PROTECTION AND CIVIL DEFENSE: RAINS IN 2013 IN THE MUNICIPALITY OF JAPERI – RJ

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ABSTRACT

This article seeks to show, through a case study of an event that occurred in 2013, in the municipality of Japeri in the State of Rio de Janeiro, in order to point out successes and mistakes made, both by the population and by the Public Power so that it can improve the structures of Civil Defense at the national, state and municipal levels, with relevance with regard to investments in human and material resources and in the organization of methodologies for diagnosis and mapping of risk areas. All these changes in the environment impact in different ways on the living conditions of different social groups that inhabit the municipalities, whether in their urban or rural areas. The objective of this study was to analyze the vulnerabilities that occurred in the municipality of Japeri, during the rains of December and January 2013, a period when there were greater rainfall changes, in the interventions of emergency and disaster actions, in the scenarios of the accident. The methodology applied was based on a case study that concluded at the end of the study that it is necessary to raise awareness among the population involved, also, by establishing a partnership between the environmental sector and the municipal Civil Defense for the implementation of future actions.

Keywords: Civil Protection and Defense. Civil Defense Actions. Public Policies of Urbanization.

INTRODUCTION

PROBLEMATIZATION

What is the role of the population and the Government when hydrological disasters occur based on what happened in Japeri in 2013?

OBJECTIVE

To analyze the vulnerabilities that occurred in the municipality of Japeri, during the rains of December and January of 2013, a period when there were greater rainfall changes, in the interventions of emergency and disaster actions, in the scenarios of the accident.

RELEVANCE

In recent decades, extreme events have caused constant impacts in several Brazilian municipalities.

Extreme events can occur in the form of heat waves, periods of drought, floods, landslides, etc. Certainly, droughts, floods and landslides are the most frequent natural disasters in the country. (Loureiro et, al, 2014)

Currently, in Brazil, it is the responsibility of the Ministry of Cities to deal with urban development policy and sectoral policies for housing, environmental sanitation, urban transport and traffic. But the housing panorama is still marked by precarious settlements devoid of urban equipment and mainly composed of buildings of low construction standard and empirical construction. In 2001, according to the Brazilian Institute of Geography and Statistics (IBGE), the country had 19,631 registered favelas, in a total of more than 1.6 million households. Of these, 70.1% were located in the 32 largest municipalities in the country with more than 500 thousand inhabitants. (Souza, et, al, 2009)

The Hyogo Framework, and the 1st National Conference on Civil Defense and Humanitarian Assistance (CNDC, 2010), took place in March 2010 in Brasilia, and brought new proposals for public policy on Civil Defense where they were formulated and approved, in order to contribute to the reformulation of the Civil Defense planning process in Brazil. Both established strategies and priorities in facing issues such as poverty, vulnerabilities in their multiple dimensions, in addition to the importance of preparing diagnoses and risk maps.

The theme of disaster risk has been institutionalized for many years, but the implementation of the Civil Defense System in most municipalities is far behind. In the ministries, there are different programs related to the theme of climate change and natural disasters, however, there were many adversities to integrate them transversally to the

issues of poverty, environmental degradation, health, housing, education, among others. Transversality in the assessment of risks and vulnerabilities in the management process was a basic condition for jointly facing the problems and factors that determine, to this day, the occurrence of disasters

LITERATURE REVIEW

In times of war, communities affected by combat actions needed to mobilize quickly to reestablish the basic needs of the community, in the areas of health, food, transportation, shelter, security, etc., providing them with minimum conditions for their subsistence. (Neto, 2007).

