landslides.

In May 2020, the city was in a rainy season, occasionally precipitation with the accumulation of moisture was one of the factors that caused a landslide at the site. According to residents near the area, they said that the trees located in the slopes suffered the impact of the rain, in which it promoted the "avalanche effect", when the wind shakes the trees and further worsens the situation, as some fell on the houses (Figure 1).

Figure 1 – Landslide on Prado Omena Street causing tree felling over homes on May 26, 2020

Source: authors archive, 2020.

On the other hand, man's action greatly favors the appearance of the problem. And as the slopes are located in the urban area of the city, it is on this street that the main services of the city, the police station, school, pharmacies and commercial stores of Branquinha, these linked to the residences are concentrated.

However, not only the hillside is the imminent danger of the residents who reside on this street. At the bottom of the residences is the Branca dos Tavares River, a sub-tributary of the Mundaú River (Figure 2). And that in times of exceptional rainfall, cause flooding causing inconvenience to the local population.

Figure 2 – Branca River skirting behind the residences of Prado Omena Street

Source: authors archive, 2020.

With this, it is necessary that the municipal agencies, especially the Department of Environment, Infrastructure and Civil Defense always be on alert and schedule visits and articulate projects to minimize damage that may occur, either by slipping or by flooding in this region of the urban area of Branquinha.

Alto São Simeão Neighborhood

The Alto São Simeão district is located on a hillside in the eastern part of the city. The houses that are situated in the areas of risks, and irregularly are those that is located on the slopes of the hill. The history of the emergence of the locality generates controversy. According to reports of residents who have lived in the place for a long time, the area was intended for people who did not own their own homes and due to financial instability, also could not afford rent. With this, the residents of the neighborhood went to request land to the manager of the municipality, this granted the request.

However, the mayor at the time stressed that he would not take responsibility for any damage that would come to the population that was there, since they would be in a risk area. For the area is morphologically constituted by a strand that erosive processes are constantly verified, not only in rainy court, but in summer as well.

A second version told by another resident, about the emergence of the neighborhood, according to him, the owner of the São Simeão Sugar and Alcohol Plant gave part of the

land to the economically devoid individuals to settle on the site.

However, according to BBCBrasil, the city of Branquinha was hit by several floods that resulted in the creation of several clusters, including Alto São Simeão. Despite the different information focused on its emergence, it is seen with concreteness that the reality experienced by society is the result of political dismay, since safe housing is one of the basic foundations before the Constitution of Brazil.

In view of this scenario, the consequences of anthropic action in these irregular areas are noticeable. During the interview with some residents of the Alto São Simeão neighborhood, according to an elaborate question about whether they knew where the effluents that were produced in their waste were intended. One of them was quite incisive in saying that "those of the sink and drain of the bathroom were poured out of the pipes that come out of the houses and reappear on the slopes or in the same street, in the open air" (Figure 3).

In relation to the waste from the toilets, they are dumped in septic forces that are built in the backyards of the residences and that due to the mass slips, some bathrooms and the tank are already compromised.

Figure 3 - View of one of the streets of alto São Simeão neighborhood

Source: authors archive, 2020.

When dealing with human action, these will occur quickly, in line with other natural characteristics such as climate, relief and weather. Human interaction in nature can cause disaggregation of the natural cycle, but when there is vegetation the erosion process is almost nil, since:

> On grassy or forested surfaces, erosion occurs slowly and appears to be balanced with soil formation. Accelerated erosion occurs where humans interfere in this balance, starting with the removal of vegetation cover and continuing by inadequate use and management of agricultural activities, urbanization, mining and other economic activities (GOUDIE and VILES, 1997 apud CUNHA and GUERRA, 2005, p. 200).

Thus, when man changes nature mainly for the use and occupation of irregular soil of strongly instable environments, with the removal of vegetation, landfills and siltation's from the springs, impermeability of the soil causing an imbalance in the amount and speed of surface runoff, these examples are contributors to the erosive processes verified in the Alto São Simeão neighborhood.

