

PERFORMANCE OF WATER RESOURCES MANAGEMENT AMONG NORTHEASTERN BRAZILIAN STATES: AN EVALUATION BASED ON PROGESTÃO TARGETS

✉ Ailton Francisco da Rocha ¹, ✉ Roger Dias Gonçalves ^{2*}

¹ Programa de Pós-Graduação em Recursos Hídricos – PRORH, Universidade Federal de Sergipe, CEP 49.100-000, São Cristóvão, SE, Brazil. E-mail: ailtonrocha@academico.ufs.br

² Departamento de Geologia, Programa de Pós-Graduação em Recursos Hídricos, Universidade Federal de Sergipe, CEP 49.100-000, São Cristóvão, SE, Brazil. E-mail: roger.dias@academico.ufs.br

*Corresponding author



This is an open access article distributed under the terms of the Creative Commons Attribution 4.0 International License.

ABSTRACT

The Program for the Consolidation of the National Water Management Pact (*Programa de Consolidação do Pacto Nacional pela Gestão das Águas – PROGESTÃO*), coordinated by Brazil's National Water and Sanitation Agency (*Agência Nacional de Águas e Saneamento Básico – ANA*), is a collaborative initiative involving all Brazilian federation units. It aims to enhance articulation and strengthen institutional cooperation to address common challenges and promote sustainable water resource use. This study evaluates the performance, measured by adherence to program targets and annual certification scores, of four Northeastern Brazilian states (Maranhão, Piauí, Rio Grande do Norte, and Sergipe), all categorized under Typology B, characterized by a satisfactory quali-quantitative balance in most basins, water uses concentrated in a few basins with critical areas, and incidence of conflicts over water use confined to those critical areas. Employing a descriptive, exploratory, and qualitative research approach, the study reveals that, although these states encountered difficulties in meeting certain objectives, the program's benefits are evident. Notably, it has strengthened State Water Resource Management Systems, expanded access to systematized water resources information, and enhanced policy implementation. Sergipe stands out, having achieved 95.31% of its Progestão targets across the first two cycles, thereby securing substantial financial support from the program, reinforcing accountability and driving systematic improvements in water resources management. Rio Grande do Norte followed with 94.85%, while Maranhão (86.58%) and Piauí (77.09%) demonstrated lower but still meaningful levels of target adherence. The study underscores the Progestão program's fundamental role in advancing sustainable water management practices within Northeast Brazil, offering critical insights for policy-making and institutional development in water resource governance, while acknowledging the limits of formal target compliance as a proxy for real-world management effectiveness.

Keywords: Brazilian water policy; PROGESTÃO; Integrated water governance; Institutional strengthening; Performance metrics.

RESUMO

DESEMPENHO DA GESTÃO DE RECURSOS HÍDRICOS ENTRE OS ESTADOS DO NORDESTE BRASILEIRO: UMA AVALIAÇÃO BASEADA NAS METAS

DO PROGESTÃO. O Programa de Consolidação do Pacto Nacional pela Gestão das Águas (PROGESTÃO), coordenado pela Agência Nacional de Águas e Saneamento Básico (ANA), é uma iniciativa colaborativa envolvendo todas as unidades da federação brasileira. O seu objetivo é aprimorar a articulação e fortalecer a cooperação institucional para enfrentar desafios comuns e promover o uso sustentável dos recursos hídricos. Este estudo avalia o desempenho – medido pela adesão às metas do programa e pontuações de certificação anual – de quatro estados do Nordeste brasileiro (Maranhão, Piauí, Rio Grande do Norte e Sergipe), todos categorizados na Tipologia B, caracterizada por um balanço quali-quantitativo satisfatório na maioria das bacias, usos da água concentrados em poucas bacias com áreas críticas e incidência de conflitos pelo uso da água restrita a essas áreas críticas. Empregando uma abordagem de análise documental descritiva, exploratória e qualitativa, o estudo revela que, embora esses estados tenham encontrado dificuldades no cumprimento de determinados objetivos, as contribuições do programa são evidentes. Notavelmente, fortaleceu os Sistemas Estaduais de Gerenciamento de Recursos Hídricos (SEGREHs), expandiu o acesso a informações sistematizadas sobre recursos hídricos e aprimorou a implementação de políticas. Sergipe destaca-se, tendo alcançado 95,31% de suas metas do Progestão ao longo dos dois primeiros ciclos, garantindo, assim, um substancial apoio financeiro do programa, reforçando a prestação de contas (*accountability*) e impulsionando melhorias sistemáticas na gestão de recursos hídricos. O Rio Grande do Norte seguiu com 94,85%, enquanto o Maranhão (86,58%) e o Piauí (77,09%) apresentaram níveis menores, mas ainda significativos, de adesão às metas. O estudo ressalta o papel fundamental do programa Progestão no avanço da capacidade institucional de gestão das águas no Nordeste do Brasil, oferecendo percepções para a formulação de políticas e desenvolvimento institucional na governança de recursos hídricos, ao mesmo tempo em que reconhece os limites do cumprimento formal de metas como indicador (*proxy*) da eficácia da gestão na prática.

Palavras-chave: Política brasileira de recursos hídricos; PROGESTÃO; Governança integrada da água; Fortalecimento institucional; Cumprimento de metas; Avaliação de desempenho.

