FOREST FIRES AND UNAUTHORIZED BURNING

PROJECTS EFFECTIVENESS EVALUATION SUPPORTED BY

AMAZON FUND

Ex-Post Effectiveness Evaluation Report on forest fires and unauthorized burning projects

This report presents the results of the ex-post effectiveness evaluations for fire prevention projects. The evaluations were conducted by a team of independent consultants coordinated by the German Cooperation for Sustainable Development through the *Deutsche Gesellschaft für Internationale Zusammenarbeit* GmbH (GIZ), under technical cooperation with BNDES regarding the Amazon Fund. All opinions expressed herein are the sole responsibility of the authors and do not necessarily reflect the positions of GIZ and BNDES. This document has not been subjected to editorial review.

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Acronyms

AmL	Amazônia Legal *(The Legal Amazon)*
BOPA	Base Operacional de Proteção Ambiental *(Environmental Protection Operational Base)*
BNDES	Banco Nacional de Desenvolvimento Econômico e Social *(National Bank for Economic and Social Development)*
CAD	Comitê de Ajuda ao Desenvolvimento *(Development Assistance Committee)*
CAR	Cadastro Ambiental Rural *(Rural Environmental Registry)*
CBM	Corpo de Bombeiros Militar *(Military Fire Brigade)*
CBMAC	Corpo de Bombeiros Militar do Estado do Acre *(Military Fire Brigade of the State of Acre)*
CBMMT	Corpo de Bombeiros Militar do Estado de Mato Grosso *(Military Fire Brigade of the State of Mato Grosso)*
CBMPA	Corpo de Bombeiros Militar do Estado do Pará *(Military Fire Brigade of the State of Pará)*
CBMTO	Corpo de Bombeiros Militar do Estado do Tocantins *(Military Fire Brigade of the State of Tocantins)*
CEPAL	Comissão Econômica para a América Latina e o Caribe *(Referred to as ECLAC - Economic Commission for Latin America and the Caribbean)*
CRMPAD	Centro Regional de Monitoramento, Prevenção Ambiental e Desastres *(Regional Center for Monitoring, EnvironmentalPrevention and Disasters)*
DAI	Diretoria de Administração Institucional *(Institutional Administration Board)*
DGE	Diretoria de Gestão Estratégica *(Strategic Management Board)*
DEFAM	Departamento de Gestão do Fundo Amazônia *(Amazon Fund Management Department)*
EPI	Equipamento de Proteção Individual *(Referred to as PPE, Personal Protective Equipment)*
FA	Fundo Amazônia *(Amazon Fund)*
FOFA	Forças, Fraquezas, Oportunidades e Ameaças *(Referred to as SWOT - Strengths, Weaknesses, Opportunities and Threats)*
GERAF	Gerência de Avaliação de Efetividade e Emprego *(Effectiveness and Employment Evaluation Management Department)*
GIZ	Gesellschaft für Internationale Zusammenarbeit GmbH
IBAMA	Instituto Brasileiro do Meio Ambiente e dos Recursos Naturais Renováveis *(Brazilian Institute of Environment and Renewable Natural Resources)*
Incra	Instituto Nacional de Colonização e Reforma Agrária *(National Institute of Colonization and Agrarian Reform)*
ICMBio	Instituto Chico Mendes de Conservação da Biodiversidade *(Chico Mendes Institute for Biodiversity Conservation)*
Imac	Instituto de Meio Ambiente do Acre *(Institute of Environment of Acre)*
INPE	Instituto Nacional de Pesquisas Espaciais *(National Institute for Space Research)*
MMA	Ministério do Meio Ambiente *(Ministry of the Environment)*
NORR	Núcleo Operacional de Resposta Rápida *(Rapid Response Operational Core)*
OCDE	Organização para a Cooperação e Desenvolvimento Econômico *(Organization for Economic Cooperation and Development)*
ONU	Organização das Nações Unidas *(Referred to as the UN - United Nations)*
PPCD	Plano de Prevenção e Controle do Desmatamento *(Plan for Prevention and Control of Deforestation)*
PPCDAm	Plano de Ação para Prevenção e Controle do Desmatamento na Amazônia Legal *(Action Plan for Prevention and Control of Deforestation in the Legal Amazon)*
RAR	Relatório de Avaliação dos Resultados *(Results Evaluation Report)*
RED	Relatórios de Desempenho *(Performance Reports)*
REDD+	Redução de Emissões provenientes de Desmatamento e Degradação Florestal (+ conservação de estoques de carbono florestal, manejo sustentável de florestas e aumento de estoques de carbono florestal) *(Reduction of Emissions from Deforestation and Forest Degradation + conservation of forest carbon stocks, sustainable forest management and increase of forest carbon stocks)*
SEMA	Secretaria de Estado do Meio Ambiente *(State Secretary of Environment)*
SESP	Secretaria de Estado de Segurança Pública *(Public Security State Secretary)*
SIG	Sistemas de Informações Geográficas *(Referred to as GIS, Geographic Information Systems)*
SINFRA	Secretaria de Infraestrutura e Logística *(Secretary of Infrastructure and Logistics)*
TdR	Termo de Referência *(Referred to as ToR, Term of Reference)*
TI	Terras Indígenas *(Indigenous Lands)*
UC	Unidades de Conservação *(Conservation Units)*
UNFCCC	United Nations Framework Convention on Climate Change

