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THE THERMOMETER OF WATER RESOURCES GOVERNANCE IN GOIÁS

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ABSTRACT

In the State of Goiás, water governance has been developed through legal instruments such as the State Water Resources Plan and the performance of the River Basin Committees (CBH), which are essential to coordinate actions between different sectors. However, the state faces challenges such as increasing pressure on water resources caused by agricultural expansion, urbanization, and climate change. In this sense, the objective was to measure the implementation of the instruments of planning and management of Water Resources in Goiás, employing the governance thermometer. The research used the five dimensions (institutional environment, state capacities, management instruments, state-society interaction and governmental interactions). Questionnaires were applied to members of the CBHs and the State Council of Water Resources (CERHi) in 2024. Despite the advances, such as the implementation of the Webgrant system, the recomposition of the State Council of Water Resources and the creation of the Hydrometeorological Monitoring Center, obstacles persist, such as the need for continuous training, effective implementation of basin plans, operationalization of charging for the use of water, financial reorganization and improvement in institutional communication. Strengthening water governance in Goiás requires coordinated actions, greater transparency and integration among the actors involved, aiming at water security and the sustainability of resources in the long term.

Keywords: Sustainability. Integrated Management. Basin Committee.

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INTRODUCTION

The governance of water resources in Brazil is a topic of paramount importance, considering the geographic diversity and vast water potential of the country, which is home to approximately 12% of the fresh water available on the planet (National Water and Basic Sanitation Agency - ANA, 2021). Efficient and sustainable management of these resources is necessary to meet human demands, preserve ecosystems, and promote socioeconomic development.

Since the enactment of the National Water Resources Policy in 1997, Brazil has adopted a governance model that emphasizes decentralization and social participation. This policy formalizes water as a public good and, therefore, highlights the need for integrated management, which takes into account the immediate needs and the long-term preservation of water resources (Brasil, 1997).

According to the National Water Agency (ANA, 2020), the implementation of river basin committees and the creation of management plans are fundamental for the articulation between different users and sectors that depend on water.

In the current context of climate change and growing urbanization, Brazil faces challenges related to water scarcity, pollution, and conflicts of use. According to the World Water Resources Report of the United Nations Educational, Scientific and Cultural Organization - UNESCO (UNESCO, 2021), efficiency in water management becomes increasingly critical to ensure access to drinking water, the sustainability of economic activities and the conservation of biodiversity.

Civil society participation, along with inter-institutional collaboration, is essential to improve water resource governance. According to Bittencourt (2019, p. 14), "the incorporation of multiple actors in decision-making favors the construction of a more equitable and effective governance model, allowing the construction of collective and adaptive solutions".

Water resources governance is a dynamic and complex field, which requires continuous effort, ensuring that public policies are aligned with the needs of society and environmental preservation. Integrated management and cooperation between different levels of government, the private sector, and civil society are essential to address current challenges and ensure water availability for future generations **(Knaesel et al., 2020).**

Given this scenario, it is evident that the governance of water resources in Brazil must be constantly reevaluated and improved, integrating the lessons learned and the new

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social and environmental demands. The search for more effective management can ensure the availability and quality of water for future generations, in addition to contributing to the stability and resilience of aquatic ecosystems in the country.

The State of Goiás is located in the center of Brazil, has water wealth, with several hydrographic basins that supply the population and local economic activities, serve as critical elements for the conservation of biodiversity and ecosystems. The basins of the Paranaíba, São Francisco, Araguaia and Tocantins Rivers stand out (INYPSA COBRAPE, 2019).

Goiás faces challenges, such as the growing demand for water resources due to agricultural expansion and accelerated urbanization. Studies indicate that the intensification of water use for activities such as irrigated agriculture has generated pressures on water bodies, resulting in conflicts of use and deterioration of water quality (Rodrigues, 2024).

Water management practices in Goiás have been improved through the creation of legal and institutional instruments that promote the rationalization and sustainable use of water. The State Water Resources Plan (PERH) and the River Basin Committees have played key roles in coordinating management actions between different users and sectors (Goiás, 2019).

Social participation and decentralization are central pillars of this governance, with the objective of involving civil society in decision-making and in the formulation of policies that directly impact the use of water. In addition, water management must consider climate variability and the need to adapt to climate change, which can lead to water scarcity (**Bolson; Haonat,** 2016).

Considering that since the institution of the National Water Resources Management System - SINGREH, there has been a methodological bottleneck regarding the establishment of indicators and systematized monitoring of the system's governance.

In view of this, the objective was to analyze perspectives and strategies for water security in the State of Goiás, applying the five dimensions of the governance model guiding the thermometer and indicators of SINGREH, in order to identify gaps and propose guidelines and action plans that include, in a systemic way, the technical, participatory and sustainability dimensions of water governance in our State.

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The article is structured with the Introduction, where the problem and objectives are exposed, the Methodology explaining the procedures for conducting the research, the Results and Discussion with data analysis and finally, the Conclusions and References.

LITERATURE REVIEW

Before the enactment of the National Water Resources Policy in 1997, the State of Goiás already had a law that dealt with the water and mineral resources plan (Goiás, 1991). According to this plan, the Secretariat of Mines, Energy and Telecommunications – SMET was the executing body of the Water Code, and it was responsible for:

> I - to manage the offer and grant of the use, for all purposes, of the waters under the domain of the State of Goiás, respecting the cases of competence of the Union; II – to promote the monitoring of surface and underground water resources, in order to ensure their multiple use in a rational and integrated manner; III - to coordinate, technically, the execution of the State Plan for Water and Mineral Resources, in the part referring to water resources and their management system (Goiás, 1991).

The central content of State Law No. 11,414/91 was, in a way, to create policies to promote mining in Goiás. The main normative instruments on the management of water resources in Goiás are composed of the Federal Constitution of 1988, the State Constitution of Goiás of 1989 and the State Policy on Water Resources - State Law No. 13,123/1997, which regulated article 140 of the State Constitution (Matos et al., 2019).

Article 140 of the 1989 State Constitution deals specifically with water resources, which establishes that:

> The State shall prepare and keep updated the State Plan for Water and Mineral Resources, in accordance with the National Management System, and shall institute a management system by state and municipal agencies and by civil society, as well as ensure financial resources and institutional mechanisms necessary to ensure: I – the rational use of surface and groundwater; II – the multiple use of water resources and apportionment of the costs of the respective works, in accordance with the law; III – the protection of waters against actions that may compromise their current or future use; IV – the defense against critical events that pose risks to public health and safety and economic or social losses; V – the protection of water resources, preventing the degradation of alluvial deposits, the use of toxic products by mining activities and other actions that may compromise their physical, chemical or biological conditions, as well as their use in the supply (State Secretariat for the Environment and Water Resources - SEMARH, 2012).

State Law No. 11,414 of 1991, which provided for the State Water Resources Plan, established that the management system for water and mineral resources in the State of Goiás would be composed of the Secretariat of Mines, Energy and Telecommunications

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and the State Councils of Water Resources and Geology and Mineral Resources. In 1995 there were changes in the basic organizational structure of the direct administration of the Executive Branch, through Law No. 12,603, where the State Council of Water Resources (CERH) became part of the structure of the Secretariat of Environment and Water Resources (SEMARH), then Decree No. 4,468/1995 defined the competencies of the CERH. With this change in the organizational structure, the governance of water resources in Goiás has advanced. Chart 1 shows the legal framework of the State of Goiás related to water resources.

Table 1: State legislation related to water resources in Goiás.

