



FLOOD RISK MANAGEMENT IN THE STATE OF RORAIMA, AMAZON, BRAZIL

A. ARAÚJO JÚNIOR¹

¹ Post graduate student specialization Education for Environmental Management (NUMA/UFPA) and Pr. Auxiliary of the Federal University of Roraima (UFRR)

ABSTRACT: The Amazon region is known for its exuberant flora and fauna and its watercourses pertaining to the Amazon watershed, but the region suffers because of recurrent and sporadic natural phenomena such as floods. The state of Roraima was chosen as the study area because cities have heavily affected by floods, in addition to being at risk of flooding as the capital of Boa Vista, is necessary to understand what are the mechanisms for managing this situation. The methodology of the study consists document analysis Atlas of Natural Disasters of the State of Roraima and social data from the Brazilian Institute of Geography and Statistics 2010, understanding the reality from the systemic method, ie designing the space from the interaction of political, economic and environmental relations, as it is believed that control measures and mitigation of flood risks are still inefficient in dealing with situations of natural disaster prevention.

Key Words: Risk, flood, management.

1. INTRODUCTION

Disaster is defined as a result of adverse events natural or caused by mankind, on an ecosystem (vulnerable), causing human damage, material and / or environmental and consequential economic and social losses. Here we note that the term "adverse" means hostile, enemy, otherwise, one that brings misfortune and unhappiness (Castro, 1998; KOBAYAMA et al, 2006.).

Conceptualize risk becomes important in this context, since this is nothing more than the perception of possible danger, more or less predictable by a social group or an individual who has been exposed to it (VEYRET, 2007), ie , risk is a phenomenon that could become and that one day in the past has happened, but for some reason its consequences have been forgotten.

In this sense, agreeing Araújo Júnior (2013) the work will use the term risk as a category of analysis according to Castro et al. (2008) is associated to a priori notions of uncertainty, exposure to danger, loss and material, economic and human losses as a result of processes of "natural" order (such as exogenous and endogenous processes of the Earth) and / or those associated with work and human relations.

The relief downgraded the Amazon region causes problems such as floods and landslides are not frequency as in other regions of the country, however, the low topography decreases the time of stormwater runoff causing flooding advancing on the plain flood (usually employed in urban areas) have a time of reduced runoff which enhances flooding, hinders locomotion, destroys property, and may also be a vector of waterborne diseases or even take lives.

So, the state of Roraima was selected as the study area because cities possess heavily affected by floods, in addition to being at risk of flooding as the capital of Boa Vista, is necessary to understand what are the mechanisms for managing this situation.

2. MATERIALS AND METHODS

The methodology of the study consists of document analysis Atlas of Natural Disasters of the State of Roraima and social data from the Brazilian Institute of Geography and Statistics 2010, understanding the reality from the systemic method, ie designing the space from the interaction of political, economic and environmental relationships.

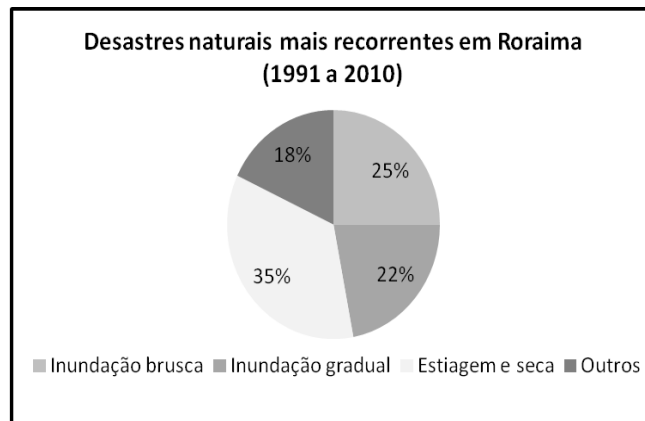
The materials obtained from surveys allowed for the creation of graphics on the most recurrent disasters in the state of Roraima, the frequency that gradual and sudden floods occur and also the human damage

caused by sudden and gradual flooding.

3. RESULTS AND DISCUSSION

The state of Roraima in the northern portion of Brazil, with the only capital city located in the north hemisphere Boa Vista, in the period 1991 to 2010 was hit by several natural disasters related to drought and dry, sudden and gradual floods, windstorms and forest fires . For both, the analysis will fall on the events related to flooding (Graphic 1) because they represent the most significant percentage.

