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CAPACITY BUILDING IN RESILIENT COMMUNITIES IN LAND MANAGEMENT KNOWLEDGE, DISASTER RISK AWARENESS, ADAPTATION AND MITIGATION TO CLIMATE CHANGE

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Resumen:

Los efectos del cambio climático y la variabilidad climática y las afectaciones por desastres naturales se encuentran relacionado a las condiciones hidrometeorológicas van en aumento, debido a esto, es necesario implementar estrategias que permitan aumentar la resiliencia en los territorios y preparar a la comunidad para la respuesta, con el objetivo de salvar vidas y reducir pérdidas. El objetivo de la realización de la investigación es proponer una nueva estructura para los sistemas de alerta temprana climatológico (SATC) ante eventos extremos del clima, como medida de adaptación al cambio climático, basado en las experiencias del sistema de alerta temprana climatológica de Norte de Santander (Colombia). en sus dos fases, ejecutadas por la Universidad de Pamplona, en alianza con la unidad nacional para la gestión del riesgo de desastres – UNGRD y la gobernación de Norte de Santander, Colombia. Esta nueva propuesta le apuesta a un nuevo Sistema con enfoque de abajo hacia arriba, desde la construcción colectiva de la gobernanza del riesgo y la corresponsabilidad en el conocimiento del riesgo, reducción del riesgo y manejo de desastres.

Palabras Claves. Resiliencia, gestión del riesgo, planificación territorial, eventos climáticos extremos

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STRENGTHENING CAPACITIES IN RESILIENT COMMUNITIES IN KNOWLEDGE OF TERRITORY MANAGEMENT, AWARENESS OF DISASTER RISK, ADAPTATION AND MITIGATION TO CLIMATE CHANGE

Abstract:

The effects of climate change and climate variability and the effects of natural disasters are related to hydrometeorological conditions and are increasing. Due to this, it is necessary to implement strategies that increase resilience in the territories and prepare the community for the response. , with the aim of saving lives and reducing losses. The objective of carrying out the research is to propose a new structure for climatological early warning systems (SATC) in the face of extreme climate events, as a measure of adaptation to climate change, based on the experiences of the climatological early warning system of Northern Santander (Colombia). in its two phases, executed by the University of Pamplona, in alliance with the national unit for disaster risk management – UNGRD and the government of Norte de Santander, Colombia. This new proposal is committed to a new System with a bottom-up approach, from the collective construction of risk governance and co-responsibility in risk knowledge, risk reduction and disaster management.
Keywords. Resilience, risk management, territorial planning, extreme climate events

FORTALECENDO AS CAPACIDADES DAS COMUNIDADES RESILIENTES NO CONHECIMENTO DA GESTÃO DO TERRITÓRIO, CONSCIENTIZAÇÃO DO RISCO DE DESASTRES, ADAPTAÇÃO E MITIGAÇÃO ÀS MUDANÇAS CLIMÁTICAS

Resumo:

Os efeitos das alterações climáticas e da variabilidade climática e os efeitos dos desastres naturais estão relacionados com as condições hidrometeorológicas e são crescentes, pelo que é necessário implementar estratégias que aumentem a resiliência nos territórios e preparem a comunidade para a resposta. objetivo de salvar vidas e reduzir perdas. O objetivo da realização da pesquisa é propor uma nova estrutura para sistemas de alerta precoce climatológico (SATC) diante de eventos climáticos extremos, como medida de adaptação às mudanças climáticas, com base nas experiências do sistema de alerta precoce climatológico do Norte. Santander (Colômbia). em suas duas fases, executadas pela Universidade de Pamplona, em aliança com a unidade nacional de gestão de risco de desastres – UNGRD e o governo do Norte de Santander, Colômbia. Esta nova proposta aposta num novo Sistema com uma abordagem bottom-up, a partir da construção colectiva da governação do risco e da corresponsabilidade no conhecimento do risco, na redução do risco e na gestão de desastres.
Palavras chave. Resiliência, gestão de riscos, planeamento territorial, eventos climáticos extremo

1. INTRODUCTION:

Capacity building in resilient communities in land management knowledge, disaster risk awareness, adaptation, climate change mitigation and early warning, is proposed as a response to the limited technical, institutional and financial capacities for climate change management articulated to disaster risk management by the CTGRD derived from the fact that there are municipalities highly vulnerable to the effects of climate change, which has impacts on inter-institutional coordination, formulation, implementation and monitoring of policies, programs and projects for risk reduction and adaptation to climate change. This problem is expressed in 4 main causes:

1. Poor articulation of climate change and risk management agendas at the territorial level in Colombia.
2. Lack of clear knowledge on the part of territorial risk management coordinators on climate change and climate variability adaptation and mitigation issues.
3. Lack of clarity on the roles of the territorial risk management councils in the regional climate change nodes.
4. Low capacities of the CTGRD to incorporate climate change and variability criteria in the Municipal Disaster Risk Management Plans.

