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RISK ANALYSIS AND DISASTER MANAGEMENT: A COMPARATIVE STUDY BETWEEN BRAZILIAN AND COLOMBIAN PUBLIC POLICIES

Análise de risco e gerenciamento de desastres: estudo comparativo entre as políticas públicas brasileira e colombiana

Nathani Eduarda de Andrades Feldens[1], Giuliano Crauss Daronco[2]
1 Student of the Graduate Program in Civil and Environmental Engineering, University of Passo Fundo, Brazil
2 Professor at the Northwestern Regional University of Rio Grande do Sul, Brazil
E-mail: neafeldens@gmail.com, giuliano.daronco@unijui.edu.br

ABSTRACT

In the last decades Natural Disasters are an increasingly present theme in the daily lives of the population. They have been occurring more frequently in Brazil in recent years, and are increasing in intensity and frequency, causing deaths and material damage. The geographical position of Colombia, the dynamics of nature and the way Colombian communities have occupied their ecosystems, determine that more and more disasters are occurring in the country. In this paper, a comparison between Brazilian and Colombian public policies on disaster management is developed, indicating the items of greater or lesser relevance in the actions of prevention, preparedness, response and reconstruction.

Keywords: Prevention. Natural Disasters. Brazil. Colombia. Reconstruction. SDG 11.

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ANÁLISE DE RISCO E GERENCIAMENTO DE DESASTRES: ESTUDO COMPARATIVO ENTRE AS POLÍTICAS PÚBLICAS BRASILEIRA E COLOMBIANA

Risk Analysis and Disaster Management: A Comparative Study Between Brazilian and Colombian Public Policies

Nathani Eduarda de Andrades Feldens[1], Giuliano Crauss Daronco[2]
1 Student of the Graduate Program in Civil and Environmental Engineering, University of Passo Fundo, Brazil
2 Professor at the Northwestern Regional University of Rio Grande do Sul, Brazil
E-mail: neafeldens@gmail.com, giuliano.daronco@unijui.edu.br

RESUMO

Nas últimas décadas os Desastres Naturais constituem um tema cada vez mais presente no cotidiano das populações. Eles têm ocorrido com mais frequência no Brasil nos últimos anos, além disto estão aumentando de intensidade e periodicidade, provocando óbitos e danos materiais. A posição geográfica da Colômbia, a dinâmica da natureza e a maneira como as comunidades colombianas ocuparam seus ecossistemas, determinam que cada vez se apresentem mais desastres no país. Neste trabalho desenvolveu-se uma comparação entre as políticas públicas brasileira e colombiana, relativas ao gerenciamento de desastres, indicando os itens de maior ou menor relevância nas ações de prevenção, preparação, resposta e reconstrução.
Palavras-chave: Prevenção. Desastres Naturais. Brasil. Colômbia. Reconstrução.ODS 11.

INTRODUCTION

In the last decades, Natural Disasters are an increasingly present theme in the daily lives of the populations. There is a considerable increase not only in frequency and intensity, but also in the impacts generated, with increasingly intense damage and losses. (CEPED UFSC, 2013a, p. 3)

Although there are records that prove events from the time of colonial Brazil, according to data surveyed by CEPED UFSC, in the last two decades, the number of disasters recorded is as large as, if not larger, than that recorded in almost five hundred years of history. (SOUZA et al., 2011, p.376)

> "[...] the organization of information related to disasters in Brazil, made available in the PNGR database, provides adequate tools to the local reality for effective actions in risk reduction, as well as directs the political and technical decisions of risk management. However, it is necessary to create a risk culture, still non-existent in the country, so that citizens are prepared to participate in decision making. This measure becomes feasible through access to quality information and the exchange of views between the main social agents, in the search for participation and involvement of all sectors of society. " (CEPED UFSC, 2013a, p.122)

Like many countries in Latin America, Colombia faces major challenges that seriously threaten its development. Factors such as population displacement from rural to urban areas, environmental degradation, and accelerated land use change amplify these challenges. These socio-economic conditions, together with the country's propensity for natural disasters such as earthquakes, floods and landslides, intensified by human actions and changing climate conditions, confirm a continuous process of risk building and accumulation. The materialization of these risks in disasters, affect the country's development, besides hindering and delaying its social welfare goals brought by the Government. (MUNDIAL et al., 2012).

