FEDERAL COURT OF ACCOUNTS TCU

AUDIT REPORT

ADAPTATION ACTIONS FOR CLIMATE CHANGE AND GREENHOUSE GAS MITIGATION IN AGRICULTURE

SecexDesenvolvimento
AudAgroAmbiental

AUDIT REPORT ON ACTIONS FOR CLIMATE CHANGE ADAPTATION AND GREENHOUSE GAS MITIGATION IN AGRICULTURE

TC 033.495/2023-8 **Audit** 188/2023

Reporter: Benjamin Zymler

Modality: Performance Audit

Originating Act: Dispatch of June 12, 2023, by Minister Benjamin Zymler (document 5 of TC 008.831/2023-8).

Objective of the Audit: To determine whether the planning, implementation, and monitoring of actions and activities for adapting to climate change and mitigating greenhouse gas emissions in agriculture, under the ABC+ Plan and the National Adaptation Plan, up to 2023, have been conducted in accordance with the National Climate Change Policy and the international commitments made by Brazil under the UNFCCC, with the aim of maintaining and expanding the productivity of the sector in the face of climate change.

Designation Act: Audit Ordinance AudAgroAmbiental 508, of September 19, 2023 (document 3), amended by Audit Ordinance AudAgroAmbiental 9, of January 18, 2024 (document 63), and by Audit Ordinance AudAgroAmbiental 72, of February 29, 2024 (document 81) – Planning Step and Audit Ordinance AudAgroAmbiental 81, of March 2, 2024 (document 86), amended by Audit Ordinance AudAgroAmbiental 221, of April 30, 2024 (document 127) – Conducting and Reporting Steps

Audit Period: September 20, 2023, to December 15, 2023, January 17, 2024, to February 9, 2024, February 15, 2024, to May 17, 2024, and August 1, 2024, to August 9, 2024.

Team Composition in the Planning, Conducting, and Reporting Steps:

Auditor	Registration	Allocation	Period
Vinícius Neves dos Santos (Coordinator)	10216-4	AudAgroAmbiental	20/9/2023 a 29/09/2023 19/10/2023 a 31/10/2023 13/11/2023 a 15/12/2023 17/1/2024 a 10/5/2024
Rodrigo Paulo Rodrigues da Silva	12221-1	AudAgroAmbiental	20/9/2023 a 15/12/2023 17/1/2024 a 17/5/2024 1/8/2024 a 9/8/2024
Vanessa Piauilino Gomes Santos	12175-4	AudAgroAmbiental	20/9/2023 a 06/10/2023 16/10/2023 a 20/10/2023 13/11/2023 a 15/12/2023 17/1/2024 a 17/5/2024 1/8/2024 a 9/8/2024
Cezar Batalha de Araújo (Supervisor)	9.650-4	AudAgroAmbiental	20/9/2023 a 15/12/2023 17/1/2024 a 17/5/2024 1/8/2024 a 9/8/2024

AUDITED AGENCIES AND ENTITIES:

Audited unit: Ministry of Agriculture and Livestock (MAPA), Ministry of the Environment and Climate Change (MMA), and Ministry of Agrarian Development and Family Agriculture (MDA).

Linkage in the TCU: Specialized Audit Unit in Agriculture, Environment, and Economic Development (AudAgroAmbiental).

Volume of audited resources: According to Annex I of TCU Ordinance 222/2023, R$ 1,017,774.00 (document 72, p. 2), referring to the amount committed to the program during the period covered by the examinations.

WHAT THE TCU AUDITED

Why was the audit conducted?

The audit was motivated by the identification of risks in the federal government's strategy for reducing greenhouse gas emissions in agriculture and adapting the sector to climate change. The National Adaptation Plan was not renewed after the first cycle ended in 2020, and the ABC+ Plan, with a greater focus on mitigation technologies, showed weaknesses in its implementation and results monitoring capacity.

What are the main proposals?

Determinations were proposed for the entities involved to establish and operationalize the governance structures and monitoring systems of the ABC+ Plan. Recommendations were made to MAPA to coordinate and control the ABC+ Plan at the federal level, as well as to define a baseline for the Plan's commitments and a standardized methodology for verifying the implementation of SPSABC. Additionally, the development of an adaptation strategy for agriculture was proposed, based on existing climate vulnerabilities and future climate change scenarios, with the definition of actions, responsible parties, goals, and priority regions and populations.

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WHAT DID THE TCU FIND?

The audit aimed to determine whether actions and activities for climate change adaptation and greenhouse gas emission mitigation in agriculture, within the scope of the Sectoral Plan for Climate Change Adaptation and Low Carbon Emission in Agriculture (ABC+ Plan) and the agricultural strategy of the National Adaptation Plan (NAP), have been conducted in accordance with the National Climate Change Policy and Brazil's international commitments to the United Nations Framework Convention on Climate Change (UNFCCC).

During this audit, it was found that the agricultural strategy of the NAP, referring to the 2016-2020 cycle, was not properly implemented and consequently failed to complete the planned initiatives or achieve its objectives and targets. Furthermore, it was noted that there is no national strategy for the adaptation of agriculture to climate change and extreme weather events. Existing plans do not focus on the adaptation of agriculture as a whole but rather on isolated production systems. There is no mapping of regional vulnerabilities or crops for the development of specific actions, nor are there structural actions capable of inducing increased resilience of areas and producers to expected climate change scenarios.

It was also found that the ABC+ Plan was not properly institutionalized at the federal level, as only MAPA effectively implements the Plan, and the governance structures provided for, CTABC and CENABC, were not properly operationalized, resulting in low execution of actions and activities aimed at federal actors, or even the execution of mitigation and adaptation actions without relating them to the sectoral Plan. Additionally, it was found that the ABC+ Plan did not define reference values for all commitments and targets related to SPSABC. The reference values are the baseline of the targets, referring to the end of 2020, which must be presented in a structured way so that during monitoring it is possible to verify the actual increase in the adoption of SPSABC. Monitoring must follow the same methodology for defining the baselines to enable verification of the Plan's results in terms of technology adoption. Finally, it was found that the monitoring systems within the Integrated Information System of the ABC Plan (SIN-ABC) were not operationalized, which prevents the consolidation and systematization of achieved results.

WHAT ARE THE EXPECTED BENEFITS?

It is expected that the proposed measures will improve the institutionalization and monitoring of the ABC+ Plan, promoting greater alignment and coordination among federal agencies, increased transparency, and reliability of reported data, allowing for independent verifications and more efficient monitoring of progress towards the targets. Additionally, with well-defined monitoring methodologies, it will be possible to include the results of GHG mitigation in agriculture in the National Inventory of Anthropogenic Emissions and Removals of Greenhouse Gases. It is also expected that with the implementation of an agricultural adaptation strategy, regions, crops, and populations with the greatest vulnerabilities will be identified and effective actions directed, increasing the resilience of agricultural systems, reducing production losses, and enhancing food security.

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I. Introduction

1. This is an operational audit aimed at determining whether the planning, implementation, and monitoring of actions and activities for climate change adaptation and greenhouse gas emission mitigation in agriculture, within the scope of the Sectoral Plan for Climate Change Adaptation and Low Carbon Emission in Agriculture (ABC+ Plan) and the National Adaptation Plan (NAP) up to 2023, have been conducted in accordance with the National Climate Change Policy and Brazil's international commitments to the United Nations Framework Convention on Climate Change (UNFCCC), in the pursuit of maintaining and increasing sector productivity in the face of climate change.

2. During the 21st Conference of the Parties (COP21) of the UNFCCC held in Paris, a new agreement was established in response to the growing global concern about climate change, of which Brazil is one of the signatories. The main goal of the Paris Agreement is to strengthen the global response to the threat of climate change and empower countries to address its impacts. This commitment aims to keep the global average temperature increase below 2°C above pre-industrial levels, with additional efforts to limit the temperature increase to 1.5°C.

3. In this challenging scenario of global warming, the agricultural sector, particularly vulnerable to climate change, will face significant challenges to ensure food production in quantity and quality compatible with the growing population demand, with real threats to global food security. In this context, it becomes imperative to adopt effective strategies for climate change adaptation and greenhouse gas (GHG) emission mitigation to ensure the sustainability and resilience of the agricultural sector in the face of climate challenges.

4. In this sense, the Sectoral Plan for Climate Change Adaptation and Low Carbon Emission in Agriculture (ABC+ Plan) represents an important governmental instrument to promote the transition to low-carbon agriculture through the adoption of sustainable practices and innovative technologies. Launched by the Ministry of Agriculture and Livestock (MAPA), this plan is effective for the period from 2020 to 2030.

5. In turn, the National Adaptation Plan (NAP), established by the Ministry of the Environment and Climate Change (MMA) in 2016, aims to reduce national vulnerability to climate change and manage the associated risks. The NAP 's development considered eleven sectors of the economy, including a strategy for the agricultural sector.

6. After the audit planning phase, the scope was defined to examine the ABC+ Plan in its mitigation and adaptation strategies, as well as the agricultural strategy of the NAP. Therefore, the rest of the NAP, which includes ten sectors besides agriculture, is not part of this audit's scope.

7. This audit exposes, in the findings chapter, problems found in the ABC+ Plan and the NAP's agricultural strategy, such as the lack of compatibility between the two plans, the failure to meet the NAP targets, the absence of NAP updates after its term ended, inactive committees responsible for monitoring the ABC+ Plan, MAPA's inability to monitor the ABC+ Plan actions, agricultural mitigation efforts not being considered for the National Inventory purposes, among others. Finally, this work proposes improvements to the responsible agencies to enhance the effectiveness and efficiency of adaptation and mitigation policies in Brazilian agriculture.

8. Regarding the methodology applied in the audit, techniques such as Strengths, Weaknesses, Opportunities, and Threats (SWOT) analysis, Risk Verification Diagram (RVD), Stakeholder Analysis, as well as the development of the Audit Plan, Global Audit Strategy, and design and findings matrices were employed. Various interviews with managers, specialists, and other stakeholders involved in the programs were conducted; on-site visits, two reference panels for presenting and validating the design and audit findings matrices, as well as document analyses

and research. From the diagnostics, the most relevant items were selected to be included in this work.

9. The final analyses and conclusions of this work were carried out in accordance with the auditing standards and techniques accepted by the Court. All evidence collected during the work's execution was subjected to tests of sufficiency, relevance, and reliability.

10. This report is organized into chapters presenting a brief overview, five audit findings, conclusion, and recommendation. The findings are structured in a summarized manner, presenting the situation found, causes, effects, recommendations, and expected benefits. The post-textual elements include: analysis of managers' comments; detailed methodology used in this audit, and bibliographic references.

II. Overview

11. The Law 12.187/2009 established the National Policy on Climate Change (PNMC) with the objective of harmonizing economic and social development with the protection of the climate system, reducing anthropogenic emissions, and strengthening the removal of greenhouse gases (GHG), as well as implementing measures to promote adaptation to climate change, defined as those directly or indirectly attributed to human activity and those caused by natural climate variability. The PNMC also mandates the establishment of sectoral plans, including for agriculture, for the mitigation and adaptation to climate change, aiming to consolidate a low-carbon economy.

12. According to the PNMC, mitigation is defined as technological changes and substitutions that reduce resource use and emissions per unit of production, as well as measures that reduce greenhouse gas emissions and increase sinks, processes that remove GHG from the atmosphere. Adaptation, in turn, refers to initiatives to reduce the vulnerability of natural and human systems to the actual and expected effects of climate change.

13. Decree 7.390/2010, replaced by Decree 9.578/2018, established the Plan for the Consolidation of a Low Carbon Emission Economy in Agriculture, which originated the Sectoral Plan for Mitigation and Adaptation to Climate Change for the Consolidation of a Low Carbon Emission Economy in Agriculture (ABC Plan), in its first cycle from 2010 to 2020. During the first cycle of the ABC Plan, the National Adaptation Plan was instituted, in compliance with the commitments assumed in the Paris Agreement, with an adaptation strategy for agriculture.

14. In 2021, the Sectoral Plan for Climate Change Adaptation and Low Carbon Emission in Agriculture (ABC+ Plan) was instituted, initially by MAPA Ordinance 323/2021, replaced by MAPA Ordinance 471/2022, referring to a second cycle of the sectoral agricultural plan.

II.1 About the National Adaptation Plan (NAP) – 2016 to 2020

15. The Federal Government's National Climate Change Adaptation Plan (NAP) aims to guide initiatives for the long-term management and reduction of climate risk, as established in MMA Ordinance 150/2016. The Plan was developed within the Executive Group of the Interministerial Committee on Climate Change (GEx-CIM) between 2013 and 2016, as established by the PNMC and Decree 7.390/2010. The NAP aligns with the National Climate Change Plan, sectoral mitigation and adaptation plans, and the adaptation decisions undertaken by Brazil within the framework of the Conference of the Parties on Climate Change (documents 98 and 99).

16. The development of the NAP stems from Brazil's commitment under the Paris Agreement, promulgated by Decree 9.073/2017. The global goal of the Agreement is to increase adaptive capacity, strengthen resilience, and reduce vulnerability to climate change. Paragraph 9 of Article 7 of the Agreement stipulates that parties should undertake adaptation planning processes, which may include the development and implementation of national adaptation plans.

17. The overall objective of the National Adaptation Plan is to promote the management and reduction of climate risk in the country in the face of adverse effects of climate change, to seize emerging opportunities, avoid losses and damages, and build instruments that enable the adaptation of natural, human, productive, and infrastructure systems.

18. The specific objectives of the NAP are to guide the expansion and dissemination of scientific, technical, and traditional knowledge, supporting the production, management, and dissemination of information on climate risk, and the development of capacity-building measures for government entities and society; to promote coordination and cooperation among public agencies for climate risk management through participatory processes with society, aiming for the continuous improvement of actions for climate risk management; and to identify and propose measures to promote adaptation and reduce climate risk.

19. The agricultural strategy of the NAP was prepared under the coordination of the Ministry of Agriculture, which is the focal point for this sectoral strategy. According to the NAP, a variety of regulatory policies and instruments apply to the management of climate variability and its effects on the agricultural sector, among which was the Low Carbon Agriculture Plan (ABC), in effect at the time, one of the sectoral plans that comprise the National Climate Change Plan (PNMC).

20. To guide the construction and management of the Agricultural Adaptation Program, the guidelines shown in Figure 1, in the next page, were considered (document 102, p. 34).

