

URBAN PUBLIC POLICY FOR NATURAL DISASTER RISK MANAGEMENT IN BLUMENAU-SC: PROCESSES AND ACTIVITIES^{1,2}

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1 Introduction

According to the CRED and UNISDR (2015) report on climate-related trends over the past 20 years (1995 to 2015), Brazil is the only country in the Americas that is among the 10 countries with the highest number of people affected by climate change. In general, most of the natural disasters in Brazil are related to hydrological phenomena, i.e., the excess or lack of water as a triggering agent (LONDE et al, 2014).

Classifying a disaster as natural does not mean naturalizing or depoliticizing the discussion about the phenomenon. The socio-political and cultural processes influencing the creation of a disaster that is triggered by a natural agent must be recognized (JACOBI, GÜNTHER, GIATTI, 2012; MITJAVILA, GRAH, 2011). These processes include the failure to promote participative, horizontal, and transparent management (JACOBI; BARBI, 2007); the changes in the magnitude and frequency of natural disasters, partly attributed to the anthropogenic activities intensifying climate change (IPCC, 2014); the occupancy of new geographical areas susceptible to disaster; and the increased vulnerability and exposure of people and goods (encouraged by inadequate urban land policies).

In the face of these issues and the commitment made by Brazil and other countries to the UN (2015), the public policies for natural disaster risk management (NDRM) in Brazil have been expanded. The emphasis has been on the implementation of the federal law nº12,608/2012 that established the National Policy on Protection and Civil Defense (PNPDEC) (BRAZIL, 2012). Whether it be done for territorial unity or the fact that the natural disasters in Brazil are related mostly to hydrological phenomena (CEPED, 2013),

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the mechanisms specified in the aforementioned national policy need to be coordinated with those in the policies governing the urban territories (federal law nº10,257/2007), basic sanitation (federal law nº 11,445/2007), and national water resources (federal law nº 9,433/1997). The objective is to guarantee an integrated and shared process for natural disaster risk management (BRAZIL, 2012).

The municipality of Blumenau, located in the Itajaí River basin in the state of Santa Catarina, has a long history of disasters associated with extreme hydrological phenomena. Thus, the municipal civil defense agency was established in 1973, the same year that the state civil defense agency was created. Over the years, the municipal public policies for disaster risk management have become more complex. This was magnified after two events: the disaster of 2008 and the creation of the PNPDEC when, through a national policy, legal support was granted to the NDRM (VIEIRA; JANSEN; POZZOBON, 2016). Currently, the municipal organizational structure comprises the Municipal Secretariat of Citizens' Defense to which four directorates are attached: (1) Civil Defense; (2) Geology, Analysis, and Natural Risks; (3) Projects; and (4) Integrated Security Policies.

The PNPDEC tends to increase the complexity of the disaster risk management process by establishing the responsibilities of each federated entity. In addition, it uses a systemic approach to prevention, mitigation, preparedness, response, and recovery. This reinforces the need for the coordination of the water resources, land use and occupation policies, and disaster risk policies for all municipal and regional public bodies (MARTINS, 2007). The goal is to improve agency integration and shared management with civil society.

Because little is known about the organization, visions, and activities of the municipal public entities involved in disaster risk management, this study analyzed Blumenau's urban public policies for natural disaster risk management. The relevant municipal public bodies were identified. In addition, the managers' ideas and activities, including their descriptions of intragovernmental coordination and conflicts, were examined.

It should be noted that the study was not an exhaustive survey of natural disaster risk management activities. It provides an overview and problematization of Blumenau's urban public policy for natural disaster risk management. Thus, the study could promote the continual improvement of existing policies for the development of a model that improves the integration of the municipal agencies. This should not be limited to the municipal administration. It should include the harmonization of and coordination with the social agents at all levels throughout the country.

