

# CIVIL SOCIETY AND PUBLIC POLICIES FOR NATURAL DISASTERS IN BRAZIL: THE CASE OF FLOODING OF SÃO LUIZ DO PARAITINGA IN 2010

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**Keywords:** government actions, socio disaster, prevention, risk, vulnerability

## Abstract

This study aims to analyze and evaluate the strategies used by Brazil in protecting the impacts from natural events on civil society and the implementation of public policies of natural disasters floods. To assist in the understanding of these strategies, was adopted as a case study the municipality of São Luiz do Paraitinga (SP) which, in 2010, was hit by a major flood due to heavy rains that caused the river Paraitinga overflow. The theme presented is multidisciplinary, it is located on the border between the Human Sciences (Sociology, Politics and Geography Science), Social Sciences (Urban Planning and Regional Law and Demography), and Exact Sciences and Earth (Earth Sciences) which methodological approach is plural, based on the literature, documentary research and in field with the use of questionnaires and interviews.

## 1. INTRODUCTION

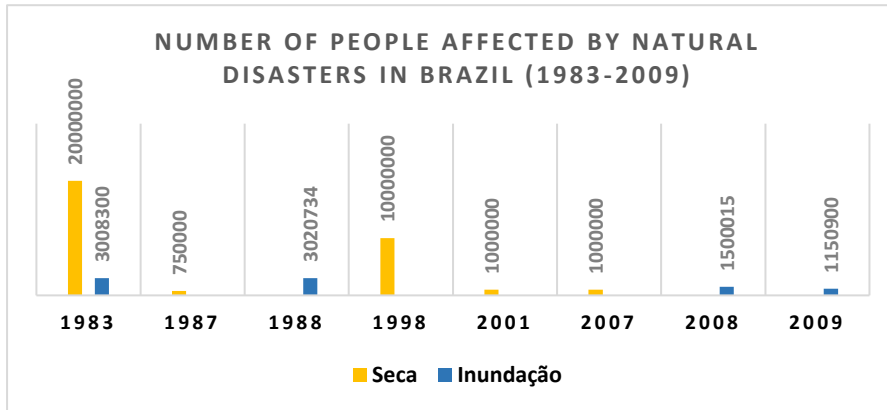
In the last thirty years, there was, in Brazil, the perception that extreme natural events, due to climatic, hydrological and geological phenomena intensified and caused many natural disasters, especially the intense droughts, floods and mass movements, resulting in the high number of homeless and deaths, diseases (leptospirosis, psychological trauma, etc.), material and immaterial losses, destruction of public infrastructure, economic losses, social and cultural, etc.

Studies by Toro et al. (2014) to the World Bank, on financial losses and tax impacts of four natural disasters in Brazil (the floods in Santa Catarina, Pernambuco and Alagoas, and landslides in Rio de Janeiro), occurred between the years 2008 and 2011, found that the average annual loss (WFP) in the country was 3.9 billion dollars.

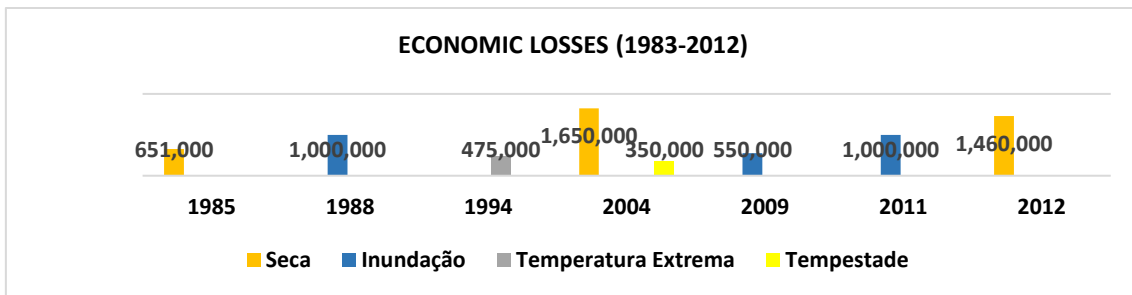
According to data from the *International Disaster Database* - EM-DAT (2011), in the period between 1980-2010, the disasters that most hit Brazil were droughts and floods. In these thirty years concerning the research, there were in the country 146 natural events, 4,948 deaths and 47,984,677 people was affected. Over the years, the economic losses reached a total of US \$ 9,226,170.00.