21. In this context, the agricultural strategy of the NAP included initiatives, indicators, goals, expected impacts, and responsible parties (document 99, p. 10-33). Goal 3.1 is the development and implementation of the Agricultural Risk and Vulnerability Monitoring and Simulation System, under the responsibility of the Brazilian Agricultural Research Corporation (Embrapa), and Goal 3.2 is the creation of the Agricultural Climate Intelligence Center, focused on applying climate risk in Brazilian Agricultural Policy, under the responsibility of MAPA.

22. The initiatives planned in the NAP's agricultural strategy were aimed at promoting greater knowledge of the country's vulnerabilities and climate risks, identifying priority regions and populations, to enable the application of climate risk in the planning actions of Brazilian agricultural policy.

23. The first NAP monitoring and evaluation report was published at the end of 2017, analyzing the results of the implementation in 2016 and 2017 (documents 100 and 101). In 2021, at the end of the four-year execution cycle of the NAP, the MMA prepared the Final Monitoring and Evaluation Report of the National Climate Change Adaptation Plan – 2016-2020 Cycle, presenting the main advances achieved during this period as outlined in the Plan (document 102). Since then, no updates or a new cycle of the NAP have been published, suggesting the conclusion of its activities in 2020.

Figure 1 – Guidelines of the Agricultural Adaptation Program

Source: National Adaptation Plan - Final Monitoring and Evaluation Report (2016-2020), document 102, p. 34.

II.2 About the ABC+ Plan (2020 to 2030)

24. The Sectoral Plan for Climate Change Adaptation and Low Carbon Emission in Agriculture (ABC+ Plan) is the Brazilian government's national agenda to address climate change in the agricultural sector for the period 2020 to 2030, following the ABC Plan (2010-2020). Its objective is to encourage the adoption and maintenance of sustainable technologies for agriculture, focusing on the mitigation of greenhouse gas (GHG) emissions and utilizing the concept of the "Integrated Landscape Approach."

25. The general objective of the ABC+ Plan is to promote climate change adaptation and control greenhouse gas (GHG) emissions in Brazilian agriculture, with an increase in the efficiency and resilience of productive systems, based on integrated landscape management. It aims to recognize the efforts of the productive sector in adopting and maintaining sustainable production systems, promoting the conservation and protection of natural resources, ensuring productivity, and providing high-quality food and other agricultural products.

26. The specific objectives of the ABC+ Plan are (document 97, p. 42):

Figure 2 - ABC+ Specific objectives

Source: Operational Plan of the ABC+ Plan, document 97, p. 42.

27. In its new phase, the ABC+ continues to prioritize already anthropized areas, focusing on the efficient use of available resources (soil, water, and biodiversity) as the foundation for increasing production and productivity. One of the main new features introduced is the restructuring and enhancement of the conceptual bases that underpin it, with the inclusion of concepts endorsed by the scientific community.

28. The operational actions are structured around three conceptual strategies presented in the strategic plan, which aim to highlight important issues for national agriculture, and consist of: Integrated Landscape Approach (AIP); stimulating the adoption and maintenance of Sustainable Production Systems, Practices, Products, and Processes (SPSABC); and contributions to GHG mitigation and adaptation.

29. The ABC+ Plan, established by MAPA Ordinance 471/2022, set targets for expanding the adoption of SPSABC in areas and for mitigating greenhouse gas emissions, as presented in the following table.

Table 1 - ABC+ Plan Goals for 2030

ABC+ Plan Goals for 2030			
SPSABC		Expansion of Adoption	Potential GHG Emission Mitigation (million MgCO2eq)
Practices for Recovery of Degraded Pastures		30 million ha	113,70
No-Tillage System	No-Tillage System for Grain Production	12,5 million ha	12,11
	No-Tillage System for Horticulture	0,08 million ha	0,88
Integrated Systems	Integrated Crop-Livestock-Forestry	10 million ha	37,90
	Agroforestry Systems	0,10 million ha	0,38
Planted Forests		4 million ha	510,00
Bio-inputs		13 million ha	23,40
Irrigated Systems		3 million ha	50,00
Animal Production Waste Management		208,40 million m³	277,80
Intensive Cattle Finishing		Additional 5 million animals	16,24
Total SPSABC			1.042,41

Source: Operational Plan of the ABC+ Plan.

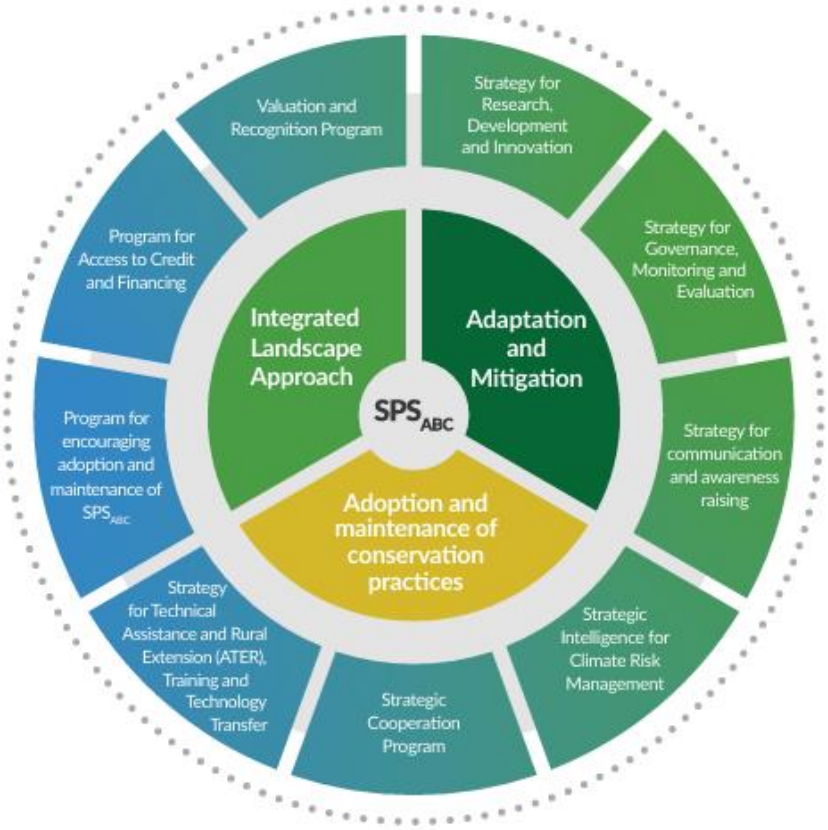
30. The technologies considered sustainable by the ABC+ Plan have been expanded compared to the ABC Plan, meaning new SPSABC have been incorporated. The main changes include the addition of three new SPSABC: No-Till System for Horticulture (SPDH), Irrigated Systems (SI), and Intensive Cattle Finishing (TI). Agroforestry Systems (SAF), along with Crop-Livestock-Forest Integration Systems, form the Integration Systems technology.

31. The scope of three existing SPSABC has been expanded: Practices for the Recovery of Degraded Pastures (PRDP) now considers both the recovery and renewal of pastures with some

degree of degradation, Bio-inputs include Biological Nitrogen Fixation (FBN) and Plant Growth-Promoting Microorganisms, and Animal Production Waste Management (MRPA) considers other wastes beyond animal manure, promoting the use of by-products obtained as bioenergy and biofertilizer.

32. To achieve the targets, the ABC+ Plan has been structured into nine axes, distributed among five Strategies and four Programs, which are interconnected with each other and with the pillars defined in the Plan, as shown in the following figure:

Figure 3 - ABC+ Operational Plan Programs and Strategies



Source: Operational Plan of the ABC+ Plan, document 97, p. 84.

33. For each Program and Strategy, actions and activities necessary to achieve the strategic objectives of ABC+ and the respective targets for the 2025 and 2030 exercises are presented. The actions and activities are assigned to focal points and involved actors, who will execute them directly with MAPA (document 97, p. 84).

III. Audit Findings

34. At the end of the planning step, the following audit questions and sub-questions were developed to be investigated:

a) **Audit Question 1**: Was the sectoral agriculture strategy of the National Adaptation Plan, from 2016 to 2023, planned, implemented, and monitored by the federal government in a manner consistent with the premises defined by the UNFCCC and achieved the proposed goals and objectives?

   i. **Audit Sub-question 1.1** - Was the National Adaptation Plan planned and updated

to specify the vulnerabilities and risks of climate change in the agriculture sector, actions and activities for adaptation to future climate events, necessary resources, sources of funding, goals, and monitoring indicators, including the participation of vulnerable populations and specific actions for these groups?

ii. **Audit Sub-question 1.2** - Was the National Adaptation Plan for the agriculture sector implemented to internalize the planned actions in the involved agencies and entities and to structure governance for aligning actions sufficiently for execution?

iii. **Audit Sub-question 1.3** - Were the monitoring activities of the National Adaptation Plan conducted timely and directed to assess the implementation of goals and indicators, and to propose improvements to the Plan, as outlined in it and in the guidelines of the UNFCCC?

iv. **Audit Sub-question 1.4** - Did the National Adaptation Plan in the agriculture sector achieve its objectives?

b) **Audit Question 2**: Did the planning of the ABC+ Plan comply with the good governance practices of public administration, as defined in Decree 9.203/2017, by envisioning actions and activities for adapting agriculture to climate change and mitigating greenhouse gas emissions from the sector, aligned with the premises of the National Policy on Climate Change (PNMC)?

i. **Audit Sub-question 2.1** - Was the ABC+ Plan planned and constructed in a way that indicates the actions and activities to be prioritized, the necessary financial resources, and sources of funding, as well as specified the baseline goals for mitigation related to the SPSABC?

ii. **Audit Sub-question 2.2** - Was the ABC+ Plan planned and constructed considering the main risks and vulnerabilities of climate change for agriculture, as well as prioritized actions and activities to promote resilience in the sector, including the participation of vulnerable populations and specific actions for these groups?

c) **Audit Question 3**: Does the execution strategy of the ABC+ Plan until 2023, prioritizing the implementation of State Management Groups (SMGs), the approval of State Action Plans (SAPs), and the promotion of SPSABC through rural credit, enable the effective achievement of the established goals, as well as the actions and activities described in the programs and strategies?

i. **Audit Sub-question 3.1** - Is the performance of the Ministry of Agriculture and Livestock (MAPA) with State Management Groups in the development and execution of actions and activities 11 outlined in the SAPs sufficient for the local implementation of SPSABC, as well as for carrying out communication actions and training of technicians and farmers?

ii. **Audit Sub-question 3.2** - Did the strategy to promote SPSABC technologies through subsidized credit lines from the ABC Program and RenovAgro enable access for farmers of all sizes to the resources needed for the adoption of these technologies between 2020 and 2023?

iii. **Audit Sub-question 3.3** - What is the degree of implementation of the strategy to promote the adoption of SPSABC by rural producers, through actions and activities outlined in the ABC+ Plan, for the dissemination and adoption of sustainable practices by farmers?

iv. **Audit Sub-question 3.4** - Have the institutionalization, governance, and coordination mechanisms defined in the ABC+ Plan been implemented and are they operational, enabling and compelling the effective exercise of roles and responsibilities among the actors and focal points defined?

d) **Audit Question 4**: Is the Monitoring, Reporting, and Verification (MRV) process of the ABC+ Plan structured with goals and quality indicators to allow for accurate measurement of the implementation of SPSABC, the execution of actions and activities, and the volume of mitigation based on criteria consistent with the IPCC (Intergovernmental Panel on Climate Change)?

i. **Audit Sub-question 4.1** - Have the monitoring systems outlined in the ABC+ Plan been implemented, are they operational, and do they have the appropriate technologies for the accurate verification of SPSABC mitigation goals, as well as the execution of planned actions and activities?

ii. **Audit Sub-question 4.2** - Are the reported results of the implementation of actions, activities, and goals of the ABC+ Plan reliable, verifiable, and methodologically comparable to the baseline established in the Plan?

iii. **Audit Sub-question 4.3** - Is the Monitoring, Reporting, and Verification (MRV) methodology adopted by the ABC+ Plan consistent with the IPCC guidelines and the methodology used by Ministry of Science, Technology and Innovation (MCTI) in the National Inventory of Anthropogenic Emissions by Sources and Removals of Greenhouse Gases, so that agricultural mitigation contributes to the NDC established by Brazil under the UNFCCC?

35. Based on these questions, audit procedures were carried out that resulted in five findings, presented in the following sections through the exposition of the following elements: criteria, evidence, causes, effects, best practices, conclusions, recommendations, and expected benefits.

III.1 Agricultural strategy of the NAP 2016-2020 did not achieve its objectives and goals

Figure 4 - Summary of Audit Finding 1

Due to the NAP not being formally institutionalized within MAPA, not directly impacting the actions of the current ABC Plan, and not resulting in effective actions by the Ministry, the agricultural strategy of the NAP 2016-2020 did not achieve its objectives and goals. This led to the non-implementation of the expected impacts of the Plan, such as the classification of the territory on a scale of vulnerability and climate risk, the definition of priorities, and the establishment of contingency plans.

36. The National Climate Change Adaptation Plan (NAP), established by MMA Ordinance 150/2016, contained an agricultural strategy aimed at creating a secure environment for decision-making processes by rural producers and public policy managers, addressing climate uncertainty with efficient access to information, technologies, and production processes for establishing sustainable production systems.

37. In this sense, the Plan defined guidelines, goals, initiatives, and indicators under the responsibility of MAPA and the Brazilian Agricultural Research Corporation (Embrapa). The two goals of the agricultural strategy were: Agricultural Risk and Vulnerability Monitoring and Simulation System - developed and implemented, and Agricultural Climate Intelligence Center - focused on applying climate risk in Brazilian agricultural policy - created (document 18, p. 28-

29). However, by the end of the cycle in 2020, the NAP had not achieved the overall objective and goals of the agricultural strategy.

38. Two monitoring sessions of the NAP took place, one in 2017 and another at the end of the cycle, called the final monitoring. The Annex to the 2016-2017 Monitoring Report (document 100, p. 13) states that regarding the agricultural strategy, activities, goals, and guidelines were initiated. However, the actions with initiated execution related to the established goals resulted in products generated by systems already developed before the NAP or being updated. The report mentioned the development of a conceptual note on the Agricultural Climate Intelligence Center and the implementation of various research projects.

39. In the Final Monitoring Report of the NAP, from 2021 (document 102, p. 34-37), there was no analysis of the achievement of the planned goals; it merely stated that some actions had begun implementation. The summary of actions and initiatives presented included various pre-existing actions related to the ABC Plan and other programs such as Pronasolos, but did not provide information on the initiatives explicitly planned in the NAP's agricultural strategy.