After the occurrence of the La Niña phenomenon (2010-2011), the Colombian Government in partnership with the World Bank and the National Planning Department, developed a comprehensive evaluation of risk management policies, likewise short and long-term strategic recommendations were created, which contribute to reduce the population and economic impact on the occurrence of disasters. (MUNDIAL et al., 2012).

In the search for a more suitable future for human life, the 2030 Agenda was developed, a collaborative work between 169 countries that lists the sustainable development goals (SDGs) for the world until 2030. In all, there are 17 goals, three of which address the topic of disasters, being the SDG 1 - Poverty Eradication, SDG 11 - Sustainable Cities and Communities, and SDG 13 - Action Against Global Climate Change. Among these, SDG 11 has goal 11.5 closely related to the subject addressed in this study, which is "By 2030, significantly reduce the number of deaths and people affected by disasters and substantially reduce the direct economic losses caused by disasters relative to global gross domestic product, including water-related disasters, with a focus on protecting the poor and people in vulnerable situations" (UNDRR, 2021).

Thus, in this paper, the result of an undergraduate monograph, a comparison was developed between Brazilian and Colombian public policies on disaster management, indicating the items of greater or lesser relevance in the actions of prevention, preparedness, response, and reconstruction.

1 LITERATURE REVIEW

1.1 Brazilian natural disaster (risk) management

Brazil is the largest country in South America, occupying 47% of the South American territory, with a total area of 8,515,767.049 km² and a population of 190,732,694 people, bounded by the Atlantic Ocean to the east, it has a coastline of 7,491 km. It is divided into 27 Federative Units, 26 states and the Federal District, and borders all other South American countries except Chile and Ecuador. (IBGE, n.d.; CIA, n.d.)

The results of the Demographic Census of 1940 revealed that only 31.2% of the Brazilian population at the time, which was 41,236,315 inhabitants, lived in urban areas. In the following decades this percentage increased systematically, with a growing tendency toward urbanization, but it was only in 1970 that an urban population greater than the rural population (55.9%) was recorded for the country as a whole. This high migration causes an unequal urbanization, and today they invariably present an absolute picture of poverty, provoking in addition a

worsening in the socioeconomic (growth, income, unemployment and violence) and urbanistic (urban growth and increase of slums) indices. (BRITO; HORTA; AMARAL, 2011; FERREIRA, 2000)

> "The country's urbanization process, which accelerated intensely as of the 1950s, was not accompanied by robust urban development policies to provide housing for the entire population. Unable to purchase a home in the legal market, important portions of the poorest population occupied those lands not available in the real estate market, due to restrictions on legal occupation, either because of the potential risk situation or because of the need for environmental preservation. Thus, precarious settlements were implanted and expanded in the cities, occupying areas with high slopes and river banks, resulting in urban plots of extreme vulnerability to landslides, floods and mudslides". (BERTONE AND MARINHO, 2013, p.7)

Natural disasters have occurred more frequently in Brazil in recent years. The most recurrent events recorded in the country are those resulting from floods, mudslides, landslides (mass movement), droughts and windstorms. (BERTONE; MARINHO, 2013, p.4)

> "These disasters that influence human activities have historically been intensifying due to the mismanagement of watersheds, especially by disorganized urbanization. In addition, global warming increases the frequency and intensity of rainfall events, leading to increased incidence of natural disasters." (KOBIYAMA et al., 2003 apud KOBIYAMA et al., 2004)

In Brazil, the occurrence and intensity of natural disasters depend more on the degree of vulnerability of the affected communities than on the magnitude of the adverse events. (BERTONE; MARINHO, 2013). But, for reasons not yet pacified, natural disasters are increasing in intensity and frequency, causing deaths and material damage. However, Brazilian society is unprepared to meet the public needs arising from its effects or give a quick response of reconstruction and assistance to victims. (SÉGUIN, 2013)

In order to meet these public needs, from the joint dialogue between ministries and the federal, state and municipal governments, in addition to several research institutions, the National Plan for Risk Management and Disaster Response was prepared in the year 2012, coordinated by the Civil House. The Plan disclosed investments of 18.8 billion between the years 2012 to 2014. (CEMADEN, n.d.; MP, 2012)

For the organized action of the entities, the axes were built that focused government action on the prevention of natural disasters: mapping of risk areas, structuring of a monitoring and warning system, structuring works and, in the medium term, strengthening of civil defense agencies and support for better urban planning capable of avoiding the occupation of risk areas. (CEMADEN, n.d.). The Plan then distributed into four major axes (Figure 1), aimed at addressing the main crises in each state.