Norm	Approval	Description
State Law No. 23,202 of January 9, 2025	2025	Establishes the State Policy for the Inspection of the Environment and Water Resources
State Law No. 21,777, of January 16, 2023	2023	Amends Law No. 16,209, of March 17, 2008, which provides for the collection and reserve of rainwater in buildings built by the State Government.
State Law No. 21,792, of February 16, 2023	2023	Establishes the basic administrative organization of the Executive Branch and makes other provisions.
State Law No. 21,998, of June 06, 2023	2023	Amends Law No. 16,586, of June 16, 2009, which provides for environmental education, establishes the State Policy for Environmental Education and provides for other provisions.
State Law No. 22,017, of June 14, 2023	2023	Amends Law No. 18,102, of July 18, 2013, which provides for administrative infractions to the environment and respective sanctions, institutes the administrative process for their investigation at the state level and provides for other measures.
State Law No. 22,104, of July 12, 2023	2023	Amends Law No. 16,209, of March 17, 2008, which provides for the installation of systems for the collection, conservation and rational use of water in state public buildings.
State Law No. 22,368, of October 31, 2023	2023	Establishes deadlines for the regularization of dams in water courses within the State of Goiás and provides other provisions.
State Law No. 22,384, of November 20, 2023	2023	Establishes the State Rural Sanitation Program, establishes the guidelines and conditions for the provision of public sanitation service of basic water supply and sanitary sewage in communities established in rural areas and areas of the State of Goiás.
State Law No. 21,231, of January 10, 2022.	2022	Provides for the regularization of environmental liabilities of rural and urban properties, as well as forest compensation and compensation for damages to regularize the suppression of native vegetation carried out without the prior authorization of the competent environmental agency, as well as the definition of the parameters of forest compensation and forest replacement in the State of Goiás.
State Law No. 21,468, of June 23, 2022	2022	Establishes the State Policy "Clean Water" in public establishments.
State Law No. 21,495, of July	2022	Establishes the Policy to Encourage the Conservation

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07, 2022		and Construction of Dams in the State of Goiás.
State Law No. 20,961, of January 13, 2021	2021	Amends Law No. 18,102, of July 18, 2013, which provides for administrative infractions to the environment and respective sanctions.
State Law No. 21,054, of July 15, 2021	2021	Establishes the State Policy for the Protection and Preservation of Water Springs.
State Law No. 21,062, of July 20, 2021	2021	Amends Laws No. 20,694, of December 26, 2019, which provides for general rules for Environmental Licensing in the State of Goiás and provides for other provisions.
State Law No. 20,758, of January 30, 2020	2020	Establishes the State Policy for Dam Safety and Efficiency - PESB, and provides other provisions.
State Law No. 20,694, of December 26, 2019	2019	Provides for general rules for the Environmental Licensing of the State of Goiás and provides for other provisions.
"State Law No. 20,096, of May 23, 2018"	2018	Approves the State Water Resources Plan (PERH) for the 2017-2020 triennium.
State Law No. 19,619, of April 7, 2017	2017	Establishes the State Day for the Protection of the Meia Ponte River.
State Law No. 14,475, of July 16, 2003	2003	Provides for the creation of the Goiás Water Agency and provides for other provisions. Extinguished by Law No. 16,272, of 05-30-2008. (Revoked by Law No. 20,694, of 12-26-2019, art. 72.)
State Law No. 13,583, of January 11, 2000	2000	Provides for the conservation and environmental protection of groundwater deposits in the State of Goiás and provides for other provisions.
State Law No. 13,040, of March 20, 1997	1997	Approves the State Plan for Water and Mineral Resources, for the four-year period 1995/1998.
State Law No. 13,061, of May 9, 1997	1997	Amends the State Plan for Water and Mineral Resources for the four-year period 1995/1998, in the part mentioned, and makes other provisions.
State Law No. 13,123, of July 16, 1997	1997	Establishes guidelines for the state water resources policy, as well as the integrated water resources management system and provides other provisions.
State Law No. 12,603, of April 7, 1995	1995	Introduces changes in the basic organizational structure of the direct administration of the Executive Branch and makes other provisions.
State Law No. 11,414, of January 22, 1991	1991	Provides for the State Plan for Water and Mineral Resources and provides for other provisions.
State Law No. 11,548, of October 8, 1991	1991	Water and Mineral Resources and provides other provisions.

Source: authors (2025) from the legislations

The State Water Resources Policy, established by Law No. 13,123/1997, aims to ensure that water, a natural resource essential to life, economic development and social well-being, can be controlled and used, in quantity and in satisfactory quality standards, by its current users and future generations. The policy is based on principles based on participatory and integrated management, recognition of the hydrographic basin as a physical-territorial unit of planning (Goiás, 1997).

Also established in this regulation was the integrated system of water resources management, a means by which the State ensures financial and institutional resources to

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comply with the provisions of articles 132 and 140 of the State Constitution, mainly to ensure the rational use of this resource, ensuring the supply to the populations as a priority use, protection of waters against any type of contamination and multiple use of water resources, among others.

It also provides rules on the conservation and environmental protection of groundwater deposits. Progress on the subject came from Decree No. 10,280 / 2023, which regulates articles 16 and 49 of the aforementioned law, which deals with the Charge for the use of water resources within the state.

The State of Goiás joined the Procommittees in 2017, based on CERHI Resolution No. 45, of November 30, 2016, and State Decree No. 8877, of January 20, 2017. On December 28, 2017, Contract No. 078/2017/ANA - Procommittees was signed, entered into between the National Water Agency, the State of Goiás, through the then SECIMA, now SEMAD, and the then State Council of Sanitation, Environment and Water Resources, now the State Council of Water Resources, as an intervening party. The contract provides for the transfer of financial resources in the form of payment for the achievement of goals established under the National Program for the Strengthening of River Basin Committees - Procommittees.

The State of Goiás, within the scope of the Procommittees, enrolled 7 (seven) basin committees in the program, since the operationalization of 7 CBH's would be more efficient instead of the 11 (eleven) that were initially foreseen when defining the Planning and Management Units of Water Resources of the State of Goiás. The goals of the Program are divided into six components: 1) Operation and Document Compliance; 2) Training; 3) Communication; 4) Registration; 5) Implementation of Management Instruments and 6) Monitoring. The average in the state's certifications in the 2017-2021 period was 84.37%, that is, a result considered good, given the difficulties and challenges faced.

The State of Goiás is part of two federal river basin committees: the CBH of the Paranaíba River and the CBH of the São Francisco River (CBHSF). In addition to the federal ones, there are six state committees, the oldest being CBH Meia Ponte and the newest called CBH AGTO, which is in the process of being installed. Chart 2 shows the six state river basin committees in Goiás and their coverage area, and Figure 1 represents the state water resources management units in Goiás.