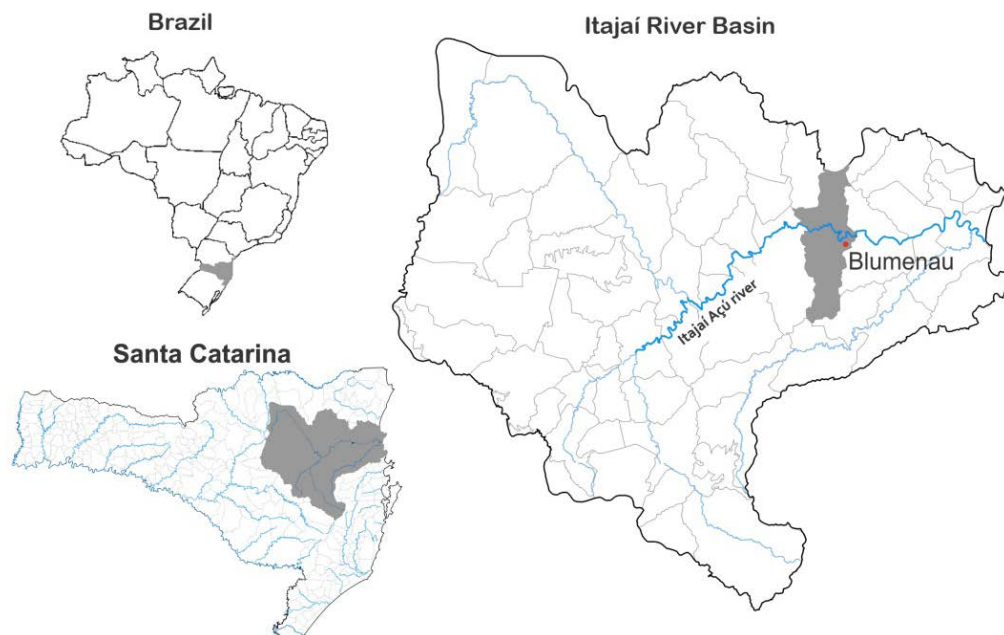
2 Methodological route

2.1 Study area

In the Itajaí River basin, natural disasters, such as floods, flash floods, and landslides, occur frequently. Approximately 15,000 km², the Itajaí River basin represents 16.15% of the territory of Santa Catarina, which is home to 50 municipalities that, together with other sectors, form part of the Basin Committee, a collegiate body for water resource management in the basin (ITAJAI COMMITTEE, 1998). In 2015, the population of

Blumenau (Figure 1), the municipality under review, was estimated at 338,876, 95.5% of which was urban (IBGE, 2016).

Figure 1 – Location of the Itajaí River basin and the municipality of Blumenau.



Source: Authors (2019).

The municipality is at serious risk for geodynamic and hydrological disasters (VIEIRA; JANSEN; POZZOBON, 2016). In November 2008, floods and landslides affected 103,000 people, leaving 5,200 homeless, 25,000 displaced, 2,400 injured (some seriously), and 24 dead (SEVEGNANI et al., 2009). Ten floods were recorded in the municipality: in the year 2009 (1), 2010 (1), 2011 (2), 2013 (1), 2014 (2), 2015 (1) and 2017 (2) (BLUMENAU, 2018).

Blumenau was the focus of this study because it provides an example of natural disaster risk management at the municipal level. According to Nogueira, Oliveira and Canil (2014), a disaster risk management policy must be implemented through the municipality. Municipalities are the places in which these policies must be executed even though most of the recurrent disasters in Brazil (ALVIM; CASION; ZIONI, 2010), such as the floods in Blumenau, are regional in scope.

2.2 Method

The systemic approach was adopted because the disaster risk had been temporarily modified through interventions. These interventions can create retroactive effects that

positively or negatively affect the system. In addition, this approach considers not only the descriptions of the isolated activities linked to disaster risk management but also those related to coordination, which ascribes to the whole a meaning greater than the sum of the activities or parts. The systemic approach to disaster risk knowledge, prevention, mitigation, preparedness, response, and recovery/reconstruction constitutes one of the guidelines of the PNPDEC and the Itajaí River Basin Water Resources Plan (ITAJAI COMMITTEE, 2010). It is therefore relevant to research.

The structure of Blumenau's urban public policies for natural disaster risk management was determined through the analysis of primary and secondary data. The secondary data comprised national and international publications, as well as legislation for local disaster risk management. This enabled the identification of Blumenau's organizational structure for disaster risk management.

The information in the documents was supported by data from interviews with 10 municipal public managers who discussed their ideas and activities, including the possible intragovernmental conflicts and coordination. The 10 municipal bodies whose managers were interviewed had demonstrated their competence in disaster risk management in accordance with the: (a) PNPDEC (BRAZIL, 2012); (b) the complementary law nº 870/2013 that established the administrative structure of Blumenau's municipal executive authority (BLUMENAU, 2013a); and (c) the decree nº10,124/2013 (BLUMENAU, 2013b) that established the Special Commission for the Natural Risk and Disaster Management (CEGERD). The disaster risk management activities described by the managers were classified according to six key processes (Table 1), based on Narváez, Lavell and Ortega (2009) and GITEC & CODEX Remote (2014).

Table 1 - Key processes in disaster risk management.

| Key processes | Definition |
|-------------------------|--|
| Disaster risk knowledge | Identify , make available, and disseminate data; share knowledge that facilitates effective risk management. |
| Prevention | Avoid the construction of risk; prevent the development of risk factors by implementing territorial and environmental urban policies. |
| Mitigation | Reduce existing risk by establishing measures to reduce losses and damage from future disasters. |
| Preparedness | Develop capacities, instruments, and mechanisms to respond adequately to the imminence and/or occurrence of a disaster. |
| Response | Satisfy the basic and immediate needs of populations, institutions, and/or structures threatened and/or affected by the disaster; provide for the emergence of new risk conditions. |
| Recovery/Reconstruction | Restore acceptable and sustainable conditions for economic and social development; reduce risk to lower than pre-disaster level. |

Source: Adapted from Narváez, Lavell and Ortega (2009).

3 Results and discussion

The results of the research are presented and discussed from two domains: (1) the survey of the municipal public agencies responsible for disaster risk management regarding their competencies and (2) the ideas and activities described by the representatives of the agencies surveyed on natural disaster risk management.