1. Executive Summary

Fire is one of the most commonly used instruments in traditional productive activities due to the culture of slash-and-burn cultivation that clears land and transforms the forest into pasture. When carried out by correct management and guided by competent authorities, fires do not pose risks to biodiversity conservation. However, the relationship between unauthorized burning and deforestation is not new. When left unchecked, fire can consume vast areas of land, causing losses in biodiversity, agricultural production and even human lives, as well as numerous direct and indirect economic losses.

Deforestation, in turn, can be carried out manually with felling and subsequent burning, or it can be mechanised with the use of machines and woodpile burning, without further employing residues. When burning is finalised with burns, a new problem, in addition to the loss of biodiversity due to the lack of fire control, occurs: the fire also destroys the microorganisms that facilitate the decomposition of organic matter, which promotes the recycling of nutrients needed by plants. The loss of organic matter leaves the soil more exposed to erosion and rain, exacerbating its depletion.

In addition to causing forest and biodiversity loss, uncontrolled burns[1] can spread to the point of becoming a wildfire[2]. Fires also release gases into the atmosphere that, in high concentrations, harm human health. The effects of uncontrolled burns must be taken into consideration when analysing initiatives meant to fight forest fires.

To tackle factors that contribute to deforestation, the Amazon Fund (AF) expanded support to include actions related to preventing and extinguishing forest fires and unauthorised burnings in the Legal Amazon. This report will present the evaluation of the results of four illegal uses of fire and wildfire prevention projects that joined the Fund between 2012 and 2013.

Each of these projects operates within a different state of the Amazon: Acre, Mato Grosso, Pará and Tocantins. Together the projects cover a total of 61 municipalities in their original proposals, which is equivalent to an area of approximately 47.29 million hectares (ha), corresponding to 18.2% of the states' total territorial extension and 9.1% of the total area of the Amazon. The projects' implementation timelines vary from 54 months, the shortest, to 83 months, the longest. The projects totalled R$ 60.2 million, with support from the Amazon Fund amounting to R$47.6 million, 79% of the total amount invested. In every project, contracts were signed directly with each state government, with their respective Military Fire Brigade (CBM - Portuguese abbreviation of Military Fire Brigade) as the implementing agency.

To better understand the impact of the current and finished projects supported by the Amazon Fund, effectiveness evaluations have been performed since 2016. These evaluations measure the achieved results and their effects, as well as the sustainability of the changes caused by the implementation of the project, based on the criteria of the Organization for Cooperation and Economic Development (OECD), which evaluate a project's relevance,

1. Burning or fire usage is a common element in rural landscapes, used for clearing newly deforested areas or pastures. However, the fire often gets out of the control of those who started it, quickly growing in size . Additionally, in cases of drought, the scenario can be even worse, as low humidity allows fire to advance through forests.