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Table 2 - River Basin Committees of the State of Goiás

Aspectos	CBH Bois	CBH Meia Ponte	CBH Corumbá, Veríssimo e São Marcos	CBH Baixo Paranaíba	CBH Afluentes Goianos do Rio Araguaia -AGORA	CBH Afluentes Goianos do Tocantins - AGTO
Decreto de instalação	DECRETO ESTADUAL Nº 5.826, DE 11 DE SETEMBRO DE 2003	16 de julho de 1997, por meio da lei nº 13.123. DECRETO ESTADUAL Nº 5.580, DE 09 DE ABRIL DE 2002	DECRETO ESTADUAL Nº 7.536, DE 29 DE DEZEMBRO DE 2011	DECRETO ESTADUAL Nº 7.535, de 29 de dezembro de 2011	DECRETO ESTADUAL Nº 9972, de 20 de outubro de 2021	Em processo de Instalação
População (hab)	716.520 (10%)	2.581.069 (37%)	1.954.651 (28%)	327.371 (4%)	406.336 (6%)	937.473 (13%)
Nº de Municípios	52	37	42	19	60	81
Área (km²)	35.562 (10%)	14.773 (4%)	46.921 (14%)	43.825 (13%)	93.073 (27%)	102.717 (30%)
Deliberações	23	23	24	6		

Source: The authors (2025) based on information from SIRHGO (2025)

Figure 1 - State Water Resources Management Units in Goiás

Source: ANA (2025)

The State of Goiás adhered to Progestao - Cycle 3 through Official Letter No. 3638/2023/SEMAD, of June 20, 2023, and appointed the Secretariat of Environment and Sustainable Development as the coordinating entity of the Program in the state. The state remained with the type B of management, which means "Satisfactory quali-quantitative balance in most basins; uses concentrated in a few basins with quali-quantitative criticality (critical areas)". Goiás also approved the Goal Framework with the State Council of Water Resources and signed the Progestao - cycle 3 contract with ANA on September 5, 2023, defining the period from 2023 to 2027 for certification (Brasil, 2023).

METHODOLOGY

The research was developed in the state of Goiás, in 2024, and was validated by the research ethics committee of PUC Goiás under the number 79900024.9.0000.0037.

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The governance thermometer was used, which identifies the state of water resources policy in the State of Goiás, in the five structural dimensions and their respective indicators, as proposed by Lima et al. (2014): a) Institutional Environment; b) State Capacities; c) Management Instruments; d) State-Society Interaction and e) Government Interactions. Within each dimension, aspects were analyzed and indicators were pointed out (Charts 3 to 7).

Table 3 – Governance dimension: Institutional Environment

Governance Dimension	Governance Aspect	What you want to check	Indicators
INSTITUTIONAL ENVIRONMENT	Effectiveness of the legislation	The development and legal recognition of adequacies of water resources instruments and collegiates. Participation of the municipalities of Goiás in the collegiate bodies of the SIGRH (State Council of Water Resources and Basin Committees);	Degree of adequacy of the law to the reality of Goiás, of the municipalities of Goiás.
	Importance of the topic on the public agenda	Whether the water theme and the guidelines, goals and recommendations of SINGREH are being incorporated into the debates of development policies formulated or in the process of being formulated. Whether the guidelines and goals of the State Water Resources Plan have been absorbed and incorporated into the state's Socioeconomic and Sectoral Development Plans;	Degree of inclusion of the water theme (guidelines, targets and recommendations of the SIGRH) in development policy debates. Adhesion to the Pact for Water Management

Source: Prepared by the authors (2025) with information extracted from Lima et al. (2014)

Table 4 – Governance dimension: State capacities

Governance Dimension	Governance Aspect	What you want to check	Indicators
STATE CAPACITIES	Coordinated action by government agencies	The articulation between water resources policy and related municipal policies.	Degree of absorption of the guidelines and goals of the Basin Plans in the municipal Master Plans (and vice versa)
		The articulation between water resources policy and related sectoral policies.	Degree of absorption of the guidelines and Goals of the National and State Water Resources Plans in the Socio-Economic and Sectoral Development Plans.
		If the monitoring and coordination of the System is taking place through an executive body linked to the CERH constituted in a collegiate manner with representation of the States	Actions coordinated by the Coordinating Body of the system
	Quality of bureaucracy	If the technical team of the management body is quantitatively and qualitatively adequate to the stage of progress in the implementation	Composition of the water resources team of the managing body (quantity and qualification).

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		of management.	
	Financial Resources	If a fund for the management of water resources exists and is being operated	Revenues applied in management by a national water fund
		If the CFURH resources distributed to states and municipalities are being applied in actions aimed at the management of water resources.	Actions implemented with CFURH resources
		Identification in the headings of the Multi-year Plans of the resources that will be allocated to Water Resources and related areas, considering the priorities of the respective water resources plans.	Execution of resources allocated in the PPA for water resources / budget execution.
		The execution of the planning.	Resources transferred between agencies and sectors (applied) / planned resources

Source: Prepared by the authors (2025) with information extracted from Lima et al., (2014)

Table 5 – Governance dimension: Management Instruments

Governance Dimension	Governance Aspect	What you want to check	Indicators
MANAGEMENT TOOLS	Indicators	The existence of indicators that help in the monitoring of actions.	Availability of indicators in planning
	Monitoring	The existence and frequency of monitoring.	% of monitoring actions executed in a predetermined period
	Monitoring and Evaluation	The effectiveness of the monitoring – whether the correction needs found are being incorporated into the planning.	% of Recommendations resulting from evaluation incorporated into the planning
	Planning	Planning execution	Goals implemented / goals planned.

Source: Prepared by the authors (2025) with information extracted from Lima et al., (2014)

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Table 6 – Governance dimension: State-Society Interaction

Governance Dimension	Governance Aspect	What you want to check	Indicators
STATE-SOCIETY INTERACTION	Participation qualification	If the information made available to the participants of the collegiate is being absorbed satisfactorily.	The satisfaction index of the collegiate entities made available.
		The existence of institutional training campaigns encouraging participation in the System.	Number of campaigns run in the media
		The implementation of projects, actions, deliberations being monitored and evaluated by collegiate bodies.	Number of projects, actions and deliberations, implemented and evaluated.
	Participation channels	If participation in the official bodies of the SIGRH is being effective.	Degree of compliance with legal attributions by the Collegiates.

Source: Prepared by the authors (2025) with information extracted from Lima et al., (2014)

Chart 7 – Governance Dimension: Government Interactions

Governance Dimension	Governance Aspect	What you want to check	Indicators
GOVERNMENT INTERACTIONS	Inter and Intrasectoral Articulation	If there is a definition of joint actions between the various related sectors	Number of goals common to the various systems being implemented
		If the participation of other related sectors is being effective in the definition of joint actions.	% representation of other public sectors in the CERH.
		Whether the participation of representatives of the water resources sector is being effective in defining joint actions	% of representatives of water resources management bodies in collegiate bodies of other public policies indispensable to HR management
	Federative Forums	If the existing forums are fulfilling the role of articulating pacts among their members.	Number of actions agreed to be implemented annually
	Participation of municipalities	How the appropriation of the water agenda grows.	Number of actions related to the management of water resources developed.
		Qualified participation in the management of water resources.	Commitments made by municipalities in the collegiate bodies
		If municipal participation has been regulated through	Legal instruments for the management of the system incorporating municipal

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		normative instruments of the SIGRH.	participation.

Source: Prepared by the authors (2025) with information extracted from Lima et al., (2014)

A questionnaire was prepared using *Google Forms*, divided into five axes of governance dimension, as detailed in the previous tables, and sent to the Executive Secretariats of the Goiás River Basin Committees and the State Council of Water Resources – CERHi, which forwarded the *link* to participate in the survey to all members of the CBHs of Goiás and to the CERHi councilors. 14 volunteers participated in the research.

The thermometer identified the stage of the water resources policy in the State of Goiás, considering the five structural dimensions of its governance system and recorded three stages: basic, intermediate and advanced. The situation of each stage was indicated by the research participants themselves, followed by arguments that explain the reasons for this classification. The basic stage indicates an initial level of institutional and operational development. It may reflect the absence or inefficiency of management instruments, low articulation between actors, and fragility in the implementation of public policies. The intermediate stage reflects an advance in relation to the basics, with the existence of partially consolidated institutional and normative structures, growing social participation and still limited but existing use of management instruments. The advanced stage, on the other hand, represents a situation of consolidated governance, with integration between legal and operational instruments, broad social participation, transparency, and capacity for interinstitutional and territorial articulation.