See below the charts 1 and 2, with the data of the number of people affected and the economic losses in Brazil in the period 1980-2012, according to EM-DAT data.

**Graph 1 – Number of people affected by natural disasters in Brazil (1983-2009)**



**Graph 2 – Economic losses occurred in Brazil due to natural disasters (1983 – 2012)**



## 2. THE NATURAL DISASTERS IN BRAZIL BY GEOGRAPHIC REGIONS

The most affected Brazilian states by natural disasters are: Sao Paulo (floods, fires and landslides), Rio de Janeiro (floods and landslides), Minas Gerais (floods, landslides and droughts), Espírito Santo (floods, landslides, marine erosion) Santa Catarina (floods, hail, tornadoes, cyclones and high wind speed), Paraná (hail, floods, frost), Bahia (droughts), Pernambuco (floods and droughts), Alagoas (floods and droughts), Sergipe and Paraíba (droughts), Ceará (drought and marine erosion), Acre (floods) and Amazonas (floods and droughts).

In the year 2012, according to the *Brazilian Yearbook Natural Data Disaster 2012*, they were officially reported the occurrence of 376 disasters in Brazil, and 93 caused deaths and affected 16,977,614 people. Were hit 3,781 municipalities, of which 65.06% for drought/want of rain. Of this total of municipalities affected, 28 are located in the Central West region, 1,783 in the Northeast, 149 located in the Northern region, 775 were in the Southeast region and 1,046 in the South, as stated in table 1.

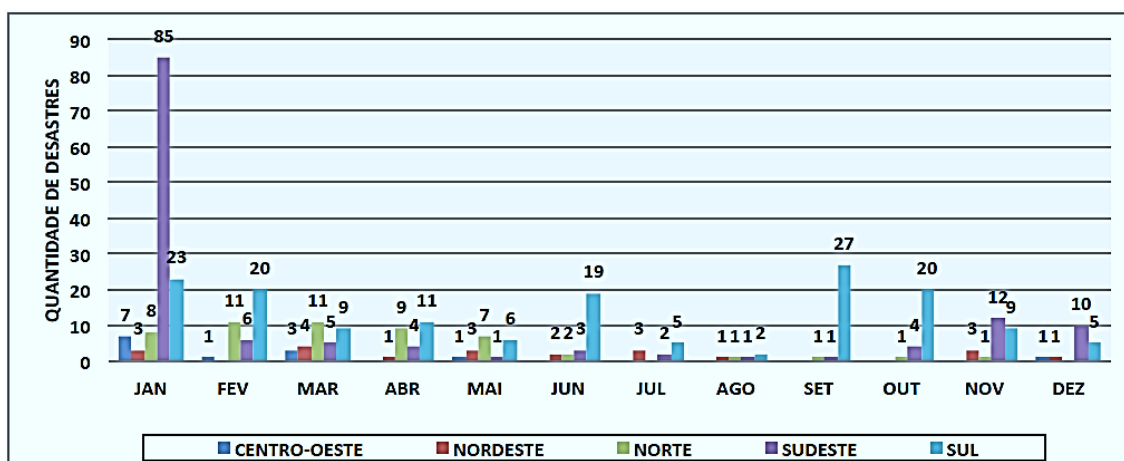
**Table 1 – Number of affected municipalities, by micro-areas, in Brazil (2012)**