2. Forest fires are uncontrolled fires in vegetation, such as plantations, pastures and forested areas. It destroys vegetation, which fatally damages fauna, flora and economics .

effectiveness, efficiency, impact and sustainability. Below, the main points are highlighted in aggregate according to the criteria that demonstrate how the aggregated results of the projects contributed to achieving the expected changes, taking the aforementioned method for evaluating effectiveness into account.

Relevance

The results achieved by the projects remain extremely relevant to improving the fight against deforestation due to forest fires and unauthorised burnings. The projects helped the states' firefighters (CBM) structure preventive and monitoring activities and improved active firefighting, ensuring that fires could be tackled quickly and efficiently. The objectives chosen for the projects were consistent with the need to expand the CBMs' performance, mainly because up until that time, they had been primarily restricted to urban fires. These projects have become incredibly relevant to the CBM action plan's effectiveness in the fight against forest fires.

Effectiveness

The projects met all their goals, primarily resulting in a shorter response time to fighting forest fires and less unauthorised burning, as well as an increased spread of CBM action in their respective states. All of the projects' activities were directly related to their main goals and always related to each project's three common themes: training, infrastructure and instrumentation.

One of the main factors that influenced the practical implementation of the projects was the CBM managers' performance, focused on the objective improvement of the field response to fight forest fires. Another positive factor for the project's effectiveness was the relationship with other state institutions, such as the State Secretary of the Environment (SEMA). These State Secretaries, in most cases, supported and provided the necessary connections to various institutions and coordinated efforts linked to their states.

Efficiency

The overall cost-benefit ratio of the actions taken was perceived positively. Measures intended to prevent, monitor and fight forest fires have, by nature, a high cost associated with their logistics, equipment, effective training and outreach materials. These figures represent a small fraction of the funds necessary to reduce forest fires in the four mentioned states, despite investments already made to the projects. Nevertheless, according to all project interviewees, the investments were undoubtedly efficient.

Any attempt to identify which projects possessed the best and worst cost-benefit ratios has not been possible due to the states' differing territorial characteristics, with varying rates of, e.g., territorial coverage, climate, socio-environmental conditions and even the unique internal governance and organisation of each state. All projects were able to execute the activities planned and, in some cases, carried out activities beyond those planned. An example of this can be found in the increase in the expected territorial coverage and the number of people trained to fight forest fires.

However, it is difficult to measure how efficient the projects' results were at combating deforestation caused by forest fires and unauthorised burnings. A better parameter of cost-benefit analysis would be to compare the cost to execute the same activities elsewhere, but because CBM's forest fire fighting is relatively new and records are scarce, any comparison would be weak. There are other projects in progress and, perhaps, these finalised projects can serve as a reference for future analysis.

Aggregate Impact

One of the factors of impact identified was the improvement of internal processes due to manager training at participating institutions. These processes cover concrete prevention, monitoring and firefighting initiatives, but above all, intelligence and strategic activities related to all aspects of forest fires. Several respondents mentioned that the projects were a "tipping point" because forest fires were not prioritised in planning efforts for these institutions prior to them.

Manager training at partner institutions helped to improve connections between institutions regarding forest fires. In addition to training, the creation of volunteer brigades also contributed to the impact of the projects.

Monitorization was carried out by creating situation rooms or monitoring centres, always alongside state and federal institutions. These activities add more impact to the overall picture, as they create coordinated efforts in various administrative spheres.

There are still ongoing impacts derived from these projects, among which we can note: a constant increase in the CBM's acting capacity; improving alliances with OEMAS and other bodies linked to rural activities; the creation of the Consortium of General Commanders of the Legal Amazon; participation in the Amazon Governors Forum; and the preparation of project proposals for the continued support of the Amazon Fund in forest fires prevention activities.