RESULTS AND DISCUSSIONS

In the Institutional Environment dimension, the volunteers evaluated two aspects of governance: Effectiveness of legislation and Importance of the Theme in the Public Agenda. Regarding the first aspect, the participation of the municipalities of Goiás in the river basin committees and the State Council of Water Resources (CERHi) was verified, in addition to the legal recognition of adjustments to the instruments and collegiates.

In a classification of the stage of the institutional environment of SINGREH, 57.1% of the volunteers considered it to be in an intermediate stage both in the "Effectiveness of the legislation" and in the "Importance of the theme in the Public Agenda" aspect (Figure 2).

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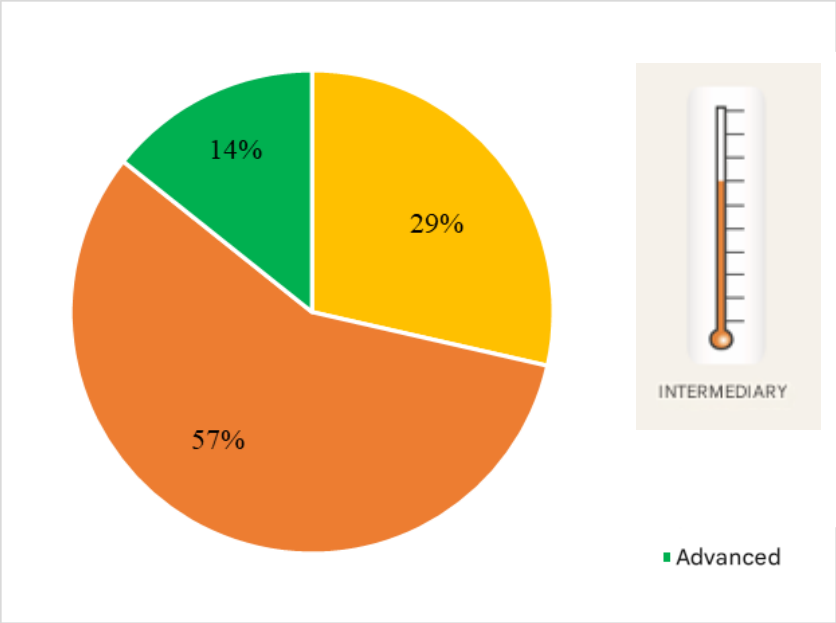
Figure 2 – Thermometer of the "Institutional Environment" Dimension. Classification of governance aspects: Effectiveness of Legislation and Importance of the theme in the Public Agenda in Goiás.



Source: The authors (2025)

In the "State Capacities" dimension, three aspects were evaluated: a) Coordinated action of government agencies; b) Quality of bureaucracy and c) Financial Resources. In the first aspect of this dimension, 71.4% of the volunteers classified it as basic stage and 28.6% as intermediate stage. In the second, 57.7% classified it as Intermediate and 35.7% as Basic. Regarding the third and last criterion of the dimension, 78.6% considered the Basic stage and 21.4% the Intermediate stage (Figure 3).

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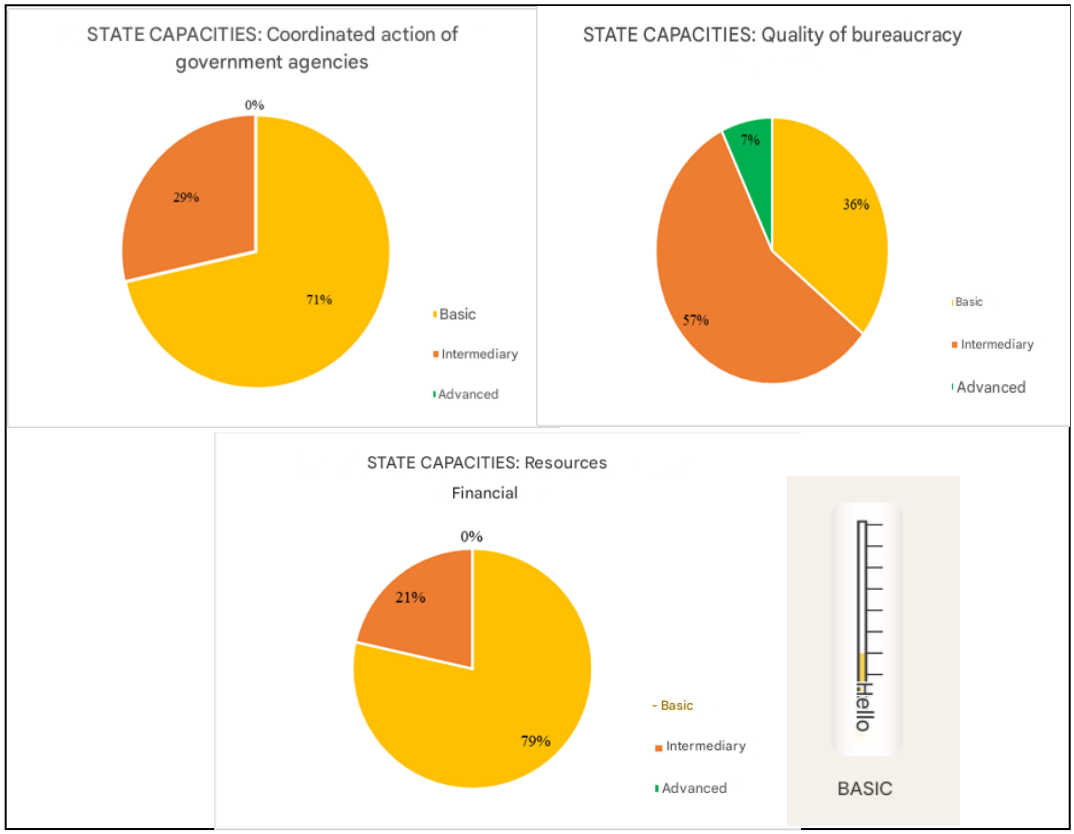
Figure 3 – Thermometer of the "State Capacities" Dimension. Classification of governance aspects: Coordinated action of government agencies, Quality of bureaucracy and Financial Resources in Goiás.



Source: The authors (2025)

In this dimension, it is worth noting how challenging it is for the municipalities of Goiás to prepare their municipal master plans and maintain periodic reviews within the deadlines. Few or rare are the municipalities that, when preparing their master plans, absorb the guidelines and goals of the River Basin Plans to which they belong. The basin committees have little dialogue with the municipal executive power and vice versa. In addition, the allocation and application of financial resources to the management of water resources requires greater regulation and efficiency.

Progress was made with the launch of the National Pact for Water Management in 2011, which aims to strengthen the State Water Resources Management Systems with a view to intensifying the process of articulation and expansion of institutional cooperation ties within the scope of the National Water Resources Management System – SINGREH.

The Pact's central purpose is to establish commitments between the federative entities, in order to face shared challenges and encourage the sustainable and multifunctional use of water resources. To achieve this greater objective, it unfolds into two specific goals: to ensure effective coordination between the management of water

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resources and the regulation of their uses, both at the national and state levels; and consolidate the Brazilian model of water governance, characterized by integration, decentralization, and active participation of society (ANA, 2023).

Regarding the quality criterion of bureaucracy, it is undeniable that the technical team of the managing body, the Department of Environment and Sustainable Development of Goiás (SEMAD), has a high level of qualification and competence. The professionals who make up this technical staff have a solid academic background, extensive experience in the area of expertise and demonstrate deep knowledge of the guidelines and regulations that govern environmental and natural resource management.