Figure 1. Stages of action of the National Plan for Risk Management and Disaster Response

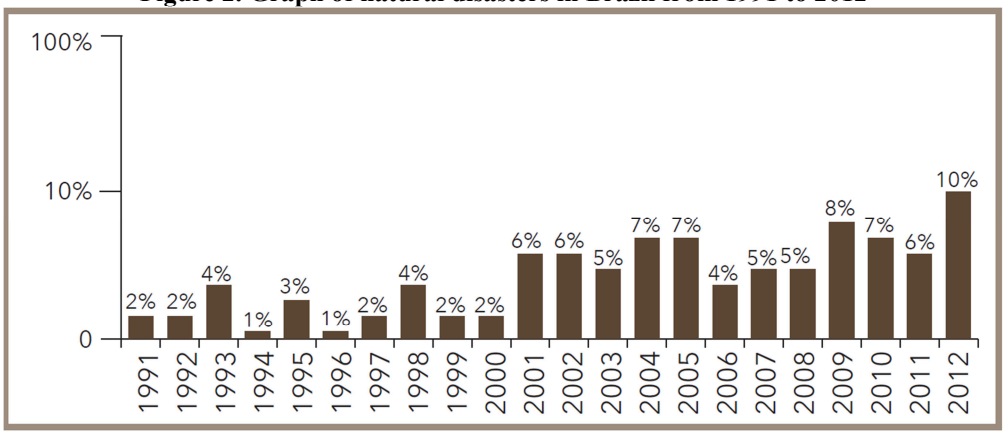
Source: National Plan for Risk Management and Disaster Response (2012)

> "In addition to construction work, the strengthening of local civil protection agencies has been the focus of the work. Communities will only be resilient if they are well oriented and prepared, especially in a country consisting of 5,655 municipalities. It is essential, the participation of local governments, the training and capacity building of the necessary human resources and providing the means for them to work together with the most vulnerable populations. "(MI, 2012, p.2)

Disasters will keep happening, but the population needs to be informed and prepared to face them. The population needs to count on a strong and structured local civil protection body and, especially, to participate in building the resilience policy of their city. (IM, 2012, p.2)

According to the Brazilian Atlas of Natural Disasters, the increase in the number of natural disasters occurred in the 2000s, and rose even more from 2010 to 2012 (Figure 2). According to CEPED UFSC (2013a, p.34), "Of the total 38,996 records, 8,515 (22%) occurred in the 1990s; 21,741 (56%) occurred in the 2000s; and in the years 2010, 2011 and 2012 alone this number already adds up to 8,740 (22%)."

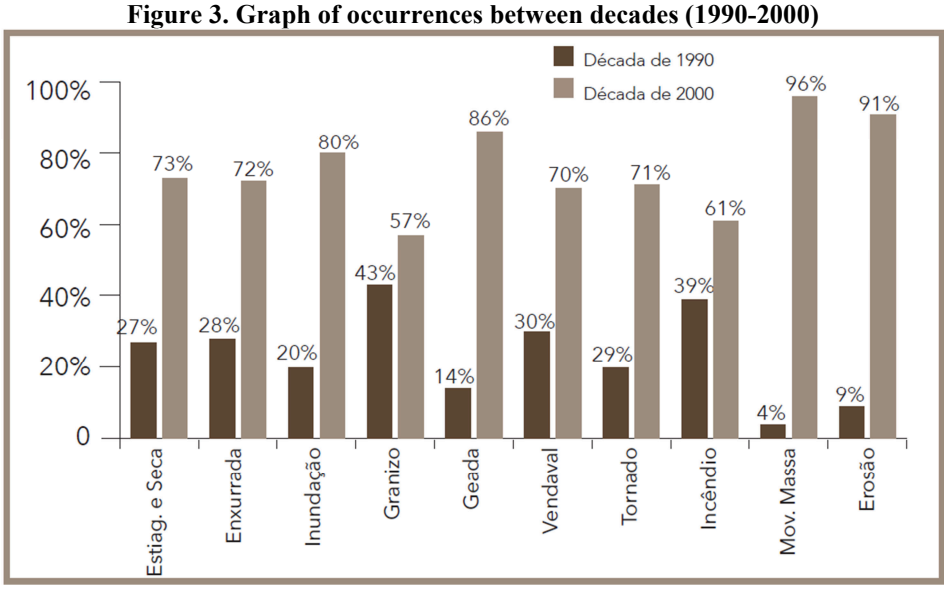
Figure 2. Graph of natural disasters in Brazil from 1991 to 2012