In the history of humanity, there have been major disasters associated with earthquakes, volcanism, hurricanes and tsunamis, which have killed thousands of people around the world. However, international records show that, from the second half of the twentieth century, there was a significant increase in the frequency and intensity of natural disasters. (Maffra et, al, 2007)

The negative results caused by natural disasters can reach proportions beyond the response capacity of the affected public agencies, proportions that reach threats to life, the environment and economic and financial development. (CNM, 2016)

The issue of disaster risk has been institutionalized for many years, according to item XVIII of Article 21 of the Federal Constitution of 1988 establishes that it is up to the Union to "*plan and promote permanent defense against public calamities, especially droughts and floods*". (Brazil, 1988)

In Brazil, in 2012, the National Policy for Civil Protection and Defense (PNPDEC) (Law No. 12,608) was instituted, which establishes government attributions at the federal, state, and municipal levels to face these events and minimize the risks and impacts of disasters, considering legal and administrative aspects. This Law was revised, in part, by Federal Law 14,750 of December 12, 2023. (Brazil, 2023).

The PNPDEC, in its article 8, established the following competencies for the municipalities, among others:

> III - incorporating civil protection and defense actions into municipal planning;
> IV - to identify and map the areas at risk of disasters;
> V – to promote the inspection of disaster risk areas and to prohibit new occupations in these areas;
> IX - to keep the population informed about areas of risk and the occurrence of extreme events, as well as about prevention and warning protocols and emergency actions in disaster circumstances (Brasil, 2012).

Thus, to ensure the civil protection of the population, it is necessary to identify vulnerabilities and social groups exposed to risks. It is also essential to understand which processes are involved in the constitution of vulnerabilities to disasters and which involve, in turn, an intersectoral and transdisciplinary management of risks (Júnior, 2016)

When dealing with the issue of reducing vulnerability to hydrometeorological events, such as rainfall, it is necessary to take into account the imbrications of political-institutional practices. (Valencio, 2010).

The challenge in this process for disaster risk reduction and in facing these situations lies in the recognition of the intersectoral nature of these actions and the need for them to be transversalized among the different public spheres: municipal, state and federal, private entities and civil society. (MIN, 2010)

At the intersection of these elements, we identify strategies that both make it impossible to establish a higher level of territorial security for impoverished social groups and reiterate the social disqualification of this group when affected by rainwater and mud that carry their material goods and their lives. (Valencio, 2010).

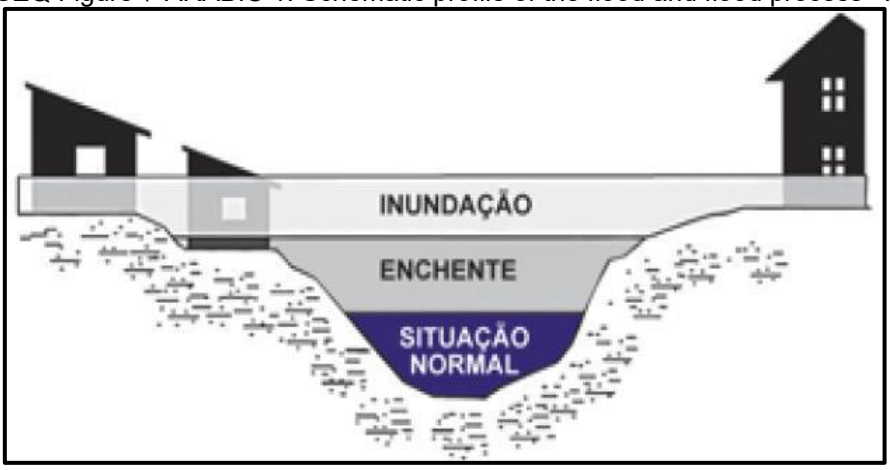
For the actions to be successful, the Civil Defense needs to establish partnerships and build networks so that other sectors can take ownership and share in the programs to be developed. The involvement of communities and institutions will then make it possible to expand autonomy and ensure self-management for decision-making on the situations that affect them. Gradually, it becomes possible to build legal and juridical recognition in a formal process of decision-making and resource management. (MIN, 2010)

CHARACTERIZATION OF FLOODS, FLOODS AND FLASH FLOODS IN URBAN AREAS

Floods and floods are natural events classified and codified in Brazil (2022), which occur periodically in watercourses, often triggered by heavy and rapid rains or long-lasting rains. In addition to flooding and flooding, there are also the concepts of flooding and flooding, usually used in urban areas. (Tominaga et, al, 2012)

Figure 1 shows the difference between the normal situation of the volume of water in the channel of a watercourse and the events of flooding and flooding.