Although there is room for improvement in the quantitative aspect, since a greater number of professionals could optimize the agency's response capacity and increase the effectiveness of public policies, the technical quality of the team is an unquestionable differential. These specialists have been playing a fundamental role in the formulation, implementation and inspection of environmental policies in the state, contributing to the consolidation of efficient and sustainable management.

The performance of these professionals has been marked by commitment and the continuous search for improvement, reflected in advances in environmental governance in Goiás. The work developed by this team has been essential for the modernization of administrative processes, the improvement of environmental regulation and the strengthening of the articulation between the different actors involved in the management of natural resources.

The state of Goiás has stood out nationally for the implementation of updated platforms for the management of water resources, such as the Integrated System of Water Resources of Goiás (SIRHGO), the Web Grant system and the INÃ System for environmental complaints. These technological tools have provided greater transparency, agility and effectiveness in the management and regulation of water resources, allowing accurate and integrated monitoring of environmental demands and infractions.

In the "Management Instruments" dimension, four aspects were evaluated: a) Indicators; b) Monitoring, c) Monitoring and Evaluation and, d) Planning. All aspects of this dimension were classified by most of the research participants as a "low" level (Figure 4).

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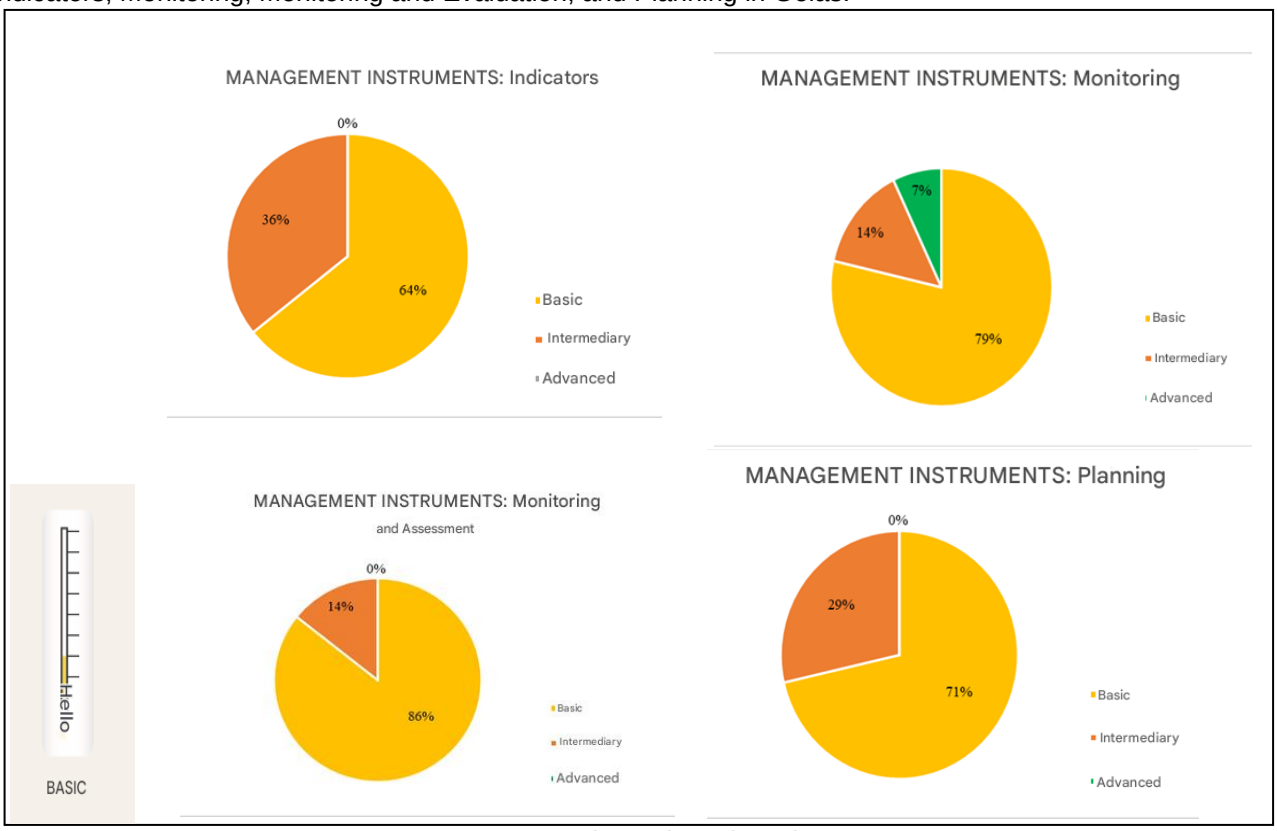
Figure 4 – Thermometer of the "Management Instruments" Dimension. Classification of governance aspects: Indicators, Monitoring, Monitoring and Evaluation, and Planning in Goiás.



Source: The authors (2025)

Even though it is considered at a basic level, it should be noted that the State of Goiás has been standing out for being a pioneer in developing an unprecedented and innovative system for monitoring river basin plans in the country, capable of monitoring the fulfillment of the goals and objectives of the state's state and interstate water resources plans.

The Integrated Water Resources Management System in Goiás aims to implement the state water resources policy, as well as to develop, review and execute the corresponding state plan. This system involves the participation of state and municipal institutions, as well as civil society, as established in article 140 of the State Constitution. Its structure is formed by advisory and deliberative bodies, as well as a central executive body, as represented in Figure (5).

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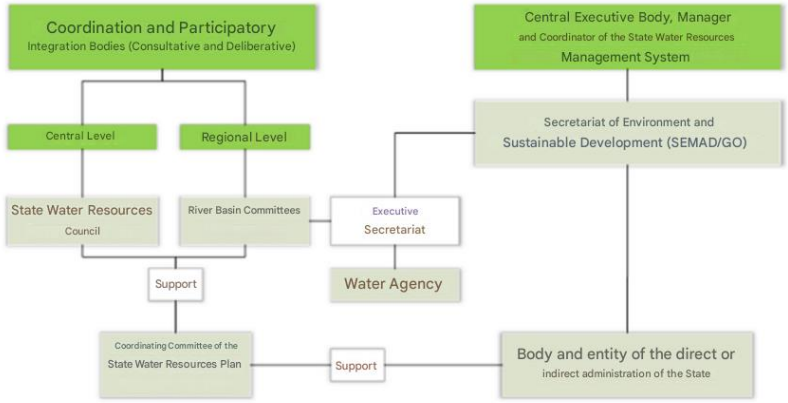
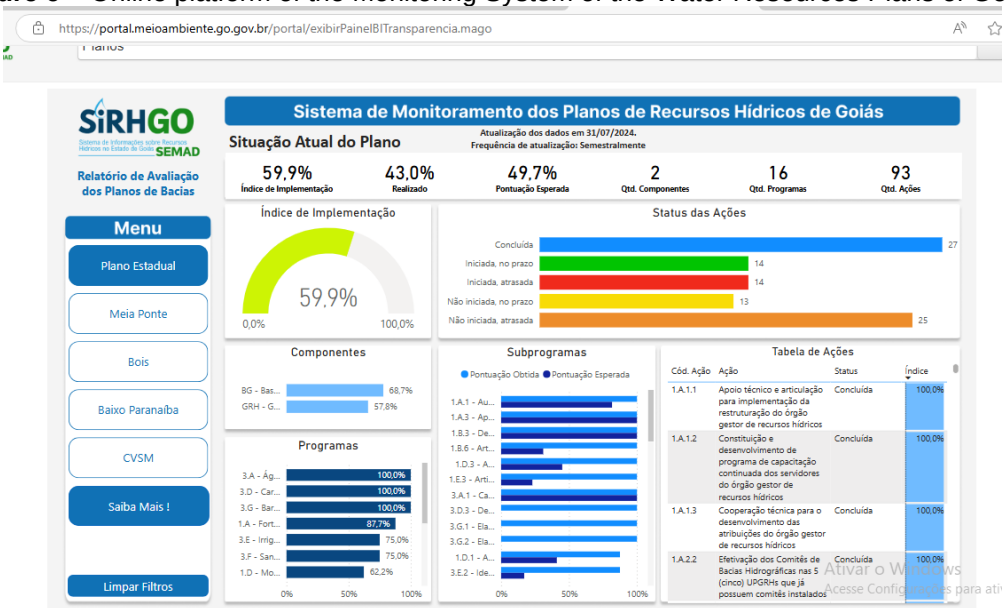
Figure 5 - Integrated Water Resources Management System of the state of Goiás



Source: Goiás (2014; 1997; 2015).

