

The social capacities of families in the Chone canton's urban area in the face of physical vulnerability to the threat of flooding

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Abstract: A capability is a quality or circumstance consisting of being able to efficiently perform an action, activity, aptitude, or effectiveness. It is an aptitude or talent that equips someone to successfully perform something. In this sense, different types of capabilities have been identified; one of these is social capability. This concept encompasses the generation and development of knowledge on key topics, including climate information, vulnerability information, and the building of resilience in different systems and sectors, as well as the recovery of traditional practices. Using a descriptive, exploratory, and qualitative-quantitative methodological perspective, this research aims to address the social capabilities of families in the urban area of the Chone canton, Manabí province, in the face of physical vulnerability to the threat of flooding. It is based on the idea that this capability constitutes a relevant and pertinent articulating axis for the development of public policies and their impact on reducing vulnerability conditions, both in social and economic systems, as well as in strengthening the resilience of ecosystems and natural capital. As a result of this work, it is established that the incorporation of social capacities into municipal planning promotes new forms of active participation where society is included throughout the entire process of formulating, implementing, and evaluating public policies for adaptation and climate change. Therefore, it is concluded that such capacities contribute to streamlining the systematization, coordination, and connection of knowledge with decision-making in a Decentralized Autonomous Government (GAD) such as the one considered in this study.

Key words: social capacities; vulnerability; Chone canton; floods; public policies

1 Introduction

Social capabilities are conceived as the ability to make decisions and behave successfully in a given situation, anticipating, responding to, coping with, recovering from, or adapting to the negative impacts of an external disturbance, as well as employing the necessary resources. In the specific case of this study, the aim is to provide a holistic and comprehensive perspective on the management of these types of capabilities among families in the urban area of Chone canton, facing physical vulnerability to the threat of flooding.

According to Fukuda et al. (2002), social capabilities are contextual competencies that include valuable elements in risk and disaster prevention, such as public policy, legislation, and national budgets. These components are energized through political management and lobbying. Incorporating this concept promotes the design and validation of agreements, mechanisms, and instruments for developing capacities for horizontal coordination among different institutions at both the

local and national levels.

In this context, this research paper aims to investigate how effective flood risk management utilizes families' social capabilities within the framework of public participation obligations. It details how participation occurs, the characteristics of the participants, and the conditions of the participatory process.

This paper argues that family participation contributes to building social capacities for more effective flood risk management, and analyzes which factors are most relevant in this construction.

2 Methodology (materials and methods)

This is a descriptive and exploratory study with a qualitative and quantitative approach. Bibliographic and documentary research analysis methods were also employed.

Along with quantitative and qualitative aspects, this research employs the descriptive method, the purpose of which is to gain a first understanding of reality as it emerges from the researcher's direct observation and the knowledge acquired through the indirect information obtained.

The descriptive method is one of the variants of the qualitative paradigm and aims to evaluate certain characteristics of a population or particular situation. Describing, in this case, is synonymous with measuring. Variables or concepts are measured to specify the important characteristics of individuals, communities, human groups, or the phenomenon being analyzed. Therefore, it is a method whose purpose is to obtain, interpret, and present, with the greatest possible rigor and accuracy, information about a reality according to certain criteria previously established by each science. From the above, it can be deduced that the descriptive method is the most appropriate for obtaining the necessary information for the analysis of virtual classrooms as an interactive learning environment in Ecuadorian higher education (Hernández y Mendoza, 2018).

Finally, the methodological approach was completed with a bibliographic-documentary perspective, which allows for the compilation of existing theory on the proposed object of study. According to Hernández (2014), this approach analyzes various documentary sources useful for shaping the theoretical foundation and contributes to a better understanding of the methodological issues of the research.

The sample consisted of 60 male and female heads of household, whose families live near the banks of the river in Chone and are considered vulnerable to the threat of this natural phenomenon. The data collection technique was a survey, which was applied to this population group. This technique is an instrument that allows for the collection of general information and perspectives from a group of people. According to Hernández and Mendoza (2018), the survey is a research study conducted on a sample of subjects representative of a broader group and uses standardized questioning procedures to obtain quantitative measures of objective and subjective characteristics of the population. The proposed methodological framework serves to achieve the main purposes of this research.

2.1 Population awareness about floods

The population studied through the different research instruments has shown interest in the problems presented, so as a strategy to reduce social vulnerability it is pertinent to generate and improve the skills of the population, through increasing social capacities combating vulnerability and the risk of flooding.