Figure: SEQ Figure * ARABIC 1: Schematic profile of the flood and flood process - Adapted



(Source: Brazil, 2007)

According to the Brazilian Classification and Codification of Disasters (Cobrade):

A. **Flooding:** Submersion of areas outside the normal limits of a watercourse in areas that are not normally submerged. The overflow occurs gradually, usually caused by prolonged rainfall in lowland areas.
B. **Flooding:** Extrapolation of the drainage capacity of urban drainage systems and consequent accumulation of water in streets, sidewalks or other urban infrastructures, as a result of heavy rainfall.
C. **Runoff:** Surface runoff of high speed and energy, caused by intense and concentrated rainfall, usually in small basins of rugged relief. Characterized by the sudden increase in the flows of a certain drainage and sudden overflow of the river channel. It has great destructive power

It is now known that floods are related to the amount and intensity of atmospheric precipitation. The magnitude and frequency of floods occur as a function of the intensity and distribution of precipitation, the rate of water infiltration into the soil, the degree of soil saturation, and the morphometric and morphological characteristics of the drainage basin. (Tominaga et, al, 2012)

Due to the high degree of degradation of urban rivers, resulting from the release of sewage and garbage, the contamination of rainwater by washing surfaces and the plumbing itself, there is a detachment between the natural environment (river) and the city. Watercourses are now recognized as sewage channels (and no longer as rivers) and, consequently, any covering intervention is no longer recognized as impactful (negative impact). (Souza, 2013)

THE CONSEQUENCES OF FLOODS IN URBAN AREAS

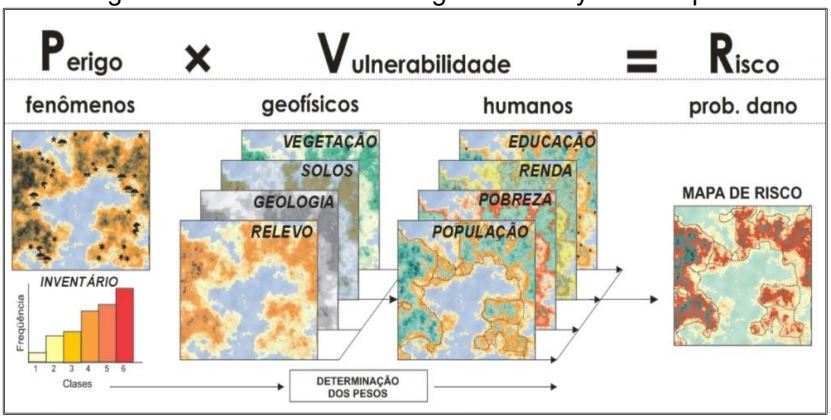
According to Law 14,750, of December 12, 2023 - "the result of adverse events, of natural origin or induced by human action, on ecosystems or vulnerable populations that causes significant human, material or environmental damage and consequent economic and social losses" (Brasil, 2023).

Social and environmental risks can be reduced and avoided through efficient management of land and environmental resources. Therefore, it is important to plan and execute measures to prevent or minimize disasters in conjunction with other issues and sectors, governmental or non-governmental segments, and society. The negligence on the part of the municipal management, in relation to the risk areas and the vulnerable population, brings losses that go beyond the local scope. (Coutinho et, al, 2015)

The risk defined and expressed by Freire (2014) is the probability of harmful consequences or expected losses (deaths, injuries, property, livelihoods, interruption of economic activity or environment, natural or anthropogenic hazards, and conditions of vulnerability, as in Figure 2).