REGIÃO	Número de Municípios Afetados
Centro-Oeste	28
Nordeste	1.783
Norte	149
Sudeste	775
Sul	1.046
<b>TOTAL</b>	<b>3.781</b>

When analyzing in Graph 3 below the different types of disasters in Brazil, as the monthly occurrence and affected regions, some peculiarities are observed:

- The months of highest occurrence of disasters in the North is between January and May;
- The peak of disasters in the Northeast occurs in the months of January, March, April, May, June, July and November;
- The Central West region recorded an increase in natural disasters between January and March;
- The South and Southeast regions have natural disasters almost every month of the year.

**Graph 3 - Monthly occurrence of natural disasters by region (2012)**



It is important to explain that by 2012, Brazil did not adopt the natural disaster classification as EM-DAT, which hampered the framework of certain events such as disasters by international bodies.

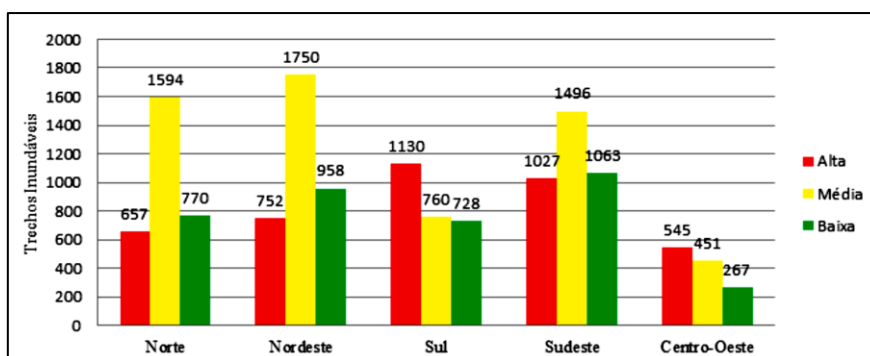
On the other hand, EM-DAT data in relation to Brazil is still incomplete, since they are only recorded as disasters those which are considered in the requirements under Brazilian laws of National Protection and Civil Defense Policy, disregarding the sum of "small events".

### 3. THE FLOODS IN BRAZIL

The most common type of natural disaster that causes great inconvenience and problems in Brazil are floods caused by prolonged rains, which have increased considerably in recent years, causing loss of life and major financial, economic, environmental, social and cultural damage, especially in urban areas, as occurred in the city of São Luiz do Paraitinga, at the beginning of 2010, when the city, which has all its historic center listed by the Institute of historical and Artistic Heritage - IPHAN, at the federal level, and by the Council for the Defense of Historical, Archaeological, Artistic and Touristic national heritage, in the State of São Paulo, was almost totally destroyed by a flood.

The *Atlas de Vulnerabilidade a Inunções* (Atlas of Vulnerability to Flood), published by the National Agency of Waters in 2014, notes that most of the floods in Brazil are hydrologic and fluvial nature, and identified 13,948 stretches of river flooding in 2780 watercourses in the country, with 4,111 sections, i.e. 30% of that total were considered highly vulnerable to flooding. The Midwest and South region had the highest proportion of river stretches with high vulnerability to floods, while in the North and Northeast were identified 78% of the stretches medium or low vulnerability to flooding. See the representation of these data in Graph 4.

**Graph 4 – Number of stretches vulnerable to floods in Brazil, by region**



### 4. THE PUBLIC POLICIES AND TOOLS TO FACE THE NATURAL DISASTERS IN BRAZIL

In matters relating to natural disasters, there were (and still are) in Brazil a certain indifference on the part of public authorities on issues relating to negative consequences of natural disasters. Persisted in the country the idea that these events were natural and therefore cannot be controlled.

This false impression was created and developed because the government and society did not consider floods, landslides and droughts in the disaster category, as they were "normal" or "will of God". On the other hand, the people affected due to their social and economic conditions, were invisible to the clear majority of society, and they did not participate in decision making, and had almost no influence with the government.

