XXV SIMPÓSIO BRASILEIRO DE RECURSOS HIDRÍCOS

TOWARD CROSS SECTORAL, MULTI-LEVEL AND TERRITORIAL GOVERNANCE OF WATER RESOURCES IN CEARA

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Abstract: Recently, the State of Ceará was affected by a severe multi-year drought (2012-2018) that had devastating consequences for various sectors of society. This drought has hinted at that current water resources management is not so resilient in the face of drought. Consequently, a paradigm shift has emerged in the State and a multi-level cross-sectorial water governance model is being constructed in the scope of the Sertões project.
This communication presents the main points that led to this paradigm shift and the challenges and steps in progress for implementing this innovative water governance model.

Resumo: Recentemente, o Estado do Ceará foi afetado por uma seca severa multianual (2012-2018) que teve consequências devastadoras para vários setores da sociedade. Essa seca indicou que a atual gestão dos recursos hídricos não era tão resiliente frente a seca. Em decorrência, um modelo de governança de água intersetorial e multiescala está sendo construída no escopo do projeto Sertões. Esta comunicação apresenta os principais pontos que levaram a essa mudança de paradigma e os desafios e etapas em andamento para a implementação desse modelo inovador de governança da água.

Palavras-Chave: Water resource management; Territorial governance; Innovative water governance model

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INTRODUCTION

Drought has been a persistent issue in Northeast Brazil for centuries and climate change projection indicates it will get worse. The last multi-year drought (2012-2018) had devastating consequences for water storage, agriculture, livestock, and industry. In 2016, from the 155 strategic monitored reservoirs in the state of Ceará, 39 completely emptied, 42 reached their minimum water levels requiring pumping systems to access water, and 52% of the state's municipalities experienced water supply disruptions (Martins and Magalhães, 2017).

In response to this severe crisis, the Ceará State built an ambitious technically innovative water infrastructure program called *Malha d'Água* (Grid of Water) in order to strengthen the hydric security of the State. This ambitious programme (R$5.55 billion) aims to collect water directly from strategic reservoirs offering greater water guarantee and to install water treatment plants in the immediate vicinity of these reservoirs in order to guarantee the quality and quantity of the drinking water supply to the main urban and district centres integrated into the system. The system is completed by small adductors to supply certain rural areas close to the network and by collection points for water trucks to optimise their carbon footprint.

However, this drought has begun to bring to the statement that water infrastructure alone cannot prevent recurring water crises. It opens up a better dialogue between science and policy and an important paradigm shift towards proactivity and integrated water resources management is taking place. In the scope of the Sertões and Gesurh Ceará State investment program, this paradigm shift had encouraged the construction of a multi-level cross-sectorial integrated water governance model to accompany the *Malha d'Água* water infrastructure program for the Sertão central region.

This paper first presents the main points that led to this paradigm shift, then the challenges and steps underway to implement this innovative water governance model.

MATERIALS AND METHODS

Firstly, the Premissa project (2019-2020), led by the State of Ceará (and in particular Funceme), AFD and Cirad, carried out a participatory diagnosis of water governance and territorial development challenges in the central Sertões region. This led to a shared vision among the stakeholders involved in the project of the current problems and challenges of water resource management. Secondly, the Sertoes research and development project (2021-2023) continued to reflect on the current water management model and how it could be improved, in particular to better take into account territorial specificities, and local and cross-sectoral issues around water. Thus, began a process of participatory construction of an innovative model of territorial water governance, based on numerous multi-stakeholder workshops including state government actors from the water, agrarian development and environment sectors, municipal public authorities and civil society organizations (NGOs, trade unions, community associations, etc.) and on the methodology of participatory rural diagnosis (Verdejo, 2006). Finally, this trajectory has led to the integration of a component for local water governance and micro-investments for agro-environmental water enhancement into Secretary of Water Resources (SRH) international financing program (Gesurh program financed by AFD scheduled to start in 2024), which is part of the *Malha d'Água* investment project.

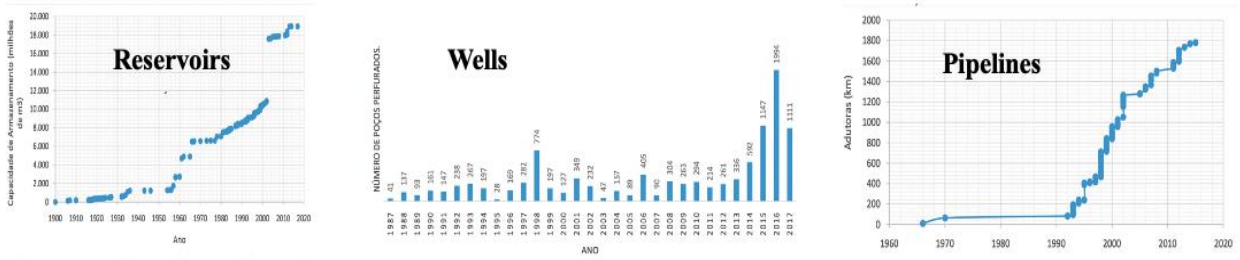
1. CONVERGENCE OF ELEMENTS FOR A PARADIGM SHIFT FOR TERRITORIAL WATER GOVERNANCE