40. MAPA stated through Official Letter 3/2023/COGIS/CGMC/DEPROS-SDI/SDI/MAPA (document 23, p. 8) that the Agricultural Risk and Vulnerability Monitoring and Simulation System was not implemented and the Agricultural Climate Intelligence Center was not created. Additionally, it was reported that other planned initiatives, such as structuring a system to prioritize vulnerable regions and land use planning and developing contingency plans, were not implemented.

41. In an interview, Embrapa managers pointed out that NAP Goal 3.1, which focuses on developing the Agricultural Risk and Vulnerability Monitoring and Simulation System, had similarities with the functionalities of the Climate Risk Agricultural Zoning (Zarc) system, already in operation. However, they emphasized that while Zarc met some of the goal's requirements, additional efforts were still needed to fully achieve the proposed objectives (document 59, p. 3).

42. Paragraph 9 of Article 7 of the Paris Agreement, promulgated in Brazil by Decree 9.073/2017, stipulates that each country should undertake adaptation planning processes and adopt measures by developing or strengthening plans or policies that may include national adaptation plans.

43. Decree 9.203/2017, which addresses the governance policy of the federal public administration, establishes as a governance guideline in item IV of Article 4 the articulation of institutions and coordination of processes to generate, preserve, and deliver public value. Public value is understood as the products and results generated or delivered that represent effective and useful responses to public needs or demands.

44. With the non-fulfillment of the goals, the main impacts and expected results of the NAP's agricultural strategy were not achieved, such as the classification of the Brazilian territory on a scale of vulnerability and climate risk; the identification of priority areas; the improvement of the predictability of agricultural insurance planning to support zoning policies; the guarantee of adequate and efficient investments of resources for agricultural adaptation to climate change; collaboration with the country's food and nutritional security in the face of increased frequency of extreme events; and the contribution to improving the readiness, adaptive capacity, and resilience of the sector.

45. This situation occurred due to the absence of formal incorporation of the NAP into MAPA's operational structures; lack of synchronization and compatibility of NAP activities with the current ABC Plan and subsequent ABC+ Plan; the absence of adequate evaluation of the agricultural strategy's goals and indicators; lack of proposals for changes or updates based on

monitoring results and new scientific advances; and the low coordination between MAPA, Embrapa, and other relevant stakeholders.

46. MMA Ordinance 150/2016 (document 115) established the NAP in the federal government and stipulated in Article 7 that actions would be executed by federal government agencies designated as focal points or responsible for the goals, within their competencies, and that the financing of these actions would be the responsibility of their executors.

47. MAPA did not formally adjust its structure to incorporate the initiatives and goals defined in the NAP's agricultural strategy. Additionally, it claims there is no structured information to segregate budgetary actions exclusive to NAP activities (document 122, p. 6), meaning there was no designation of a responsible sector or budgetary actions for the execution of NAP initiatives. The Ministry states that "the major contribution of the agricultural sector, regarding MAPA's responsibilities for the NAP in the first cycle, was the execution of the ABC Plan (...). Thus, institutional arrangements occurred within the scope of the State Management Groups of the then-current ABC Plan."

48. However, the institutionalization of the SMGs within the ABC Plan is not to be confused with the institutionalization of the NAP within MAPA, defined as the executor. The SMGs are institutionalized at the local level, focused on implementing GHG mitigation and adaptation technologies for productive systems promoted by the ABC Plan. On the other hand, the initiatives planned by the NAP focused on developing structuring technologies and systems aimed at predicting climatic events and adapting agriculture to climate change.

49. Moreover, the NAP's agricultural strategy anticipated an update of the then-current ABC Plan between 2016 and 2017, focusing on its adaptation program, with emphasis on (document 99, p. 25):

> The review of the Adaptation Program should take into account recent surveys that were conducted, as well as projections of relevant meteorological variables for agricultural production, and existing information on the sector's vulnerability to climate projections. The starting point for the review and the new proposal will consider what is already in the ABC Plan (BRAZIL, 2012), and should then include new elements and establish priorities, as discussed in the plenary session. This effort aims to promote the generation, management, and dissemination of basic environmental information, as well as enable necessary access to technological information needed to expand the variety of technological alternatives and processes that support rural producers. The review period of the Plan should last about a year, starting in 2016, with the evaluation of ongoing actions and, subsequently, the discussion and proposal to strengthen actions and possible new lines of action, with completion expected by early 2017. (free translation)

50. This review of the ABC Plan 2010-2020 was not implemented, and in the construction of the current ABC Plan, the adaptation program did not conceive initiatives similar to those planned in the NAP's agricultural strategy to understand the sector's vulnerabilities to climate change and establish priorities for increasing resilience. The omission of this critical step demonstrates persistent gaps in the management and implementation of climate adaptation policies in the Brazilian agricultural sector.

51. Additionally, the monitoring of the NAP's agricultural strategy did not conduct a detailed evaluation of the fulfillment of goals or indicators, nor did it critically assess completed actions and achieved results. There was no structuring action from the monitoring, with correction of inconsistencies and alignment of actions aimed at overcoming listed difficulties.

52. Finally, interviews with MAPA managers and requisition letters sent confirmed that the recommendations and learnings from the first NAP implementation cycle were not incorporated into the Plan during its term. This situation demonstrates a disconnect between the

monitoring conducted and the practical application of their findings to improve climate adaptation strategies in Brazilian agriculture.

53. It is also noteworthy that there was no formal coordination at the national level around the agricultural strategy, as there was no formalization of the interinstitutional working group planned as a NAP initiative, which would involve various key actors such as the National Institute of Meteorology (INMET), Embrapa, MAPA, the Ministry of Science, Technology and Innovation (MCTI), the Ministry of Agrarian Development and Family Agriculture (MDA), the Ministry of the Environment and Climate Change (MMA), among others (document 23, p. 8), nor was there a discussion forum between MAPA and Embrapa, defined as executors of the strategy.

54. In these terms, it is proposed to inform MAPA and MMA, based on Article 9, item I, of TCU Resolution 315, of 2020, that the agricultural strategy of the NAP was not properly institutionalized, and its monitoring did not present an evaluation of the completion of planned activities, the achievement of goals, and the results of indicators, in non-compliance with the public governance guidelines defined in items III, IV, X, and XI of Article 4 of Decree 9.203/2017 and paragraph 9 of Article 7 of the Annex to Decree 9.073/2017.

55. The expected benefit of the control action is that in the construction and implementation of the next National Adaptation Plan or an equivalent instrument, there will be an institutionalization to be internalized by the organs and entities responsible for Brazilian agriculture, as well as providing better monitoring of plans and public policies, with the evaluation of the implementation of actions, goals, and indicators in an objective manner.

56. The MMA, as the general coordinator of the interministerial process of drafting the Climate Plan, yet to come, states that it sought opportunities for improvement considering previous experiences, with principles to be observed by the bodies involved in the construction of the sectoral chapters of the adaptation component and guidelines to promote greater transparency in management and qualify the monitoring process. (document 171, p. 4)

III.2 Absence of a long-term strategy for agricultural adaptation

Figure 5 - Summary of Audit Finding 2

Due to the NAP not being updated after 2020 and the ABC+ Plan focusing on the adaptation of productive systems, there is currently no long-term strategy for adapting Brazilian agriculture. This has led to a lack of coordination in actions aimed at reducing vulnerabilities and building resilience in agriculture, negatively impacting the agriculture's ability to adapt to future climate scenarios and increasing extreme events.

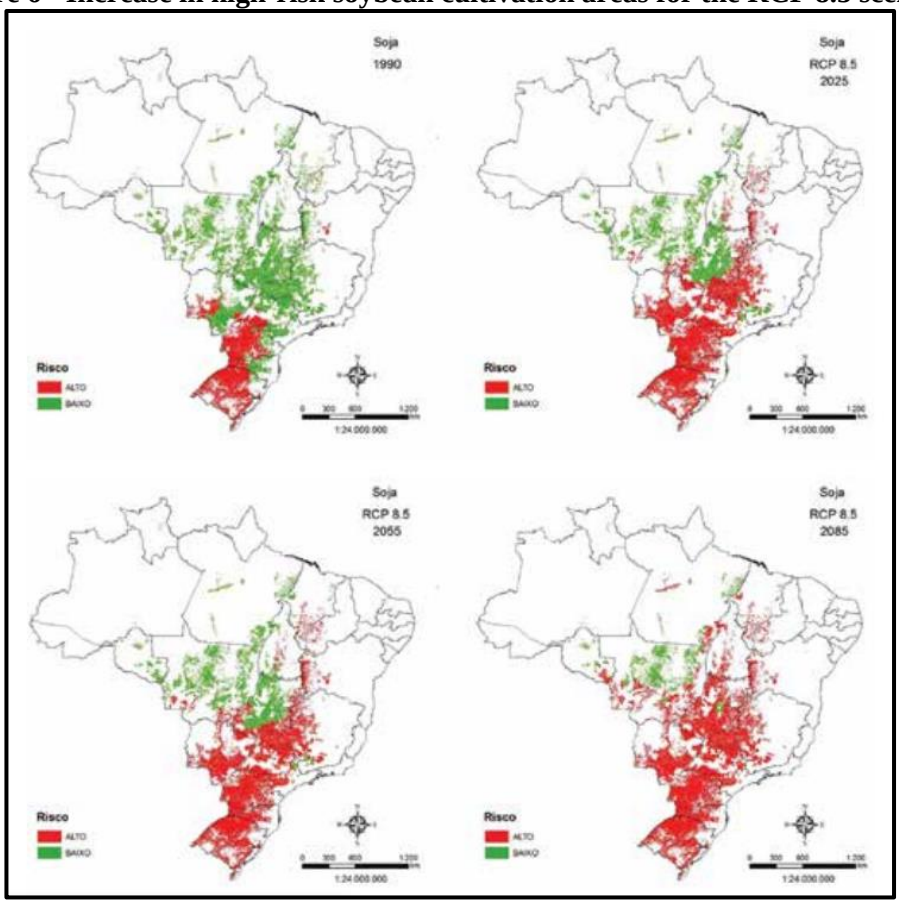
57. Item 9 of Article 7 of the Paris Agreement, promulgated by Decree 9,073/2017, determines that each country, as appropriate, should undertake adaptation planning processes and adopt measures such as the development or enhancement of plans, policies, and/or relevant contributions. According to the National Policy on Climate Change (PNMC), established by Law 12,187/2009, adaptation refers to initiatives and measures to reduce the vulnerability of systems to the current and expected effects of climate change.

58. The agricultural sector in Brazil is not aligned with this demand from the Paris Agreement, as there is currently no formalized long-term strategy from the federal government for the adaptation of rural producers and their properties to the expected climate changes, with the definition of current vulnerabilities, expected climate changes, actions to increase resilience, and the definition of priority regions or populations.

59. According to the publication by MCTi, Climate Modeling and Sectoral Vulnerabilities to Climate Change in Brazil, which presents the main vulnerabilities of agriculture linked to global warming, there is a strong tendency for an increase in the frequency of days with temperatures

above 34°C in the coming years. The forecast is that this climate change will have a significant impact on various sectors of Brazilian agriculture. In the plant area, for example, if management and adaptation solutions are not sought, there could be a reduction of up to 90% in the production of second-crop corn and 80% of soybeans (document 114, p. 182).

Figure 6 - Increase in high-risk soybean cultivation areas for the RCP 8.5 scenario



Source: Climate Modeling and Sectoral Vulnerabilities to Climate Change in Brazil (document 114, p. 174)

60. As will be detailed below, the existing instruments and strategies for agriculture are not sufficient to promote the sector's adaptation to this expected future scenario.

61. The National Adaptation Plan (NAP), which had an agriculture strategy, was established for a four-year cycle, from 2016 to 2020, and defined that the review process for the next cycle would be carried out during the last year of the current cycle, taking into account the results of monitoring and evaluation (document 98, p. 41). In 2021, the Final Monitoring and Evaluation Report of the NAP was published, showing that the first cycle of the NAP occurred from 2016 to 2020 (document 102, p. 18).

62. Since then, the NAP has not been updated or reissued, resulting in the end of its validity and the execution of the actions provided therein. In interviews, MMA managers reported that there is no consensus on whether the NAP is still in force, but stated that the cycle ended in 2020, and added that they are working on the Climate Plan, its replacement, which is expected to be published in 2025 (document 64, p. 3).

63. It is noteworthy that the agriculture strategy of the first cycle of the NAP was designed as a starting point for effective actions for the sector's adaptation. The planned activities and deliveries were focused on consolidating information on vulnerabilities to climate change in areas or regions and the establishment of research systems and centers, to then apply climate risk in Brazilian agricultural policy (document 99, p. 27-29). However, the targets were not met, and

various planned initiatives were not completed, as informed by MAPA through the letter 3/2023/COGIS/CGMC/DEPROS-SDI/SDI/MAPA (document 23, p. 8).

64. The Sectoral Plan for Adaptation to Climate Change and Low Carbon Emission in Agriculture, aimed at Sustainable Development (2020-2030) or ABC+ Plan has the general objective of promoting adaptation to climate change and the control of Greenhouse Gas (GHG) emissions in Brazilian agriculture, with increased efficiency and resilience of production systems (document 97, p. 20). The Plan has targets mainly linked to the expansion of the adoption of systems, practices, products, and sustainable production processes, called SPSABC, which are economically more efficient technologies that reduce greenhouse gas emissions and can contribute to the adaptation of production systems (document 97, p. 43-45).

65. However, an adaptation strategy for agriculture to climate change goes beyond the promotion of technologies focused on GHG emission mitigation, as exposed by the ABC+ Plan itself (document 97, p. 35; our emphasis):

> In light of current knowledge, it is understood that the promotion of technologies, products, and production systems that limit current and future emissions and/or promote sinks for GHGs, **are not sufficient to reduce the sector's risks.**
>
> Therefore, with the increasing frequency of extreme climatic events, **it is urgent to strengthen actions aimed at reducing the vulnerability** of agricultural production systems, and increasing the sector's resilience.

66. The promotion of SPSABC is a starting point for adaptation, aimed at improving the efficiency of production systems in the current climate scenario. However, with the expectation of rising temperatures and extreme weather events, the promotion of SPSABC is not sufficient for the adaptation of Brazilian agriculture to the expected climate changes. A specific adaptation strategy focused on actions such as genetic improvement, better management practices, mapping areas according to vulnerability, and defining priority areas and populations is needed.