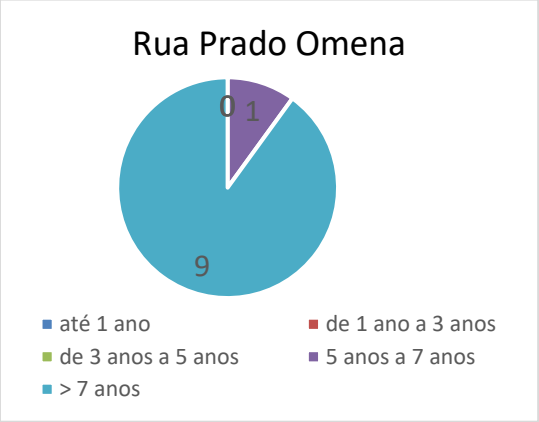
RESULTS AND DISCUSSION

As a result of the research, during the field activity, 20 sample questionnaires were applied, with 6 closed and direct questions. Ten questionnaires were applied in each pilot area. The questionnaires were applied only in the residences that are in the hillside areas. The following are the answers of the residents of each area respectively, Prado Omena Street and the neighborhood Alto São Simeão**.**

Source: Survey data, 2021

1. How long do you live on Prado Omena Street or Alto São Simeão?

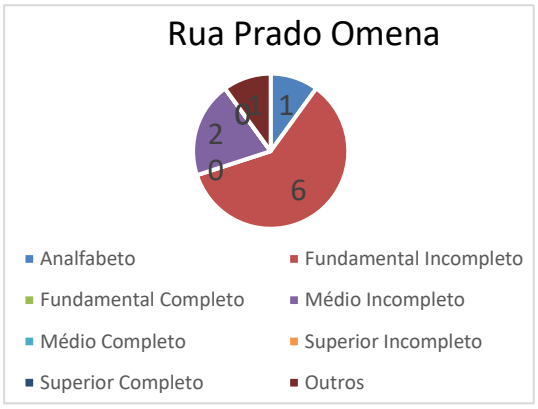
Source:



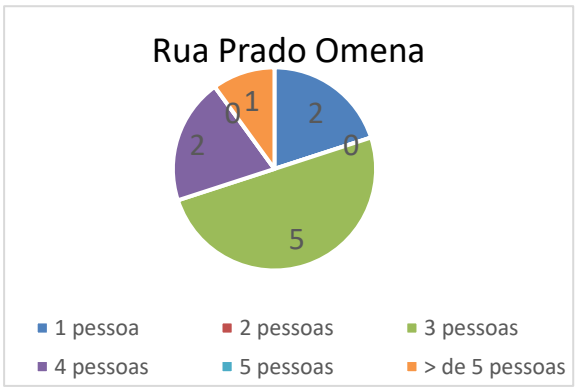
Survey data, 2021.

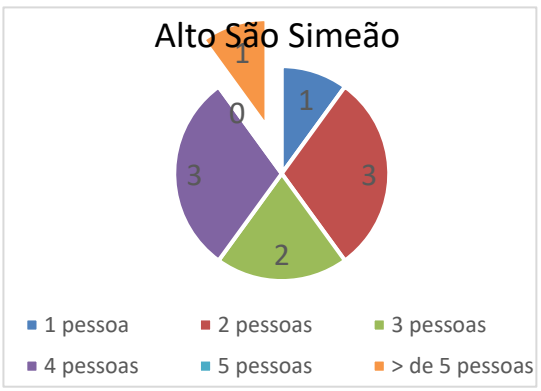
By analyzing the answers to the first question, it is observed that the majority of the population that resides in the research areas has lived for more than seven years. Demonstrating that they already know social and environmental issues.

2. How many people live in the house?



Source: Survey data, 2021





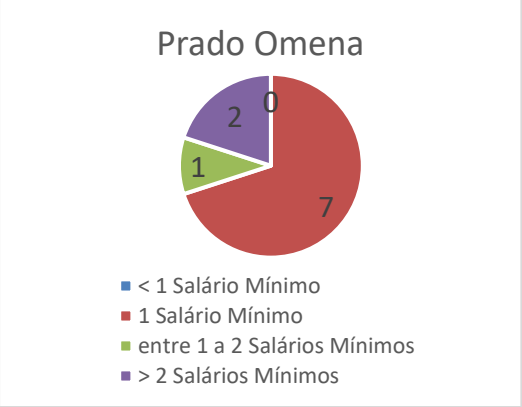
In the question of the number of residents living in the dwellings, it was verified that varied greatly, and no interviewee resided alone, always the answers varied from 2 or more people in the houses.

3- What is your level of education?

Source: Survey data, 2021.

Regarding the interviewees' education, it was clear that education is one of the most problematic social elements of these people. If you see in the graphs above, of the 20 people interviewed, that is, 10 in Prado Omena Street and 10 in alto São Simeão neighborhood, 5 are illiterate, 9 residents only have the incomplete elementary and only one with complete superior.

4- What is a family income?



Source: Survey data, 2021.