Risk = hazards x vulnerability

Figure 2: Parameters involving a risk analysis - Adapted



(Source: natural disasters and geotechnologies: basic concepts INPE, 2008)

It can be said that, in addition to the natural conditions, the various anthropic interventions carried out in the physical environment have been decisive in the occurrence of disasters, floods and floods, especially urban expansion occurs with a set of actions that modify the original conditions of the hydrological cycle of a region: deforestation, exposure of land to erosion and consequent silting of watercourses. (Brazil, 2007)

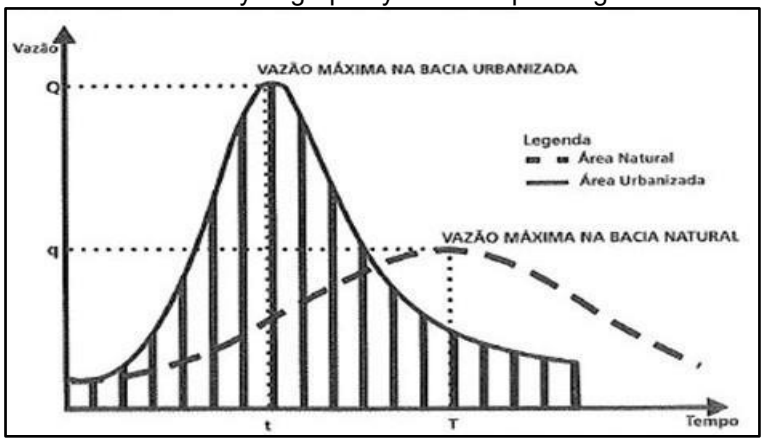
Deforestation and the disorderly occupation of slopes have caused a series of harmful effects, triggering several processes of disaster risks. Its effects combined with the problems of precarious housing, limited access and/or lack of basic infrastructure, and the

lack of knowledge of how to build on slopes have greatly contributed to the production of an environment of high vulnerability and risk. Disaster is not a one-off problem that is limited to the occurrence of rainfall, but the result of the interaction between a natural phenomenon and anthropic action on the environment. (Dutra, 2011)

Urbanization causes soil waterproofing, reducing infiltration, underground runoff and the concentration time of the basin. As a result, in a few minutes after a rain, the first signs of flooding appear. If there is no urban planning, it will be inevitable that numerous problems will arise for the population, as a result of the impacts of urbanization on the environment. (Bezerra et, al, 2016)

From the hydrological point of view, Figure 3 clearly shows the change caused in the maximum flow of a basin, a function of impermeabilization of the land as a result of urbanization. (Brazil, 2017)

Figure 3: Modification in the hydrograph by the waterproofing of the basin - Adapted



Source: Brazil, 2007

PREVENTIVE MEASURES IN RISK AREAS

The municipalities were delegated the tasks of identifying and mapping disaster risk areas; promote the inspection of disaster risk areas and prohibit new occupations in these areas; inspect buildings and risk areas and promote, when appropriate, preventive intervention and the evacuation of the population from high-risk areas or vulnerable buildings; keep the population informed about risk areas and the occurrence of extreme events, as well as about prevention and warning protocols and emergency actions in disaster circumstances. (Brazil, 2012).

The master plan is the basic instrument of the municipal policy of development and urban expansion, with the objective of ordering the development of the social functions of the city or municipality and ensuring the well-being of its inhabitants. The way space is used in cities can have severe impacts, and it is necessary to guide urban expansion, invest in

basic infrastructure, promote the conservation of open spaces and the protection of natural resources, as well as equity in the use of public space. (Coutinho et, al, 2015)

The master plan must include, among other information, the survey of risk areas based on a geotechnical map, urban drainage measures and guidelines for the land regularization of settlements. (Ganem, 2012)

The Urban Drainage Master Plan must provide for the mechanisms for managing urban infrastructure, related to the flow of rainwater, rivers and streams in urban areas. The proper planning of these mechanisms combined with the use and occupation of the appropriate land will contribute to improving sanitation conditions, environmental and urban quality, and reducing economic losses. (Bezerra, et, al, 2016)

Environmental education is another very important instrument. The population must be aware that the inadequate disposal of garbage and debris causes problems in the drainage system and in the flow of rivers, causing flooding, flooding and flooding. (Tominaga et, al, 2012)