RESUMEN

DESEMPEÑO DE LA GESTIÓN DE RECURSOS HÍDRICOS ENTRE LOS ESTADOS DEL NORESTE BRASILEÑO: UNA EVALUACIÓN BASADA EN LAS METAS DEL PROGESTÃO. El Programa de Consolidación del Pacto Nacional por la Gestión de las Aguas (Programa de Consolidação do Pacto Nacional pela Gestão das Águas – PROGESTÃO), coordinado por la Agencia Nacional de Aguas y Saneamiento Básico (Agência Nacional de Águas e Saneamento Básico – ANA), es una iniciativa colaborativa que involucra a todas las unidades de la federación brasileña. Su objetivo es mejorar la articulación y fortalecer la cooperación institucional para abordar desafíos comunes y promover el uso sostenible de los recursos hídricos. Este estudio evalúa el desempeño – medido por el cumplimiento de las metas del programa y las puntuaciones de certificación anual – de cuatro estados del noreste brasileño (Maranhão, Piauí, Rio Grande do Norte y Sergipe), todos categorizados bajo la Tipología B, caracterizada por un equilibrio cuali-cuantitativo satisfactorio en la mayoría de las cuencas, usos del agua concentrados en unas pocas cuencas con áreas críticas e incidencia de conflictos por el uso del agua limitados a esas áreas críticas. Empleando un enfoque de análisis documental descriptivo, exploratorio y cualitativo, el estudio revela que, aunque estos estados encontraron dificultades para cumplir ciertos objetivos, las contribuciones del programa son evidentes. En particular, ha fortalecido los Sistemas Estatales de Gestión de Recursos Hídricos (Sistemas Estaduais de Gerenciamento de Recursos Hídricos –

SEGREHs), ampliado el acceso a información sistematizada sobre recursos hídricos y mejorado la implementación de políticas. Sergipe se destaca por haber alcanzado el 95,31% de sus metas del Progestão a lo largo de los dos primeros ciclos, asegurando así un apoyo financiero sustancial del programa, reforzando la rendición de cuentas (*accountability*) e impulsando mejoras sistemáticas en la gestión de los recursos hídricos. Río Grande do Norte le siguió con el 94,85%, mientras que Maranhão (86,58%) y Piauí (77,09%) demostraron niveles menores, pero aún significativos, de cumplimiento de metas. El estudio subraya el papel fundamental del programa Progestão en el avance de la capacidad institucional de la gestión del agua en el noreste de Brasil, ofreciendo perspectivas para la formulación de políticas y el desarrollo institucional en la gobernanza de los recursos hídricos, al tiempo que reconoce los límites del cumplimiento formal de las metas como un indicador (*proxy*) de la eficacia de la gestión en la realidad.

Palabras clave: Política brasileña de recursos hídricos; PROGESTÃO; Gobernanza integrada del agua; Fortalecimiento institucional; Cumplimiento de metas; Evaluación de desempeño.

1 INTRODUCTION

Public management of water resources is inherently complex, involving the prioritization of uses according to legal frameworks, in Brazil, human and animal supply have priority over other uses (Brazil, 1997), and the resolution of conflicts arising from its utilization to ensure a continuous supply to all users (Levino et al., 2023). The decision-making processes governing these resources are highly contextual and often influenced by political goals, which can exacerbate existing management challenges (Rus, 2014; Waters et al., 2021). In many cases, difficulties in water resource management are attributed more to governance failures than to the physical availability of water (Bezerra et al., 2021). Therefore, performance evaluation of public water management organizations must transcend economic considerations to include efficiency and effectiveness criteria (Gerasimova et al., 2019).

Increasing pressures for reform in public management practices have prompted organizations to adopt tools and strategies traditionally reserved for the private sector (Aragão & Fontana, 2022). In the technical field of water resources management, this has led to the exploration of innovative methods such as Results-Oriented Management (ROM), which enhances the effectiveness of public management by introducing flexibility to processes and projects, thereby addressing the constraints of traditional bureaucratic systems (Ha & Hai, 2020; Saghi-Jadid & Ketabchi, 2021). Kirschke et al. (2022) describe ROM as a strategic approach that

aligns processes with desired outcomes, thereby maximizing the creation of public value (Kanufre & Rezende, 2012).

Levino et al. (2023) review literature indicating that Results-Oriented Management (ROM) is widely used across various public and non-profit sectors, including educational management, health systems, municipal governance, and government agencies (Borodiyenko et al., 2020; Cordova-Pozo et al., 2018; Gonzaga et al., 2017). Within the domain of Water Resources Management (WRM), ROM has been shown to enhance sustainability and efficiency in diverse projects, from dam operations to community water initiatives (Bongei & Kaburu, 2021; Jumba et al., 2013).

In Brazil, the Program for the Consolidation of the National Water Management Pact (PROGESTÃO), established under Resolution No. 379/2013 by the National Water and Basic Sanitation Agency (Agência Nacional de Águas e Saneamento Básico [ANA], 2013), incorporates ROM principles to allocate federal resources for state-level water management (Almeida et al., 2020). The primary goal of PROGESTÃO is to foster commitments among federated entities to address shared challenges and encourage the sustainable, multiple use of water resources. The program specifically aims to enhance coordination between national and state-level water management and regulatory processes, and to fortify Brazil's water management framework, making it more integrated, decentralized, and participatory (ANA, 2021).

Progestão targets are categorized into two types: federative cooperation targets and state-level water resources management targets. The former are established by the National Water and Basic Sanitation Agency (ANA) based on legal regulations or the need for information sharing. The latter are determined by state managing bodies and ratified by the respective State Water Resources Councils (*Conselhos Estaduais de Recursos Hídricos* – CERHs), depending on the management typology – A, B, C, or D – adopted by each state (ANA, 2021). These typologies reflect increasing complexity in water resource management challenges, ranging from low (Typology A) to very high (Typology D), as described in detail in the Methodology section.

Progestão is structured as a financial incentive program, with voluntary participation from federation units based on a ‘payment for results’ model. This approach involves the transfer of ANA’s budgetary resources contingent upon the fulfillment of state-level water resources management and federative cooperation targets (ANA, 2021). The program includes all federation units, coordinated across the national territory through decrees of adherence signed by the respective State Governments and the Federal District (ANA, 2021).

The first cycle of Progestão, initiated in 2013 as a practical tool for implementing the Pact, offered up to five annual payments of R\$ 750,000 to each federative unit, contingent upon meeting pre-established institutional targets. The second cycle began in August 2017, where each unit could receive up to R\$ 5 million at the contract’s conclusion, again dependent on the achievement of specified targets (ANA, 2021).

In 2017, the Institute for Applied Economic Research (*Instituto de Pesquisa Econômica Aplicada* [IPEA], 2017) released a report establishing a basic reference for Progestão evaluation, including the development of a logical model to coordinate the program’s actions with its intended outcomes. Subsequent studies, including Almeida et al. (2020), who conducted a comparative qualitative evaluation of administrative experiences in the Northeast and North regions, and Almeida et al. (2023), who analyzed administrative experiences across Brazilian federation entities in Progestão, have built upon this foundation. Additionally, Levino et al. (2023) explored the state of Alagoas, presenting a group decision model to identify barriers in achieving the program’s targets.