67. It is understood that the ABC+ Plan does not fully cover this gap, as it does not present a future scenario to which agriculture must adapt, does not present actions to analyze the vulnerability of regions, nor does it present priority populations with greater exposure to the effects of climate change. Moreover, it should be noted that if the expected temperature increases of 1.5°C by 2040 occurs, the implementation of SPSABC, in isolation, is not sufficient for the adaptation of agriculture.

68. In interviews with MAPA managers, it was reported that the adaptation actions of the ABC+ Plan are focused on production systems, i.e., within the farm's gate, where they say the Ministry can act (document 126, p. 1). This approach to adaptation in production systems, although beneficial for the areas where they are implemented, does not have a holistic approach to the adaptation needs of agriculture.

69. The MAPA publication “Adaptation Strategies to Climate Change of Brazilian Agricultural Systems”, which gathered more than sixty works from 320 researchers aiming to identify methods and approaches to assess the resilience and adaptive capacity of agricultural systems, concluded as follows (document 128, p. 165-166):

> (...) the proposals and the results that the ABC Plan has achieved, from the establishment of strategies and technologies that lead to greater sustainability of agricultural systems, somehow contribute to the adaptive capacity to climate change. However, the magnitude of the impacts of the ABC Plan in strengthening the resilience and adaptive capacity of agricultural systems is not yet clear. Although all the research in this collection and throughout Brazil is extremely relevant for advancement on the topic, the evaluation of the information presented in this publication, both by reviewing national and international documents and ongoing initiatives, shows that there is no clarity as the definitions and related concepts are still confused. Without

> clarity of concepts, methodologies for assessing adaptive capacity are not possible, reinforcing the scenario of uncertainty observed when discussing adaptation.
>
> From this finding, this collection recommends promoting the advancement of public policies beyond the efficiency of their application, focusing mainly on the effectiveness of their results. (...)
>
> To address the conceptual and methodological indefiniteness, the path to be followed to understand and advance the effectiveness of the adaptation of agricultural systems to climate change in Brazil is the construction of a conceptual framework, with clear and feasible definitions, objectives, and evaluation methodologies, that encompass technical, institutional, and procedural strategies and that can effectively give agricultural producers the necessary security in their decision-making process, in an increasingly uncertain environment, regarding the capacity to project favorable climatic conditions for Brazilian agriculture.

70. The ABC+ Plan foresees among its initiatives the elaboration of this conceptual framework for adaptation in agriculture, with the establishment of indicators aimed at identifying and evaluating adaptation strategies and the adaptive capacity of SPSABC (document 97, p. 108). Through the letter 3/2023/COGIS/CGMC/DEPROS-SDI/SDI/MAPA (document 23, p. 7), the Ministry states that the publication of the Conceptual Framework was consolidated in the "Climate Change Adaptation Strategy for the Brazilian Agriculture and Livestock Sector", a document presented at COP28, in 2023.

71. This document presents the conceptual framework, composed of six strategic axes, four adaptation initiatives, and one adaptation strategy, with actions to be executed and indicators (document 53).

72. In general, the publication resembles more an orientative document on how to proceed with the elaboration of adaptation strategies for agriculture, than an implementable strategy with inherent definitions. The document does not formally define functions, competencies, and responsibilities or even institutional arrangements necessary for the implementation of the strategy or its monitoring.

73. The planned actions are not specific enough to allow for their execution and accountability. For example, the actions "encourage the development of cultivars and strains, hybrids, and varieties tolerant to various predicted climatic conditions, such as drought, high temperatures, floods, and frosts, certified and accessible to producers" and "conduct studies for the production of bioinputs that allow replacing the use of nitrogen fertilizers" to be carried out by research, teaching, and extension institutions and private companies (document 53, p. 17) are generic, do not specify how many, how, or who will carry out, and do not allow for their execution to be demanded by third parties.

74. The presented indicators also do not clearly measure the policy results or even the resilience of agriculture, as they are focused on existing technologies and systems, such as Zarc, or on the promotion and implementation of SPSABC, already foreseen in the ABC+ Plan (document 53, p. 22-27).

75. The publication itself concludes that it is still necessary to advance in identifying data for the defined indicators, as well as to evaluate each production chain in its level of adaptation (document 53, p. 28):

> The CF is a tool for understanding the status of the different production chains in terms of actions to improve resilience to climate change; indicators make it possible to assess the status, efficiency, or absence of strategies to adapt to climate change in agricultural and livestock systems based on the operating logic of the CF. (...)
>
> The next step will be to obtain data for each indicator, making it possible to monitor the degree of adaptation of production chains of the Brazilian agriculture and livestock sector within the

scope of the ABC+ Plan and to receive subsidies to direct actions that improve the adaptation of agriculture and livestock systems.

76. In an interview with MAPA managers, it was reported that it is not clear how the actions and initiatives foreseen in the Conceptual Framework will be implemented (document 126, p. 2-3).

77. All these instruments and tools for an adaptation policy do not address identifying and directing actions to populations most vulnerable to climate change, which, according to MDA, are family farmers (document 116, p. 6). However, MDA, the body with competence over this segment of producers, was not included in the actions of the NAP, nor is it present in the discussions on the construction of adaptation strategies and initiatives. Thus, the participation of MDA in outlining adaptation strategies and plans is understood to be fundamental to ensure the treatment of issues related to family agriculture and other groups vulnerable to climate change.

78. Currently, the MMA is coordinating the interministerial process of drafting the Climate Plan, an update of the National Plan on Climate Change. In this context, a Temporary Technical Group on Adaptation was created, with the participation of MAPA, which will develop a sectoral adaptation plan for agriculture.

79. The main effect of this absence of an effective adaptation plan with implemented actions is the low capacity of Brazilian agriculture to adapt to the expected climate changes and current extreme weather events, which can lead to significant production losses, impacting mainly the most vulnerable populations.

80. Given the above, it is proposed to recommend to MAPA and MDA, based on art. 11 of Resolution-TCU 315, of 2020, to develop and establish an adaptation strategy for national agriculture, based on future climate change scenarios and the current stage of vulnerability of regions and crops, with the definition of actions, responsible parties, targets, indicators, priority areas and populations, an estimate of necessary resources and funding sources, with each ministry acting within its specific competencies.

81. The expected benefits are better preparation of agricultural systems to face climatic variations and extreme events, which can reduce production losses and increase food security. Increased resilience contributes to the economic stability of rural communities and the country as a whole.

III.3 Low institutionalization of the ABC+ Plan

Figure 7 - Summary of Audit Finding 3

Due to the ABC+ Plan being established by an ordinance of the Ministry of Agriculture, Livestock, and Supply (MAPA) and the planned control and alignment forums not being active, there was no proper institutionalization and governance structuring of the Plan at the federal level, with the recognition of roles and responsibilities by agencies and entities outside the MAPA structure. This led to low execution of actions by other federal entities or to the execution of actions without linkage to the ABC+ Plan.

82. The ABC+ Plan is structured into programs and strategies that are subdivided into actions, and these into activities. For each activity, a focal point and involved actors are designated. The Plan does not define responsibilities for the focal point or the involved actors, but, according to MAPA, the focal point is not necessarily responsible for executing the action, but rather for coordinating or inducing the actions and activities.

83. However, there has not been an institutionalization of the ABC+ Plan at the federal level nor the establishment of an adequate governance structure, since bodies and entities listed as focal points sometimes do not recognize the assignments and activities designated to them, and

MAPA does not have access to information and data on the execution of these activities that occur outside the Ministry's structure.

84. This situation goes against what is established in Decree 9.203/2017, which provides for the governance policy of the federal public administration, which defines, in clauses IV and X of art. 4, as a public governance guideline, to articulate institutions and coordinate processes for better integration between different levels and spheres of the public sector, and to formally define the functions, competencies, and responsibilities of the structures and institutional arrangements.

85. It was found that after the enactment of Law 14.600/2023, which changed the basic organization of the ministries, this situation was exacerbated, as MAPA's secretariats were transformed into new ministries, which increased the distance of these actors from the ABC+ Plan.

86. Anater - listed as a focal point and actor involved in activities of the technical assistance, training, and technology transfer strategy - reported in an interview that it understands it has not assumed commitments in relation to the ABC+ Plan. Additionally, it reported never having participated in forums or meetings for alignment or accountability on the planned activities, i.e., the ABC+ Plan was not formalized internally in this entity (document 106).

87. The Agency states that to internalize a demand, it should be passed on by MDA, along with a budget for the development of actions, and this did not occur within the scope of the ABC+ Plan. In these terms, the activities designated to Anater, as a focal point or involved actor, were not executed. The Agency also did not develop the role of coordination or induction of these activities.

88. MDA, which at the time of the structuring of the ABC+ Plan was the Secretariat of Family Agriculture and Cooperativism (SAF) of MAPA, reported (document 116 and 131) developing various actions internally that have relations with the activities in which SAF was designated as a focal point or involved actor in the ABC+ Plan. It presented actions carried out by the Dom Helder Câmara Project (PDHC II), as well as actions to promote Agroforestry Systems, and highlighted that a National Program of Productive Forests was developed, currently awaiting approval via Decree, which aims to "Contribute to the mitigation and adaptation to climate change".

89. It is noteworthy that MDA implements actions for the mitigation of GHGs and adaptation to climate change with family farmers, but not necessarily following the strategies and actions defined in the ABC+ Plan.

90. The Ministry reported that there were no attempts at contact by MAPA regarding the activities planned in the ABC+ Plan, and that the current management changed the approach of public policies directed at family agriculture, with a greater focus on agroecological transition, thus, it considers necessary an alignment of MDA's actions with the demands of the ABC+ Plan (document 116, p. 3-4).

91. Embrapa, a public company linked to MAPA, pointed out that it has more than sixty activities as a focal point and more than 41 in which it is involved, however, even with knowledge that several activities are being executed, it does not have specific monitoring of the actions focused on meeting the ABC+ Plan (document 59). In this sense, information about the progress of these activities is not passed on to MAPA.

92. The following causes were identified for the situation found: ABC+ Plan instituted only within the scope of MAPA; the lack of management aimed at control, coordination, and management of activities developed by federal focal points; and the non-operationalization of the coordination and control forums provided for in the regulations.

93. MAPA Ordinance 471/2022 is the normative act that instituted the ABC+ Plan. In its art. 1, it is clear that the Plan is instituted "within the scope" of MAPA only, i.e., the rules and

commitments defined there are enforceable by MAPA, and not by other bodies and entities. However, the ABC+ Plan adopts a structure in which activities are directed to focal points and actors involved outside the Ministry's structure, with targets to be delivered in 2025 and at the end of the Plan in 2030.

94. Thus, the Ministerial Ordinance of MAPA, which institutes the ABC+ Plan, could not formally determine, in a coercive manner, actions and activities to be executed by other ministries.

95. According to the ABC+ Plan (document 97, p. 37) MAPA plays the role of national coordination of ABC+, executing the general strategy, and being responsible for the monitoring, follow-up, systematization, and endorsement of the actions, results, and impacts generated by the ABC and ABC+ Plan. It also defines that:

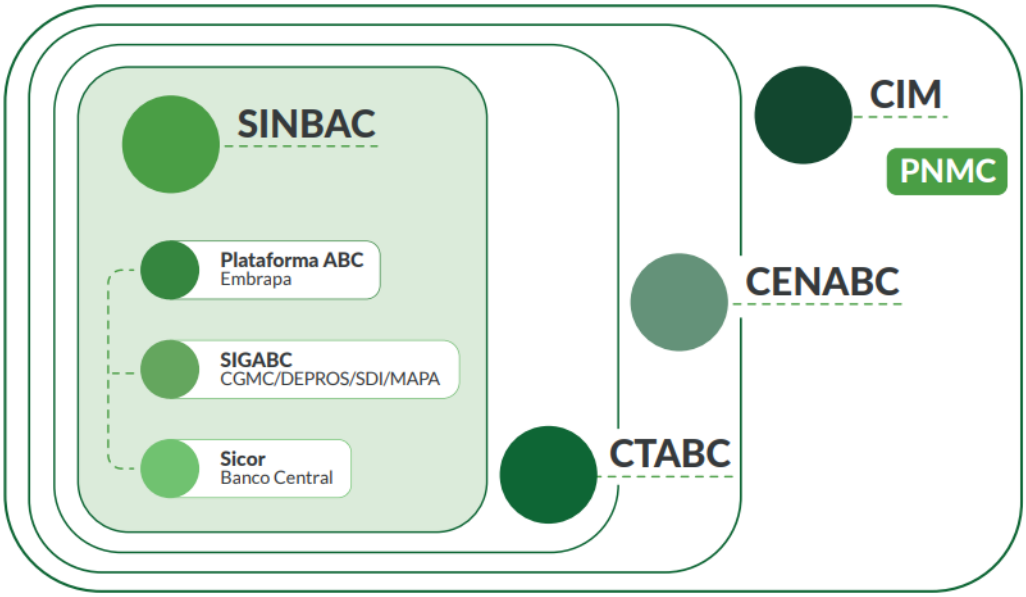
> It is MAPA's function to establish fluid articulation with the different actors and segments of society, as well as to stimulate their involvement in the actions foreseen in ABC+ and in achieving its targets.
>
> Moreover, it is its role to ensure clear and updated information on the advances and achievements of ABC+, promoting informational symmetry between public and private, including in relation to official national and international communications, with transparency and promptness.

96. However, MAPA does not perform actions aimed at control, coordination, or macro management of the activities developed by focal points of other federal bodies and entities. The current follow-up occurs in the activities carried out by the states within the scope of the State Management Groups (SMG) (document 23, p. 6).

97. Furthermore, the forums provided for in the ABC+ Plan as governance structures that would have the participation of various bodies and entities at the federal level, have not been operationalized so far.

98. The ABC+ Plan presents the following governance structure (document 97, p, 38), also provided for in art. 4 of MAPA Ordinance 471/2022, which would start from the ABC Information System (SINABC) and go through the ABC+ Plan Technical Monitoring Committee (CTABC), the National Executive Commission of the ABC+ Plan (CENABC), and finally the Interministerial Committee on Climate Change (CIM).

Figure 8 - Governance System of the ABC+ Plan



Source: ABC+ Plan, document 97, p. 38.

99. The ABC+ Plan Technical Monitoring Committee (CTABC) was established by Decree 10,606/2021 with functions to support the CENABC, define guidelines for monitoring, and approve methodologies for monitoring the ABC+ Plan.