Considering the severity of the events and their consequences and more frequent global trends, it is vital for the planning of prevention and response actions to structure information and surveillance systems on natural disasters, which contain the integrated action of sectors such as Health, Environment and Civil Defense, in addition to the participation of civil society and local communities that suffer more directly from the effects of disasters. (Sobral et, al, 2010)

MATERIALS AND METHODS

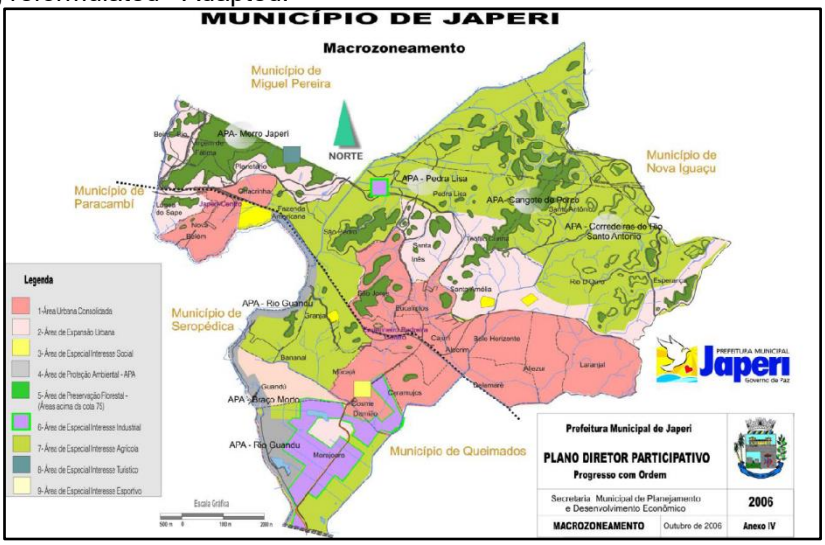
CHARACTERIZATION OF THE STUDY AREA

Japeri is a municipality in the Metropolitan Region of Rio de Janeiro that makes up the municipalities of the Baixada Fluminense of the State, located at the geographic coordinates 22º38'35" south latitude and 43º39'12" west longitude, at 30 meters of altitude it occupies an area of 82,954km², as in Figure 4. The population verified in the 2013 count was 98,393 inhabitants, IBGE estimate, limited by the municipalities of Paracambi, Seropédica, Queimados, Miguel Pereira and Nova Iguaçu. Bathed by the rivers Guandu, Santana, Rio dos Poços, Rio d'Ouro, Santo Antônio, Ribeirão das Lages and São Pedro, it is cut by the RJ-125, and called "Estrada Miguel Pereira" and RJ 093 called "Estrada Ary Schiavo". (Plancon, 2015)

The rainfall of the municipality on December 6, 2013 reached 90 mm according to the rainfall devices installed by the National Center for Monitoring and Alerts of Natural Disasters (Cemaden) and according to data from INEA/SEA/State Government, in the

points of flooding and flooding pointed out by the Municipal Contingency Plan prepared and reviewed every year by SEMPDEC. Historical data reported by SEMPDEC pointed to rainfall indices that far exceeded the drainage capacity of water bodies and the urban drainage system, so the vast majority of the affected population was related to urban areas and urban expansion, according to the Municipal Macrozoning, positioned in riverbank areas and adjacent areas. (SEMPDEC, 2013)

Figure 4: Political Division of the Municipality of Japeri - Participatory Master Plan, 2006. The Municipality's Master Plan is being reformulated - Adapted.



Source: SEMPDEC Collection

STUDY TOOLS

For the elaboration of this work, research was carried out with municipal public agencies on historical data, literature review, based on bibliographic references researched in books, websites, articles, theses, laws and reliable documents pertinent to the theme of the subject, from which the data were collected for analysis.

After the data surveys , it was found that there are points of flooding and flooding in the municipality, especially in the neighborhoods called critical points considered by SEMPDEC, Figures 5 and 6, that by determination of Law 12.608 - National Policy for Civil Protection and Defense, Contingency Plans must be prepared according to the threats, respectively classified and codified in Cobrade.