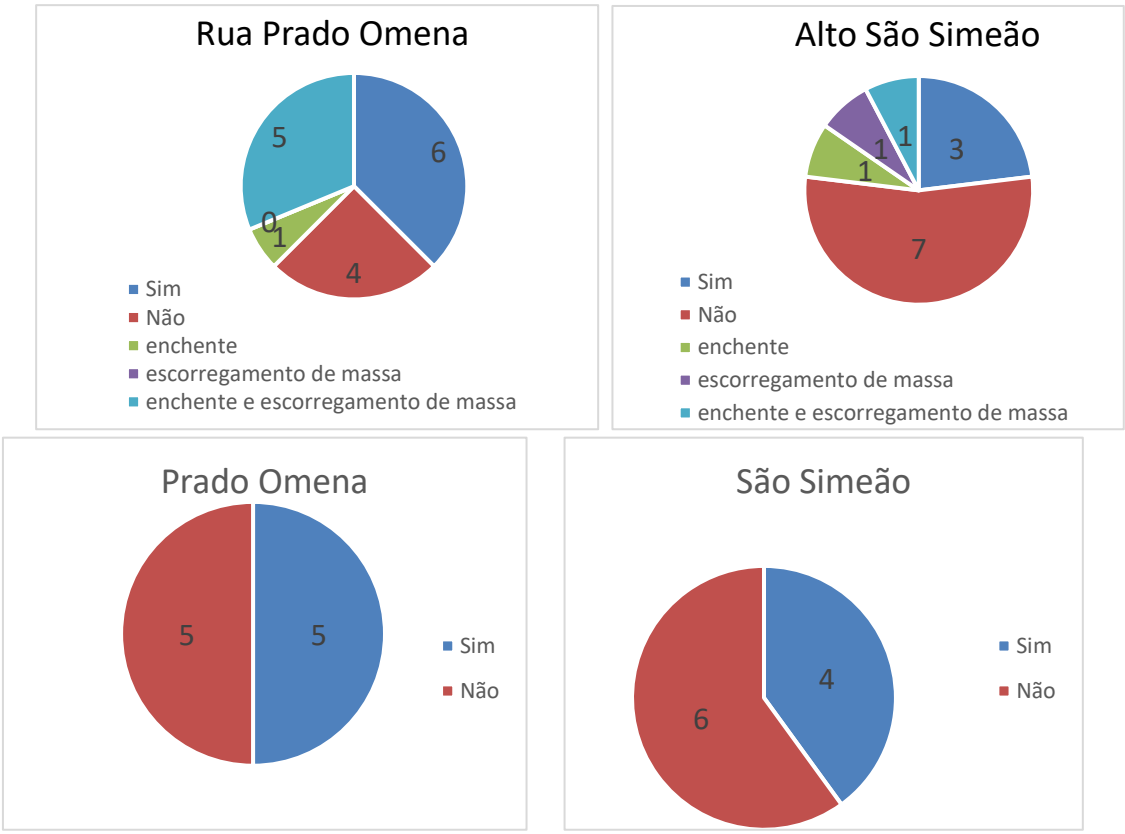
Regarding family income, of the 20 interviewees, 11 respondents receive 1 minimum wage, which comes from retirement and/or to complete the income of a minimum wage complement with social benefits of the federal government. Only in Prado Omena street did two residents answer that the family income exceeds two minimum wages.

5- Can you tell if the municipality has civil defense?

Source: Survey data, 2021.

Regarding whether the residents knew how to inform that there was the Civil Defense agency in the municipality, the response sample was very worrying, because of the 20 interviewees, 11 answered that they did not know how to inform, and only 9 knew. In this sense, an organ of extreme importance for occurrences for regions that suffer or will suffer extreme effects that cause damage of all magnitude so material or deaths should be better disclosed to the population.

6- Have you ever been through a natural disaster? And which(is)? Below are the charts with the answers.



Source: Survey data, 2021.

In Prado Omena Street, of the ten people interviewed, six positively stated that they had already experienced disasters, and that flooding and landslide were the disasters pointed out. In the Alto São Simeão neighborhood, of the ten interviewees, only three reported that they had been affected by natural disasters and 7 who did not go through this problem.