Within the Information System on Water Resources in the State of Goiás – SIRGHO, there is an exclusive platform for the monitoring system of the water resources plans of Goiás, which contains information on the current situation of each plan, the implementation index, table of actions and status of the actions (Figure 6).

Figure 6 – Online platform of the Monitoring System of the Water Resources Plans of Goiás.



Source: Department of Environment and Sustainable Development of Goiás (SEMAD, 2025)

Water resources plans are instruments with a guiding function for the use, recovery and conservation of water resources. The plans can be carried out at three different scales: national; state and interstate and by hydrographic basin (Campus; Studart, 2003). These documents combine systematic analysis of current conditions, projections of future possibilities and the socioeconomic reality of the region in which the main water resource

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under study is located. In this way, it is possible to establish a set of short, medium, and long-term actions to seek solutions to the problems identified, prevent future problems related to multiple uses of water, in addition to making systems more resilient (Teixeira et al., 2021; Tundisi, 2008)

Three Interstate Water Resources Plans are in force, namely: Strategic Plan for Water Resources of the Tocantins and Araguaia River Basin, published in 2009 (ANA, 2009); Water Resources Plan for the São Francisco River Basin 2016-2025 (NEMUS, 2016) and the Water Resources Plan and the Framework of Surface Water Bodies of the Paranaíba River Basin, published in 2013 (ANA, 2013) and which is already in the process of renewal.

The State Water Resources Plan of the State of Goiás is also in force, which was revised and published in 2015 (INYPSA COBRAPE, 2015), a robust document that sought to make its objectives compatible with existing state plans and sectoral policies. In addition to the state plan, the state of Goiás prepared the Paranaíba Tributaries Basin Plans in the State of Goiás, which integrates four action plans of the following Water Resources Planning and Management Units of the State of Goiás (UPGRH): UPGRH of the Corumbá, Veríssimo and São Marcos Rivers (Goiás, 2021a); UPGRH of the Meia Ponte River (Goiás, 2021b); UPGRH of the Rio dos Bois (Goiás, 2021c) and UPGRH of the Goiás Tributaries of the Lower Paranaíba (Goiás, 2021d).

For one of the volunteers of the research, the Integrated State System of Water Resources Management in Goiás is operational and demonstrates important advances, especially with regard to the implementation of management instruments. The performance of the state management body has been oriented towards the consolidation of these instruments, although it faces considerable challenges, among which the limitation in the number of specialized civil servants stands out, which compromises the institutional capacity to meet the growing demand for services and regulations in the sector (Anonymous participant 4, 2024).

The grant for the use of surface and groundwater is supported by a consolidated regulation, which has been progressively improved. The State Water Resources Plan, approved in 2016 (Goiás, 2016), represents a structuring milestone of state policy, being complemented by the Basin Plans of the tributary regions of the Paranaíba River, whose final versions were approved in 2021 (Goiás, 2021a, 2021b; 2021c; 2021d). However, the

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tributary basins of the Araguaia and Tocantins rivers do not yet have specific plans, which highlights a gap in regionalized planning (Anonymous participant 3, 2024).

According to a participant's report, another recent advance was the approval, in 2023, of the framing of the water bodies of the tributary basins of the Paranaíba. The other basins still lack this important management tool, which establishes water quality goals compatible with the intended uses. The charge for the use of water, approved in 2023, is expected to start collecting and applying the resources from 2025 (Goiás, 2023). The State Water Resources Information System was implemented in 2024, representing an important instrument for transparency and support for decision-making (Anonymous participant 4, 2024).

The State has five active River Basin Committees (CBHs) in 2025, with the creation of the CBH for the tributaries of the Tocantins River missing. Participation in the committees has been stimulated through actions by the state government, although greater autonomy and professionalization of these instances is still sought. It is expected that the resources from charging for the use of water will promote this transition, expanding the deliberative capacity and institutional sustainability of the CBHs.

In general, both the committees and the State Council of Water Resources (CERHi) have exercised deliberative functions, ensuring the participatory component of public policy. However, the institutional articulation is considered fragile, occurring in a more structured way between the National Water and Basic Sanitation Agency (ANA) and the State Secretariat for the Environment and Sustainable Development (SEMAD), and between the latter and the Water Resources Planning and Management Units (UPGRHs). On the other hand, the articulation with economic sectors and municipalities occurs, mostly, within the scope of protocols of intentions or planning processes that lack more solid institutionalization.

Regarding the "State-Society Interaction" dimension, aspects related to the governance of water resources were evaluated, with emphasis on: a) qualification of social participation and b) institutional channels of participation. Both aspects were predominantly classified at the basic level by the majority of the survey respondents (Figure 7), evidencing structural and operational weaknesses in the participatory system.

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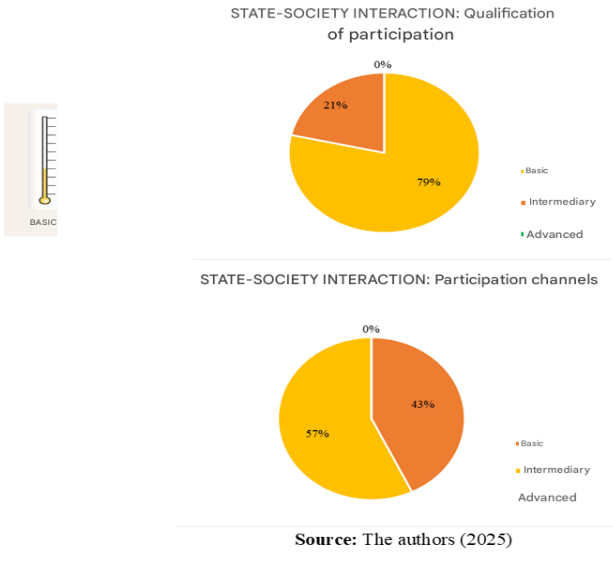
Figure 7 – Thermometer of the "State-Society Interaction" Dimension. Classification of the aspects "Qualification of participation" and "Participation Channels" in Goiás.



Source: The authors (2025)

The qualified participation of the actors involved in water management is considered one of the pillars for the effectiveness of environmental governance (**Ribeiro; Johnsson, 2018;** Read; Agrawal, 2006). The absence of adequate training compromises the effectiveness of the decisions made and limits the democratic exercise within the collegiate bodies.

In the deliberative process, it is essential that all representatives clearly understand the topics under discussion. The absence of an accessible language in technical communications hinders effective participation, especially of new members, who often, because they do not understand the content of the discussions, end up assuming a passive posture in the face of the technical and political dominance of government representatives and large water users (Jacobi et al., 2012).