Source: CEPED UFSC (2013a, p.34)

From the same author's point of view, the numbers, however, do not allow us to affirm that disasters have increased by 78% in the last 13 years, since the historical fragility of the Civil Defense System in keeping its records updated is well known. Figure 3 illustrates the comparative graph between the occurrences between decades.

Figure 3. Graph of occurrences between decades (1990-2000)



Source: CEPED UFSC (2013a, p.34)

With the introduction of the PNGR mentioned above, a monitoring and alert system was developed, which according to CEMADEN (n.d.) works as follows: the alerts prepared by Cemaden, based on risk analysis of potentially adverse conditions, through modeling studies and systematic monitoring of data from the geo-hydro-meteorological networks distributed throughout the country, are immediately forwarded to Cenad. In cases of potential disasters, Cenad forwards the alerts received from Cemaden and triggers the civil defense agencies in the states and municipalities, offering support to disaster response actions.

In 2013, another Protocol for Integrated Action was signed specifically for cases of gradual flooding, bringing together, in addition to Cemaden and Cenad, the National Water Agency (ANA) and the Mineral Resources Research Company (CPRM). (CEMADEN, n.d.)

Once, until the year 2011, the public policies in Brazil on natural disasters were only of response, humanitarian actions. There was no preparation and monitoring. This has advanced, but since the plan was created in 2012, the budget funds for actions in the area have decreased. Relevant laws, such as those on water resources and the City Statute, did not even mention floods and landslides. Disasters were solemnly ignored by the legislator. Therefore, the "disastrous right" prevailed. (FOLHA DE SÃO PAULO, 2018; MARRARA, n.d.)

The only Law that exposed something in relation to disasters and that spoke only of state aid for prevention and post-disaster, was Law n. 12.340/2010, regulated by Decree n. 7.257/2010, which then, disciplines state aid for disaster prevention and rescue activities, assistance and post-disaster reconstruction.

This law, reformulated in 2014, became Law 12,983/2014. It then amends Law no. 12,340/ 2010, to dispose on the transfers of Union resources to the agencies and entities of the States, Federal District and Municipalities for the execution of prevention actions in risk areas and response and recovery in areas affected by disasters and on the National Fund for Public Calamities, Protection and Civil Defense, and Laws nos. 10,257, of July 10, 2001, and 12,409, of May 25, 2011, and revokes provisions of Law no. 12,340, of December 1, 2010. (BRAZIL, 2014)

In 2012, in addition to the PNGR, a Commission was created in the House of Representatives and another in the Federal Senate to discuss changes in the structure of the national Civil Defense.

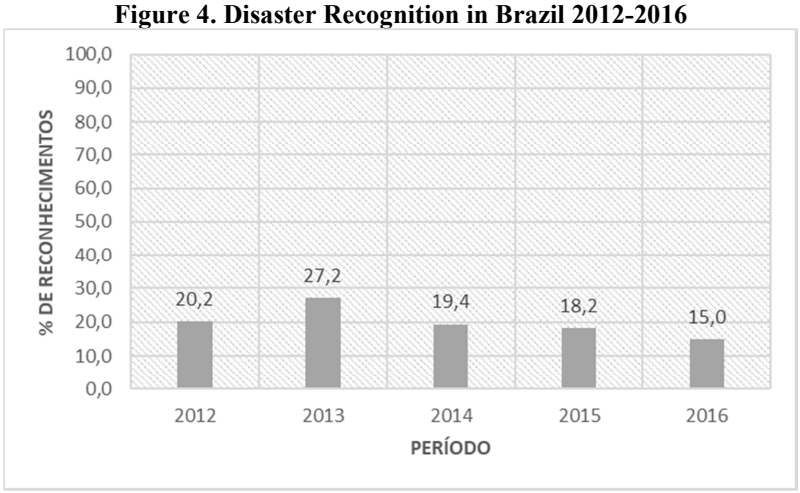
As relevant as the aforementioned legislations, are the modifications in other relevant federal diplomas, in order to correct unacceptable gaps in the pre-existing legislation.