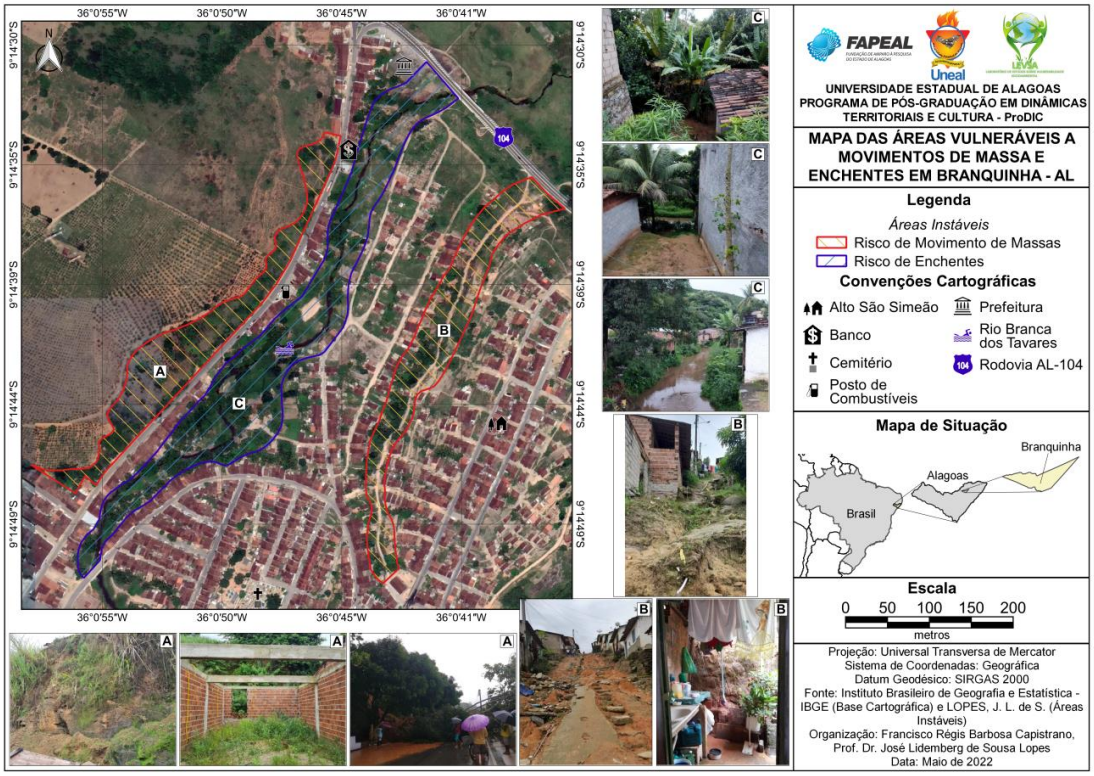
And as the research is a mapping of the areas of mass movements, in this case the slips

in Branquinha, and that the model in the research was that of Tricart Ecodynamics (1977), map 3 of the marketable areas of the pilot areas of the research was performed.

According to Map 3, the areas that are cracked with the letters A and C are those between Prado Omena Street, leading us to realize that this street is in imminent danger, either by landslides or by flooding. The letter B, on the other hand, is where the slope of the Alto São Simeão neighborhood is located, and the population also deserves attention from public agencies.

This ingredient, slopes and river, is a danger to areas that do not have residences, imagine when these places are occupied? It was in this intituto that the research was carried out, to alert the municipal government and the community in general that the increasing pressures exerted by society on the natural environment has the need for planning and management, whose central objective is the spatial planning.

Map 3 – Use of Jean Tricat's Ecodynamics model for Prado Omena and São Simeão street in relation to the erosive process of mass slipping



Elaborated: Francisco Régis Barbosa Capistrano and José Lidemberg de Sousa Lopes, 2022.

FINAL CONSIDERATIONS

For the conclusion of this research, we want to show that the approach of the theme mass movement, in this case of slips, is clearly related to aspects of the relationship between society and nature, in which the problems caused by the interventions promoted by man in the natural environment are the basis for the analysis of Interviews for these types of problems. The environmental and territorial framework of the urban area of Branquinha is worrisome when we talk about mass slipping or flooding.

In this context, we can perceive that the city shows that the relationship between society/nature takes place in a disharmony manner, triggering numerous problems, whether environmental and/or social, and one of them is socio-spatial segregation, whose most striking consequence is the expansion of social inequalities, which in the work in question is housing.

In the areas of research this inequality is easily verified, because Prado Omena Street and alto São Simeão neighborhood do not obey formal, but formal arrangements. In this sense, the government is sinful in relation territorial management. The omission of the supervisory bodies is great, encompassing the historical exclusion of the less favored social layers in the processes of planning and management of the territory.

In view of so many disparities, environmental policies need to be put concretely in the local reality, considering that there should be regulatory policies in order to create specific laws to establish or regulate standards of use and access to the environment and its resources and the creation of institutional solutions that ensure compliance with the law.

Moreover, it is essential to carry out structuring policies, because these are in the engagement of direct intervention by the government or non-governmental bodies in the protection of the natural environment and the equal development of quality of life for all citizens. Not being left out, the inducing policies, actions that object to influence the behavior of individuals or social groups: awareness.

Therefore, all these policies, if they are put into practice, will be essential for the alleviation of environmental and social problems throughout the urban area of Branquinha, and extend to the entire municipality.

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