Despite these contributions, the literature lacks comparative evaluations specifically focusing on the performance of Northeastern states classified under the B typology in Progestão.

This study aims to perform a comparative performance evaluation of federative cooperation targets and state-level water resources management targets among Northeastern Brazilian states (Maranhão, Piauí, Rio Grande do Norte, and Sergipe) that have adopted the B typology. The evaluation spans the first and second cycles of Progestão, examining how these states have navigated the program’s demands and opportunities. Following the Patton’s guidance (Patton, 2008), our evaluation adopts a realistic epistemology, focusing on identifying and proving correlations between the means employed and the results achieved. This approach involves understanding the mechanisms that generate these results and interpreting outcomes through a lens of contextualized judgment, considering the specific conditions under which they were realized.

By addressing these aspects, the study not only assesses the effectiveness of water resource management strategies but also contributes to Sustainable Development Goal (SDG) 6: Clean Water and Sanitation (*Objetivos de Desenvolvimento Sustentável 6 – ODS 6*) (United Nations, 2015), exploring how improved management practices can enhance both the efficiency and sustainability of water resources in the region.

2 METHODOLOGY

This study focuses on the Northeastern Brazilian states of Maranhão, Piauí, Rio Grande do Norte, and Sergipe, which have opted for B typology under Progestão. These regions are characterized by diverse water resource challenges, making them ideal candidates for evaluating the efficacy of federative cooperation and state management strategies in water resources.

A descriptive, exploratory, and qualitative approach was employed, based on documentary analysis of official data and reports from the PROGESTÃO website hosted by ANA, covering both the 1st and 2nd cycles of the program. Documents analyzed included legal regulations, management performance reports, and annual certification outcomes for each of the four states. The systematic organization of these documents constitutes the primary analytical corpus of the study (ANA, 2017a; ANA, 2017b; ANA, 2018b;

ANA, 2018c; ANA, 2021; ANA, 2023a; ANA, 2023b; ANA, 2023c; ANA, 2023d).

Data were extracted by systematically reviewing each state’s administrative experience synthesis reports for Cycles 1 and 2, cataloguing: (i) the targets adopted by each state; (ii) the targets achieved and not achieved; (iii) annual certification scores; and (iv) total financial transfers received. Where targets changed between Cycles 1 and 2, these modifications were noted and taken into account in the comparative analysis. Mandatory and optional targets were identified based on each state’s typology classification and the program’s normative framework (ANA, 2021); non-compliance with optional targets was noted but not factored into certification scores.

ANA has developed a specific methodology to evaluate the water resources management systems of states and the Federal District. This methodology categorizes management systems into four typologies—A, B, C, and D—based on a set of variables that define the complexity of water management challenges (Table 1). Typology classification follows the framework outlined by the Organization for Economic Co-operation and Development (*Organização para a Cooperação e Desenvolvimento Econômico* [OECD], 2015), which recognizes four levels of management

TABLE 1 – Management Typologies: A, B, C, and D of the Progestão Program (adapted from ANA, 2021).

<i>Typology</i>	<i>Description</i>
A	Quali-quantitative balance: satisfactory across almost the entire territory; Quali-quantitative criticality: insignificant; Water uses: sporadic and dispersed; Incidence of conflicts over water use: low.
B	Quali-quantitative balance: satisfactory in most basins; Water uses: concentrated in a few basins with quali-quantitative criticality (critical areas); Incidence of conflicts over water use: confined to critical areas only.
C	Quali-quantitative balance: critical in some basins (qualitative or quantitative criticality); Water uses: concentrated in a few basins with quali-quantitative criticality (critical areas); Conflicts over water use: higher intensity and scope of conflicts, but still confined to critical areas.
D	Quali-quantitative balance: critical (qualitative or quantitative criticality) in several basins; Water uses: concentrated in multiple basins, not only in those with quali-quantitative criticality (critical areas); Conflicts over water use: widespread and highly complex conflicts, not confined to critical areas.

complexity: low (Typology A), medium (Typology B), high (Typology C), and very high (Typology D). As the intensity and complexity of conflicts increase from A to D, the required institutional responses evolve from basic monitoring and targeted interventions to comprehensive planning and the deployment of specialized agencies. The typologies are crucial for determining the appropriate institutional model for each state and for establishing differentiated targets under the program (ANA, 2021).

The typology adopted by each state determines whether water resources management targets are mandatory or optional; non-compliance with optional targets does not impact the state’s final certification scores. Participation in Progestão is voluntary, available to all states that wish to collaborate in achieving the objectives of the National Water Management Pact. Financial incentives are structured around annual certifications that assess the fulfillment of agreed targets, with the amounts transferred being proportional to the scores obtained in these evaluations (Almeida et al., 2020). Water resources management targets were organized into four groups of variables evaluated systematically (Table 2), as specified by Libânio (2015).

Certification results were categorized into three performance tiers, following the classification proposed by Levino et al. (2023): reasonable

TABLE 2 – State goals and management variables considered in the Progestão program evaluation (according to Libânio, 2015).

<i>Aspect Category</i>	<i>Management Variables</i>
Institutional, Legal, and Social Articulation	Institutional Model of Water Resources Management (SEGREH); Managing Body; Legal Framework; State Council; Sectoral Capacitation; Process Management; Basin Committees and Collegiate Bodies; Agency and Delegated Entities; Social Communication and Outreach; Coordination with User and Cross-Sectoral Groups.
Planning	Hydrographic Division; Water Balance; Strategic Planning; State Water Resources Plan; Basin Plans; Classification; Special Management Studies; Decision Support Models and Systems.
Information	Cartographic Database; Hydrometeorological Monitoring; Water Quality Monitoring; User Registry and Infrastructure; Information System; Research, Development, and Innovation.
Regulatory, Economic, and Operational	Water Rights Allocation; Enforcement; Financial Sustainability of the Management System; State Water Resources Fund; Charges; Water Works; Inductive Programs; Management and Control of Critical Events.