It is observed, among the members of the CBHs, individuals with little understanding of the policy, as well as of the logic of the National Water Resources Management System (SINGREH), foundations, guidelines and instruments of the National Water Resources Policy and even inexperience for political debates on the subject, considering that the participatory instances of the management system, It is not limited only to technical and scientific knowledge. Lima et al., (2014) reinforce this fragility in the national context:

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> A factor that compromises the progress of the implementation of the policy based on intergovernmental relations is the qualification of the people who work in the systems, reflecting the lack of understanding about what the policy is (foundations, guidelines, objectives and instruments) and about the National Water Resources Management System (its entities, competencies and forms of action). Another component of the necessary qualification is experience in political debate, considering that in the participatory instances of the system, debates do not presuppose only technical knowledge. Research with participants in collegiate bodies identifies that one of the major obstacles to qualified participation has been the quality of the information made available for this purpose (Lima et al., 2014, p. 37)

Still in the national context, Grangeiro et al., (2019), when analyzing minutes of a river basin committee, identified members who expressed a lack of knowledge about a certain topic put to a vote in the plenary:

> This fact was identified during the meetings of the basin committee, where the members identified a gap in training and knowledge in the issues put on the agenda and in deliberative processes (...) one member pointed out the lack of knowledge about a topic put to a vote in the plenary. At that meeting, a voting process was conducted for the plenary, in which it would express itself on something without having adequate knowledge (Grangeiro et al., 2019, p. 324).

Braga et al. (2021) report that many members of basin committees demonstrate unpreparedness to participate in political-institutional debates, which compromises the deliberative nature of the committees, which transcends technical-scientific knowledge.

In the context of the qualification of participation, the promotion of training needs to be strengthened among the members of the CBHs in Goiás and Brazil, but in a way that is compatible with the level of challenges faced in the management of water resources and adapted to the set of skills necessary for the performance of their duties as a member of a river basin committee.

Although the River Basin Committees (CBHs) are collegiate bodies with an advisory and deliberative nature, their performance has been limited by the lack of legal knowledge of their members or by the absence of financial resources to operationalize their competencies (Lima et al., 2014). The insufficiency of effective channels of social participation — even if legally guaranteed — highlights the need to expand the quality and reach of these instances. There is an imperative for continuous processes of training, awareness and social engagement so that citizens understand their role within the water resources management system.

Regarding the "Government Interactions" dimension, three aspects of governance were analyzed: a) the inter- and intra-sectoral articulation, b) the effectiveness of the

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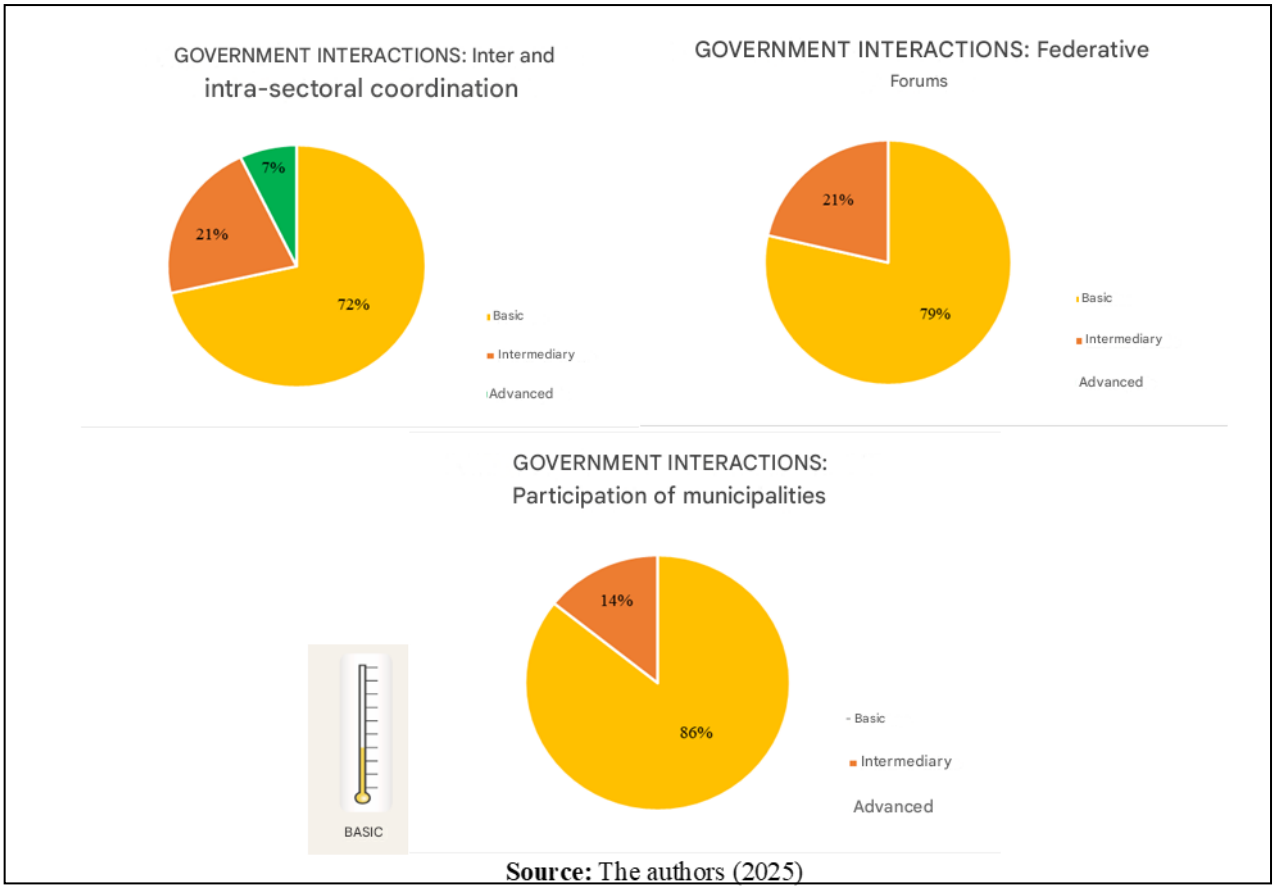
federative forums and c) the participation of the municipalities. All of these elements were classified as basic level by 72%, 79%, and 86% of the participants, respectively (Figure 8), which reflects a disconnect between the spheres of government and the fragmentation of environmental public policies.

Figure 8 – Thermometer of the "Government Interactions" Dimension and classification of the three related aspects in Goiás.



Source: The authors (2025)

The development of intrasectoral articulation is key to the success of policies and, in many cases, the same is true for intersectoral articulation. Discussions on water must permeate sectoral policies in a concrete and articulated way. In the design of the system, the water resources councils have the role of articulating water resources planning with sectoral planning and, according to their sphere of action (national or state), with national or state planning (Lima et al, 2014).

The lack of articulation between the different sectors and federative entities compromises multilevel governance, which is essential to face the complex challenges of water management, such as conflicts over use, water scarcity and degradation of aquatic ecosystems (Organization for Economic Cooperation and Development - OECD, 2015). In

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this sense, strengthening the spaces for dialogue between public and private actors, and between the federal, state and municipal levels, is one of the strategies most recommended by the specialized literature to improve water governance (National Health Foundation - FUNASA, 2014; WORLD BANK, 2018).

In the context of Goiás, it is noteworthy that the participation of the municipalities has been discreet, which weakens the decentralized and integrated management provided for in the National Water Resources Policy. This reality is no different in the national context, as highlighted by Lima et al., (2014): "The participation of municipalities has been incipient and poorly qualified in the collegiate bodies of water resources and in the actions of their competence regarding the use and occupation of the land and in the area of sanitation and in the interface with the management of water resources, not observed in the elaboration of Municipal Laws and Plans (Lima et al., 2014, p. 36).