3.1 Blumenau public agencies responsible for disaster risk management

The public administration bodies responsible for executing the municipal competencies established by the PNPDEC were identified through an analysis of complementary law nº 870/2013, which defines the administrative structure of the public authority of Blumenau. The following were identified: (1) the Municipal Secretariat of Citizens' Defense (SEDECI), (2) Municipal Department of Social Development (SEMUDES), (3) Municipal Secretariat for Urban Planning (SEPLAN), (4) Municipal Secretariat of Health (SEMUS), (5) Municipal Environmental Foundation (FAEMA), (6) Municipal Secretariat of Education (SEMED), and (7) Municipal Secretariat of Urban Services (SESUR). Because the CEGERD was responsible for designing and monitoring the Municipal Civil Protection and Defense Policy, other commission members were interviewed. Interviews were also conducted with members of the CEGERD, the managers of the abovementioned secretariats, and four other bodies: (8) the Attorney General of the Municipality (PROGEM), (9) Mayor's Office (GABPREF), (10) Municipal Secretariat of Works (SEMOB), and (11) Department of Government Management of the Municipality of Blumenau (SEGG). The SEGG member argued that the agency had been removed from the CEGERD; thus, this official did not participate in the survey.

According to Vieira and Packer (2015), most of the municipal competencies established by the PNPDEC conformed to those required in the complementary law nº 870/2013 to SEDECI. The wording of the competencies established by municipal law was generic; however, the federal law was more specific. Therefore, there is need for greater specificity in the legal guidelines articulated by the SEDECI and the other bodies responsible for natural disaster risk management in Blumenau. This would align with those of the PNPDEC and address the need for the management responsibilities to be shared by the governmental agencies. According to Narváez, Lavell and Ortega (2009), appropriate risk management should include the delineation of the processes and activities in which each entity would participate. This includes the conditions for intervention and it should also include a definition of the internal (internal departments) and external (society) relationships.

Therefore, the study sought to describe the ideas and activities of each managing body identified above in relation to its natural disaster risk management strategies.

3.2 Ideas and activities of representatives of disaster risk management agencies

As a contribution to the urban public policy analysis of disaster risk management, the information obtained from the interviews is described below. It includes the ideas

and activities related to disaster risk management. The conflicts and the possibilities for cooperation among the management bodies are analyzed.

Table 2 shows that of the six risk management processes defined by the PNPDEC, disaster risk knowledge process had the largest number (24) of activities. None of these activities was coordinated with any of the higher education institutions, which could have provided theoretical and practical support. The number of activities, in reverse order, is as follows: key response processes (20), prevention (19), preparedness (19), recovery/reconstruction (7), and mitigation (6).

Regardless of the number of activities performed, the agencies that were interviewed had collaborated on the design of the urban public policies for disaster risk management. The activities identified by the participants were based on their competencies. Examples are mapping, inspection, street sweeping, damage assessment, and the elaboration of the projects related to the reconstruction of damaged public assets. This phenomenon was described by Narvaez and Ortega (2009, p. 34, our translation), who stated that disaster risk management encompasses “very varied interventions, ranging from the formulation and implementation of policies and strategies, to the implementation of concrete actions and instruments of reduction and control”.

Table 2 –Number of disaster risk management activities performed by Blume-nau public agencies.

| Process \ Agencies | SEDECI | SEMUDES | SEPLAN | SEMUS | FAEMA | SEMED | PROGEM | GABPREF | SEMOB | SESUR | Total |
|--------------------------|-----------|-----------|-----------|-----------|----------|----------|----------|----------|----------|----------|-------|
| DISASTER RISK KNOWLEDGE | 5 | 2 | 2 | 5 | 4 | 1 | 3 | 1 | 1 | - | 24 |
| PREVENTION | 5 | 1 | 7 | - | 3 | 1 | 1 | - | - | 1 | 19 |
| MITIGATION | 1 | 1 | - | 1 | - | - | - | - | 3 | - | 6 |
| PREPAREDNESS | 7 | 2 | 1 | 3 | 1 | 2 | - | 1 | 1 | 1 | 19 |
| RESPONSE | 5 | 6 | - | 4 | 1 | - | - | 2 | - | 2 | 20 |
| RECOVERY/ RECONSTRUCTION | 2 | 1 | 1 | 1 | - | - | - | - | 1 | 1 | 7 |
| TOTAL | 25 | 13 | 11 | 14 | 9 | 4 | 4 | 4 | 6 | 5 | |

SEDECI – Municipal Secretariat of Citizens' Defense
 SEPLAN – Municipal Secretariat for Urban Planning
 FAEMA – Municipal Environmental Foundation
 PROGEM – Attorney General of the Municipality
 SEMOB – Municipal Secretariat of Works
 Source: Authors (2019).

SEMUDES – Municipal Department of Social Development
 SEMUS – Municipal Secretariat of Health
 SEMED – Municipal Secretariat of Education
 GABPREF – Mayor's Office
 SESUR – Municipal Secretariat of Urban Services

The difference in the number of activities performed by the public agencies under study quantifies their performance; however, it does not provide information about the quality of the system. Based on the systemic approach, the whole is greater than the sum of the parts. Attention should be paid to the competencies of each of the agencies and the relationships among them. The integration, coordination, and dialogue among the interest groups, including those at other territorial levels, should be verified. It should be noted that the activities described by the participants referred to all of the processes, without distinctions being made for risk type. Specific threats, such as floods and landslides, require distinct management actions because they are associated with specific types of

physical events, potential damage, occurrence areas, and territorial scales (NARVÁEZ; LAVELL; ORTEGA, 2009).