100. The National Executive Commission of the ABC+ Plan (CENABC) was established by Decree 10,431/2020 with competencies to follow the implementation, monitoring, and evaluation of the Plan, to subsidize and support bodies and institutions involved in the implementation, to evaluate the results and guide the prioritization of actions, among others. Recently, the Decree was amended to adapt its structure to the new ministerial reality.

101. These governance structures, if operational, would be responsible for monitoring the implementation of activities and coordinating the ABC+ Plan, which would contribute to better institutionalization of the Plan in other federal bodies given the mandatory participation in meetings.

102. This low institutionalization of the ABC+ Plan in federal bodies and entities results in the low implementation of actions and activities in which these institutions were designated as focal points or as responsible actors, such as providing technical assistance and rural extension or support to family farmers.

103. Moreover, MAPA does not have knowledge about the progress of actions being executed by the federal government that involve GHG mitigation and adaptation to climate change, which prevents the consolidation of results within the scope of the ABC+ Plan.

104. It was identified as a good practice carried out by MAPA, the institutionalization of the State Management Groups, in the federation units, which are formally established by state governments and have the participation of secretariats of agriculture, environment, family agriculture, economy, and technical assistance entities, which align and promote actions of the ABC+ Plan at the local level.

105. Given the above, it is proposed to determine to MAPA, based on art. 4, item I, of Resolution-TCU 315, of 2020, that, within 60 days, operationalize the National Executive Commission of the Sectoral Plan for Adaptation to Climate Change and Low Carbon Emission in Agriculture (CENABC) and the Technical Monitoring Committee of the Sectoral Plan for the Consolidation of a Low Carbon Economy in Agriculture (CTABC) in terms of art. 1 of Decree 10,431/2020, art. 3 of Decree 10,606/2021.

106. Furthermore, it is proposed to recommend to MAPA, based on art. 11 of Resolution-TCU 315, of 2020, to exercise the function of national coordinator of the ABC+ Plan and establish articulation with federal government bodies and entities, as well as to execute actions aimed at control and coordination of activities developed by focal points and actors involved in the ABC+ Plan.

107. With the adoption of this recommendation, the following benefits are expected: alignment of actions and initiatives of federal bodies in actions related to the ABC+ Plan; better coordination and control over results and impacts of the ABC+ Plan.

III.4 ABC+ Plan targets defined without appropriate reference values

Figure 9 - Summary of Audit Finding 4

Due to the lack of methodology for monitoring the implementation of SPSABC in Brazil and the low availability of data on its application activities, the ABC+ Plan defined its targets without appropriate reference values and without regionalizing these targets among the Brazilian states. This leads to the current impossibility of monitoring all SPSABC and the risk of inability to prove results by 2030, impacting the accounting of the agricultural sector's efforts in the national greenhouse gas emissions inventory.

108. MAPA Ordinance 471/2022, which established the ABC+ Plan, defined in its article 3 the commitments to stimulate the adoption of systems, practices, products, and sustainable production processes (SPSABC). The ABC+ Plan presents these commitments to expand adoption as targets to be achieved by 2030, presented in Table 1.

109. All targets refer to the expansion of SPSABC, whether in area, volume, or number of animals, thus, to enable monitoring, it is essential to define and disclose reference values of the application of these technologies in 2020, the base year of the ABC+ Plan, in order to enable comparison and verification of the expansion. Moreover, it is essential that the methodology for calculating the expansion values, to be replicated in future monitoring, is the same as that used in defining the reference values.

110. However, it was found that the ABC+ Plan does not define a clear baseline for each SPSABC expansion commitment, with data presentation of the situation before the start of the Plan's implementation and the methodology to be replicated for verification in future years.

111. Decree 9,578/2018 established, in its article 23, that appropriate methodologies and mechanisms should be adopted to verify the fulfillment of commitments assumed by Brazil for the mitigation of GHGs. Among them are described the SPSABC of recovery of degraded pastures, ILPF, SPD, biological nitrogen fixation, which in the current ABC+ Plan was named Bioinputs, planted forests, and Animal Production Waste Management (MRPA).

112. In turn, Decree 9,203/2017, which provides for the governance policy of the federal public administration, establishes as a public governance guideline to monitor performance and evaluate the design, implementation, and results of policies and priority actions (clause III, of art. 4), and defines that it is up to the high administration of the bodies to implement mechanisms, instances, and practices, which must include at least ways to monitor results (art. 6).

113. Furthermore, the TCU's Public Policy Control Framework highlights the need for the use of reliable data and the definition of a baseline:

> Moreover, it is worth investigating whether the monitoring plan has defined key progress indicators for the main objectives of the policy, which must be based on reliable data. Attention should also be paid to ensure that each indicator presents a **description, data source, collection frequency, responsible collection agency, baseline value (whenever relevant), target for the period, and the value achieved in the period.**

114. However, the only SPSABC with a clear baseline and defined methodology for verifying the baseline and the expansion of adoption is the practice for the recovery of degraded pastures (PRPD), for which a monitoring module was developed within the ABC Platform, using geoprocessing techniques to identify degraded areas and using data from the Laboratory of Image Processing and Geoprocessing of the Federal University of Goiás (Lapig/UFG).

115. Within the scope of the ABC Platform, modules are being developed for the verification of SPSABC Intensive Cattle Finishing (TI) and Animal Production Waste Management (MRPA), for which verification methodologies are still being developed, and the 2020 baseline has not yet been defined.

116. Nevertheless, MAPA stated, through Official Letter 61/2024/CDCON/AECI/MAPA, that there are baselines for all SPSABC. For Crop-Livestock-Forestry Integration (iLPF), along with Agroforestry Systems (SAF), it declared that the technology expanded, from 2010 to 2020, 10.76 million hectares, totaling, in 2020, an area of 16.27 million hectares of application of these technologies (document 122, p. 8). However, the expansion data for the previous period are based on linear growth projections of technology application, conducted by scientific studies. This result is not based on field-collected data for the year 2020 and does not come from a scientific methodology for replication in the Plan's monitoring years.

117. Regarding the No-Till System (SPD), the Official Letter reported that it used data published by Manzatto et al. (2020), and updated it based on the 2020 Municipal Agricultural Production (PAM), resulting in an expansion of 14.59 million hectares in the first cycle of the ABC (document 122, p. 8). Thus, the 2020 baseline was not presented, only the growth of the previous period, and it is also worth noting that the methodology used in the study is based on the assumption, established in 2002, that 80% of Brazil's soybean production uses no-tillage, a factor considered insufficient for defining a baseline for no-tillage area and even less for no-tillage system.

118. As for the SPSABC Bioinputs, the Ministry again used data from Manzatto et al. (2020), updated by PAM, which presents the value of the expanded area, but not the 2020 reference value of the area using the technology (document 122, p. 8). Moreover, the study's assumption is that the expansion area is equivalent to the soy production expansion area, without further justification for adopting this premise.

119. For Planted Forests, the Official Letter provided the 2019 reference value, of 9 million hectares with Planted Forests technology, based on data from the Brazilian Tree Institute (IBÁ) of 2020 (document 122, p. 8). However, it is not specified on which data these areas were identified and even what methodology was used. It is also worth noting that this information comes from a sector association.

120. Finally, regarding Animal Production Waste Management (MRPA), MAPA only reported the result of the previous period's expansion, without the 2020 reference value and without a defined methodology. It is worth noting that the volume of treated waste reported in the Official Letter is an estimate (document 122, p. 8).

121. For the other SPSABC, the Official Letter did not present information on reference values or baselines for the year 2020. Thus, for most SPSABC, there is no clear and methodologically proven baseline for the commitments assumed by the ABC+ Plan.

122. In a meeting, MAPA managers stated that there was a baseline, which may not be correct or ideal, but it was the best information they had at the time. Values of technology application in 2020 were raised, but it is not possible to affirm that it is correct. Regarding new technologies, they claim they did not have a reference at the time of defining the targets (document 126, p. 5).

123. This scenario results in MAPA's inability to monitor and follow up on the implementation of SPSABC that have not yet had baselines and methodologies defined. Currently, it is not possible to perform an objective verification of the expansion of SPSABC under the ABC+ Plan. This situation, if it persists, may impact the possibility of proving the achievement of the Plan's commitments and targets by the end of the cycle, in 2030.

124. Moreover, as the Federal Government did not have these SPSABC baselines, the State Management Groups (SMG) developed their State Action Plans and defined targets for the state based on reference values from the year 2020, which are not adherent to the methodology that will be used for monitoring.

125. For example, MAPA considered as no-tillage 80% of soybean production, while the SMG of Minas Gerais considered as SPD the entirety of soybean planting in the state (document 113, p. 25). In an interview, the SMG of Minas Gerais stated that the baseline was discussed in the SMG when deciding the state's targets, and even that the state's Emater (Rural Technical Assistance and Extension Company) made a non-scientific estimate of areas of each technology of the ABC+ Plan (document 87, p. 5). These differences, both in baseline and methodology, imply divergent results at the end of the Plan, between the states, and between all of them and the consolidated national results.

126. Another consequence of the lack of methodological definition of reference values is the non-appropriation of the efforts to mitigate greenhouse gases (GHG) from agriculture in the National Inventory of Anthropogenic Emission and Removals of Greenhouse Gases. From the fourth Inventory, the factor of degraded pastures for the Amazon and Cerrado biomes and animal waste management was included in the calculations, but the latter based on the premise that only 1% of confined animal waste is treated.

127. With the definition of methodology to define reference values and carry out monitoring, more and better data from agricultural activity will be generated, and these can be incorporated into the Inventory to better reflect the result of SPSABC and agriculture in GHG emissions.

128. As an example, the application of no-tillage systems in grains and irrigated systems reduces the GHG emission of these crops. However, without reliable and verifiable data and methodology, this reduction is not accounted for in the Inventory.

129. Another problem identified is the lack of informational systems to support the monitoring of the ABC+ Plan targets. The ABC Platform is the system part of SIN-ABC responsible for coordinating efforts regarding the monitoring of SPSABC targets (document 126, p. 8), however, so far, only the monitoring module for degraded pastures of the Platform has been implemented, with data referring to 2020 and 2021.

130. MAPA reported in Official Letter 61/2024/CDCON/AECI/MAPA that there is a lack of methodology and data for monitoring some SPSABC (document 122, p. 15):

> For other technologies, it is necessary to identify the best secure and available data bases related to these technologies.
>
> Once these bases are identified, and based on technically and scientifically founded premises, methodologies are developed that inform us of the current implementation status, as well as algorithms that can indicate their evolution over time.

131. Through Official Letter 3/2023/COGIS/CGMC/DEPROS-SDI/SDI/MAPA, the Ministry highlights the difficulties in monitoring other technologies (document 23, p. 9-10):

> The progress on other technologies will depend on the availability of data and databases. By strategy, it is understood how the system is intended to be developed to perform the monitoring, the technology to perform the verification already exists and is available, there are data with this information or it still needs to be generated, if the Ministry has access to these data, or other risks already identified for the full implementation of the system.
>
> The development of information technology solutions for monitoring the evolution of ABC+ technologies, in addition to strategic criteria, as previously mentioned, depends on data and databases, preferably public.
>
> Our criterion is to use the best data base available at the moment, without giving up changing it in the future for a better one. For some technologies, the databases do not yet exist, as in the case of Agroforestry Systems.

132. Thus, the Ministry has not yet implemented the entire system necessary for the monitoring, reporting, and verification of SPSABC, due to the lack of structured data, and at the necessary level of detail, of agricultural activity in Brazil and the definition of methodology for these verifications, which were not defined at the beginning of the Plan's execution and are still being studied or developed.

133. Given the above, it is proposed to recommend to MAPA, based on article 11 of Resolution-TCU 315, of 2020, to define baselines for all commitments defined in MAPA Ordinance 471/2022, which are methodologically verifiable by third parties and enable the monitoring of the results of the actions; establish a standardized verification methodology for the

implementation of SPSABC, compatible with the used baselines, and capable of being incorporated into the Inventory; and share with each State Management Group the state baseline of each commitment defined in MAPA Ordinance 471/2022.

134. As benefits resulting from this deliberation, it is expected that MAPA will increase the transparency and reliability of the reported data of the ABC+ Plan. The definition of baselines and verification methodology will allow third parties to independently verify the results, which can improve the credibility and acceptance of the Ministry's actions both nationally and internationally. Moreover, with well-defined baselines, MAPA will be able to more efficiently monitor progress towards the targets established in the ABC+ Plan and make proactive adjustments to policies and strategies, ensuring that sustainability objectives are achieved.

135. Additionally, establishing a standardized verification methodology for the implementation of SPSABC ensures that the collected data are consistent and comparable between different regions and periods. This not only simplifies data analysis and interpretation but also strengthens the integrity and usefulness of the generated information. Finally, with improvements in data collection and verification, the reductions in GHG emissions due to the implementation of sustainable practices can be more precisely accounted for in the National Inventory of Anthropogenic Emission and Removals of Greenhouse Gases. This directly contributes to achieving national and international climate change mitigation targets."

III.5 Systems planned in the ABC+ Plan are not operational

Figure 10 - Summary of Audit Finding 5

Due to delays in the development, homologation, and production of the systems included in the SIN-ABC, MAPA has not yet concluded any of the systems planned in the ABC+ Plan. This leads to a lack of knowledge within the Ministry about the current stage of implementation of actions, activities, and goals, impacting its ability to inform society and stakeholders about the results of the ABC+ Plan.

136. Decree 10.606/2021 established the Integrated Information System of the Sectoral Plan for Consolidation of a Low Carbon Economy in Agriculture (SIN-ABC) within the scope of MAPA, with the objective of providing technical and scientific support to the CTABC in monitoring actions, as well as consolidating and systematizing the results of the Plan's execution, mainly those from SIGABC, SICOR, and the ABC Platform. Thus, the SIN-ABC's function is to consolidate the results obtained by the different systems and systematize the results of the ABC+ Plan's execution.

137. However, none of the three systems is fully operational so far, and MAPA is still working to finalize their development.

138. The ABC Plan Governance System (SIGABC) is intended for actors involved in the execution of the ABC+ Plan, whether federal or state, to report their goals and results, which will enable MAPA to monitor both actions and activities defined in the strategies and programs of the Plan, as well as the expansion of the adoption of SPSABC, to be passed on by the SMGs.

139. SIGABC was approved in the second half of 2023, according to information sent by Official Letter 61/2024/CDCON/AECI/MAPA, but it was necessary to adjust the System due to identified security flaws. It is currently at the Secretariat of Information Technology of MAPA for adjustments of technical issues and definition of a definitive schedule for deployment in production (document 122, p. 14). It was reported that there is a queue of Ministry systems for production, and SIGABC is waiting in this queue.