> "In the City Statute, Law 12.608 included, for example, the obligation for municipalities located in vulnerable areas to publish master plans. In the Law of Land Division, it inserted the prohibition of the approval of subdivision and land division projects in risk areas defined as not buildable by the master plan or by legislation derived from it. The Environmental Education Law now includes the obligation to teach civil defense and protection against disasters guidelines in primary and secondary schools. Finally, the Law on Alternative Service to Compulsory Military Service extended the alternative service to the training activity for acting in areas affected by disasters, in emergency situations and states of calamity. "(MARRARO, n.d.)

Experts in the area agree that there was a leap forward in 2011 and 2012, but many important initiatives were not continued. More efficient public policies are also hindered by the lack of structure and professionalization of municipal civil defenses, which are poorly prepared to deal with disaster response - and even less prepared for prevention. (FOLHA DE SÃO PAULO, 2018)

The percentage of misfortunes reached almost 28% in the year 2013, however in positive sign starts to decrease in the following years as we can notice in Figure 4. In the period 2012 -2016, there were 13,772 recognized disasters, among these 54 states of public calamity and 13,718 emergency situations. (S2ID, n.d.)

Figure 4. Disaster Recognition in Brazil 2012-2016



Source: Adapted from S2ID (n.d.)

The S2ID, reformulated in 2012, does not aim to be a database, but rather a system of mandatory transfers from the Union to municipalities and states, but claims that the lack of quality of national data on disasters also affects its system, which has a number of problems. Currently it reflects only part of the reality, and may present a general scenario with undersized numbers, because several cities do not decree an emergency and do not register in the system, not meaning that a disaster has not occurred. (FOLHA DE SÃO PAULO, 2018)

In an interview with Folha de São Paulo (2018), David Stevens of UNISDR, reinforces that the lack of data in the country hampers the development of public policies. He also states that what Brazil has today only supplies what it does, which is to manage emergency.

1.2 Colombian natural disaster (risk) management

Colombia, a country in northwestern South America, has a total area of 1,138,914 km² and a population of 47,698,524 inhabitants. It is divided into 32 departments and one capital district. It borders Venezuela and Brazil to the east, Ecuador and Peru to the south, the Caribbean Sea to the north, Panama to the northwest, and the Pacific Ocean to the west. In addition, it has maritime borders with Venezuela, Jamaica, Haiti, Dominican Republic, Honduras, Nicaragua, and Costa Rica. (CIA, n.d).

Since the 1960s, Colombia has undergone a massive migration to its cities that has transformed what was a mostly agrarian society into one of Latin America's most urbanized nations. Bogotá, Medellín, Cali, and Barranquilla have seen increased economic activity, access to better education and health care systems, and accelerated technological development. (AMA, 2013)

During this intense growth, however, social divisions developed within cities themselves and between rural and urban areas. Urban centers grew so rapidly (and in a highly disorganized manner) that many residents were forced to live in makeshift settlements, with nearly one-third of the population in poverty. In Medellín, about two-thirds of the population live in slums. (AMA, 2013)

Colombia's geographical position, the dynamics of nature, which along with cultural diversity, constitutes one of the most important riches of this territory, and the way Colombian communities have occupied their ecosystems, especially in the second half of the twentieth century, determine that more and more disasters are occurring in the country. These are not exclusive to Colombia. Similar factors, linked to the increase in human population, and especially to the increase in communities in vulnerable conditions, increasingly determine the increase of disasters in the world. (ARBOLEDA et al, 2004, p.2)

Currently, the distribution of the exposure level indicates that in Colombia, 36% of the territory is at high seismic risk, 28% at high flood potential and 8% at high threat due to mass movements. While geological events cause large losses concentrated in a territory and in a relatively short time, hydrometeorological phenomena generate more localized but high frequency impacts, which cumulatively over time mean losses, even greater than those associated with seismic events, and volcanic eruptions. (MUNDIAL et al, 2012, p. 4)

It can be said that disasters in Colombia began to be noticed after the Tumanco tsunami (December 12, 1979) and the earthquake that affected the cities of Pereira and Manizales (November 23, 1979). Nevertheless, in the twentieth century there were already disasters that impacted the country, among them the explosion of trucks loaded with dynamite in the city of Cali (1956) and, later, the Quebradablanca landslide in 1974, which left dozens dead and left the city of Bogotá cut off from the eastern plains for a considerable time. (ARBOLEDA et al, 2004, p.2)