Local authorities, universities and other institutions are seeking strategies to increase the capacity for adaptation and resilience to the impacts of extreme climate phenomena, such as floods, droughts, landslides due to rain, among others, The main impacts generated in recent years are associated with climate change scenarios and the La Niña phenomenon, which in the country were known as "the 2010-2011 winter wave", which hit the department of Norte de Santander hard (Becher, 2012), where human and economic losses were recorded, leading to a setback in regional development. These impacts reveal great difficulties at the regional and local level in dealing with emergencies, difficulties in accessing hydroclimatic information, which is key for climate risk zoning and the generation of early warnings, as well as other necessary inputs to support decision-making and planning processes, land use planning, risk management and adaptation to climate change (Alzate, Rojas and Mosquera, 2015).

2. METHODOLOGY:

For the generation of this SATC structure as a measure of adaptation to climate change from the bottom-up approach, a study of the state of the art of SATC in Colombia and at the international level with its different approaches is carried out, where its strengths, weaknesses and aspects to be improved are analyzed, which function as determinants for the structuring of this model. It is complemented with the lessons learned from the two phases of implementation of this SATC, where community participation, scientific capacity building, governance and sustainability are key aspects for the implementation and execution of an SATC.

3. THEORETICAL BACKGROUND: CONTEXTUALIZATION OF EARLY WARNING SYSTEMS

Climate early warning systems (SATC) as a strategy to reduce losses and save lives. Throughout the last decades, there has been growing interest in implementing different strategies to reduce the impacts of climate variability and climate change, related to inadequate anthropic dynamics, which increase exposure to disasters and vulnerability to the occurrence of an extreme weather event, "the exposure and vulnerability of people and communities are different depending on inequalities in levels of wealth and education, disability and health status, as well as gender, age, social class and other social and cultural characteristics" (2012, IPCC, p. 6), the annual losses generated by this type of phenomena vary from

billions of dollars to more than 200 billion dollars, according to the report of the Intergovernmental Panel on Climate Change, which only considers economic aspects and does not monetize the loss of human lives, the damage to ecosystems and the significant impact on cultural heritage.

According to ISDR, climate early warning systems (SATC) are defined as the "set of capacities necessary to generate and disseminate timely and effective warning information that allows threatened people, communities and organizations to prepare and act appropriately and with sufficient time to reduce the possibility of damage or loss", are considered as a strategy to reduce the impacts of extreme climate events and as a measure of adaptation to climate change, since they contribute to reduce losses and save lives, from the scenarios of risk awareness, risk reduction, prevention and preparedness, where risk is understood as "the combination of the probability of an event occurring and its negative consequences" (UNISDR, 2009).

In Colombia there is Law 1523, which defines risk management as "a social process oriented to the formulation, implementation, monitoring and evaluation of policies, strategies, plans, programs, regulations, instruments, measures and permanent actions for the knowledge and reduction of risk and for disaster management, with the explicit purpose of contributing to safety, welfare, quality of life of people and sustainable development" (Congress of Colombia, 2012, p.1). It establishes that risk management is the responsibility of all Colombians, including authorities and inhabitants.

Disaster risk management in Colombia is based on three processes: risk awareness, risk reduction and disaster management. Risk knowledge is the process that prioritizes the identification, characterization and prioritization of risk scenarios present in the territory, the study and evaluation of risk, hazard monitoring and risk communication.

Risk reduction refers to interventions aimed at reducing present and future risk conditions in the territory, risk mitigation and prevention, with the objective of reducing the threat, the exposed elements, so that losses are minimal with the occurrence of a hazardous event, within this process is the prospective intervention and financial protection.

Disaster management is the process of emergency response preparedness, post-disaster recovery, and the execution of emergency response, rehabilitation, and recovery.

Early warning systems are located as a planning instrument that articulates the processes of disaster risk management. See figure 1, since, from its different processes, it promotes knowledge of the territory and its risk scenarios, establishes measures to reduce the impacts of a possible occurrence of a hazardous event and establishes measures for prevention and action in the event of an emergency.