The SEDECI was the secretariat with the highest number of disaster risk management activities in accordance with the competencies established in the PNPDEC. It should be noted that the number of activities per agency is an important indicator for risk management analysis. However, more relevant was the analysis of the activities on the basis of the legal competencies of each public agency, as evidenced by the coordination of the activities and the level of decentralization.

3.2.1 Coordination of urban public policy for disaster risk management in Blumenau

The interviews provided data on the coordination of the natural disaster risk management activities of the municipal administration agencies. Figure 2 provides a description and synthesis. The relationships are illustrated as follows: letters and arrows for the vertical integration of the agencies engaged in the same process, colors and numbers for the horizontal integration of the processes within a single municipal agency, and letters and numbers for the cross-functional integration of processes across agencies. The arrows indicate the interviewed secretary's recognition of areas of coordination. For example, in the case of connection A, the arrow indicates that the SEMUDES, in the "mapping of irregular occupations" activities, recognized or acknowledged coordination with the SEDECI.

In the presentation of the results, the coordination within the key processes, i.e., the vertical connections (Figure 2) will be discussed first. This will be followed by the discussion of the horizontal connections and the intersections.

3.2.1.1 Coordination of disaster risk knowledge activities

Link A demonstrates the coordination between the activities of the SEMUDES and the SEDECI. According to the data collected, information on irregular occupations and the mapping of flood, flash flood, and landslide susceptibility was exchanged.

Link B shows that the SEDECI, SEMUDES, SEPLAN, SEMUS, FAEMA, SEMED, PROGEM, GABPREF and SEMOB are linked to the Special Commission for the Natural Risk and Disaster Management (CEGERD), which makes decisions on the other NDRM processes on the basis of known risks. When the CEGERD was created, it was under the purview of the Government Management Secretariat. According to the participants, internal disagreements resulted in its being subordinate to the Municipal Secretariat for Urban Planning (SEPLAN). Although the commission should meet regularly, this has not been the case. It is clear that the coordination among the secretariats overseen by the commission must be improved because of the fundamental importance to the intra-governmental or sectoral integration envisioned by the PNPDEC.

According to Londe et al. (2014, p.142), coordination between agencies should be promoted to prevent future risks and to reduce existing risks because "it is not advisable

to wait for disasters to occur for inter-institutional communication” to occur. According to these authors, this type of coordination requires planning. At the moment of emergence, the information must flow quickly and clearly to facilitate rapid decision-making. This highlights the role of a commission that can translate these demands into integrated and participatory activities by diverse social agents.

Link C shows the relationship between the SEDECI and the PROGEM. Studies have been conducted regarding the revision to the decree nº 9,853 (BLUMENAU, 2012) that deals with land use and occupation restrictions.

According to the SEDECI participant:

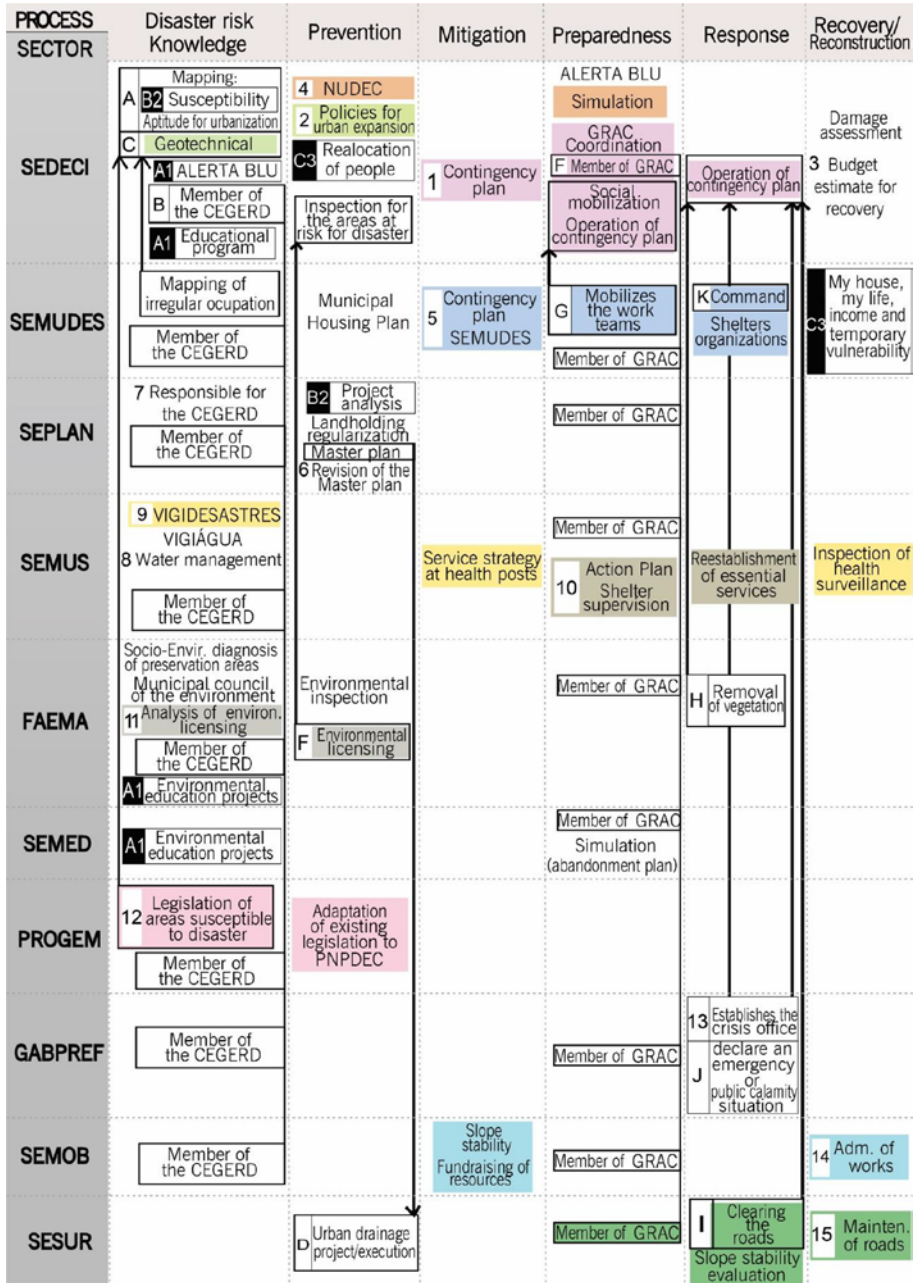
The revision of the decree “Identification of Geological Risk Areas—ARG’s,” which is actually the geotechnical chart of the aptitude for urbanization. A new mapping will be done (already existing on a 1/25,000 scale, which will be changed to 1/2,000–1/5,000) by the SEDECI Geology Directory.