In the field of public policy, these were aimed at the welfare, mainly to meet local politicians, who used natural disasters, specifically in the case of droughts in the Northeast, as power tool and maintenance of political bargaining.

However, since the nineties, when Brazil hosted the United Nations Conference on Environment and Development - Rio 92 and the Convention United Nations Framework on Climate Change (1992), the Kyoto Protocol (1997) and after participation in various conferences organized by the United Nations on disaster reduction, including: Resolution No. 42/169 - which established the International Decade for Natural disaster reduction (DIRDN 1990-1999), the Strategy and Action Plan Yokohama for World Safer (1994), Hyogo Framework for Action (2005) and more recently Marco Sendai (2015), the country began to adapt to international guidelines on natural disasters, adopting the paradigm of prevention and mitigation of disasters.

Moreover, the extreme weather events have become frequent and increasing in the country, and caused several larger natural disasters, with large numbers of human losses and economic, social and environmental damage, which forced the authorities to move from a position inert to the negative effects caused by natural disasters in Brazil for a proactive positioning in search of efficient, effective and quick solutions, rethinking the process of public policy.

Furthermore, programs, policies and actions have joined several other targeted policies for land use planning, urban development, health, the environment, climate change, water resources, infrastructure, education science and technology, and promoting sustainable development. Consequently, this set of policies and actions acquire a plural sectorial and plural diversified character as to implement the participation of various degrees of political power and different government agencies.

In Brazil, the Federal Constitution of 1988 provides in art. 21, XVIII and art. 22, XXVIII, that the actions, programs and policies to natural disasters are the exclusive competence of the Union. However, by means of Law No. 12,608 / 2012, which established the National Policy for the Protection and Civil Defense, the regulatory framework of disasters in the country, the Union authorizes and assigns responsibilities to Member States, the Federal District and the municipalities to implement, coordinate and institute policies and actions related to disasters, as well as participate in various ministries, state departments and local and other subsidiary bodies to Brazilian Administration.

In the administrative and governmental structure of federal, state and local governments, they were created multiple cores to assess issues relating to natural disasters and catastrophes, to implement programs that will lead to effective action to identify and quantify the individual, social and economic risk, evaluate vulnerability and risk to which humans are exposed to disasters, and thus develop specific public policies for the prevention and mitigation of natural disasters, among which we can mention:

- a) National Policy on Protection and Civil Defense, established by Law No. 12,608 / 2012, which lays on the National System for the Protection and Civil Defense, the National Board of Protection and Civil Defense: it authorizes the creation of the information system and monitors disasters, give the guidelines for the prevention, mitigation, preparedness, response, recovery and mitigation of the effects of disasters, establishing monitoring, identification and assessment of threats, susceptibility and vulnerability to disasters in the States, the Municipalities and the District Federal, and their powers to act in cases related to disasters and the role of civil defense;
- b) Law No. 12.340 / 2010, amended by Law No. 12.983, of June 2, 2014, which provides for the transfer of federal funds to the organs and entities of the States, Federal District and Municipalities for the implementation of preventive actions in areas of disaster risk and response actions, recovery of areas affected by disasters, the

transfer of funds through the National Fund for disaster Public, Civil Protection and Defense to the states and municipalities affected by disasters;

- c) Program 2040 - National Plan for Risk Management and Answers to Disaster;
- d) Decree No. 7,257 / 2010, which provides for the National Civil Defense System, recognition of emergency and a state of emergency and the restoration of essential services and reconstruction of areas hit by disasters;
- e) National Policy on Climate Change, established by Law No. 12.187 / 2009, which provides for the adoption of initiatives and measures to reduce the vulnerability of natural and human systems face to the current and expected effects of climate change (art. 2, I) and conceptualizes the vulnerability as the degree of susceptibility of a system, due to its sensitivity, adaptability, and the character, magnitude and rate of change and climate variation to which it is exposed, dealing with the adverse effects of climate change , including climate variability and extreme events (art. 2, X); and
- f) Federal Decree of September 26, 2005, which established the National Week for Disaster Reduction.