Figure 1: Contributions of SATC to disaster risk management. Source: Authors

The climatological early warning system of Norte de Santander, developed by the University of Pamplona, proposes a structure that allows the articulation between the different processes of disaster risk management and increases resilience in the territories, from the linking of the actors to its execution.

The development of early warning systems in the international context. Since 1960, work has been done on the development of SATC, as they contribute to reduce economic and human losses, currently they are instruments that have taken great relevance, as evidence of this, some international agreements related to climate change, sustainable development and disaster risk management, which include SATC and link them in their global goals, is the case of the Sendai Framework for Disaster Reduction 2015-2030, the 2030 Agenda for Sustainable Development and the Paris Agreement. See figure 2.

Figure 2: International Agreements where SATC are considered. Source: Authors

Due to the different experiences that have been developed, the SATC are in constant evolution and can have different structures and approaches, they are a focus of study for universities and territorial entities, interested in protecting and preparing their community, before the occurrence of an extreme weather event, since they can be implemented as a measure of adaptation to climate change and can be focused on different risk scenarios of natural origin such as floods, droughts, torrential floods, landslides due to rain, frost.

An early warning system can be defined as the set of tools, control devices, management capabilities and technological instruments that key institutions identify to disseminate information in a timely manner to communities exposed to a risk, and whose result are mitigation measures aimed at reducing the effects of natural disasters and economic and life losses, as well as injuries (Dominguez, Lozano, 2014, p, 322). (Dominguez, Lozano, 2014, p, 322).

The SATC are a flexible and adaptable instrument; therefore, their structure depends on the level of complexity required. Below are some of the subsystems that make up an SATC, as a result of the different experiences that have been carried out at national and international level. See figure 3. It shows the evolution of early warning systems, the first systems were simpler and unidirectional and the most recent ones have an integral and multi-hazard character, where the participation of the actors is key and processes of risk knowledge, monitoring and warning, dissemination and communication and response capacity are carried out, for the Multi-hazard SATC it links the preparation, response and feedback of the system, so that it adapts to the needs of the territory, where the co-responsibility of all the actors is of vital importance.

Figure 3: Evolution of the SATC and its elements. Source: Authors

Climate early warning systems as a tool for linking land-use planning, disaster risk management and climate change management.

The SATC can currently be considered as planning instruments that articulate land use planning, risk management and climate change management, see Figure 4, since they link processes of knowledge of the territory, in its vulnerability and risk factors, which are determinant for the planning of the territories, from their current challenges and prospectively prepare for the future, where possible climate change scenarios and the impacts that can be generated are considered, all this information generated from the SATC, complements the studies of the POT, PIGCC, environmental studies, and others. "Climate variability, coupled with climate change (long periods of time), trigger impacts of greater frequency, magnitude and intensity of events associated with hydrometeorological and hydroclimatic phenomena that must be addressed in the short term" (2018, Climate Change Group DGOAT, p.19).

Figure 4: Land use planning, risk management and climate change management. Source: Authors

In Colombia, due to inadequate planning and land management processes, a large part of the population is at risk due to climate variability and climate change.

Colombian legislation has sought to develop laws that allow the articulation of different processes such as disaster risk management through law 1523 of 2012, which adopts the national policy on disaster risk management and establishes the National Risk Management System (SNGRD), law 1931 of 2018 in which the national policy on climate change is adopted, law 1454 of 2011 Organic law on territorial planning (LOOT), law 388 of 1997 on territorial planning, where the purpose is "to promote the increase of the capacity for decentralization, planning, management and administration of their own interests for the entities and instances of territorial integration, it will promote the transfer of competences and decision-making power to the closest territorial entities." (Congress of Colombia, 2011, p, 13). The present laws seek to ensure the well-being of the inhabitants from "a preventive vision towards all types of threats that affect social integrity and compromise the sustainability of ecological biodiversity" (Calderón, Frey, 2017, p.242) under a perspective of risk governance.

Territorial entities must make decisions on urban and rural territories, considering their growth and development, taking as guidelines the different existing threats from natural and anthropic phenomena and additionally from the prospective phenomena that can be associated with climate change, where the trends shown by studies are an increase in the intensity and occurrence of extreme weather events, therefore, the territories must implement strategies for risk mitigation and adaptation to climate change, including economic growth and reduction of inequalities, in order to increase resilience to disasters.

Within the aforementioned laws, the articulation between the National Disaster Risk Management System and the municipalities, with their public and private entities and the civil society, at different scales from scenarios of autonomy and complementarity,

that seek to join efforts to strengthen the knowledge of risk, risk reduction and disaster management, This is reflected in the image of cities and territories, where associative thinking is used, since disasters can occur in specific places, but the effects and impacts are never local. Therefore, it is of vital importance to articulate disaster risk management with the planning of safe territories and sustainable territorial environmental management.