(71–80%), satisfactory (81–90%), and excellent (91–100%). This classification was adopted as an analytical instrument to facilitate the comparison of state performance within a common evaluative framework, making it possible to contextually interpret degrees of target adherence. It is important to note, however, that this classification reflects formal adherence to Progestão parameters, and does not necessarily capture the full complexity of real-world water governance outcomes.

The study recognizes methodological limitations inherent to this design: (i) the reliance on official program data may introduce institutional bias, as such data represent self-reported and ANA-verified compliance rather than independent evaluation of management quality; (ii) the certification scores measure formal adherence to targets rather than the broader effectiveness of water resource governance; and (iii) contextual factors – political, financial, and institutional – that may influence target achievement are not fully captured by the program’s metrics alone. These limitations are acknowledged in the interpretation of results throughout the paper.

3 RESULTS AND DISCUSSION

The Progestão program dual focus on federal cooperation and state-level management allowed each component to contribute up to 50% towards overall goal achievement. In the program’s initial stages, evaluations of federal cooperation goals commenced in the year following their

introduction, as these goals had no immediate financial implications. This setup enabled a phased and detailed assessment of performance across participating states.

3.1 State-specific performance analyses

Maranhão joined Progestão under Decree No. 29,302 (Maranhão, 2013), with the State Secretariat of Environment and Natural Resources (*Secretaria de Meio Ambiente e Recursos Naturais* – SEMA) serving as the coordinating entity. The state participated in the 1st Cycle from 2014 to 2017 and the 2nd Cycle from 2018 to 2022, consistently adopting management typology “B” throughout both periods.

During these cycles, Maranhão achieved an average certification of 41.58% in federal cooperation goals and 45.00% in state management goals. This performance resulted in an overall satisfactory cumulative score of 86.58%, according to reports by the National Water and Sanitation Agency in 2018 (ANA, 2018c) and 2023 (ANA, 2023a). The state recorded its highest performance scores in Year 2 (99.25%) and Year 4 (97.40%), with its lowest scores appearing in Year 9 (52.99%) and Year 6 (80.26%). Figure 1a illustrates the detailed year-by-year final results.

Piauí entered Progestão under Decree No. 15,270 (Piauí, 2013), coordinated by the State Secretariat of Environment and Water Resources (*Secretaria de Meio Ambiente e Recursos Hídricos* – SEMARH). The state engaged in the 1st Cycle

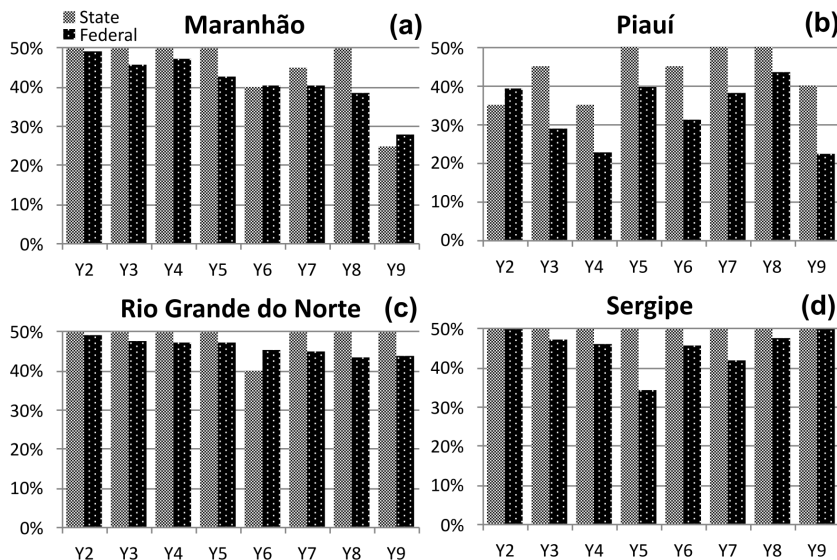


FIGURE 1 – Final certification results in first and second cycles of the program (Y=year).

from 2013 to 2016 and the 2nd Cycle from 2017 to 2021, consistently adopting management typology “B” during these periods.

Piauí’s performance averaged 33.34% in federal cooperation goals and 43.75% in state management goals, leading to a cumulative reasonable score of 77.09% (ANA, 2017a; ANA, 2023b). The state’s best performances were in Year 8 (93.63%) and Year 5 (89.77%), while the lowest were in Year 4 (57.90%) and Year 9 (62.57%). Figure 1 (b) presents these results year by year. Piauí’s consistently lower scores indicate structural difficulties in consolidating its water management framework, particularly related to planning instruments and institutional capacity.

Rio Grande do Norte commenced its involvement in Progestão with Decree No. 23,745 (Rio Grande do Norte, 2013), and coordinated by the Institute of Water Management of Rio Grande do Norte (*Instituto de Gestão das Águas do Rio Grande do Norte – IGARN*). The state participated in both the 1st Cycle, from 2013 to 2017, and the 2nd Cycle, from 2018 to 2022, consistently adopting management typology “B.”

During its engagement with the program, Rio Grande do Norte achieved an average of 46.10% in federal cooperation goals and 48.75% in state management goals. This robust performance resulted in an excellent overall cumulative score of 94.85%, as reported by ANA in 2018 (ANA, 2018b) and 2023 (ANA, 2023c). The state’s highest

scores were recorded in Year 2 (99.10%) and Year 3 (97.70%), whereas the lowest scores appeared in Year 6 (85.42%) and Year 8 (93.29%). Figure 1c visually represents these results, detailing the state’s performance year by year.

Sergipe entered the Progestão program under Decree No. 29,412 (Sergipe, 2013), with the Secretariat of the Environment and Water Resources (*Secretaria de Meio Ambiente, Sustentabilidade e Ações – SEMARH*) acting as the coordinating entity. The state participated in the 1st Cycle from 2013 to 2016 and the 2nd Cycle from 2017 to 2021, consistently adopting the management typology “B” across both periods.

Throughout its participation, Sergipe recorded an average of 45.31% in federal cooperation goals and 50.00% in state management goals, culminating in an excellent overall performance with a cumulative score of 95.31%, as reported by ANA in 2017 (ANA, 2017b) and 2023 (ANA, 2023d). Sergipe’s peak performances were noted in Year 9 (99.82%) and Year 2 (99.75%), with its more challenging years being Year 5 (84.39%) and Year 7 (91.90%). Figure 1 (d) visually details these results, illustrating the state’s performance trajectory year by year.