Colombia has been a pioneer in Latin America in developing a more integral view on the treatment of risks and disasters, allowing a reduction in the loss of lives; however, the damage to property, infrastructure and livelihoods continues to increase and shows that disasters are not events of nature per se, but the result of the application of inadequate development models that do not consider the relationship between society and nature. (MUNDIAL et al, 2012, p. 3)

Law 1.523/2012, was a landmark, through it the national policy of disaster risk management was adopted and the Sistema Nacional de Gestión del Riesgo de Desastres (SNGRD) was established. It is then determined that risk management is a process in which a series of actions are carried out aimed at knowledge and risk reduction for disaster management, with the purpose of contributing to the good development of the country and the community. Likewise, it is determined that risk knowledge, corresponds to the identification of risk scenarios, the analysis and

evaluation of risk and its components and communication to promote greater awareness of them that feed the processes of risk reduction and disaster management. (SNGRD, 2012)

The risk knowledge process can be divided into three main components: the first can be classified as risk analysis and assessment, in which the process of identifying risk scenarios is found. The second can be understood as monitoring and the third, risk communication for disaster reduction and management. (OLAYA G.; MORA C., 2016, p. 6)

There are several regulations of the SNGRD, the Colombian government has released a material where all these are. In this material the aforementioned Law 1.523/2012 is the main one, there are some current regulations that have not been repealed by this law, these that talk about the National Disaster Fund. Decrees 4,702/2010 and 4,830/2010 modify previous decrees, while Decree 4,579/2010 declares a national disaster situation in Colombian territory, and Decree 4,580/2010 declares a state of economic, social, and ecological emergency due to serious public calamity. In addition to these, there are also Decree 4,147/2011 which creates the National Unit for Disaster Risk Management, thus establishing its purpose and structure, and also Law 1,505/2012 through which the National Subsystem of First Response Volunteers is created and incentives are given to volunteers from Civil Defense, the Colombian Fire Department and the Colombian Red Cross and other provisions are issued about volunteering in first response. (SNGRD, 2012)

According to Law 1,523/2012 (Article 6), the general objective of the national system is to carry out the social process of risk management in order to offer protection to the population of the Colombian territory, improve safety, well-being and quality of life, and contribute to sustainable development. (SNGRD, 2012)

The proposals for strengthening and updating the normative and regulatory framework on the subject of disaster risk management in Colombia have not materialized into concrete results. Despite these established actions and commitments, the update initiative has not yet been plausible for the country. (MUNDIAL et al, 2012, p. 372)

2 METHODOLOGY

Given the complexity and heterogeneity of the scope of Public Policies, it is essential to delimit the scope of the work. This study is restricted to the aspects of actions of prevention, preparation, response, and reconstruction of natural disasters, in the same way in the scope of theoretical and geographical rescue of the two countries, Brazil and Colombia.

Objectively, the research is classified as exploratory, for taking on the character of bibliographical research. The exploratory method, according to Selltiz (1967 apud GIL, 2002, p.41), considers that "These researches have as objective to provide more familiarity with the problem, in order to make it more explicit or to form hypotheses. It can be said that these researches have as main objective the improvement of ideas or the discovery of intuitions. "For the author, in most cases, these surveys are configured as bibliographic research or case studies.

3 RESULTS

3.1 Actions in the face of disasters

3.1.1 Mariana Dam Crash/Brazil (2015)

The dam was located in the municipality of Mariana/MG and was specifically built to serve as a deposit for the waste generated during the iron mining process. It belonged to the company Samarco S/A. (LOPES, 2016, p.2)

On the 5th day of November 2015, the Fundão dam collapsed and broke, causing an unprecedented environmental disaster. The immediate effects of this tragedy, still unfolding, could be observed from downstream of the destroyed dam, in Minas Gerais, to the mouth of the Doce River, in the sea of Espírito Santo. It left as its legacy, a trail of destruction, contamination and deaths. (LOPES, 2016)