To achieve this alignment between territorial planning, disaster risk management and climate change management, strategic projects are formulated in alliance with the different local, regional and national entities, with the objective of turning them into planning instruments, with information systems and financing mechanisms that complement and strengthen the actions carried out by the territorial entities and link other strategic actors, such as universities, private enterprise and the productive sector, based on the principles of governance and co-responsibility. These projects should focus on social construction, where threatening phenomena and risk are studied from the perspective of complexity and uncertainty, where new strategies are generated to address these phenomena, based on the characteristics of the territory, related to exposed elements and types of social vulnerability, considering conditions of poverty, inequality, corruption, and other variables, relevant for the generation of contextualized responses that enhance resilience to extreme climate events. The articulation between these three processes is a strategy for the territories to know their hazards and vulnerabilities, adapt to the effects of a changing climate, be prepared for the possible occurrence of a hazardous event and implement strategies in their development model for a sustainable development.

4. RESULTS:

Climatological early warning system from the bottom up. Based on the experience of the climatological early warning system of Norte de Santander, Colombia, which has been developed in two phases, in the years 2012 - 2015 and 2017 - 2020, the following structure is proposed, which seeks to be a strategy for adaptation to climate change and mitigation of impacts from events related to hydrometeorological conditions, where risk governance and coordination and participation among the different key actors of the territory in terms of risk are strengthened.

For the implementation of the SATC, the intervention area is organized by basins, for the department of Norte de Santander, six basins were proposed: Pamplonita River, El Zulia River, Táchira River, Chitagá River, Algodonal River and Tibú River. The intervention area is composed of 29 municipalities and works under the associative model, considering the basins as regions, where collective strategies are generated for emergency preparedness and attention.

Bottom-up climatological early warning system

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For the proper implementation of this SATC, with a bottom-up approach, it is important the representation of all actors present in the territory, educational, productive, rural and urban community sectors, the administration from the local, regional and national scales. Working in coordination with the departmental councils for disaster risk management - CDGRD, municipal councils for disaster risk management - CMGRD, community action boards, universities and researchers, environmentalists and other actors will guarantee the use of the information generated from the system. See Figure 5.

Figure 5: Strategic principles of a SATC. Source: Authors

The strategic principles of the SATC are active community participation, for decision making and actions, co-responsibility where all actors are committed to teamwork, collaborative learning and knowledge management, to revitalize the role of the community in the knowledge of its territory, from the different cultural and inherited practices that guide processes such as agriculture, governance, to make decisions and establish responsibilities in the installation of the monitoring, preparedness and response network, self-organization, so that the community establishes actions proposed on a voluntary basis, complementary to those carried out by the work team, for example, manual monitoring systems or strategies for disseminating information and alerts developed autonomously, conscious action to rethink inadequate cultural practices regarding environmental management and disaster risk management, empowerment to recognize the community's potential for building resilient territories and the role of first responder when an eventuality occurs, reflection, valuing life to avoid risk situations, mainly in territorial planning, and resilience to have the capacity to adapt and respond to hazardous events.

5. CONCLUSIONS:

Capacity building in resilient communities in territorial management knowledge, disaster risk awareness, adaptation, climate change mitigation and early warning, is proposed as a response to the guidelines for the structuring of territorial plans for disaster risk management and focuses the orientation of the PMGRD, as the main instrument for the harmonization of these regulations, from the scenarios of climate change, its adaptation and climate action, from the identification and characterization of its different risk scenarios, with a prospective vision of risk management and climate change management, collective and in articulation with the different key actors of the municipality in order to consolidate resilient territories adapted to climate change.

Alert systems function as a strategy to strengthen resilience in communities, adaptation to climate change and mitigation of impacts. To be effective, the different territorial actors must be articulated, where risk conditions can be understood, monitored and evaluated. and the importance of monitoring, for the generation of alerts from prevention and co-responsibility. The full participation of the actors strengthens governance and sustainability, strategic for territorial planning where all information related to risk management is decisive for decision-making and its prospective.

The generation of synergies from the articulation of the different key actors present in the territory, such as

territorial entities, universities, CAR, community leaders, from the strengthening of the municipalities' own capacities, is the key to the incorporation of Risk Reduction of Disasters and Adaptation to Climate Change, where territorial planning and development from a local and regional vision focus on climate resilience and strengthening territorial adaptive capacity.

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