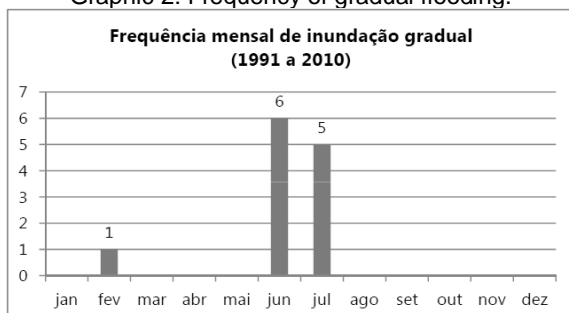
Graphic 1: Percentage of the most recurring disasters in the Amazon during the period 1991-2010



Font: Official documents of the State of Roraima 2011 apud UFSC, 2011.

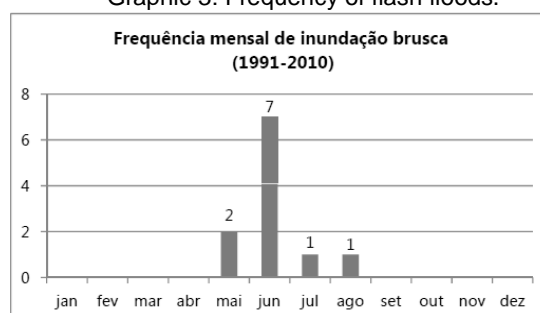
Although 35% of natural disasters are related to drought and dry, floods together represent 47% of disasters, and floods are more frequent in the months from May to August as explained in graphics 2 and 3:

Graphic 2: Frequency of gradual flooding.



Font: Official documents of the State of Roraima 2011 apud UFSC. 2011.

Graphic 3: Frequency of flash floods.



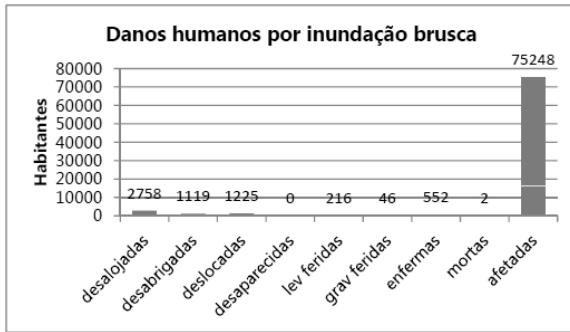
Font: Official documents of the State of Roraima 2011 apud UFSC, 2011.

According to data from UFSC (2011) are recorded in those months on average 20 days of rainfall events, which range from strong and fast and gradual, lasting throughout the day.

The unfortunate episode occurred in the municipalities of Roraima in 2011, only materialized the risk of flooding by which the cities were exposed. Noteworthy is the city of Boa Vista, as the capital of the state of Roraima is presented, according to [Molinari et al. \(2011\)](#) as a medium-sized city compared to other cities in Brazil, but with a twist: it constitutes a city-center, a concrete example of urban macrocephaly, since most of the State apparatus, as well as most of the population State, 214 541 inhabitants, ie 62% of the state population resides in the capital.

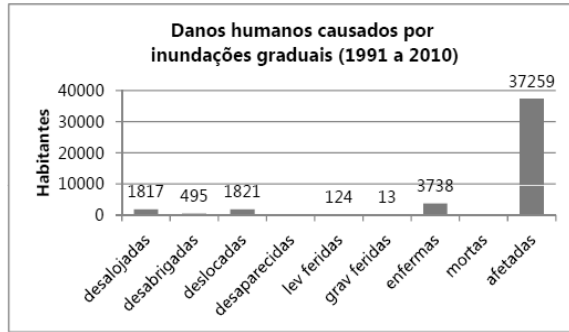
The human flood damage are historically significant (graphics 4 and 5) and in 2011 the government of Roraima declared a state of public calamity. "It's a public health issue, it is a safety issue, it is a question of humanity," says the governor José de Anchieta (JORNAL HOJE, 2011).

Graphic 4: Human Damage caused by sudden flooding (1991-2010)



Font: Official documents of the State of Roraima 2011 apud UFSC, 2011.

Graphic 5: Human Damage caused by gradual inundation (1991-2010)



Font: Official documents of the State of Roraima 2011 apud UFSC, 2011.