Figure 2 displays the performance of the states of Maranhão, Piauí, Rio Grande do Norte, and Sergipe in achieving the objectives of Cycle 1 and Cycle 2 of Progestão. As illustrated in the figure, Sergipe notably excelled in meeting the program’s

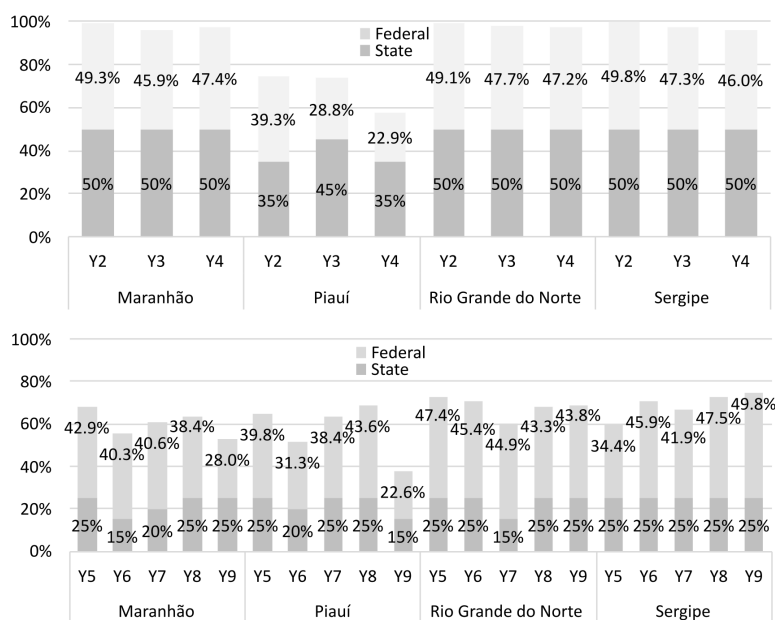


FIGURE 2 – Performance of the states of Maranhão, Piauí, Rio Grande do Norte, and Sergipe in meeting the goals of Progestão Cycles 1 and 2 (Y=year).

goals during both cycles, successfully achieving all the selected state goals. It was followed closely by Rio Grande do Norte, with Maranhão and Piauí trailing in their goal attainment. This visualization highlights the varying degrees of success among the states and underscores Sergipe’s leadership in implementing the Progestão objectives effectively.

Considering the complexity and scope of the goals adopted by each state, a qualitative evaluation was conducted to assess the experiences and challenges encountered. This evaluation linked the unmet water resources management goals with specific issues that contributed to non-compliance, providing insights into the systemic and operational barriers faced by the states. Almeida et al. (2020) also observed that this approach helped to identify key areas requiring targeted interventions and policy adjustments to enhance future compliance and performance.

3.2 Quantitative achievements and challenges

Table 3 details the number of goals adopted and achieved by the states of Maranhão, Piauí, Rio Grande do Norte, and Sergipe during Cycles 1 and 2 of Progestão. The data reveal that Sergipe and Rio Grande do Norte were particularly successful in the first cycle, achieving the majority of their set objectives. This trend continued into the second cycle, where these two states again outperformed the others, successfully meeting most of their goals. This consistent achievement underscores their effective implementation strategies and strong compliance with Progestão’s targets.

Table 4 provides a detailed overview of the goals not achieved during Cycles 1 and 2 by the states of Maranhão, Piauí, Rio Grande do Norte,

and Sergipe, also listing the main challenges that contributed to these shortcomings. This table is instrumental in identifying specific areas where each state struggled, allowing for a targeted analysis of systemic issues and operational hurdles that prevented full compliance with the Progestão objectives.

Table 4 highlights significant discrepancies in achieving certain Progestão goals, particularly “Research, Development, and Innovation,” which three out of four states failed to meet during the first cycle. The main issue for Piauí was the absence of funded initiatives within its state water resources management system targeting this goal. Maranhão and Sergipe faced similar challenges, where despite the presence of funded actions, they were not integrated into a comprehensive and structured plan, leading to their non-compliance. The second cycle presented challenges with the “Inspection” goal, where Maranhão, Piauí, and Rio Grande do Norte did not have adequate structures in place to conduct necessary inspection activities, reflecting a continued struggle in operational implementation.

3.3 Financial implications and disbursements

Financial allocations from ANA were determined based on annual percentage evaluation scores of each state’s target adherence, assessed annually by ANA’s technical team. Over Cycles 1 and 2, substantial financial resources were disbursed to support ongoing and future water management initiatives. Specifically, Maranhão received R\$ 7,443,966.60, Piauí received R\$ 6,817,672.12, Rio Grande do Norte received R\$ 8,209,695.35, and Sergipe received R\$ 8,329,198.21. These figures are directly proportional to each state’s cumulative certification scores, indicating that the ‘payment for results’ mechanism does function as intended in differentiating resource transfers according to performance. Detailed annual disbursements are presented in Figure 3.

3.4 Broader impacts of enhanced state water resources management

The successful adherence to PROGESTÃO targets appears to have contributed to measurable institutional improvements in state water resources management. Based on the program reports analyzed, the following advances may be noted: strengthening of State Water Resources Management Systems (SEGREGs); enhancement of the availability of systematized information

TABLE 3 – Goals achieved on typology B by the states of Maranhão, Piauí, Rio Grande do Norte, and Sergipe. Adapted from Almeida *et al.* (2020).

States	Number of goals (Cycle 1)	Goals achieved (Cycle 1)	Number of goals (Cycle 2)	Goals achieved (Cycle 2)
Maranhão	28	15	31	21
Piauí	25	17	28	21
Rio Grande do Norte	29	27	31	26
Sergipe	32	22	31	29

TABLE 4 – Goals not achieved during Cycles 1 and 2 by the states of Maranhão, Piauí, Rio Grande do Norte, Sergipe, and main identified problems. Adapted from Almeida *et al.* (2020).