Thus, and based on a pertinent theoretical foundation, a survey was conducted among 60 male and female heads of households whose families live near the banks of the Chone River and are considered vulnerable to the threat of this natural phenomenon. Therefore, a system of indicators was developed to evaluate the existence of social capabilities among families in this area, which are related to flood risk management. This section details the results of these surveys. It should be noted that the development of this instrument was based on research by Ciuró (2017) and Kuhlicke et al. (2011),

detailed in the discussion section of this paper, on the implications of each type of social capability related to the following aspects: knowledge, interest and/or motivation, social networks, participation, and financing.

Table 1. What do floods mean to you?

Variables	Heads of families	Percentage %
A crucial emergency requiring the intervention of local authorities	30	50%
An inevitable natural episode that I must be prepared to deal with without the intervention of public authorities.	12	20%
An inevitable natural event that I must be prepared to deal with, and where intervention by local authorities is only required when it is a very critical situation.	18	30%
Other (specify)	0	0%
Total	60	100%

This first question of the survey assesses household heads' knowledge of flooding. 50% of respondents believe it is a critical emergency requiring the intervention of local authorities. Twenty percent believe it is an unavoidable natural event that they must be prepared to deal with without the intervention of public authorities. Another 30% believe it is an unavoidable natural event that they must be prepared to deal with, and only in very critical situations is the intervention of local authorities required.

2.2 Vulnerability to natural phenomena

The Chone canton has an area of 3,570 square kilometers and is located in the north-central coastal region of Ecuador on a vast plain crossed by the Chone River at an altitude of 17 meters above sea level. It has a population of 150,000.

Rojas et al. (2014) define a flood as the rise of water above the normal level of the riverbed. Normal level should be understood as the elevation of the water surface that does not cause damage, that is, a flood is an elevation greater than usual in the riverbed, which can cause losses. Floods occur more frequently during heavy rains, when natural waterways lack the capacity to transmit excess water. Furthermore, they are directly related to human actions, since they exert actions in the place they live, such as uncontrolled urbanization, pollution, uncontrolled agricultural activities or industrialization, without realizing the future consequences since they are largely located near rivers, estuaries, seas, mangroves, and are exposed areas.

Table 2. To what extent do you consider yourself and your family vulnerable to natural phenomena such as floods?

Variables	Heads of households	Heads of households
Always	9	15%
Often	42	70%
Occasionally	9	15%
Rarely	0	0%
Never	0	0%
Total	60	100%

own elaboration

In this second question, 15% of heads of household in the Chone canton indicated that they are always vulnerable to natural phenomena such as floods. They often indicated that it was 70%. Finally, the remaining 15% stated that it was occasionally.

The previous and this questions assess the community's level of knowledge about floods. That is, they assess the level of knowledge about flood risk management, the ability to exchange and transfer knowledge, and the learning capacity. According to Ciuró (2017), knowledge about the risk of flooding is generally present. From the results, it can be concluded that knowledge about flood risk management and the capacity for learning and openness to local knowledge is neither widespread nor uniform.

2.3 About motivation

The city of Chone has a population of 52,810 according to the 2010 census, making it the third most populous city in the province. It is the core of the Chone metropolitan area, which also includes nearby cities and rural parishes. It is one of the province's main economic drivers through activities such as agriculture, commerce, and livestock. The latter makes the canton the leading livestock center in the province, with nearly 300,000 head of cattle adapted to the harsh conditions of the tropical mountains (Delgado and Manjarrés, 2019).

In the case of the Chone canton, the existence of disaster risk threats, particularly during the rainy season, has not only natural but also man-made causes, which is why it is necessary to diagnose social vulnerabilities and develop capacities to reduce risks. According to Correa and Ramírez (2011), the risk of various phenomena such as flooding, for example, constitutes a latent condition in our environment and represents potential damage in the future. Risk can be anticipated, but it also allows society to intervene in its prevention and mitigation.

In this context, Loyola (2019) argues that floods affect more people worldwide than any other hazard. Floods occur in various forms, including flash floods, coastal flooding, surface water flooding, and inundation flooding.

Table 3. How do you rate the level of motivation you receive from the Chone Regional Government (GAD) authorities to get involved in training and prevention activities for natural phenomena such as floods?

Variables	Heads of families	Percentage %
Very satisfactory	0	0%
Satisfactory	0	0%
Unsatisfactory	6	10%
Not satisfactory	54	90%
Prefers not to comment	0	0%
Total	60	100%

own elaboration

In this third question of the survey, the vast majority, or 90%, considered the level of motivation they receive from the Chone Regional Government authorities to engage in training and flood prevention activities to be less than satisfactory. Only 10% considered it unsatisfactory.