140. The SMG of Ceará participated in the system's test phase, however, it realized that it was necessary to develop its own system to facilitate the updating of goals in SIGABC (document

104, p. 3-4). The SMG of Mato Grosso, another test participant, reported that it suggested the system flag errors during data entry to avoid insertion mistakes (document 107, p. 3).

141. According to MAPA, SIGABC is the fundamental system to support the Ministry's articulation with the SMGs in the execution phase of the Plan and for monitoring mainly the results of activities carried out locally (document 122, p. 12).

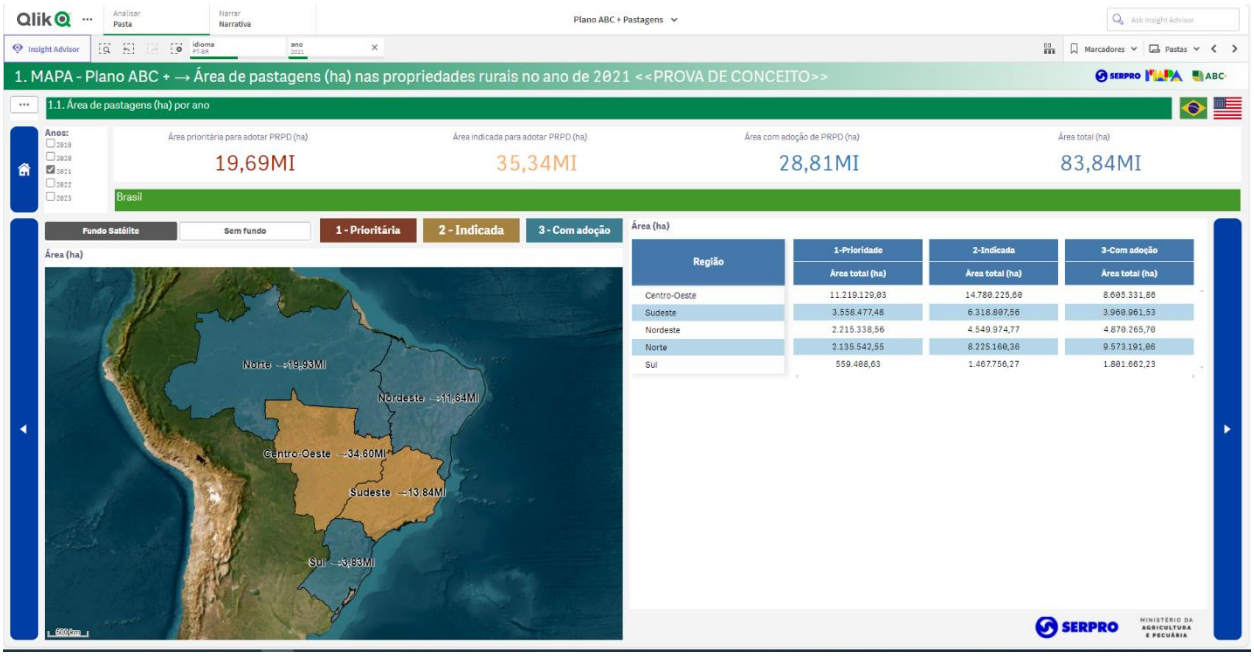
142. Regarding the Rural Credit and Proagro Operations System (Sicor), MAPA does not have access to the system, which is under the custody of the Central Bank of Brazil. Thus, it is developing the SicorABC Panel, which is not a system, but panels built from information extracted from the Rural Credit Data Matrix (MDCR), the Rural Environmental Registry (CAR), and IBGE tables (document 60, p. 1). The SicorABC Panel aims to monitor rural credit operations contracted for the adoption of SPSABC, both by the ABC Program, RenovAgro, or other credit lines.

143. The Panel is already developed, however, it is waiting for verification of legal issues by the Legal Consultancy of MAPA for availability in the production environment, since it contains potentially sensitive data of rural producers, such as the borrower's CPF (Brazilian Individual Taxpayer Registry Number) and identification of the plot, according to Official Letter 61/2024/CDCON/AECI/MAPA (document 122, p. 14).

144. The last of the three systems for the consolidation of SIN-ABC is the Multi-institutional Platform for Monitoring Greenhouse Gas Emission Reductions (ABC Platform), which aims to monitor the data of adoption of SPSABC and their respective contributions to adaptation and mitigation of Greenhouse Gases.

145. Within the scope of the ABC Platform, the module of the Practices for Recovery of Degraded Pastures (PRPD) was developed, available on the MAPA portal. It is worth noting that the PRPD module provided only contains data for the years 2020 and 2021, requiring the acquisition of new data for more updated information (document 122, p. 14-15). For PRPD, the Platform classifies areas as priority or indicated for recovery and allows refinement by municipality, as shown in the following image.

Figure 11 - PRPD Module of the ABC Platform



Source: PRPD Panel, consulted on 5/9/2024, available at: https://www.gov.br/agricultura/pt-br/assuntos/sustentabilidade/planoabc-abcmais/abc/sinabc/plataforma-abc

146. MAPA reported that it is finalizing the Intensive Cattle Finishing (TI) module and that, subsequently, the next SPSABC to be worked on will be the Animal Production Waste Management (MRPA). Regarding the other SPSABCs, it was reported that there is still no defined monitoring methodology to be implemented in the system (document 122, p. 14). MAPA also communicated that there is no schedule for the completion of the other modules, but an expectation of completion by the end of 2024 (document 103, p. 4).

147. Decree 9,203/2017, which provides for the governance policy of the federal public administration, establishes as a public governance guideline, in clause III of art. 4, to monitor performance and evaluate the design, implementation, and results of policies and priority actions, and defines, in art. 6, that it is up to the high administration of the bodies to implement mechanisms, instances, and practices, which must include at least ways to monitor results.

148. As a cause for the non-operationalization of the systems, it is highlighted that neither the ABC+ Plan nor MAPA defined dates or schedules for the implementation of the SIN-ABC systems. In addition, there were delays in the development, homologation, and implementation of the informational systems in a production environment. It is worth noting MAPA's inaction in implementing a monitoring system during the first cycle of the ABC Plan, from 2010 to 2020, resulting in the need to develop all systems, during the current Plan.

149. Another factor is the need to identify data and a database of agricultural activity, which is a fundamental requirement for the development of the modules of the other SPSABCs on the ABC Platform (document 103, p. 4).

150. The non-operationalization of these systems implies the impossibility for SIN-ABC to consolidate and systematize the results of the Plan's execution. Thus, MAPA does not have knowledge about the current compliance with actions and activities defined in the strategies and programs of the ABC+ Plan and the expansion of the adoption of SPSABCs, and the Ministry does not have the capacity to evaluate the consistency and performance of the Plan, or even to adjust strategies and actions to achieve the objectives.

151. Given the above, it is proposed to determine to MAPA, based on art. 4, I, of Resolution-TCU 315, of 2020, that, within 180 days, operationalize the SIN-ABC, consolidate and systematize the results of the execution of the ABC+ Plan from the ABC Plan Governance System, the Multi-institutional Platform for Monitoring Greenhouse Gas Emission Reductions, and the Rural Credit and Proagro Operations System, as provided in item II, of art. 1 of Decree 10,606/2021.

152. It is expected that this deliberation will result in the operationalization of the systems, in a way that allows MAPA to monitor the execution of actions and activities, and the adoption of SPSABCs, evaluate the results of the ABC+ Plan, in addition to promoting transparency and facilitating public access to information on the results achieved.

IV. Conclusion

153. As one of the pillars of the national economy and essential for food security, the agricultural sector faces increasingly urgent challenges due to the impacts of climate change. Global warming and the more frequent and intense occurrence of extreme weather events threaten the stability and productivity of agricultural and livestock activities. Furthermore, greenhouse gas (GHG) emissions from these activities contribute to the worsening of the global climate problem.

154. In this context, it is imperative that the agricultural sector adopts policies that not only reduce its GHG emissions but also promote adaptation measures to climate change. The Sectoral Plan for Climate Change Adaptation and Low Carbon Emission in Agriculture (ABC+ Plan) emerged with the goal of promoting adaptation to climate change and controlling GHG emissions in Brazilian agriculture for the period from 2020 to 2030. However, as highlighted throughout this audit report, the Plan presents a series of problems that compromise its effectiveness.

155. Moreover, the agriculture strategy of the National Adaptation Plan (NAP), created with the purpose of promoting the management and reduction of climate risk in the country in the face of the adverse effects of climate change, failed to meet its objectives and goals, as emphasized in this report.

156. This work sought to examine the planning, implementation, and monitoring of adaptation and mitigation actions and activities in agriculture, focusing on the ABC+ Plan and the NAP, in order to verify if they are aligned with the National Policy on Climate Change and the international commitments made by Brazil to the United Nations Framework Convention on Climate Change (UNFCCC).

157. In this sense, it was found that the main impacts and expected results of the National Adaptation Plan's (NAP) agriculture strategy were not achieved, such as the classification of Brazilian territory in terms of vulnerability and climate risk and the identification of priority areas, the improvement in the predictability of agricultural insurance planning and support for agricultural zoning policies, the guarantee of adequate and efficient investment of resources for the adaptation of agriculture to climate change, in addition to the improvement of readiness, adaptive capacity, and resilience of the sector. It was verified that the NAP was not formally incorporated into the operational structures of MAPA, hindering its effective implementation.

158. Furthermore, it was identified that there is no long-term strategy or plan for the adaptation of agriculture to climate change, negatively impacting the sector's capacity to adapt to future climate scenarios and the increase in extreme events. This gap results from the lack of updating of the NAP after its validity ended in 2020, combined with the restricted focus of the adaptation strategy contained in the ABC+ Plan. The latter focuses on improving the efficiency and resilience of production systems within properties, without encompassing agriculture as a whole.

159. The development of the Climate Plan, an update of the National Plan on Climate Change, is highlighted, which has a temporary technical group on adaptation, with the participation of MAPA.

160. It was also found that there is a lack of institutionalization and structuring of adequate governance of the ABC+ Plan at the federal level, with a lack of clear assignment of roles and responsibilities for bodies and entities external to the structure of MAPA. This resulted in the low implementation of activities defined in the Plan with focal points or actors involved defined outside the structure of the Ministry.

161. Additionally, the ABC+ Plan defined its goals without appropriate reference values, resulting in the current impossibility of monitoring the Sustainable Production Systems, Practices, Products, and Processes (SPSABC). This poses a significant risk of not being able to prove the results of the Plan in 2030, which impacts the accounting of the agricultural effort in the National Inventory of Anthropogenic Emission and Removals of Greenhouse Gases.

162. Finally, it was found that the three systems proposed by the ABC+ Plan for monitoring and evaluation of public policy, members of the Integrated Information System of the ABC Plan (SIN-ABC), are not operational. This means that MAPA does not have updated information on the

progress of actions, activities, and goals established in the strategies and programs of the ABC+ Plan, as well as on the implementation of the SPSABC.

163. These findings are addressed in five findings in the body of this report, and the referrals for the findings range from recommendations to develop and institute an adaptation strategy for national agriculture, to determinations for the consolidation and systematization of the results of the execution of the ABC+ Plan from the ABC Plan Governance System (SIGABC), the ABC Platform, and the Rural Credit and Proagro Operations System (Sicor), among other suggested proposals.

164. The implementation of the proposed measures has the potential to significantly enhance the institutionalization and monitoring of the ABC+ Plan, resulting in more effective alignment and coordination among federal agencies. This, in turn, will contribute to greater transparency and reliability of the reported data, facilitating independent verifications and more accurate monitoring of the progress of actions and activities in relation to the established goals, allowing the integration of GHG mitigation results from agriculture into the National Inventory of Anthropogenic Emissions and Removals of Greenhouse Gases.

165. Furthermore, with the implementation of an adaptation strategy to climate change focused on agriculture, it is expected to identify the most vulnerable regions, crops, and populations, directing effective actions that contribute to increasing the resilience of agricultural systems. This should result in the reduction of production losses and an increase in food security, directly benefiting society as a whole.

V. Proposals

167. In light of the above, the case is submitted for higher consideration, proposing:

Determination

I. To **determine** the Ministry of Agriculture and Livestock, based on article 4, I, of Resolution-TCU 315, of 2020, that:

a) within 60 days, operationalize the National Executive Commission of the Sectoral Plan for Adaptation to Climate Change and Low Carbon Emission in Agriculture (CENABC) and the Technical Committee for Monitoring the Sectoral Plan for Consolidation of a Low Carbon Economy in Agriculture (CTABC) in terms of article 1 of Decree 10.431/2020 and article 3 of Decree 10.606/2021 (section III.3 of the report);

b) within 180 days, operationalize the Integrated Information System of the ABC Plan (SIN-ABC), consolidate and systematize the results of the execution of the Sectoral Plan for Climate Change Adaptation and Low Carbon Emission in Agriculture (ABC+ Plan) from the ABC Plan Governance System, the Multi-institutional Platform for Monitoring Greenhouse Gas Emission Reductions, and the Rural Credit and Proagro Operations System (Sicor), as provided in clause II, of article 1 of Decree 10.606/2021 (section III.5 of the report);

Recommendations

III. To **recommend** to the Ministry of Agriculture and Livestock and the Ministry of Agrarian Development and Family Agriculture, based on article 11 of Resolution-TCU 315, of 2020, to develop and establish an adaptation strategy for national agriculture, based on future climate change scenarios and the current stage of vulnerability of regions and crops, with the definition of actions, responsible parties, goals, indicators, vulnerable areas and populations, an estimate of necessary resources and financing sources, with each ministry acting within its specific competencies (section III.2 of the report);

IV. To **recommend** to the Ministry of Agriculture and Livestock, based on article 11 of Resolution-TCU 315, of 2020, that:

a) exercise the function of national coordinator of the ABC+ Plan and establish articulation with federal government bodies and entities, as well as execute actions aimed at the control and coordination of activities developed by focal points and actors involved in the ABC+ Plan (section III.3 of the report);

b) define baselines for all commitments defined in MAPA Ordinance 471/2022, that are methodologically capable of proof and verification by third parties and allow the monitoring of the results of the actions (section III.4 of the report);

c) establish a standardized methodology for verifying the implementation of the Sustainable Production Systems, Practices, Products, and Processes (SPSABC), compatible with the baselines used, and capable of being incorporated into the Inventory (section III.4 of the report);

d) share with each State Management Group the state baseline of each commitment defined in MAPA Ordinance 471/2022, in order to standardize the goals assumed by each state (section III.4 of the report);

Information

VI. To **inform** the Ministry of Agriculture and Livestock and the Ministry of the Environment and Climate Change, based on article 9, clause I, of Resolution-TCU 315, of 2020, that the agriculture strategy of the NAP was not properly institutionalized, as well as its monitoring did not present an evaluation on the conclusion of the planned activities, the achievement of the goals, and the results of the indicators, in non-compliance with the public governance guidelines defined in clauses III, IV, X, and XI of article 4 of Decree 9.203/2017, and paragraph 9, of article 7 of the Annex to Decree 9.073/2017 (section III.1 of the report);

Other Proposals

VII. To **authorize** AudAgroAmbiental to proceed with the monitoring of the determination and recommendations that may be pronounced in this process;

VIII. To **file** the case in terms of article 169, clause V, of the Internal Regulations of the TCU.

Brasília (DF), on August 28, 2024

Signed electronically
Vinícius Neves dos Santos
AUFC – Registration 10.216-4
Coordinator

Signed electronically
Rodrigo Paulo Rodrigues da Silva
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Signed electronically
Vanessa Piauilino Gomes Santos
AUFC – Registration 12175-4

Appendix I – Analysis of Managers' Comments

1. In compliance with the provisions of Article 14 of Resolution TCU 315/2020 and paragraphs 520 to 528 of TCU's Performance Audit Manual, approved by Ordinance-Segecex 18/2020, it was sent to the Executive Secretariats of the Ministry of Agriculture and Livestock (MAPA), the Ministry of Agrarian Development and Family Agriculture (MDA), and the Ministry of the Environment and Climate Change (MMA) (documents 142-144), the excerpt from the preliminary version of the Audit Report on Adaptation Actions to Climate Change and Mitigation of Greenhouse Gases in Agriculture, document 139, so that the managers could present their comments.