State	Goals Not Achieved in Cycle 1 Main Identified Problems	Goals Not Achieved in Cycle 2 Main Identified Problems
Maranhão	<ul style="list-style-type: none"> Coordinator/Management Entity Process Management Basin Committees and Collegiate Bodies Sectoral Training Institutional Strategic Planning State Water Resources Plan User Registers and Infrastructure Water Quality Monitoring Research, Development, and Innovation Charges Financial Sustainability of the Management System State Water Resources Fund Inducing Programs <p>Main problems: absence of structured plans for R&D&I; institutional fragmentation in process management; limited financial instruments.</p>	<ul style="list-style-type: none"> Social Communication and Information Dissemination Coordination with User and Cross-Sectoral Sectors Hydrographic Division Institutional Strategic Planning State Water Resources Plan Special Management Studies Hydrometeorological Monitoring Inspection Charges State Water Resources Fund <p>Main problems: persistent gaps in inspection infrastructure; insufficient implementation of financial instruments; planning continuity challenges.</p>
Piauí	<ul style="list-style-type: none"> Coordinator/Management Entity Legal Framework Social Communication and Dissemination Sectoral Training Water Balance State Water Resources Plan Water Quality Monitoring Research, Development, and Innovation <p>Main problem: absence of funded R&D&I initiatives within the state water resources management system.</p>	<ul style="list-style-type: none"> Coordination with User and Cross-Sectoral Sectors Hydrographic Division Basin Plans Special Management Studies Inspection Water Infrastructure Inducing Programs and Projects <p>Main problems: insufficient inspection structures; gaps in basin-level planning instruments.</p>
Rio Grande do Norte	<ul style="list-style-type: none"> Legal Framework Hydrographic Division <p>Best performer in Cycle 1; difficulties limited to legal and territorial demarcation aspects.</p>	<ul style="list-style-type: none"> Legal Framework Water Quality Monitoring Inspection State Water Resources Fund Inducing Programs and Projects <p>Main problems: lack of adequate inspection structures; gaps in financial instruments and monitoring.</p>
Sergipe	<ul style="list-style-type: none"> Coordinator/Management Entity Water Balance Basin Plans Decision Support Models and Systems Information System Research, Development, and Innovation Water Rights Allocation Charges Water Infrastructure Management and Control of Critical Events <p>Main problems: absence of structured R&D&I plans; operational limitations in decision-support systems and water allocation.</p>	<ul style="list-style-type: none"> Decision Support Models and Systems (absence of operational systems at state level) Charges <p>Significant improvement in Cycle 2; remaining gaps concentrated in decision-support technology and financial instruments.</p>

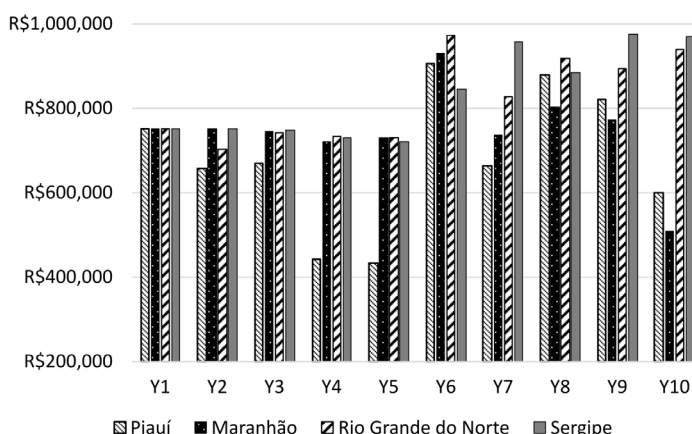


FIGURE 3 – Financial resources transferred in the first and second cycles of Progestão (Y=Year).

about water resources; improvement in the implementation of national policy instruments; and increased coordination among state managers and between states and ANA (ANA, 2021; IPEA, 2017). These collective improvements suggest that the program has been effective as an institutional development instrument.

It should be noted, however, that these observations are based on official program documentation and, therefore, may reflect formal institutional compliance rather than substantive improvements in governance quality. Some studies question whether performance-based programs fully capture the complexity of real-world water governance, including the actual reduction in water-use conflicts or improvements in water quality and availability (Kirschke et al., 2022). The present analysis cannot confirm causal links between target achievement and concrete improvements in water availability or conflict reduction, as no independent outcome data were available. Future research employing mixed methods – combining certification data with field assessments or user surveys – could help close this gap.

Furthermore, it is important to consider that the PROGESTÃO model, despite its merits, presents inherent limitations: (i) it incentivizes formal compliance over substantive governance change; (ii) states with stronger pre-existing institutional capacity benefit more easily, potentially reinforcing regional inequalities; and (iii) the focus on measurable targets may divert attention from governance dimensions that are harder to quantify but equally important. A balanced assessment requires acknowledging these structural constraints alongside the program's acknowledged contributions.

4 CONCLUSIONS

The participation of Maranhão, Piauí, Rio Grande do Norte, and Sergipe in PROGESTÃO across two cycles has contributed to meaningful institutional advancements in state-level water resources management. A key methodological contribution of this study lies in the systematic comparative analysis of target adherence across states sharing the same typology classification – enabling more consistent cross-state comparisons than previous studies that considered heterogeneous typology groups. The study also integrates quantitative certification data with qualitative identification of unmet goals and contributing

challenges, offering a richer analytical lens than purely numeric assessments.

Among the states analyzed, Sergipe emerged as the leading performer, with the highest overall adherence rate of 95.31%, followed by Rio Grande do Norte (94.85%), Maranhão (86.58%), and Piauí (77.09%). These results indicate that Sergipe and Rio Grande do Norte were more successful in consolidating institutional structures aligned with PROGESTÃO's requirements, while Maranhão and Piauí faced greater difficulties, particularly in planning instruments, inspection capacity, and financial management tools. The financial transfers received by each state were directly proportional to these adherence scores, confirming the efficacy of the program's 'payment for results' mechanism in operationalizing performance-based resource allocation.