- **Prevention**

The incorporation of a culture of disaster risk is essential to encourage an emphasis on prevention rather than on response. To this end, it is considered fundamental, in the case of dam construction, to integrate the technical culture of the engineers with the culture of the natives, which is inserted in a non-technical universe and with a probable religious connotation. In the case of dams that serve many municipalities downstream, the ideal is

for the Municipal Civil Defense Coordination to take this integration to the community and be regional in scope so that its work is more comprehensive. (GUEDES, 2011, p.99)

For mitigation and risk control, the enterprise has an Environmental Impact Assessment, which on the date of the disaster was in the process of renewal, but this document suffers a more bureaucratic view of Brazilian companies and ends up having deficiencies in its preparation and in the measurement of risks. On the other hand, the political authorities, considering the undertakings of great economic importance, rarely reject the processes. (MILANEZ; LOSEKANN, 2016).

- **Preparation**

The reports in several news vehicles give evidence that there was no preparation whatsoever for the situation, the disaster jeopardized the functioning of the city government, as it sensitively affected the city's GDP. Samarco's management reported that there was no sound alarm, as the population had never requested one, and that soon after the incident an emergency plan was put in place, that they even called some people to leave their homes, they said that the plan followed the Brazilian legislation and international best practices, but at no time gave details about this plan. (D'AGOSTINO, 2015)

- **Response**

To help the victims of the disaster the federal government adopted various measures, the first of which was the provision of emergency aid to the region, consisting of teams from civil defense, the army and the air force to assist in the search for the missing. The National Department of Mineral Production (DNPM) was given R$ 9 million to adopt emergency measures, in addition to water supply, elaboration of a water control of the Rio Doce, as well as a recovery plan for the affected area, a task force was set up to save endangered animals and likewise, the release of machinery to assist in cleaning and reconstruction and the application of a fine to the company responsible. (BRAZIL, 2015)

- **Reconstruction**

According to Villela (2017), two years after the disaster, little has been reconstructed, the process is slow and lengthy, the result of a difficulty in defining the aspects that make certain people be considered affected by the disaster.

Still according to Villela, while the registration is in progress and the final compensation is not available, the payment of an emergency aid in the amount of one minimum wage plus 20% of this amount is given to each dependent of the affected people.

Two years later, R$ 500 million have already been paid, including indemnities, advances, aid card and a little more than 200 damage negotiations already concluded. Renova estimates that it will spend between R$2 billion and R$3 billion on these reparations. Based on the lower figure, what has already been paid corresponds to 25% of the total to be spent.

In the legal scope, a TAC (transaction and conduct adjustment term) has been elaborated, which foresees socio-environmental measures to be complied with by Samarco S/A, as well as the application of fines and legal sanctions in case of non-compliance.

3.1.2 Landslides in Mocoa/Colombia (2017)

On the night of March 31 and the early morning of April 1, 2017, the city of Mocoa, capital of the department of Putumayo, was hit by heavy rains that caused flooding caused by the rise of three rivers, as well as landslides. (EL TIEMPO, 2017)

Around ten o'clock in the evening a torrential downpour began, which was preceded by days of drizzle. Just over three hours later, the city faced the worst tragedy in its 454-year history: the three rivers that cross the municipality - the Mocoa, the Mulato, and the Sangoyaco - and several streams, such as the Taruca, swept thousands of people and tons of mud into 17 neighborhoods. (EL TIEMPO, 2017)

- **Prevention**

Economic development, despite the great efforts made to strengthen the processes of planning and protection of ecological components, has meant that intervention in the territory has been accompanied by actions such as the drying up of swamps and wetlands, the loss of forests and vegetation cover, with the consequences that this has in terms of erosion and increased runoff, significantly affecting water sources and soil stability, which

makes it susceptible to landslides, floods and torrential avenues in areas that were not previously. (MUNDIAL et al, 2012, p. 14)

Not all existing risks materialize into losses or disasters; however, when they do, they are assumed to be an indicator of the behavior of risks due to frequent socionatural phenomena. This is especially true for losses due to floods, landslides, or torrential floods. For phenomena such as earthquakes and volcanic eruptions, the risk remains latent for relatively long periods, and usually manifests itself occasionally. Changes in loss behavior are a reflection of the transformation and accumulation of risks underlying the dynamics of a society. (MUNDIAL et al, 2012, p. 17)

- **Preparation**

There was not much preparation with regard to supplies and materials needed for the search and care of the population. According to the newspaper El Tiempo (2017), added to the tragedy were the logistical difficulties faced by survivors. According to the report released by Governor Aroca at the time, there was no gas in the city, the aqueduct was affected, and the power substation also did not work, to make matters worse its repair could take a month. In addition, some of the entry and exit routes were blocked by dirt, mud and debris from trees and parts of cars and houses that were washed away by the water and mud. The avalanche took over the market, which incidentally affects the food supply in the midst of the emergency.