2. The purpose of sending the Preliminary Report is to give these entities the opportunity to comment on the findings, conclusions, and proposed recommendations of the audit before the final report is issued (ISSAI 3000/129, 2016). In this regard, the reasons for any changes in the audit report or rejection of the received comments will be analyzed and recorded next (ISSAI 3000/130, 2016).

3. The three ministries presented their considerations on the findings and recommendations (documents 150 to 172). Overall, no substantial changes in understandings or directions were proposed. There were only suggestions for changing the recipient of a recommendation by the MDA and the request from MAPA for more time to comply with a determination. The analyses of the comments sent by the managers follow.

Analyses

4. Regarding Finding 1 (agricultural strategy of the NAP 2016-2020 did not achieve its objectives and goals), MMA emphasized that the Ministry, as the coordinator in the development of the Climate Plan, "has sought to identify opportunities for improvement in light of previous experiences." Moreover, it commented that the current process of developing the Climate Plan converges with the elements pointed out in the audit (document 171, p. 4).

5. Still on Finding 1, MAPA's response did not provide new information or propose changes to the finding, merely stating that (document 168, p. 1):

> findings 1 and 2 are cause and effect. The first talks about the non-institutionalization of NAP (2016-2020) in MAPA, and the latter, about the lack of a long-term strategy for climate change adaptation in agriculture.
>
> Basically, the Ministry of Agriculture and Livestock's response to climate change, international agreements, and adaptation plans, increasing the resilience of production systems, etc., has been the ABC+ Plan.

6. Thus, since MAPA and MMA did not propose changes, the text of Finding 1 remained unchanged.

7. Regarding Finding 2, which highlights the absence of a long-term strategy for agriculture adaptation, MAPA did not offer specific comments, limiting itself to the observations already made regarding Finding 1. In document 154, where MAPA addresses all the determinations and recommendations of the TCU, the ministry does not comment on the recommendation related to Finding 2.

8. Still in the context of Finding 2, the MDA highlights that it understands the importance of being heard in the NAP review process, however, it declared that, as established by Law 14.600/2023, it does not fall within its responsibilities the "planning, implementation, and

monitoring of actions and activities for adaptation to climate change and mitigation of greenhouse gas emissions in national agriculture" (document 172, p. 2).

9. In view of this, MDA proposed a modification in the wording of the recommendation, suggesting that the development of an adaptation strategy be directed exclusively to MAPA, with contributions from MDA (document 172, p. 2-3). The ministry's suggestion was as follows, with the changes highlighted in bold:

> Given the above, it is proposed to recommend to **MAPA**, based on art. 11 of Resolution-TCU 315, of 2020, to develop and establish an adaptation strategy for national agriculture, based on future climate change scenarios and the current stage of vulnerability of regions and crops, with the definition of actions, responsible parties, targets, indicators, priority areas and populations, an estimate of necessary resources and funding sources, **considering the manifestations and contributions of MDA and directing specific measures for the inclusion of the family agriculture public, as defined by Law 11.326/2006**.

10. Initially, it is worth noting that this is a recommendation proposal, and if this competence had been expressly provided in the MDA's attributions, it would be a case for a determination proposal. Additionally, the MDA informed during the audit that it considers family farmers, its target audience, as the most vulnerable to climate change, as well as reports that it develops projects, programs, and actions focused on adaptation and vulnerabilities to climate change (document 116, p. 6). It is also worth noting that the recommendation proposal is not about a new NAP or even the MDA participating in the ABC+ Plan, but rather the participatory construction of an adaptation plan to climate change for agriculture.

11. Furthermore, as specified in Article 25, item V, of Law 14.600/2023, the ministry is assigned the competence to promote "sustainable rural development directed at family agriculture, quilombolas, and other traditional peoples and communities." In turn, Decree 11.396/2023, which approves the regimental structure of the MDA, defines, in its Article 24, the competence of the Department of Land Governance to guide and propose guidelines for emergency actions for populations victims of climate changes and environmental damages in rural areas, and in Article 25 the competence of the Department of Territorial and Socioenvironmental Development to:

> X - support the formulation of public policies for innovation and rural development, based on innovative and sustainable agricultural practices, in order to promote their integration with other public policies, with an emphasis on:
> a) development of agroforestry systems, agrocerrado systems, and other polycultures with an arboreal component;
> b) practices of sustainable management and mitigation of the effects of climate changes;
> c) recovery of degraded areas and forest recomposition; and
> d) management and conservation of soil and water;

12. Based on this legal provision, it is understood that the MDA has defined competencies to act in actions for adaptation to climate changes and reduction of greenhouse gas emissions, as long as these are specifically directed at family agriculture, quilombolas, and other traditional groups.

13. Thus, the suggestion made by MDA was not incorporated into the report. However, to clarify that the MDA and MAPA should act according to their respective attributions, the text of the recommendation was modified to incorporate the following passage highlighted in bold:

> Recommend to the Ministry of Agriculture and Livestock and the Ministry of Agrarian Development and Family Agriculture, based on article 11 of Resolution-TCU 315, of 2020, to develop and establish an adaptation strategy for national agriculture, based on future climate change scenarios and the current stage of vulnerability of regions and crops, with the definition of actions, responsible parties, goals, indicators, vulnerable areas and populations, an estimate

of necessary resources and financing sources, **with each ministry acting within its specific competencies.**

14. Regarding Finding 3 (low institutionalization of the ABC+ Plan), MAPA informed that Decree 10.431/2020, responsible for the creation of the CENABC, was modified by Decree 11.987/2024 and that with this "actions necessary for the institution and operationalization of the CENABC were resumed. The first meeting is scheduled for September/2024 and may include in its agenda the need for deliberation on the extinction of the CTABC" (document 154, p. 3).

15. Moreover, regarding the recommendation that MAPA exercise the function of national coordinator of the ABC+ Plan, the ministry declared that "the CENABC is the main tool for said national coordination, as MAPA has five members, exercises the function of Executive Secretariat of the Commission, and can also make use of the constitution of working groups to discuss and propose improvements in the topics and demands forwarded for analysis" (document 154, p. 3).

16. Thus, considering that, even with the change in the Decree, there have not yet been meetings of the CENABC, the text of Finding 3 remained unchanged.

17. Regarding Finding 4, which highlights that the goals of the ABC+ Plan were defined without appropriate reference values, MAPA acknowledged the weakness in defining baselines and listed the measures being adopted by the ministry to address this issue, such as restructuring the structure of the Depros, promoting intra and interinstitutional dialogues to rescue calculation memories, and hiring doctoral fellows to assist in obtaining databases related to the SPSABC (document 154, p. 3).

18. These actions aim for the construction and evolution of the ABC Platform to be "anchored in more solid, auditable, and reliable information for the composition of the national inventory." Consequently, the wording of Finding 4 was maintained without modifications.

19. Regarding Finding 5 (systems planned in the ABC+ Plan are not operational), MAPA reports that each of the axes is at a different stage of evolution and subject to different interactions with partner institutions for development and operationalization (document 154, p. 3).

20. The ministry claims that the development of the SINABC was included in Program 1144 "Sustainable Agriculture" of the PPA 2024-2027, in the specific objective 0036 – "to expand the official information made available to society, of actions that promote the increase of sustainability" and that by 2027 would be the necessary deadline to have a first version of the system (document 154, p. 3).

21. Regarding this statement, it is worth noting that linked to the specific objective 0036, there is the goal 06AW – "to reach the 27 units of the federation with data entered in the SINABC", which is segregated by year of the PPA, with the goal of 15 units of the federation with data entered in the SINABC already in 2024. In these terms, if there is a goal of having data from units of the federation entered in the system from the year of 2024, the information that it would be necessary for the entire term of the PPA for the SINABC to be up and running, as informed by MAPA, does not proceed.

22. Regarding the SIGABC, MAPA reports that the system is practically ready, but subject to the prioritization queue of IT for its completion, and that the common deadline of 180 days could harm the prioritization of the system, resulting in more time than necessary and desired for the system to be operational (document 154, p. 3). Regarding the panel resulting from the SICOR data, the ministry states that it is in the process of drafting the Ordinance containing the formal institution of the BI, and rules of purpose, objectives, access, and control, and concludes that "a more appropriate deadline may be more indicated for obtaining the necessary releases for public availability of the panel" (document 154, p. 3).

23. It is not plausible the understanding of MAPA that if there is more time in a TCU deliberation, the agency will delay the operationalization of the SIGABC. Regarding the SICOR panel, MAPA suggests that the 180-day deadline would not be the most appropriate, but does not specify what deadline would be necessary.

24. Thus, the understanding that the 180-day deadline from the official deliberation of the judgment is reasonable to finalize the construction of the systems that are part of the SINABC is maintained, as well as that there is still the possibility of extending the deadline based on justifications from MAPA.

Conclusion

25. The proposals contained in the manifestations of the managers of the MDA, MAPA, and MMA were considered and contributed to the improvement of this Report.

Appendix II – Detailing of the Methodology

26. This audit was preceded by the production of knowledge (TC 027.950/2022-0) focused on the theme of adaptation and mitigation of climate change in agriculture, which culminated in the determination to carry out the current audit and allowed a preliminary familiarization with the audited object.

27. The planning culminated in the design matrix, the audit plan, and finally in the design matrix panel, with the presence of managers from MAPA, specialists, and representatives of the TCU. The audit questions were defined:

Table 2 – Audit Questions

Audit Question 1: Was the sectoral agriculture strategy of the National Adaptation Plan, from 2016 to 2023, planned, implemented, and monitored by the federal government in a manner consistent with the premises defined by the UNFCCC and achieved the proposed goals and objectives? i. Audit Sub-question 1.1 - Was the National Adaptation Plan planned and updated to specify the vulnerabilities and risks of climate change in the agriculture sector, actions and activities for adaptation to future climate events, necessary resources, sources of funding, goals, and monitoring indicators, including the participation of vulnerable populations and specific actions for these groups? ii. Audit Sub-question 1.2 - Was the National Adaptation Plan for the agriculture sector implemented to internalize the planned actions in the involved agencies and entities and to structure governance for aligning actions sufficiently for execution? iii. Audit Sub-question 1.3 - Were the monitoring activities of the National Adaptation Plan conducted timely and directed to assess the implementation of goals and indicators, and to propose improvements to the Plan, as outlined in it and in the guidelines of the UNFCCC? iv. Audit Sub-question 1.4 - Did the National Adaptation Plan in the agriculture sector achieve its objectives?
Audit Question 2: Did the planning of the ABC+ Plan comply with the good governance practices of public administration, as defined in Decree 9.203/2017, by envisioning actions and activities for adapting agriculture to climate change and mitigating greenhouse gas emissions from the sector, aligned with the premises of the National Policy on Climate Change (PNMC)? i. Audit Sub-question 2.1 - Was the ABC+ Plan planned and constructed in a way that indicates the actions and activities to be prioritized, the necessary financial resources, and sources of funding, as well as specified the baseline goals for mitigation related to the SPSABC? ii. Audit Sub-question 2.2 - Was the ABC+ Plan planned and constructed considering the main risks and vulnerabilities of climate change for agriculture, as well as prioritized actions and activities to promote resilience in the sector, including the participation of vulnerable populations and specific actions for these groups?
Audit Question 3: Does the execution strategy of the ABC+ Plan until 2023, prioritizing the implementation of State Management Groups (SMGs), the approval of State Action Plans (SAPs), and the promotion of SPSABC through rural credit, enable the effective achievement of the established goals, as well as the actions and activities described in the programs and strategies? i. Audit Sub-question 3.1 - Is the performance of the Ministry of Agriculture and Livestock (MAPA) with State Management Groups in the development and execution of actions and activities outlined in the SAPs sufficient for the local implementation of SPSABC, as well as for carrying out communication actions and training of technicians and farmers? ii. Audit Sub-question 3.2 - Did the strategy to promote SPSABC technologies through subsidized credit lines from the ABC Program and RenovAgro enable access for farmers of all sizes to the resources needed for the adoption of these technologies between 2020 and 2023?

iii. What is the degree of implementation of the strategy to promote the adoption of SPSABC by rural producers, through actions and activities outlined in the ABC+ Plan, for the dissemination and adoption of sustainable practices by farmers?

iv. Audit Sub-question 3.4 - Have the institutionalization, governance, and coordination mechanisms defined in the ABC+ Plan been implemented and are they operational, enabling and compelling the effective exercise of roles and responsibilities among the actors and focal points defined?