Also are part of those policies of the Union, the National Center for Risks and Disaster Management (CENAD), the Integrated Disaster Information system (S2ID), the National Center for Monitoring and Alerts Disaster (CEMADEN), the preparation of the National Register of Municipalities with areas susceptible to the occurrence of major impact of landslides, sudden floods and other geological or hydrological processes, the National Card Civil Defense, and other programs and actions developed by the Ministry of Cities, the National Water Agency and the Ministry of Environment. So, what is observed is that the Union, through the Executive Branch, will be responsible for coordinating and organizing the policies, programs and actions to risks and natural disasters in Brazil. At the state level, the main policies developed by the States aimed to risks and natural disasters are: the State Plan for the Protection and Civil Defense, the mapping of risk areas, geological, hydrological and meteorological monitoring, identification of river basin with disaster risk, the guidelines and the organization of the State Civil Defense, and assistance to municipalities in the preparation of Contingency Plans Protection and Municipal Civil Defense.

Regarding municipalities, the main policies for risks and natural disasters are: preparation of maps of areas at risk of landslides, floods, erosion, mass landslides and other geological or hydrological processes; the development of Contingency and Protection Plan and Municipal Civil Defense; institution, structure and organization of civil defense in the municipalities; deployment of services and works for disaster risk reduction; monitoring actions, control and surveillance in susceptible areas of risks of natural disasters; preparation of geotechnical letter and the establishment of urban planning guidelines (Master Plan); the programs and support actions and services to people in the areas of risk and those affected in the event of natural disasters.

## **5. THE FLOOD OF SÃO LUIZ DO PARAITINGA (SP): THE EXPERIENCE OF A NATURAL DISASTER**

The city of São Luiz do Paraitinga, recognized as historical, cultural and environmental heritage of the State of São Paulo, at the beginning of 2010, suffered one of the worst natural disasters in the country, as a result of strong and severe rains that fell in the region and which led to the overflow of the Paraitinga River and the great flood.

The first flood of the city, said the Exit reports (1973), took place in January 1863 (or 1864). Other floods occurred in the years 1882, 1964, 1969, 1995 and 2006. Therefore, the city has always lived with the flooding of the Paraitinga River that, as testimonials of residents, usually reached levels to the gates of the City Market, and there was no why to worry about more flooding as the river waters did not exceed the marks of 2m to 4m.

However, at the end of January 1, Paraitinga waters overflowed without stopping, rising until it reached the square of the Mather Church Sao Luiz de Toloza and all the streets around the historic center, reaching the level of 12m, when the city was completely flooded, which led to the collapse of the Mother Church, the Chapel of Mercy (built over 200 years) and old houses and mansions from the mid-eighteenth century, as can be seen in Figure 1.

**Figure 1 - Flood in the historic center and the surroundings of Sao Luiz do Paraitinga (SP), 2010**



Moreover, were submerged by the waters, the city's Forum, the Natural Persons Registry, the Real Estate Registry, Securities and Corporate Documents, and properties of the rural area situated by the river.

In the analysis of the factors that contributed to the flooding of the city, should be considered: the form of city population, geography, terrain, climate and spatial occupation of the city, which makes São Luiz do Paraitinga a city with a high degree of environmental and social vulnerability. These vulnerabilities were also potentiated by economic activities in the region, as social development, environmental degradation, destruction of riparian vegetation, the occupation of the riverbed, associated with lack of effective policies for disasters and climate changes the past years.