The motivation to prepare for a flood event, the capacity for action, and the motivation to work with other actors are evaluated. According to Reyes (2019), the actions taken by the population in relation to flood risk management are concentrated during the emergency, when social involvement and collaboration between the different actors are significant. Preparedness for a flood event is considered important by the affected population, although the degree of motivation to get involved in flood management is not very high.

2.4 Social networks

Physical vulnerability refers especially to the location of human settlements in risk areas, and the deficiencies of their

physical structures to absorb the effects of these risks. For this reason, it is relevant to know the community's assessment of the dissemination in social networks by cantonal authorities of prevention activities on natural phenomena such as floods. It should be noted that the main networks used for dissemination are. Facebook, Twitter and Instagram.

According to Ramírez (2017), socialization in social networks is essential. Emphasis should be placed, above all, on how physical vulnerability refers to the resistance and susceptibility of infrastructures to the occurrence of an event. It is, in any case, the physical property of the exposed assets, which is directly related to the quality or type of material used and the type of construction of housing, economic establishments (commercial and industrial) and services (health, education, public institutions), and socioeconomic infrastructure (hydroelectric plants, roads, bridges and risk systems), to assimilate the effects of the phenomena that constitute a hazard.

According to Vázquez et al. (2016), physical vulnerability is framed in the analysis of the infrastructure of the study area; that is, the constructions and related conditions of these are analyzed, measured by the type of construction material of the houses, since this determines their stability and durability, collapse or support in the event of the phenomenon; the location and localization of the houses, since those that are closer to the site of the phenomenon are more vulnerable; the geological, topographical, morphological characteristics and type of foundation soil of the houses or structures, since this determines the permeability of the land and the stability of the buildings; in addition, it is analyzed whether or not the infrastructure complies with the law.

Table 4. How do you rate the dissemination on social media by cantonal authorities of prevention activities related to natural phenomena such as floods?

Variables	Heads of	Percentage %
Very satisfactory	0	0%
Satisfactory	0	0%
Unsatisfactory	12	20%
Not satisfactory	48	80%
Prefers not to comment	0	0%
Total	60	100%

own elaboration

In this fourth question of the survey, the vast majority, i.e. 80%, considered the dissemination of prevention activities on social networks by cantonal authorities on natural phenomena such as floods as not satisfactory at all, while the remaining 20% considered it as not very satisfactory.

This section evaluated the presence of social networks related to flood risk management in the territory, and their organizational and self-management capacity. According to Ramírez (2017), information management through these platforms is essential for working on flood risk management. These networks formed by environmental collectives usually have organizational and self-management capacity.

2.5 About participation

Vulnerability refers to the susceptibility of an element to suffer damage in the face of a hazard, which in this case is the threat of flooding. Regarding the Chone River, which is the subject of this study, a study by Delgado and Manjarrés (2019) indicates that it is the most important river, due to its water flow, which rises from the western slopes of the Balzar Mountain Range; it flows into Bahía de Caráquez, after receiving the waters of the following tributaries: on the right bank, the Mosquito, Garrapata, San Lorenzo and Los Bravíos rivers. On the left bank: the Tosagua River, with its tributaries the Canuto and Calceta.

From the perspective of Buenaño (2013), linking social capacities with community development goes hand in hand with community education. This implies promoting the initiative of community participation in problems of their environment, whether economic, cultural, social, etc., which as a result implies finding their own ways out of the risk situation in which they may live. Capacity building from the community development approach focuses on changing the attitudes and behaviors of the population as a technique for social action. From capacity building it is then possible to see the other side of the situation, turning threats and vulnerabilities into opportunities for change that come from the participation and empowerment of communities, identifying responsibility for intervention in society.

A study by the United Nations Development Programme (2012) indicates that capacities in the context of the design, articulation and implementation of public policies for adaptation present the following axes:

- Development of public policies and their impact on the reduction of vulnerability conditions, both in the social and economic systems, as well as in strengthening the resilience of ecosystems and natural capital.
- Articulation of policies and design of cross-cutting instruments for ecological land use planning and watershed management at the macro, meso, and micro levels.
- Strengthening the legal obligation for the formulation, implementation and full compliance with the public policy for adaptation and climate change.
- Generation and development of knowledge on several key topics, including climate information, information on vulnerability and resilience building in different systems and sectors, and the recovery of traditional practices.

In this sense, Barragán and Núñez (2020) consider that community leadership, based on the role played by the family, is also a key contribution to motivating the rest of the population in the sector to develop productive activities that improve their living conditions.

Table 5. Do you participate or have any type of social involvement in the activities programmed by the GAD of Chone on flood risk management?

Variables	Heads of families	Percentage %
Always	0	0%
Often	0	0%
Occasionally	6	10%
Seldom	54	90%
Never	0	0%
Total	60	100%

own elaboration

In this penultimate question of the survey, 90% answered that they rarely participate or have some type of social involvement in the activities programmed by the GAD of Chone on flood risk management, while only 10% indicated that they do so occasionally.