Large-scale mapping was performed with a tool that is more precise and appropriate for urban planning. However, none of the participants indicated the relationship of these activities to the revision of the master plan (BLUMENAU, 2006), which is within the competence of the SEPLAN.

It is noteworthy that in ALERTABLU⁶, there was no evidence of coordination with another municipal body. It seemed that the issues associated with the digital platform (alert dissemination), such as monitoring (disaster risk knowledge) and network maintenance, were being addressed by the SEDECI professionals.

6. SEDECI’s contingency plan aims to organize public, private, and community members to avoid and reduce risks (flood, flash flood, and landslides).

Figure 2 –Synthesis of the disaster risk management activities and the coordination of the Blumenau agencies surveyed.



SEDECI – Municipal Secretariat of Citizens' Defense
 SEPLAN – Municipal Secretariat for Urban Planning
 FAEMA – Municipal Environmental Foundation
 PROGEM – Attorney General of the Municipality
 SEMOB – Municipal Secretariat of Works

SEMUDES – Municipal Department of Social Development
 SEMUS – Municipal Secretariat of Health
 SEMED – Municipal Secretariat of Education
 GABPREF – Mayor's Office
 SESUR – Municipal Secretariat of Urban Services

Source: Authors (2019).

3.2.1.2 Coordination of disaster risk prevention activities

Connection D illustrates the relationship between the SEPLAN and the SESUR. The review of the master plan revealed that only one measure related to urban drainage had been presented, and it was under the jurisdiction of the Blumenau Secretariat of Urban Services. According to the SEPLAN participant:

We need to make a master plan for urban drainage, possibly even a code to supplement the master plan so that it specifies the activities in an area of expertise not found in the municipality. It is very clear that that needs to evolve in this area. I think today this is one of the great points that needs to be incorporated and have not been over the years. [...] And the issue of urban drainage will also have to be covered through the municipality's comprehensive management of the water issue. So this is an extremely important point, and today the municipality is lacking in this. We need to move forward in this area, and the proposal is that by the end of 2016, we can advance on these guidelines on the issue of urban drainage in the city of Blumenau.

According to the secretary, the urban drainage planning needs to be better developed so that it is adequate for disaster risk reduction because water has been the main trigger for the disasters in the municipality. This could be accomplished through the revision of Blumenau's Basic Municipal Sanitation Plan.

The FAEMA and the SEDECI are linked at Connection E because of their environmental licensing and inspection activities. It should be noted that the SEDECI contingency plan asks the FAEMA with the development of effective inspections for the areas at risk for disaster. This would be in compliance with the master plan, and it would curb the occupation of preservation areas. During recovery/reconstruction, the FAEMA must prepare an environmental damage assessment report that is sent to the SEDECI to facilitate the development of recovery projects for the affected areas. There is also the SEPLAN's inspection of irregular and clandestine settlements and occupations. The participants did not mention the existence of any coordination between the SEPLAN and other agencies; therefore, no coordination is indicated in Figure 2. The respondents understood that irregular and clandestine occupations needed to be supervised, and residents needed to be resettled. This is a slow process compared to the rate at which the irregular occupation of areas vulnerable to natural disasters has occurred.