Mocoa's Secretary of Government, Eduardo Alfredo Jimenez, said that the municipality does not have monitoring equipment that could provide early warning against such events, which also had no history in that region. In fact, emergencies tend to be more associated with floods due to river overflows, rather than sudden avalanches, which, however, are among the collective fears of the Moco people. (EL TIEMPO, 2017)

- **Response**

The Colombian city was declared in a state of calamity to facilitate and expedite rescue operations and aid to victims, with an undetermined number of missing and affected. Minors rescued by the authorities and whose relatives had no information were taken to the headquarters of Mocoa Family Welfare. The government activated the National Disaster Risk Management System to handle the emergency bank and machinery, as well as the provision of tanker trucks with water. (EL TIEMPO, 2017)

One thousand food items, one thousand toilet kits, one thousand kitchen kits, three thousand blankets and three thousand mattresses were delivered to the victims. In addition, the delivery of subsidies for 250,000 pesos a month for three months was organized for the affected families. (EL TIEMPO, 2017)

- **Reconstruction**

On April 3, 2017, the Colombian government already pronounced itself on the reconstruction of Mocoa, Luis Carlos Villegas, Minister of Defense, assumed the mission to rebuild the municipality in the department of Putumayo, declared an economic, social and ecological emergency. (SIG, 2017)

The disaster left 76 people missing, 1461 homes damaged, 3 bridges damaged and two destroyed in addition to 333 dead and 398 injured. It was then allocated 1.2 billion pesos through Conpes 3904 for the recovery of Mocoa. The government will deliver 1209 houses to the victims; by March of this year 309 houses had already been delivered. The Ministry of Defense believes in the full recovery of Mocoa by the year 2021. (EL TIEMPO, 2018)

CONCLUSION

The literature review showed that there is a big gap, both in bibliography and scientific papers, related to Risk Management and Disaster Management. Most publications, national and international, are directed to case studies, usually bringing responses to disasters that have already occurred.

It can be seen that disasters have occurred worldwide since the dawn of humanity, and that a significant increase has been observed in conjunction with accelerated urbanization. This has brought with it inequality, causing an evident picture of poverty, worsening socioeconomic and urbanistic indices.

In relation to this comparative study, it can be observed that, in general, Colombia is ahead of Brazil, conducting a greater management with regard to prevention, preparedness, response and reconstruction of disasters.

Brazil does not really have public policies, but programs that help mainly in the response stage, the monitoring and the database, end up being flawed because many municipalities do not report emergency situations.

Colombia, on the other hand, has greater subsidies in this area, having a National Disaster Risk Management System.

It is necessary to develop knowledge and integrated action between the areas of urban planning and risk management, which show difficulties in cooperative action. Furthermore, the insufficiency of research and specific literature related to risk management requires the assistance of empirical research in order to ensure safety in the production of informed public policies based on the Brazilian reality.

The process of interaction between the community and the university must happen in a way that contributes to changes in local practice and makes available information that helps improve the lives of the population, this being a reciprocal process. A knowledgeable society will be able to prevent and minimize the post-event phase where the losses and the consequent costs are greater than before the event.

The Brazilian government is recommended to take a higher position with regard to investments in natural disasters, in order to improve risk management and safety, as well as to improve actions in disaster situations. In the effective creation of mechanisms to produce a culture of risk among the population, the dissemination of risk knowledge, the encouragement of universities to form research groups on the subject, the training of municipalities, as well as the improvement of existing systems and programs.

For the Colombian government, it is advisable that the National Disaster Management System continues to advance and that it has the competence to achieve all the goals already set and to create new ones. A progressive effort must be made to train the teams in order to advance, especially in terms of disaster response, currently its weakest point, by educating all Colombian citizens, especially on the issue of vulnerability. A financial protection policy must be created, and with regard to interventions to reduce existing risk conditions and investment projects, we must seek to implement effective tactics to monitor their actual implementation, quality and update.

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