The rainfall that occurred in the municipality in 2013, caused the municipal decree of an Emergency Situation, according to Brasil (2022), with the State and Federal public agencies according to the Disaster Information Form (FIDE) - 2013, in the Alecrim neighborhood located in the district of Engenheiro Pedreira - Japeri - RJ, had the highest rate of flooding and flooding between the months of November and April causing inconvenience to the citizens of the region, has been affected according to the historical

reports of SEMPDEC since 2009 due to the water bodies: Teófilo Cunha Channel with an extension of 3 km, it is a tributary of the rivers: Santo Antônio River, D'Ouro River, Poços River, contributors to the Guandu River Sub-basin, an important source area of the Metropolitan Region of Rio de Janeiro, belonging to the Sepetiba Hydrographic Basin. (SEMPDEC, 2013)

However, the importance of the need to carry out preventive works to reduce and/or minimize losses and damages caused by erosive processes, landslides, floods, floods, droughts and other disasters is emphasized. And also, to analyze the vulnerability of the population, identifying the groups most affected by these risks (effects of threats on exposed social groups).

The knowledge of the territorial reality through the mapping of risk areas is strategic information, of paramount importance for the formulation of public policies, the management and planning of the territory and for the improvement of the quality of life of the population. (Júnior, 2012)

On the other hand, it is also emphasized the need to carry out detailed studies, integrated planning with intense participation of the community in the planning and execution of flood forecasting, prevention and control measures, as well-managed watersheds preserve wild flora and fauna, ensure biodiversity, facilitate pest control and reduce floods and droughts or droughts. (Saueressig, 2012)

Figure 5: Flood flooding area in the area demarcated by SEMPDEC after the 2013 rains, adapted by Engineer Bruna T. Carvalho – 2017.

Caption:
- Theophilus Canal Cunha – Area of 1
Rio D'Ouro – Area of 2
Santo Antônio River – Area of 3
Risk Region 4 – Floods and flooding
Risk Region 2 – Floods and floods

CASE STUDY

Figure 6: Irregular constructions on the banks of the Teófilo Cunha Canal in the Municipality of Japeri – RJ, in 2013.

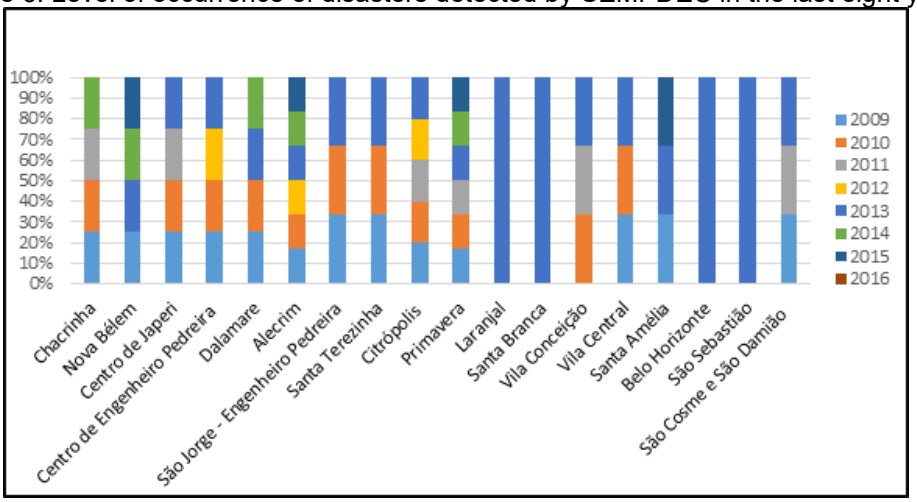
Photos: SEMPDEC Collection

The case study in this research was developed in the municipality of Japeri in the State of Rio de Janeiro, in order to combine qualitative or quantitative evidence and seeking to address propositions for understanding steps such as examination of evidence, categorization, classification in tables or charts, testing and recombination of evidence, according to Yin (2015), to understand how the event of heavy rains in Japeri in 2013 took place and its consequences.