In the integrated management of land and water use, it is observed that municipal planning instruments — such as the Master Plans, Basic Sanitation and Solid Waste Management — have been treated in a peripheral way by local managers. When elaborated, these instruments often do not incorporate the guidelines of the River Basin Plans, disarticulating actions and hindering systemic environmental planning (Tucci et al., 2015).

Although many aspects of governance have been classified as basic level, and despite the difficulties identified, it is undeniable that the State of Goiás has advanced in the management of water resources, especially as of 2022. The substantial increase in investments from federal committees stands out, which jumped from R$ 700 thousand to R$ 7 million between 2022 and 2023 (ANA, 2024). This financial increase enabled a series of structuring actions, among which the following stand out:

- Approval of the classification of water bodies in the four hydrographic basins of the Goiás tributaries of the Paranaíba River, by the State Council of Water Resources (CERHi);
- Regulation of charging for the use of water;
- Installation of 12 hydrometeorological data collection platforms;
- Issuance of 1,507 grant ordinances and 3,475 certificates of grant waiver;
- Implementation of a new grant system, operationalized in 2025;
- Adhesion to the 3rd Cycle of the Program for the Consolidation of the National Pact for Water Management (PROGESTÃO);

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- Signing of the Pact for Water Governance, at the International Seminar "Waters for the Future";
- Implementation of the Water Producer Program in four basins considered critical;
- Conducting a study for the creation of the Tocantins River Basin Committee;
- Renewal of the plenary sessions and elections of the boards of directors of the four Committees of the Goiás Tributaries of the Paranaíba River: CBH Corumbá, Veríssimo and São Marcos (CVSM), CBH Meia Ponte, CBH dos Bois and CBH Baixo Paranaíba.

These advances indicate a continuous effort at institutional structuring, but they coexist with relevant limitations, especially with regard to the training of the members of the basin committees. According to the perception of certain research volunteers, the theme related to water and the management of water resources, including its legislation, planning instruments and mechanisms of social participation, is not yet fully assimilated by the different actors involved in the process. This lack of internalization compromises the effectiveness of public policy focused on water resources and hinders consistent progress towards sustainable development and water security in the State of Goiás.

> The theme of water and water resources, their legislation, instruments, components, participation of society, etc., have not yet been or are effectively introjected, which undermines the results of this public policy and the search for and construction of sustainable development and water security in our State (Anonymous participant 1, 2024)
> If the aspects classified by me as basic do not match the reality practiced in the State, I suggest that there is a lack of disclosure of what is practiced by it, at least to the members of the basin committees (Anonymous participant 2, 2024).

Another participant points out that the annual recurrence of water crises in several municipalities in Goiás, often accompanied by rationing measures, is a concrete indication of the inefficiency of current management practices. Such a scenario shows that the ongoing actions have not been sufficient to promote the rational, equitable and sustainable use of water.

> "The simple observation that hundreds of municipalities are experiencing, repeated annually, a water crisis with water rationing to their citizens is objective evidence that what is being practiced is not and will not be in the near future sufficient time to equate and solve the problems of adequacy to the use of water resources. In Goiás we live the dilemma of the cerrado - mother of water in the indigenous understanding, floods in the rainy season and water scarcity in the dry season. We need to find a set of solutions that can guarantee the multiple uses of water: human and animal watering, irrigation, and electricity generation. I

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> understand that this will only be possible when we have a determinative, safe, predictable regulatory framework that prioritizes the common interest. A set of actions planned to achieve clear and common knowledge objectives, where the interests of the parties are objectively explicit" (Anonymous participant 3, 2024).

To overcome this dilemma, the volunteer defends the need for a robust regulatory framework, which offers legal certainty, predictability and places the collective interest as a central priority.

> The Integrated State System for the Management of Water Resources of Goiás works. The managing body acts to consolidate the management instruments. The number of servers dedicated to the management of water resources is insufficient in view of the existing demands. The granting of surface and groundwater has a defined regulation that has been evolving over time. The State Water Resources Plan was approved in 2016, and the Paranaíba Tributary Basin Plans were approved at the end of 2021, the tributary basins of the Araguaia River and the Tocantins River do not have a plan. The Framework of the tributary basins of the Paranaíba River was approved in 2023, the others do not have the framework. The Charge for the use of water resources was approved in 2023, and will begin to be collected and applied in 2025. The Water Resources Information System was implemented in 2024. There are 5 established and active Hydrographic Basin Committees (all that remains is to create the CBH of the tributaries of the Tocantins River) - participation is induced by the State. It is expected that the contribution of resources from the Collection will stimulate the independence and professionalization of the CBH. In any case, the CBHs deliberate on several issues, as well as CERHi, ensuring the participatory aspect of the water resources policy. The institutional articulation is incipient, it occurs between ANA and SEMAD, and between SEMAD and the UPGRH; between SEMAD, the sectors and the municipalities, the articulation exists as a protocol of intentions, planning (Anonymous participant 4, 2024).

Such a structure must be anchored in an articulated strategic planning, with clear goals that are widely understood by the various sectors of society. Only through a transparent pact, where the interests of the different water users are clearly defined and negotiated, will it be possible to guarantee the multiple uses of this essential resource – from human and animal supply to agricultural irrigation and electricity generation.

FINAL CONSIDERATIONS

Although the governance of water resources in the State of Goiás has been, in its general evaluation, classified as basic level, the State of Goiás has been showing important institutional and operational advances in the management of water resources. Among the main progress observed, the strengthening of the technical team responsible for the execution of the program's goals stands out, with an emphasis on meeting the

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demands related to the registration and regularization of water use, in the performance in dam safety and in the technical and institutional support to the River Basin Committees.

Another milestone was the development and availability of the automated digital system for granting processes, known as WebGrant and Veredas, which represents a leap in quality in the management of regulatory instruments. It is worth mentioning the recomposition of the State Council of Water Resources, which contributed to the improvement of participatory governance in the sector.

In the field of monitoring, the State Meteorological and Hydrological Information Monitoring Center was implemented, expanding the capacity for collecting and analyzing data in real time. At the same time, there was a strong effort to implement the National Dam Safety Policy, with advances in the institutionalization of the state policy, implementation of the Annual Inspection Plan and the establishment of the Dam Registry.

The elaboration of the Basin Plans of the tributaries of the Paranaíba River in Goiás and the systematization of water quality data are among the achievements of this cycle, reinforcing the technical basis and strategic planning of state water management.

However, the state still faces important challenges that deserve attention and continuous improvement. Among them, the need to develop and put into practice a continuous training plan on topics related to water resources stands out, adopting innovative approaches and establishing partnerships with local institutions. The effective implementation of the Basin Plans and the State Water Resources Plan remains a priority goal, as well as the operationalization of charging for the use of water.

Other critical points involve the improvement of financial planning for the use of the program's resources, as well as the restructuring of the Special Water Resources Account, linked to the State Environment Fund (FEMA) and managed without the participation of the State Water Resources Council, which limits the strategic allocation of resources specifically aimed at water management.

In addition, it is necessary to organize social communication actions in a more structured and continuous way, ensure greater transparency in the deliberations of the CERHi and the CBHs, and develop an integrated information system on water resources that works as a decision support tool in the granting processes.

Finally, even with the limited number of participants, in view of the universe of council members, there is a growing concern with the governance of water resources in Goiás, especially enhanced with the implementation of the charging instrument.

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