This section evaluates the existence of spaces for participation in flood risk management and the capacity for openness and redistribution of roles and tasks in this management. It can be deduced from this result that the community of Chone does not have a space for involvement in these processes.

2.6 About financing

For Ciuró (2017), there is a significant lack of knowledge about funding responsibilities in flood risk management and about whether there are resources for mitigation and what their origin is. In this sense, funding possibilities for community action projects related to this management are practically nonexistent, those that have been carried out have been mostly

financed with municipal funds. Likewise, the experience in fund management (beyond municipal funds) of the affected populations is very low.

Given the link between social capacities and vulnerability, it is conceived that these types of capacities are an intrinsic part of risk. Based on the above, an approach, stipulated by Ciuró (2017) and Kuhlicke, et al. (2011), is presented on the implications of each type of social capacities in the specific field of flood risk management:

- Social capabilities related to Knowledge: Without knowledge of the possibility of being flooded the opportunity to prepare is practically nil, and the potential damages are very high. Without preparation on how to react to a flood event the response is low and potential damages are high. Without knowledge about the flood phenomenon, prevention and defense are ineffective. Without knowledge of responsibilities and competencies, action is potentially conflictive, uncoordinated and therefore ineffective.

- Social capabilities related to Motivation: Without motivation, action and participation in protective measures is unlikely and potential harm is very high. Without motivation for collective work, prevention is unlikely, and without collective work in the response phase, the effectiveness is also lower.

- Social capacities related to networks: Networks are channels for knowledge transmission and motivation generation, and allow for more effective and active resource management and citizen participation. Without the existence of functional social networks, mitigation measures and response are less effective. On the other hand, social interaction through networks can lead to the generation of personal and interpersonal trust, and in situations usually characterized by a certain degree of uncertainty, trust is essential: Trust allows for greater agility in actions involving several actors and consequently greater effectiveness in flood risk management.

- Social capacities related to Participation: Social involvement contributes to more effective flood risk management, greater co-responsibility and greater autonomy of affected communities to manage their own risk. In turn, greater or better public participation in decision-making can increase the generation of knowledge about flood risk management, the degree of motivation to become involved in flood risk management, the creation of networks, and even the generation of funding initiatives.

- Social capacities related to Financing: Resources are needed to mitigate, respond and recover from floods. Without resources there is no investment in the preparedness phase and damages are potentially very high. Insurance is important to recover from flood damage, without it recovery is lower.

Table 6. Who should bear the costs to protect citizens from flooding?

Variables	Heads of households	Percentage %
The National Government	45	75%
The GAD Chone	9	15%
A citizen organization	0	0%
The neighborhood leaders	6	10%
Ignorance of the subject	0	0%
Total	60	100%

own elaboration

In this final survey question, 75% of household heads surveyed stated that the National Government should assume the costs of protecting citizens from flooding. 15%, however, indicated that it should be the Decentralized Autonomous Government of Chone. Finally, only 10% stated that it should be neighborhood leaders.

3 Conclusion

Social capacities are relevant to flood risk management because they are an intrinsic part of vulnerability, and vulnerability is an intrinsic part of risk. Public participation by families in the Chone canton is equally relevant because risk management is built on a specific perception of risk. This perception is directly related to existing social capacities, and the existence of these capacities could determine the impact of the participatory process on short-, medium-, and long-term decision-making.

It should be noted that both the results and discussion sections considered the following aspects regarding the implications of each type of social capabilities in the specific area of flood risk management:

a) Knowledge: knowledge about risk and danger, preparation, action, recovery, other actors and institutions involved, the legal framework.

b) Motivation: motivation to prepare for, cope with, and recover from impacts, sense of responsibility.

c) Networks: social media and capacity for mutual recognition.

d) Participation: equity, transparency, accountability, diversity of actors and solutions.

e) Funding: existence or availability of financial resources.

In this sense, the participatory development of social capacities linked to flood risk management can contribute to flood risk mitigation through vulnerability reduction, which reaffirms the importance of participation and communication. However, in terms of capacities, there is a low level of awareness about the hazard, the risk, and the measures to prevent and mitigate it. From this perspective, the community finds itself in a weak context of community participation due to its limited sense of belonging, participation, and leadership.

In conclusion, it is worth highlighting the possibility of integrating the entire conceptual and methodological development of this type of study into a participatory social capacity-building tool for more effective flood risk management, usable by stakeholders or competent authorities.

Conflicts of interest

The author declares no conflicts of interest regarding the publication of this paper.

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