All these elements, added to the heavy rainfall in the month of December when the rain gauges recorded a cumulative total of 1012,2 mm and the precipitation on January 1, measured 200,2mm of rain, culminated in the natural disaster of Sao Luiz do Paraitinga. The meteorologists and technicians Climate Weather and Research Forecast Center INPE - CPTEC, predicted that there would be intense rainfall "between the southern state of Rio de Janeiro and the Paraíba Valley in São Paulo and that there would be problems, but they could not determine which river could overflow.

All these data lead to the conclusion that it was foreseeable the flood in São Luiz do Paraitinga. In addition, although it is not possible to avoid it, at least could have their

effects mitigated if there were not a delaying political culture in relation to prevention and preparedness to natural disasters.

In the assessment of damage and losses, the damages in the municipality concerning infrastructure, trade, services, agriculture, livestock and tourism, exceeded R\$141 million, which is equivalent to seven times the annual budget of the municipality, which in the year 2009 was R \$ 20 million, according to annual balance data posted on the City Hall site.

IPHAN estimated that, for the restoration of the architectural ensemble of the city, it would take approximately R\$10 million.

However, not all these amounts consider the personal, emotional and psychological losses of the affected. As several interviews conducted for the study, the two major losses that the villagers had been were the destruction of the Mother Church of São Luiz de Toloza and the view of the city completely destroyed. In addition, they mentioned the loss of photographs and other memories that cannot be replaced, and pointed out that after the disaster, about fifty older residents came to die, and they attribute this fact to the sadness of these old people for what happened to the city.

Another important fact in relation to the flood of São Luiz do Paraitinga was the absence of deaths during the disaster. According to those affected, this did not happen because companies and rafting instructors of the city, using their equipment to practice sports (boats, boats and ropes), made the rescue of the residents of the city and the countryside who were stranded as we can see in Figure 2.

**Figure 2 - Rafting instructors rescuing people**



After the waters recede, the cleaning and rebuilding were initiated, with the participation of several professionals from different areas, different government agencies, universities and the general population, to provide technical and scientific support in the recovery and reconstruction process. In addition, it created the Sustainable Reconstruction Center of São Luiz do Paraitinga - the CERESTA, which was an integrated work center, in which were several government agencies (Civil Defense, Housing and Urban Development Company, Department of Water and electricity, CONDEPHAAT, IPHAN, etc.), universities (UNESP, USP) and other organizations involved in the reconstruction of the city. Effective and joint participation of the population, technical and administrative organs of government and universities, sped up the process of reconstruction and recovery of the city and contributed to that after five years after the flood, São Luiz do Paraitinga is completely rebuilt as set in Figure 3.



**Figure 3 - Overview of the city of São Luiz do Paraitinga in January 6, 2015.**



## **6. CONCLUSIONS**

The most recurrent natural disasters in Brazil are droughts and floods, and with regard to flooding, these happen in all regions of the country; however, they have different characteristics in each region.

Moreover, one observes that extreme events, combined with the inefficiency of environmental public policy, urban planning, economic and social, leads to the understanding that natural disasters should be a natural, political, social and cultural phenomenon.

In analyzing the flood of São Luiz do Paraitinga, it was possible to explain the circumstances in which the disaster occurs along certain political, economic and social practices, such as the lack of structure of the municipal civil defense, urbanization policies and soil usage, and lack of environmental management. These elements together with the geological, hydrological and climatic characteristics cooperate to increase the environmental vulnerability of the municipality.

In contrast, the research showed that it is possible to a city emerge and rebuild in the aftermath of a natural disaster, if there is oversight of government, transparency in actions taken, responsibility shared among the various spheres of government, society participation in decision-making processes of reconstruction, operation of local volunteers in prevention, preparedness and disaster response, as well as the participation of technicians and universities.

Therefore, a natural disaster, while it exposes vulnerabilities, omissions of public authorities and the deficiency of public policies, it is also an opportunity for these policies to be re-evaluated and are set new administrative and political paradigms to promote and implement actions to prevent natural disasters in Brazil.

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