Considering that more than one municipal agency is involved in enforcement, it was understood that the relationships among them should be strengthened and that the disaster protocols should clearly define their activities. Therefore, it was necessary to specify each secretariat's area of responsibility and to communicate it to the community. Thus, the areas under the jurisdiction of each municipal body and the penalties for infractions would be known.

3.2.1.3 Coordination of disaster preparedness activities

Link F articulates the participation of the SEDECI, SEMUDES, SEPLAN, SEMUS, FAEMA, SEMED, GABPREF, SEMOB, and SESUR in the Coordinated Actions Group (GRAC). According to the SEDECI's contingency plan⁷, the municipal mayor is the president of the GRAC. The contingency plan also establishes the responsibilities of the GRAC members, who include representatives of federal, state, municipal, and nongovernmental organizations. The secretariats are involved in the coordination and operation phases of the contingency plan, and each has a specific role. Some of the managers who were interviewed did not discuss participation in the GRAC; however, the SEDECI's contingency plan describes the members.

Connection G links SEMUDES and SEDECI. As is stated in the SEDECI contingency plan and the SEMUDES report, the secretariat mobilizes the work teams in accordance with the plans for coordinating social assistance activities for the homeless. It also distributes the teams at the shelters. According to the SEMUDES contingency plan, which focuses on the shelters, and the data from the interviews, the activities at the shelters are well structured.

3.2.1.4 Coordination of disaster response activities

Link H shows the coordination of the FAEMA and the SEDECI activities. As was indicated in the report and the SEDECI contingency plan, the FAEMA is responsible for the removal of vegetation in the event of a disaster. According to the FAEMA technician:

In the event of a disaster, flood, or risk, if the level of readiness is reached, the FAEMA technicians must be ready to do the evaluation [...] if there is a need to remove certain vegetation on the site, if it is causing a risk of landslides, something like this. In the attention state, they call us and we give this support.

The I link shows the coordination between the SESUR and the SEDECI on clearing the roads. The SESUR participant reported:

In the event of a disaster, the Civil Defense initially makes an assessment to see what happened, and so it gives us the situation. The SESUR engineer, together with a geologist who assists him, makes an analysis and the decision is made to intervene at that moment or not.

According to the SEDECI contingency plan, the SESUR's services are related to desanding the rivers and streams, supplying trucks for the removal of the belongings of the homeless, and maintaining the flow of traffic on the streets. The data from the interviews

7. SEDECI's contingency plan aims to organize public, private, and community members to avoid and reduce risks (flood, flash flood, and landslides).

indicate that the SESUR team, which includes geologists, has received the appropriate preparation for ensuring that the roads are cleared in the event of a disaster.

Connection J illustrates the relationship between the GABPREF and the SEDECI. The municipal mayor summons the GRAC agencies and establishes the crisis office, which includes the members of these agencies. On the basis of the intensity of the event, the mayor decides whether an emergency or public calamity situation should be declared.

The SEMUDES and the SEDECI coordinate the activation of the shelters (Link K), as reported by the SEMUDES technician and indicated in the agency's contingency plan. The activation of the shelter is ordered by the Center for Civil Defense Operations (CODEC) when requested by the appropriate authorities. The SEMUDES takes command, a function headed by the manager of social assistance policy, who is responsible for the activation and operation of the shelters. It is up to this official to summon the strategic team to evaluate the situation and to appoint the teams to assist in the activities related to the shelters. The command is supported by the strategic team. These actions are well articulated in the SEDECI and the SEMUDES contingency plans to ensure the effectiveness of those responsible at each stage of the response.

3.2.2 Coordination of activities among the municipal public agencies

The data from the interviews indicate that the agency activities were developed internally. For example, at the (1) SEDECI, the key processes of mitigation, preparedness, and response were coordinated. The SEDECI contingency plan, which envisioned collaboration among private and community entities to mobilize the society, indicates the role of amateur radio operators. The activation of the shelters is also indicated in this contingency plan. The responsibilities of the various sectors are delineated, and the establishment of a communication structure, which includes the amateur radio, is given priority. (2) The disaster risk knowledge and prevention process are coordinated. According to the SEDECI participant, a new decree that would set forth the policies for urban expansion is under discussion, and the geotechnical charts to illustrate the aptitude for urbanization are being prepared. (3) During recovery/reconstruction, the SEDECI is also responsible for damage assessment and the development of the recovery/reconstruction budget. According to the participant:

Both during and after, the S2ID system of the federal government and the National Civil Defense, which is required for disasters, has the obligation to position the federal government within 24 hours after impact and to assess the situation, and then one week after the evaluation. So, within the S2ID, all the evaluations are already included, with a budget estimate for recovery for each structure that has been damaged.

According to the participants, (4) the simulations provided for in the PNPDEC are scheduled annually in Blumenau. The 2015 simulation was considered the largest in Brazil (BLUMENAU, 2015). The SEDECI has conducted its exercises on a smaller scale;

however, the civil defense groups (NUDECs) are still involved. According to the SEDECI participant: “[...] the feedback is very interesting. The community begins to know what the procedure is, to see how it is being trained: not only the community, but also the assistance teams.”