The information to Journal Today (2011) demonstrated that 9 of the 15 counties in the state met in an emergency and with the ban on roads almost the entire interior was isolated. In some parts of the BR-174, which connects to the Roraima with the state of Amazonas, water prevented the passage of vehicles, noting that four hundred and eleven (411) people were left homeless or displaced only in Boa Vista.

After the disaster were transferred 15 millions of reais by the federal government for emergency actions, noting that at the time, Roraima registered the most severe winter in its history, with 79% of the affected population, according to the National Secretariat of Civil Defense. This value passed post-disaster would have a relevant application if this transfer occurred for preventing risks of flooding, with containment measures to minimize impacts.

Information obtained from the Ministry of National Integration - MI (2013) show that the values passed to prevent flood-related disasters are linked to infrastructure projects as plumbing streams, channel dredging, construction of storm sewers, inlets, pavement Street, slope stabilization, dredging and rehabilitation of drainage systems.

For the city of Boa Vista (RR) the total amount (Union) released for these interventions is R \$ 22,325,000.00 for execution of the work "in the Macrodrainage Caxangá and Teresa basins in Boa Vista", whose characteristics: macrodrainage on Channels Tiririca, Mecejana, Caxangá and Santa Teresa.

Such interventions are needed, however you think is insufficient invest only in infrastructural works, but also invest in training people to deal with disaster situations, as well as various risk management.

The flood risk management is detached by its great impact, well as by works related to this event are still occurring, and it is possible modify intervention actions and redirect resources to non-structural initiatives such as environmental education campaigns and formative processes of medium and long term to deal with disaster situations and prevent risk to flooding.

4. CONCLUSIONS

The state of Roraima has relevant information about the problems related to flooding, therefore it is necessary to use them for effective planning.

The desirable is a managed risk to flooding from an integrative perspective in fact and not just paper, ie, favoring social and environmental aspects in their nuances, but also in their approaches through an



6TH INTERNATIONAL CONFERENCE ON FLOOD MANAGEMENT

September 2014 - São Paulo - Brazil

integrative systemic bias, remembering that the Amazon region is not a demographic vacuum, but a very busy area, especially in its urban areas and who resents public policies beyond infrastructure to promote regional development, finding themselves so much, that environmental education would be an excellent way.

5. REFERENCES

Antônio C. R. Araújo Júnior, 2013: Paisagem antropogenética e a dinâmica do meio físico na porção sul da cidade de Belém-PA. *Ateliê Geográfico - Goiânia-GO*, v. 7, n. 2, p.71-96.

A. L. C. Castro, 1998: *Glossário de defesa civil: estudo de riscos e medicina de desastres*. Brasília: MPO/ Departamento de Defesa Civil, 283 p.

Cleber M. Castro, *et al.* 2005: A. Riscos Ambientais e Geografia: Conceituações, Abordagens e Escalas. *Anuário do Instituto de Geociências – UFRJ*. Vol. 28-2, p. 11-30, 2005.

Masato Kobiyama, *et al.* 2004: **Introdução à prevenção de desastres naturais**. Florianópolis: GEDN/UFSC, 122 p.

JORNAL HOJE. 2011: *Maior enchente do estado deixa Roraima em estado de calamidade*. Disponível em <http://g1.globo.com/jornal-hoje/noticia/2011/06/maior-enchente-do-estado-deixa-roraima-em-estado-de-calamidade.html>. 06 de junho. Acesso em 14/10/2013.

Deivison C. Molinari, *et al.* 2011: Breves considerações sobre os problemas socioambientais na BR-174: Rorainópolis, Caracarái, Iracema, Mucajái e Boa Vista (estado de Roraima). **ACTA Geográfica**, Boa Vista, Ed. Esp. Cidades na Amazônia Brasileira, p. 81-93.

MINISTÉRIO DA INTEGRAÇÃO NACIONAL – MI, 2013: *Obras de Drenagem para prevenção de enchentes*. Disponível em <<http://www.integracao.gov.br/obras-de-drenagem>>. Acesso em 16 de outubro.

UNIVERSIDADE FEDERAL DE SANTA CATARINA (UFSC), 2011: *Atlas brasileiro de desastres naturais 1991 a 2010: volume Roraima*. Centro Universitário de Estudos e Pesquisas sobre Desastres. Florianópolis: CEPED UFSC.

Yvet Veyret (Org.), 2007: *Os riscos: o homem como agressor e vítima do meio ambiente*. São Paulo: Contexto, 2007. 320 p.