Audit Question 4: Is the Monitoring, Reporting, and Verification (MRV) process of the ABC+ Plan structured with goals and quality indicators to allow for accurate measurement of the implementation of SPSABC, the execution of actions and activities, and the volume of mitigation based on criteria consistent with the IPCC (Intergovernmental Panel on Climate Change)?

i. Audit Sub-question 4.1 - Have the monitoring systems outlined in the ABC+ Plan been implemented, are they operational, and do they have the appropriate technologies for the accurate verification of SPSABC mitigation goals, as well as the execution of planned actions and activities?

ii. Audit Sub-question 4.2 - Are the reported results of the implementation of actions, activities, and goals of the ABC+ Plan reliable, verifiable, and methodologically comparable to the baseline established in the Plan?

iii. Audit Sub-question 4.3 - Is the Monitoring, Reporting, and Verification (MRV) methodology adopted by the ABC+ Plan consistent with the IPCC guidelines and the methodology used by Ministry of Science, Technology and Innovation (MCTI) in the National Inventory of Anthropogenic Emissions by Sources and Removals of Greenhouse Gases, so that agricultural mitigation contributes to the NDC established by Brazil under the UNFCCC?

Source: Developed by TCU

Criteria

28. The following criteria used in the audit are highlighted:

a. Law 12.187/2009 – National Policy on Climate Change (PNMC);
b. Ordinance MMA 150/2016 (Establishes the NAP);
c. Ordinance MAPA 471/2022 (Establishes the ABC+ Plan);
d. Decree 9.073/2017 (Paris Agreement);
e. Decree 9.203/2017 (governance of the Federal Public Administration);
f. TCU's Public Policy Control Framework;
g. TCU's Framework for the Evaluation of Public Policy Governance;
h. Decree 10.431/2020 (Establishes the CENABC);
i. Decree 10.606/2021 (Establishes the CTABC and the SIN-ABC);

Audit Scope

29. The scope of this audit included determining whether the main policies and actions for adaptation to climate change in agriculture and the mitigation of greenhouse gas emissions from the sector, within the framework of the ABC+ Plan and NAP, until 2023, have been conducted in accordance with the National Policy on Climate Change and the international commitments made by Brazil to the UNFCCC, as well as to identify possible opportunities for improvement. This audit included:

a. Planning, implementation, and monitoring processes of the ABC+ Plan and the NAP's agriculture strategy;

b. National adaptation strategy in agriculture, adhering to the parameters defined by the UNFCCC and the PNMC;

c. Systems used by MAPA for control and monitoring of the ABC+ Plan;

d. ABC Program or RenovAgro, as a tool to promote the ABC+ Plan;

e. Actions prioritized in the implementation of the ABC+ Plan; and

f. Effect of GHG mitigation in agriculture on the National GHG Inventory.

Not within the Audit Scope

30. Items of adaptation and mitigation not related to agricultural productivity, actions carried out by state agencies, and analyses of climate governance within the scope of the PNMC did not form part of the scope of this audit. Furthermore, other sectors envisaged in the NAP were also not covered in this work.

Adopted Procedures

31. This audit was preceded by a production of knowledge (TC 027.950/2022-0) focused on the theme of adaptation and mitigation of climate change in agriculture to support the planning of control actions in this area, which culminated in the determination to carry out the current audit.

32. In the planning phase, studies, analyses, and verifications were carried out aimed at building knowledge about the audit object. This phase involved collecting information to understand the functioning of the ABC+ and NAP Plans.

33. At this stage, the following techniques and procedures were used: legal framework (document 68), Stakeholder analysis (document 69); SWOT analysis (document 75); Risk assessment matrix (document 77); request for information (document 21); review of documents; meetings with managers responsible for the plans and with specialists (documents 8, 9, 13, 57, 58, 59, 60, 61, and 64).

34. Furthermore, the Global Audit Strategy (document 12) and the Design Matrix (document 84) were developed, containing in it the audit questions, information to be requested, criteria, techniques and procedures, and what the analysis will allow to say. At the end of the planning stage, the Performance Audit Plan (document 85) was produced, describing the nature of the work and the intended results, and the design matrix panel was held on 2/26/2024, with the presence of MAPA managers, specialists, and TCU representatives (document 83).

35. In the conducting phase, visits were made to the state of Minas Gerais (MG) to obtain, on-site, the impression of producers, Technical Assistance and Rural Extension (ATER) technicians, and members of the SMG-MG on the functioning of the ABC+ Plan, as well as to understand how the Plan is operationalized in practice. During the visits, conversations were held with the SMG-MG (document 87 and 88), rural producers (document 90 and 91), university professors, and ATER technicians (document 89, 92, 94, and 95) about their experiences and collected opinions on opportunities for improvement. A direct observation procedure was also carried out on a rural property of a small farmer in the municipality of Lamim, who works with the technology of planted forest (document 93). The cities visited were Belo Horizonte, Viçosa, and Lamim. Minas Gerais was chosen based on MAPA's indication, considering it one of the states with the most organized and advanced State Management Group in implementing the SAP.

36. In addition to the various meetings during the planning and conducting phases, many of them via videoconference, written inquiries were sent to the bodies and entities involved with the audit object requesting information.

37. At the end of the conducting phase, the findings matrix (document 136) was prepared and the reference panel was held on 5/3/2024, with the participation of MAPA, MDA, and MMA managers and specialists and TCU representatives (documents 137 and 138).

Compliance with TCU's Audit Standards

38. The final analyses and conclusions of this work were carried out in accordance with the norms and audit techniques accepted by the Court.

39. All evidence collected during the execution of the work was subjected to tests of sufficiency, relevance, and reliability.

Appendix III – References

BRAZIL. Constitution (1988). **Constitution of the Federative Republic of Brazil.** Available at: <http://www.planalto.gov.br/ccivil_03/constituicao/constituicaocompilado.htm>. Accessed on 9/30/2023.

BRAZIL. Paris Agreement. Available at: https://antigo.mma.gov.br/clima/convencao-das-nacoes-unidas/acordo-de-paris/item/10710.html. Accessed on 9/30/2023.

BRAZIL. Law 12.187, of December 29, 2009. **Establishes the National Policy on Climate Change - PNMC and provides other measures.** Available at https://www.planalto.gov.br/ccivil_03/_ato2007-2010/2009/lei/l12187.htm Accessed on 9/30/2023.

BRAZIL. Ordinance MMA 150, of May 10, 2016. **Establishes the National Plan for Adaptation to Climate Change and provides other measures**. Available at https://antigo.mctic.gov.br/mctic/opencms/legislacao/portarias/migracao/Portaria_MMA_n_150_de_10052016.html. Accessed on 9/30/2023.

BRAZIL. Decree 11.550, of June 5, 2023. **Provides for the Interministerial Committee on Climate Change**. Available at: https://www.planalto.gov.br/ccivil_03/_ato2023-2026/2023/decreto/D11550.htm. Accessed on 9/30/2023.

BRAZIL. Decree 9.203, November 22, 2017. **Provides for the Governance Policy of the Federal Public Direct Administration, Autarchic and Foundational.** Available at: https://www.planalto.gov.br/ccivil_03/_ato2015-2018/2017/decreto/d9203.htm. Accessed on 9/30/2023.

BRAZIL. Central Bank of Brazil. **Rural Credit Manual**. Available at https://www3.bcb.gov.br/mcr Accessed on 9/30/2023.

BRAZIL. Ministry of Agriculture, Livestock and Supply (MAPA). **Sectoral plan for mitigation and adaptation to climate change for the consolidation of a low carbon emission economy in agriculture: ABC plan (Low Carbon Agriculture).** Brasília, 2012. Available at: https://www.gov.br/agricultura/pt-br/assuntos/sustentabilidade/planoabc-abcmais/publicacoes. Accessed on 9/30/2023.

BRAZIL. Ministry of Agriculture, Livestock and Supply (MAPA). **Sectoral plan for adaptation to climate change and low carbon emission in agriculture towards sustainable development (2020-2030): strategic vision for a new cycle.** Brasília, 2021. Available at: https://www.gov.br/agricultura/pt-br/assuntos/sustentabilidade/planoabc-abcmais/publicacoes. Accessed on 9/30/2023.

BRAZIL. Ministry of Agriculture, Livestock and Supply (MAPA). **Sectoral Plan for Adaptation to Climate Change and Low Carbon Emission in Agriculture 2020-2030: Operational Plan**. Brasília, 2021. Available at: https://www.gov.br/agricultura/pt-br/assuntos/sustentabilidade/planoabc-abcmais/publicacoes. Accessed on 9/30/2023.

BRAZIL. Ministry of Agriculture and Livestock (MAPA). **ABC Plan: Ten years of success and a new sustainable way of agricultural production**. Brasília, 2023. Available at:

https://www.gov.br/agricultura/pt-br/assuntos/sustentabilidade/planoabc-abcmais/publicacoes. Accessed on 12/1/2023.

BRAZIL. Ministry of Agriculture and (MAPA). **Strategy for adaptation to climate change for Brazilian agriculture.** Brasília, 2023. Available at: https://www.gov.br/agricultura/pt-br/assuntos/sustentabilidade/planoabc-abcmais/publicacoes. Accessed on 12/1/2023.

BRAZIL. Ministry of Science, Technology and Innovation. Secretary of Policies and Programs for Research and Development (MCTI). **Climate modeling and sectoral vulnerabilities to climate change in Brazil.** Brasília, 2016. Available at: https://antigo.mctic.gov.br/mctic/opencms/ciencia/SEPED/clima/ciencia_do_clima/livro_modelagem_climatica.html Accessed on 9/30/2023

BRAZIL. Ministry of Science, Technology and Innovation. Secretary of Policies and Programs for Research and Development (MCTI). **National Emissions Registry System (SIRENE).** Available at https://www.gov.br/mcti/pt-br/acompanhe-o-mcti/cgcl/paginas/sistema-de-registro-nacional-de-emissoes-sirene. Accessed on 12/1/2023.

BRAZIL. Ministry of the Environment (MMA). **National Plan for Adaptation to Climate Change: Volume 1**. Brasília, 2016. 2 v. Available at: https://www.gov.br/mma/pt-br/assuntos/mudanca-do-clima/plano-nacional-de-adaptacao. Accessed on 1/9/2023. Accessed on 9/30/2023.

BRAZIL. Ministry of the Environment (MMA). **National Plan for Adaptation to Climate Change: 1st monitoring and evaluation report 2016 - 2017**. Brasília, 2017. Available at: https://www.gov.br/mma/pt-br/assuntos/mudanca-do-clima/plano-nacional-de-adaptacao. Accessed on 9/30/2023.

BRAZIL. Ministry of the Environment (MMA). **National Plan for Adaptation to Climate Change: final monitoring and evaluation report, cycle 2016-2020.** Brasília, 2021. Available at: https://www.gov.br/mma/pt-br/assuntos/mudanca-do-clima/plano-nacional-de-adaptacao. Accessed on 9/30/2023.

BRAZIL. Federal Court of Accounts (TCU). **Basic Governance Framework: Applicable to Bodies and Entities of the Public Administration.** Version 2. Brasília, 2014. Available at: https://portal.tcu.gov.br/data/files/FA/B6/EA/85/1CD4671023455957E18818A8/Referencial_basico_governanca_2_edicao.PDF. Accessed on 9/30/2023.

BRAZIL. Federal Court of Accounts (TCU). **Public Policy Control Framework**. Brasília, 2020. Available at: https://portal.tcu.gov.br/data/files/EF/22/A4/9A/235EC710D79E7EB7F18818A8/1_Referencial_controle_politicas_publicas.pdf. Accessed on 9/30/2023.

BRAZIL. Federal Court of Accounts (TCU). **Framework for the Evaluation of Governance in Public Policies.** Brasília, 2014. Available at: https://portal.tcu.gov.br/data/files/16/B0/CB/52/F8488710D5D7F787E18818A8/Referencial%20para%20Avalia%C3%A7%C3%A3o%20de%20Governan%C3%A7a_web.pdf. Accessed on 9/30/2023.

LEAST DEVELOPED COUNTRIES EXPERT GROUP. **National Adaptation Plans. Technical guidelines for the national adaptation plan process.** Bonn: UNFCCC Secretariat. Bonn, Germany. 2012. Available at http://unfccc.int/NAP. Accessed on 12/1/2023.

IPCC. **IPCC Guidelines for National Greenhouse Gas Inventories**, Prepared by the National Greenhouse Gas Inventories Programme, Eggleston H.S., Buendia L., Miwa K., Ngara T. and Tanabe K. (eds). Published: IGES, Japan. 2006. Available at https://www.ipcc-nggip.iges.or.jp/public/2006gl/index.html. Accessed on 12/1/2023.

List of Acronyms

ABC+	Sectoral Plan for Climate Change Adaptation and Low Carbon Emission in Agriculture
AIP	Integrated Landscape Approach
Anater	National Agency for Technical Assistance and Rural Extension
ATER	Technical Assistance and Rural Extension
CAR	Rural Environmental Registry
CENABC	National Executive Commission of ABC+ Plan
CIM	Interministerial Committee on Climate Change
CTABC	ABC+ Plan Technical Monitoring Committee
Embrapa	Brazilian Agricultural Research Corporation
FBN	Biological Nitrogen Fixation
GHG	Greenhouse Gases
IBÁ	Brazilian Tree Institute
ILPF	Crop-Livestock-Forestry Integration
INMET	National Institute of Meteorology
IPCC	Intergovernmental Panel on Climate Change
MAPA	Ministry of Agriculture and Livestock
MCTI	Ministry of Science, Technology and Innovation
MDA	Ministry of Agrarian Development and Family Agriculture
MDCR	Rural Credit Data Matrix
MMA	Ministry of the Environment and Climate Change
MRPA	Animal Production Waste Management
MRV	Monitoring, Reporting, and Verification
NAP	National Adaptation Plan
NDC	Nationally Determined Contributions
PAM	Municipal Agricultural Production
PDHC II	Dom Helder Câmara Project – second phase

PNMC	National Policy on Climate Change
PRPD	Practices for Recovery of Degraded Pastures
SAF	Agroforestry Systems
SAF	Secretariat of Family Agriculture and Cooperativism
SAP	State Action Plan
SI	Irrigated Systems
SICOR	Rural Credit and Proagro Operations System
SIGABC	ABC Plan Governance System
SINABC	Integrated Information System of ABC+ Plan
SMG	State Management Group
SPD	No-Tillage System
SPDH	No-Tillage System for Horticulture
SPSABC	Sustainable Production Systems, Practices, Products, and Processes
Swot	Strengths, Weaknesses, Opportunities and Threats
TI	Intensive Cattle Finishing
UNFCCC	United Nations Framework Convention on Climate Change
ZARC	Climate Risk Agricultural Zoning

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