(5) At the SEMUDES, the entire shelter planning and operation process is related to mitigation, preparedness, and response, as was indicated in the interview. (6) The SEPLAN is responsible for reviewing the master plan, which went into effect in 2015. One of the aims is for the master plan to be aligned with the disaster risk prevention policies. Effective risk management requires the integration of other policies, such as basic sanitation, water resources, and, especially, territorial planning. According to Momm-Schult et al. (2013), land use and occupation policies are central to increasing community resilience to natural disasters and water resources management. Also of note is that (7) CEGERD is currently chaired by the SEPLAN, which coordinates disaster risk knowledge process. However, the meetings have not been held monthly as set forth in the decree nº 10,124/2013 (BLUMENAU, 2013b). There is a belief that this should be an ongoing activity because it is intended to manage not only disasters (reactive management) but also disaster risks (corrective and prospective management). Thus, the CEGERD can act as an instrument of social control. The diversity of its membership means that the members can listen to the opinions and concerns of their communities, including the higher education institutions and other social agents.

(8) In the SEMUS, relationships are created through disaster risk knowledge process, and this is reflected in the response. Referring to the Vigiágua program, the director stated:

“The Vigiágua is a program that exists within the Board of Sanitary Surveillance and coordinates part of the distribution of chlorine, distribution of drinking water, and informs if they can use the waters of a certain source or not, e.g. rainwater.”

(9) Vigidesastres is another SEMUS program associated with disaster risk knowledge process for mitigation, preparedness, response, recovery, and reconstruction. According to the participant, it coordinates and implements the secretariat’s disaster risk management activities surrounding the key processes. However, the implementation of Vigidesastres was questioned in another study (MOURA, 2019).

(10) The SEMUS participant also commented on the board’s contingency plan, which stresses preparedness and response. The Municipal Health Department determines “what” should be done and “who” should coordinate the activities required to cope with a natural disaster. The plan relies on employee registration logistics and activities pertinent to each employee to maintain the health posts and, if necessary, to re-establish essential health services.

(11) At the FAEMA, there is a relationship between disaster risk knowledge and prevention because of environmental licensing, which addresses urban and environmental planning in the municipality. (12) According to the PROGEM participant, all of the reviews of the legal documents related to disaster risk reduction are being adapted as

PNPDEC (BRAZIL, 2012) contemplates, thus integrating disaster risk knowledge and prevention process. (13) In the response phase, once the crisis cabinet has been established at the GABPREF, an emergency situation or state of public calamity is decreed depending on the magnitude of the event. (14) The SEMOB lists the activities for the key mitigation, recovery, and reconstruction phases. These are mainly fundraising, administration, and construction inspection as polders. (15) According to the SEDECI's contingency plan, the SESUR is involved in preparedness, response, recovery, and reconstruction. It coordinates the activities related to urban drainage, road clearing and maintenance, and slope stability evaluation.

3.2.3 Cross-functional coordination of activities

The relationships among the SEDECI, FAEMA, and SEMED through their environmental educational programs are illustrated at Connection A1. These activities are indicated only for disaster risk knowledge, the basis for the other phases, because of the physical limitations of the table layout. The FAEMA and the SEMED managers indicated that there were two environmental education projects: (1) *Civil Defense at the School* and (2) *Junior Civil Defense Agent* from the SEDECI Civil Defense Directory. The SEMED does not have an environmental education program; thus, the secretariats work in partnership. The SEMED manager also highlighted ALERTABLU⁸, which is used mainly in the preparedness phase. The manager mentioned the “rain gauges that are placed in some schools”. According to the participant, ALERTABLU coordinates the work, especially in the schools located in the landslide and flood zones. During the interview, the SEMED representative identified the need for improved centralization of the information related to the schools.

The SEDECI participant described Connection B2, the relationship between the SEDECI and the SEPLAN:

“We are developing the technique for risk and hazard mapping [GIDES Project] that will later be used in Brazil. So, here’s how it works at the 1/25,000 scale here in Blumenau. For example, any request for feasibility, construction, projects, the first secretariat consulted is ours to see if it has geological risks.”

The susceptibility mapping is related to the project analysis that is performed by the SEPLAN. This relationship must be strengthened because neither the law nor the interviews have specified the agency responsible for mapping or integrating the SEPLAN data with the SEDECI geotechnical charts.

The C3 link between the SEMUDES and the SEDECI indicates a relationship regarding population relocation. According to the SEDECI participant:

8. Extreme event monitoring and warning system in Blumenau. Access to the information is free via the internet and smartphone applications (BLUMENAU, 2016a).

“The problem is housing. It reduces this offer more and more because it is very difficult to do this reallocation. These people, many of them, have been relocated to housing programs of the federal government and the ‘Caixa Economica’ [bank].”

This suggests the need to address the issue of the relocation of people living in high-risk areas.

4 Conclusions and perspectives

The Blumenau municipality’s public policies for risk management have been increasing in complexity. They rely on the expertise and legal guidelines developed by several management bodies. The findings from the interviews indicate that while multiple agencies have been involved, the coordination of their activities needs improvement.