According to the graph prepared by the authors, in Figure 6, it is verified that the Alecrim neighborhood has the highest rates of occurrences of flooding, flooding and flooding in the last eight years, this demonstrates that the public authorities have not intervened in the improvements of municipal infrastructure for disaster prevention.

Neighborhoods with occurrence of flooding and flooding

Figure 6: Level of occurrence of disasters detected by SEMPDEC in the last eight years



Source: graph prepared by the authors themselves es- 2024

The amount of garbage accumulated on the banks or disposed of incorrectly by the population ends up being dragged by the rains into the Teófilo Cunha Canal, as shown in Figure 7, hindering the natural flow, causing clogging of the stretches, under car crossing bridges, because it has an insufficient section. Between downstream and upstream there is

a part that is channeled where it suffers the bottleneck of the channel as a result of the decrease in flow.

Figure 1: Photo 1 - Overflow of the Teófilo Cunha Canal - Flood - 2009, Photo 2 - The removal of solid waste on the access bridge - 2009, Photo 3 and 4 - Comparison of the emergency situation at the time of the disaster and the current situation of the canal - 2017, Photo 5 and 6 - Flooding of the canal on Himalaya street - 2013 and current situation of the canal - 2017 of the municipality of Japeri - Engenheiro Pedreira - RJ.

Source: Photos from the SEMPDEC collection.

Siltation by sediments altered the flow capacity and increased the rate of soil erosion in the watershed, which increased the risk of water overflows. The disorderly occupation of the banks of the canal bed promoted disorganization in the use of geographic space, as a result of the devastation of riparian forests.

The drainage and sewage system was deficient, the municipality in turn did not have the proper care with maintenance and conservation, the Alecrim neighborhood was characterized by a rapid and population growth, without basic sanitation with a low-income community, the paving of streets and sidewalks caused soil waterproofing, increasing, the speed of drainage, The rainfall retention time decreased, after the rains the disinfestation system was carried out on an emergency basis for the control of infectious diseases, with the aim of mitigating a possible secondary disaster.

FINAL CONSIDERATIONS

From the data obtained by the case study, it was found that there was, already in 2013, the need for greater public and private investments for the education of the population at the time of disposal of their garbage, which based on the new norm of the Ministry of the Environment – Integrated Management of Solid Waste, urban infrastructure works throughout the Teófilo Canal Cunha, the main water receptacle of Japeri, it is verified,

in order to minimize disasters, the drainage of the canal in the most critical periods of the year, the construction of a rainwater and sewage network of the local system, in collaboration with the Environmental Sanitation Plan in which it portrayed the non-existence of the municipal drainage system.

The city of Japeri should control the disorderly occupation of the land, especially in areas established by the macrozoning plan where it establishes areas that must be occupied, so the city hall can better manage the form of occupation of its land avoiding settlements in risk areas; where the settlements pointed out by SEMPDEC, together with the Municipal Participatory Master Plan as risk areas, should be assisted with the creation of mechanisms to raise awareness among the population so that there is no further expansion of these areas and it is also necessary to remove the constructions that are eminently in danger of collapsing, directing, since that time, the population of risk areas to housing programs of social interest,

In addition to promoting the diversity of uses and contributing to the generation of new areas of employment and income, which would protect threatened families from the risk area in which they lived. Aiming, in the nature of protection and civil defense, the prevention and mitigation of risk in the most vulnerable areas, to the occurrence of disasters, which, like the one that occurred in 2013, cause loss of material goods and lives.

The Civil Defense today already has the Alert and Alarm system through *software,* in which messages are sent to the population through SMS, warning of a possible emergency situation , with technological advances in the area of civil defense, we have already installed four automatic rain gauges and a hydrological station installed in risk areas, with the objective of expanding the monitoring network and improving the forecast of natural disasters and reduce socioeconomic and environmental damage to its population.

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