The analysis of specific goal categories reveals that Rio Grande do Norte achieved the highest average score in federal cooperation goals (46.10%), indicating strong alignment with national regulatory standards, while Sergipe achieved the maximum attainable score in state management goals (50.00%), reflecting effective adaptation of the national framework to local institutional contexts. Recurrent challenges across states, particularly regarding Research, Development and Innovation (Cycle 1) and Inspection (Cycle 2), point to structural weaknesses that merit targeted policy interventions beyond the scope of the current program design.

Despite these advances, the study acknowledges important limitations. The reliance on official PROGESTÃO data introduces potential institutional bias, and the certification scores measure formal target adherence rather than the substantive effectiveness of water governance. Future research should explore whether improvements in formal compliance translate into measurable real-world outcomes, such as reductions in water-use conflicts or improvements in water quality, through independent assessments that complement official program data. A comparative evaluation including states from other Brazilian regions or from different typologies could further enrich the evidence base for PROGESTÃO policy design.

5 ACKNOWLEDGMENTS

The authors would like to thank the anonymous reviewers of this journal for their

valuable comments and suggestions, which were essential for the improvement of this paper.

6 REFERENCES

- Agência Nacional de Águas e Saneamento Básico. (2013). *Resolução ANA n.º 379, de 26 de agosto de 2013*. Aprova o Regulamento do programa de Consolidação do Pacto Nacional pela Gestão de Águas – PROGESTÃO e dá outras providências. <https://progestao.ana.gov.br/>
- Agência Nacional de Águas e Saneamento Básico. (2017a). *O Progestão no Piauí: síntese do primeiro ciclo do programa (2013–2016)*. ANA. <https://progestao.ana.gov.br/mapa/pi/progestao-1/o-progestao-no-estado-do-piaui>
- Agência Nacional de Águas e Saneamento Básico. (2017b). *O Progestão em Sergipe: síntese do primeiro ciclo do programa (2013–2016)*. ANA. <https://progestao.ana.gov.br/mapa/se/progestao-1/o-progestao-no-estado-de-sergipe>
- Agência Nacional de Águas e Saneamento Básico. (2018a). *Antecedentes do Programa PROGESTÃO*. ANA. <http://progestao.ana.gov.br/portal/progestao/progestao-1/o-programa/antecedentes>
- Agência Nacional de Águas e Saneamento Básico. (2018b). *O Progestão no Rio Grande do Norte: síntese do primeiro ciclo do programa (2014–2017)*. ANA. <https://progestao.ana.gov.br/mapa/rn/progestao-1/o-progestao-no-estado-do-rio-grande-do-norte-ciclo-1>
- Agência Nacional de Águas e Saneamento Básico. (2018c). *O Progestão no Maranhão: síntese do primeiro ciclo do programa (2014–2017)*. ANA. <https://progestao.ana.gov.br/mapa/ma/progestao-1/o-progestao-no-estado-do-maranhao-ciclo-1>
- Agência Nacional de Águas e Saneamento Básico. (2021). *PROGESTÃO – Programa de Consolidação do Pacto Nacional pela Gestão das Águas*. ANA. <https://progestao.ana.gov.br/>
- Agência Nacional de Águas e Saneamento Básico. (2023a). *O Progestão no Maranhão: síntese do segundo ciclo do programa (2018–2022)*. ANA. <https://progestao.ana.gov.br/mapa/ma/progestao-2/o-progestao-no-estado-do-maranhao-ciclo-2>
- Agência Nacional de Águas e Saneamento Básico. (2023b). *O Progestão no Piauí: síntese do segundo ciclo do programa (2017–2022)*. ANA. <https://progestao.ana.gov.br/mapa/pi/progestao-2/o-progestao-no-estado-do-piaui-ciclo-2>
- Agência Nacional de Águas e Saneamento Básico. (2023c). *O Progestão no Rio Grande do Norte: síntese do segundo ciclo do programa (2018–2022)*. ANA. <https://progestao.ana.gov.br/mapa/rn/progestao-2/o-progestao-no-estado-do-rio-grande-do-norte-ciclo-2>
- Agência Nacional de Águas e Saneamento Básico. (2023d). *O Progestão em Sergipe: síntese do segundo ciclo do programa (2017–2022)*. ANA. <https://progestao.ana.gov.br/mapa/se/progestao-2/o-progestao-no-estado-de-sergipe-ciclo-2>
- Almeida, B. M. J., Fontana, M. E., & Levino, N. A. (2020). Programa de Consolidação do Pacto Nacional pela Gestão das Águas (PROGESTÃO): uma avaliação qualitativa das experiências administrativas estaduais no Nordeste. *Anais do X Congresso Brasileiro de Engenharia de Produção (ConBRepro)*, online, 12 p. https://aprepro.org.br/conbrepro/2020/anais/arquivos/09272020_110942_5f709ecab8b7b.pdf
- Almeida, B., Fontana, M., & Almeida, N. (2023). Análise das experiências administrativas das federações brasileiras no Programa de Consolidação do Pacto Nacional pela Gestão das Águas (PROGESTÃO). *RG&PP*, 13(1), 159–179. <https://doi.org/10.11606/rgpp.v13i1.210229>
- Aragão, J. P. S., & Fontana, M. E. (2022). Guidelines for public sector managers on assessing the impact of outsourcing on business continuity strategies: a Brazilian case. *Journal of Global Operations and Strategic Sourcing*, 16(1), 118–141. <https://doi.org/10.1108/JGOSS-07-2021-0051>
- Bezerra, A. P., Vieira, Z. M. D. C., & Ribeiro, M. R. (2021). Water governance assessment at different scales: a reservoir case study in the