It is therefore recommended that the legal requirements of the SEDECI and the other agencies responsible for natural disaster risk management in Blumenau be articulated in accordance with the PNPDEC to facilitate an integrated approach. Regarding disaster risk mitigation, it is noteworthy that none of the agencies interviewed mentioned participation in discussions on flood risk reduction measures for the Itajaí River basin. The Secretariat of State for Civil Defense has developed a series of flood risk mitigation measures, which have been discussed by the Itajaí Committee. However, the data suggest that the Blumenau public agencies had not internalized this discussion.

There is also a need for improved coordination with institutions at other federal levels, especially the regional level, e.g., the Itajaí Committee, because natural events have potential harmful effects for the entire Itajaí River basin. In addition, the PNPDEC and the Water Resources Policy consider the river basin a unit of analysis for the disaster risk prevention and mitigation activities associated with floods.

A significant number of disaster risk knowledge activities were found to occur in the municipality. Although disaster risk knowledge is the basis for all activities, coordination among the agencies seemed to be weak. In addition, coordination with the university was not indicated despite the institution’s expertise in disaster risk prevention and mitigation gained through research, as per the PNPDEC guidelines. These relationships could also be strengthened through the CEGERD. It must be noted that according to the interviews that were conducted and the activities in which the CEGERD is reported to have engaged, the agency needs to be strengthened and diversified. Such a commission can promote the decentralization and effectiveness of activities while improving coordination among the municipal agencies. It can also enhance the relationship between the society and the other federal entities, as well as the higher education institutions and the Basin Committee.

An important point was the discussion and review of the master plan. A suggestion was that it be integrated with an urban drainage plan. Another concern was the relocation of the citizens living in the areas classified as being highly susceptible to landslides. This proposal reinforces the need for an entity that promotes dialogue among the various public agencies, private initiatives, and, especially, the population at large. This would

strengthen the civil defense groups. Thus, the study proposes that the municipality promote participation, transparency, and diversity in the context of administrative complexity (focus of this study) and democracy, increase civic engagement.

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Original Article

URBAN PUBLIC POLICY FOR NATURAL DISASTER RISK MANAGEMENT IN BLUMENAU-SC: PROCESSES AND ACTIVITIES

Abstract: The objective of this study was the analysis of urban public policy for natural disaster risk management in the city of Blumenau, Santa Catarina, Brazil. Two approaches were used: (1) A survey of the municipal public agencies responsible for disaster risk management was conducted. (2) The surveyed agencies' representatives' ideas and activities regarding natural disaster risk were analyzed. A systemic approach was adopted, bibliographical research was performed, and interviews were conducted with 10 municipal public managers. The results facilitated the description of the municipal public disaster risk management organizational structure and the ideas and activities related to disaster risk knowledge, prevention, mitigation, preparedness, response, recovery/reconstruction. The study concludes that there is a need for improvements in the coordination among the municipal public agencies and in shared responsibilities of the federal entities and the society for disaster risk management.

Keywords: public management, disaster risks, hydrological phenomena, flood, landslide.

Resumo: Objetivou-se analisar as políticas públicas urbanas de gestão de riscos de desastres naturais do município de Blumenau, Santa Catarina. Dois domínios foram analisados: (1) levantamento dos órgãos públicos municipais responsáveis pela gestão de riscos de desastres e (2) ações e ideias relatadas pelos representantes dos órgãos pesquisados sobre a temática dos riscos de desastres naturais. Adotou-se a abordagem sistêmica, utilizando-se pesquisa bibliográfica e entrevistas com dez gestores públicos municipais. Os resultados possibilitaram a descrição da estrutura organizacional pública municipal de gestão de riscos de desastres, assim como o levantamento de ações e ideias relacionadas aos processos de geração de conhecimento, prevenção, mitigação, preparação, resposta e reconstrução. Na conclusão aponta-se a necessidade de fortalecimento da integração entre os órgãos públicos municipais e de compartilhamento da gestão de riscos de desastres com outros entes federativos e a sociedade.

Palavras-chave: gestão pública, riscos de desastres, fenômenos hidrológicos, inundação, deslizamento.

Resumen: El objetivo es analizar las políticas públicas urbanas de gestión de riesgos de desastres naturales de la municipalidad de Blumenau, Santa Catarina. Dos dominios fueron analizados: (1) levantamiento de los órganos públicos municipales responsables de la

gestión de riesgos de desastres y (2) acciones e ideas relacionadas por los representantes de los órganos pesquisados sobre la temática de los riesgos de desastres naturales. Se ha adoptado la abordaje sistémica, utilizando-se técnicas de investigación bibliográfica y entrevistas con los gestores públicos municipales. Los resultados posibilitaron la descripción de la estructura pública municipal para la gestión de riesgos de desastres, así como también el levantamiento de acciones e ideas relacionadas a los procesos de generación de conocimiento, previsión, mitigación, preparación, respuesta y reconstrucción. Para concluir se señalan la necesidad de integración entre los órganos públicos municipales y también de compartir la gestión de riesgos de desastres con otras entidades federales y con la sociedad.

Palabra clave: gestión pública, riesgos de desastres, fenómenos hidrológicos, inundación, deslizamiento.