Governments and society responding to drought with infrastructure solution and few preparedness

Governments and society use to respond to drought with infrastructures in a logic based on increasing supply. During the last decades, the volume of water stored in Ceará strategic reservoir has exponentially grown, as wells as pipelines and wells (figure 1) (Filho, 2018). However, this increased supply tends to be accompanied by an increased demand driven by population growth and increasing economic activities (Martins and Vasconcelos Jr, 2022).

As a result, today the state of Ceará counts more than 100 000 small reservoirs, with very high density in some places (Funceme, 2021). These small reservoirs are mainly private individual ones and serve multiple productive and social functions for the rural world, such as increasing individual resilience to drought by diversifying the water source for domestic and productive supply, providing water for animal husbandry, cultivating in water infiltration areas and enhancing land value (Burte and Martins, 2020).

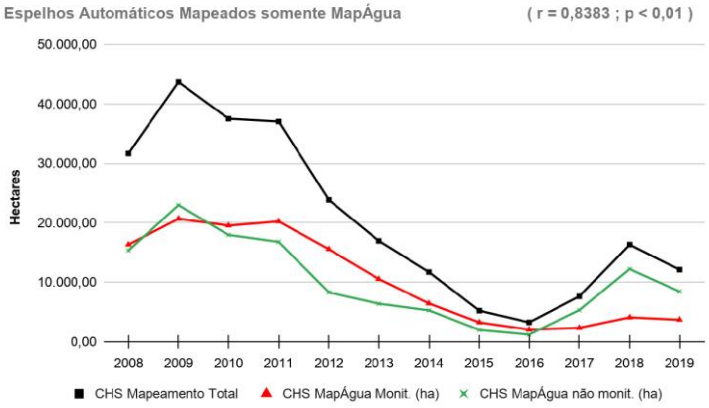
Figure 1 – Increasing of water infrastructure across time



Water infrastructures can compete with each other

Too much water infrastructures can compete with each other in a closed basin, i.e. a situation where the resource is almost totally allocated and consumed and where any additional extraction or intervention that modifies a given use, leads to changes in the circulation of water and results in a reallocation of the resource, both spatially and socially, visible or not (Molle *et al.*, 2010). In fact, it is likely that the multiplication of these small dams impacts the global water dynamics of the region disturbing the filling of the downstream reservoirs which are strategic for urban human supply throughout the State (figure 2). Indeed, figure 2 shows that from 2017, the non-monitored water bodies significantly exceed the monitored bodies in area, reinforcing this hypothesis. Moreover, even after the 2012-2018 drought, the central *sertão* region received below-average rainfall, and, until this year (2023), the Banabuiú strategic reservoir was at less than 10% of its capacity, prolonging the water stress for the region.

Figure 2 - Water spell surface evolution for strategic monitored reservoirs and not monitored ones



Invisibility of local water resources in the current water governance model

The current integrated system of water resource management (SIGERH) is based on the management of strategic dams through a highly praised participatory model consisting of regional basin committees, management commissions and negotiated water allocation instruments (Lemos & Oliveira, 2005). However, this model only manages 157 strategic reservoirs and yet does not have the capacity to reach intermediate and small water resources at the local level. Thus, a wide range of local informal arrangements predominate to govern these resources and hydric infrastructures, without monitoring of their quantity, quality, security, and also the social justice linked to these arrangements.

Sectorial cutouts without territorial planification

Other secretariats such as the Secretariat for Agrarian Development (SDA) also have programs and policies implementing micro water infrastructures for rural development. For example, the *Sao José* program (BIRD) finances rainwater cisterns and communitarian water supply systems. But the implementation of these policies is done without coordination with the SIGERH and vice-versa: each secretariat works in silo, without any territorial developing plan to ensure the coherence of the State investments. Municipal public authorities also have difficulties to design integrated territorial development plans (Junior *et al.*, 2021), and while they have abilities over environment and land management, for the moment they have no competencies over water resources, which fall within the dominion of the Federal Union or the State (Aith and Rothbarth, 2015).

In addition, most rural development policies still tend to arrive in local communities in a top-down model from the State to local communities, depending on the organisational capacity of the communities to respond to public calls for tender. As a result, public investments can be duplicated, misdirected, or even compete with each other leading to difficulties to succeed in driving sertão territories towards virtuous and resilient trajectories. This lack of territorial approach can also generate territorial inequalities if forgetting about less politically articulate communities (Burte and Martins, 2020).