- Brazilian semiarid region. *Revista Brasileira de Recursos Hídricos*, 26, Article e14. <https://doi.org/10.1590/2318-0331.262120200171>
- Bongei, M., & Kaburu, K. (2021). Result oriented approach and sustainability of community water projects in Bomet County, Kenya. *International Journal of Innovative Research and Advanced Studies*, 8(6), 40–47.
- Borodiyenko, O., Malykhina, Y., Kalenskyi, A., & Ishchenko, T. (2020). Economic, psychological and pedagogical preconditions of implementation of result-based management. *Financial and Credit Activity: Problems of Theory and Practice*, 2(33), 535–546. <https://doi.org/10.18371/fcaptive.2i33.207237>
- Brasil. (1997). *Lei n.º 9.433, de 8 de janeiro de 1997*. Institui a Política Nacional de Recursos Hídricos. Brasília: Congresso Nacional, 1997. https://www.planalto.gov.br/ccivil_03/leis/19433.htm
- Cordova-Pozo, K., Hoopes, A. J., Cordova, F., Vega, B., Segura, Z., & Hagens, A. (2018). Applying the results-based management framework to the CERCA multi-component project in adolescent sexual and reproductive health: a retrospective analysis. *Reproductive Health*, 15(1), Article 24. <http://doi.org/10.1186/s12978-018-0461-3>
- Gerasimova, L. N., Mezentseva, T. M., Parasotskaya, N. N., & Dvoretzkaya, V. V. (2019). Features of environmental cost management. *Amazonia Investiga*, 8(20), 609–615. <https://amazoniainvestiga.info/index.php/amazonia/article/view/192>
- Gonzaga, R. P., Frezatti, F., Ckagnazaroff, I. B., & Suzart, J. A. D. S. (2017). Avaliação de desempenho no governo mineiro: alterações dos indicadores e metas. *Revista de Administração Contemporânea*, 21, 1–21. <https://doi.org/10.1590/1982-7849rac2017150331>
- Ha, P. N., & Hai, N. T. H. (2020). Facilitating results-based planning in developing countries: the case of Vietnam’s Ministry of Agriculture and Rural Development. *Public Administration Issues*, 5, 59–80. <https://doi.org/10.17323/1999-5431-2020-0-5-59-80>
- Instituto de Pesquisa Econômica Aplicada. (2017). *Relatório de avaliação do programa PROGESTÃO: modelo lógico e referencial básico*. IPEA.
- Jumpa, S., Sakkatat, P., Prokati, W., Punyanuwat, A., & Pothisuwan, R. (2013). Results-based water resources management for rural development of Bhumibol and Sirikit Dams in Thailand. *Journal of Agricultural Research & Extension*, 30(1), 59–68. <http://mdc.library.mju.ac.th/article/61802/238880/346149.pdf>
- Kanufre, R. A. M., & Rezende, D. A. (2012). Princípios da gestão orientada para resultados na esfera municipal: o caso da prefeitura de Curitiba. *Revista de Administração*, 47(4), 638–652. <https://doi.org/10.5700/rausp1064>
- Kirschke, S., Avellán, T., Benavides, L., Caucci, S., Hahn, A., Müller, A., & Rubio Giraldo, C. B. (2022). Results-based management of wicked problems? Indicators and comparative evidence from Latin America. *Environmental Policy and Governance*, 33(1), 3–16. <https://doi.org/10.1002/eet.1991>
- Levino, N. A., Fontana, M. E., Monte, M. B. S., & Filho, W. A. L. (2023). A group decision model for diagnosing barriers to achieving goals in a Brazilian Water Resources Program: an analysis of the state of Alagoas. *Revista Brasileira de Recursos Hídricos*, 28, Article e3. <https://doi.org/10.1590/2318-0331.282320220078>
- Libânio, P. A. C. (2015). Classificação e avaliação de sistemas de gestão de recursos hídricos: o caso do Pacto Nacional pela Gestão das Águas. *Anais do XXI Simpósio Brasileiro de Recursos Hídricos*, Brasília, ABRHidro, 8 p. <https://files.abrhidro.org.br/Eventos/Trabalhos/4/PAP019181.pdf>
- Maranhão. (2013). *Decreto n.º 29.302, de 15 de agosto de 2013*. Dispõe sobre a adesão do Estado do Maranhão, por meio da Secretaria de Estado do Meio Ambiente e Recursos Naturais - SEMA, ao Programa de Consolidação do Pacto Nacional pela Gestão das Águas – PROGESTAO.
- Organização para a Cooperação e Desenvolvimento Econômico. (2015). *Governança dos recursos*

- hídricos no Brasil*. OECD Publishing. <https://doi.org/10.1787/9789264238169-pt>
- Patton, M. Q. (2008). *Utilization-Focused Evaluation* (4th ed.). Sage.
- Piauí. (2013). *Decreto n.º 15.270, de 16 de julho de 2013*. Dispõe sobre a adesão do Estado do Piauí ao Pacto Nacional pela Gestão das Águas.
- Rio Grande do Norte. (2013). *Decreto n.º 23.745, de 10 de setembro de 2013*. Dispõe sobre a adesão do Estado do Rio Grande do Norte ao Pacto Nacional pela Gestão de Águas.
- Rus, H. A. (2014). Corruption, conflict and the management of natural resources. *Economics of Governance*, 15(4), 355–386. <https://doi.org/10.1007/s10101-014-0148-3>
- Saghi-Jadid, M., & Ketabchi, H. (2021). Result-based management approach for aquifer restoration problems using a combined numerical simulation–parallel evolutionary optimization model. *Journal of Hydrology*, 594, Article 125709. <https://doi.org/10.1016/j.jhydrol.2020.125709>
- Sergipe. (2013). *Decreto n.º 29.412, de 15 de agosto de 2013*. Dispõe sobre a Adesão do Estado de Sergipe ao Pacto Nacional pela Gestão das Águas, e dá outras providências.
- United Nations. (2015). *Transforming our world: the 2030 Agenda for Sustainable Development*. United Nations. <https://sdgs.un.org/2030agenda>
- Waters, S., El Harrad, A., Bell, S., & Setchell, J. M. (2021). Decolonizing primate conservation practice: a case study from North Morocco. *International Journal of Primatology*, 43, 1046–1066. <https://doi.org/10.1007/s10764-021-00228-0>

Manuscript submitted on 2 March 2026, accepted on 18 May 2026.

How to cite: Rocha, A. F., & Gonçalves, R. D. (2026). Performance of Water Resources Management Among Northeastern Brazilian States: An Evaluation Based on PROGESTÃO Targets. *Derbyana*, 47, Article e904.

Authors' contribution: A.F.R.: Conceptualization, Methodology, Formal Analysis, Investigation, Data Curation, Writing – Original Draft. R.D.G.: Conceptualization, Methodology, Formal Analysis, Investigation, Data Curation, Writing – Review & Editing.

Competing interests: The authors declare no competing interests.