3. TOWARD BOTTOM-UP, CROSS SECTORAL, MULTI-LEVEL AND TERRITORIAL GOVERNANCE MODEL OF WATER RESOURCES

The last severe drought crisis and its drastic consequence for State and society have highlighted the importance of the four issues mentioned above. The focus on infrastructure in an increased supply/increased demand loop and the uncoordinated multiplication of micro water infrastructures competing with strategic ones have particularly highlighted the importance of water demand management mechanisms for multiple uses and the necessity of multi-level and cross-sectoral governance. Finding trade-offs between upstream and downstream infrastructure and between macro and micro infrastructure, while at the same time being compatible with regional sustainable socio-economic development have surged as a priority and is being worked on as part of the Sertões project.

The role of municipalities in local water governance

In events held during the Premissa and Sertões project, the States actors agreed that there is a need to develop a strategy for local governance of water resources based on the empowerment of municipal actors. In fact, the current State Water Resources Policy Law (lei 14.844/2010, article 54, chapter IX), as did the previous one in 1992, opens the possibility of municipal participation in water management. It mentions that the State shall delegate the management of Hydric Resources of local interest to the Municipalities that organise themselves technically and administratively for this purpose.

In this context, within the scope of Sertões project, collective reflexions are ongoing to think about what competencies could be delegated to municipal institutions, at which conditions and with which normalisation while being consistent with and complementary to the current SIGERH system. One issue of particular discussion during the participatory workshops is the representativity of this municipal governance model between municipality public authority, State and civil society organisations, in a context of considerable mistrust of local public authority, which can be seen as the legacy of a clientelist system. In this sense, the participation of civil society in this municipal governance is seen as a guarantee of political independence, transparency and guarantee of social participation.

Figure 3 - Participatory workshop on the role of municipal institutions in local water governance: the workshop provided an opportunity to exchange views of participants from different sectors, institutions and different scales

Territorial planification for cross-sectoral coordination and empowerment of local communities

In addition to local water governance, the Sertões project is working on territorial planning. The aim is to involve local communities in a shared participatory diagnosis of the challenges facing their territory, to support them in the building of a sustainable territorial project with action planification and to help them in implementing and monitoring this project. To achieve this, the Sertões investment program has resources available to strengthen local skills (technical assistance, support for participation and territorial engineering) and to finance actions through baskets of investment. Territorial facilitators will be trained to support and ensure continuity of the process (Braiki *et al.*, 2021). One of the challenges faced is the strengthening of the collective organizations in a context of the rise of individualism and the weakening of community associations. This dynamic can be seen as the counter-effect of the proliferation of community associations from the 90s onwards in order to gain access to the various rural development programs (electrification, water supply, road access etc.) without long-term support (Burte and Martins, 2020).

Through the inter-institutional, multi-level and cross-sectoral commitment, this territorial planification should make it possible to coordinate the various public policies aimed at rural development and mainly the SDA and SIGERH ones, making public action more effective from a bottom-up perspective. This means creating a common language and building trust, as these two important State secretariats have historically been built on different models. The SDA has been responsible for micro-infrastructure and local development, outsourcing many of these activities to NGOs, while SIGERH has focused more on engineering solutions and macro infrastructures, although it has invested in a highly praised participative water resource management system for the strategic reservoir.

In a more pragmatic approach, the territorial planification also aims to ensure the financial and technical viability of the future macro infrastructure *Malha d'Água* pipeline system: it should reduce the risk that water will be illegally diverted from the pipelines for uses or users that were not planned (productive uses of water for agriculture or livestock farming and uncontrolled perforation of the pipeline by users located along their route). In fact, the diversion of water from the infrastructure could lead to its collapse due to its undersizing, creating water supply problems for end users, whose financial contribution via water charges is supposed to contribute to the financial sustainability of the investment and its maintenance. In the event of failure to pay by official users due to undersizing, the financial and technical viability of the macro-infrastructure investment would be threatened. It is therefore all the more important to support this infrastructure with local investment for territorial development, thereby addressing the issue of more social justice and reducing inequalities in access to water between urban and rural areas, and promoting greater acceptability of the infrastructure in the areas it crosses.

CONCLUSION

The latest major drought has highlighted the limitations of the current sectoral model of water resource management, which is mainly based on infrastructure and crisis management. It leads to a paradigm shift and a multi-level and cross-sectoral governance model of water resources is being worked. The objective is that the water management model succeeds in managing local water resources and micro infrastructures by relying on and empowering local stakeholders. It is rooted on integrated territorial planification and territorial governance without sectorial cutouts, and promoting dialogue among the different scales: communities, municipalities, regional basin committees and State.

Many challenges on the ground concerning water resources, from the private appropriation of a common asset, the safety of dams during floods, the sustainability in long term of surface and groundwater exploitation, the conservation of water related ecosystem services, to the importance of local development and agriculture in maintaining a rural dynamism and combating rural exodus could be address with this innovative governance model.

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