Sustainability

Long-term sustainability of the results achieved with support from the Amazon Fund depends primarily on the projects' states' budgetary conditions, especially regarding the maintenance of major equipment purchased under the project and the resource funding available to each CBM. Although the projects were instrumental for expanding monitoring capacity, CBMs are fully financed by resources from the Fundo Especial do Corpo de Bombeiros Militar [Special Fund for Military Fire Brigades for the State of Amazonas] (FUNESBOM) and the Secretarias de Seguranca Publica [Public Security Secretaries] of their states, which limits possible investment expansion.

Training and qualifications gained from the projects tend to have a more lasting and potentially broader effect when one considers the dissemination of knowledge that naturally occurs in organizations and in practice and is not dependent on new contributions from public resources. Project management training, an indirect result of the project, also provides a favourable scenario for sustainability. Managers gain experience by creating and planning projects and attracting new external resources.

Cross-cutting Criteria

A. Gender Equality

The projects did not consider gender issues regarding their execution strategy. Despite state firefighters' corporations having their own institutional initiatives for gender equality, the projects themselves lacked this particular focus. One of the factors to be evaluated in the absence of activities related to gender equality is that the project has an instrumental priority, which seeks to better structure CBMs. Activities within corporations are institutional and state-based policies and often depend on actions from arising external projects.

B. Poverty Reduction

The projects did not directly contribute to generating local income. The activities aimed to prevent, monitor, and fight forest fires; the community fire brigades that participated in the activities were voluntary.

However, due to indirect impacts from forest fire fighting, one can conclude that reducing damage caused by the fires can improve the income of the local population. Actions were taken to discourage forest fires, but they did not emphasize the standing forest's economic importance. New projects that contribute more to this theme are needed.

C. REDD + Safeguards

All projects were aligned in some way with the [Action Plan for Prevention and Control of Deforestation in the Legal Amazon] Plano de Ação para Prevenção e Controle do Desmatamento na Amazônia Legal (PPCDAm) and with their states' plans for combating and preventing deforestation. Since CBMs are part of each state's respective framework, they each plan their activities directly with the other institutions. Thus, sweeping interactions between institutions led to greater alignment with PPCDAm and states' policies. The results of the projects were internalized, in some way, by public management processes focused on fighting deforestation. Some states implemented policies to assist in the monitorization of forest fires and active firefighting. The reduction in greenhouse gases was not estimated.

Main Conclusions

All projects had, in practice, the same objective: to support the monitoring, prevention and combat of deforestation resulting from forest fires and unauthorised burning across Brazilian states through training, purchasing equipment and improving physical structures. In this sense, we can conclude that the projects were focused on the structural nature of the state CBMs regarding forest fires.

Training that occurred was focused on fire use and management, leading to an institutional paradigm shift. Some respondents were adamant that before the project, firefighters first thought was that fire should always be fought and not managed. In addition to the concept of fire management, training was essential to improve environmental monitoring efforts.

Equipment was also vital to improving firefighting response efforts, facilitating firefighter team movements, and providing adequate equipment to front line teams. However, the need for technology maintenance and improvement is constant, and states must include it in their budgets. Equipment is expensive, so considering strategies to share it between CBMs could be an alternative approach. The creation of the Amazon Association CBM, one of the indirect, unforeseen outcomes of the project, could find itself in the position to promote the implementation of these strategies, as well as being a political forum that should foster dialogue with other institutions linked to the prevention of and fight against deforestation in the Amazon.

These physical structures allowed for widespread and improved capabilities pertaining to the prevention, monitorization and fight against forest fires. Due to their expansive territories, some states still need to invest in more outposts to improve coverage of other areas.

Overall, the projects were essential to shifting the paradigm amongst the CBMs -- from combatting forest fires to the use and integrated fire management. Likewise, they were also instrumental in giving more significance to issues of prevention, monitorization and forest firefighting at municipal and state levels.

2. Background

Fire is a widely used instrument in the Amazon for productive activities, especially when associated with the culture of slash-and-burn techniques used to clear areas for farming and transform the forest for other uses.

The fires directly affect the region's biodiversity, causing damage to its fauna and flora and negatively influencing its rain regime. Unauthorized and unplanned burnings create negative impacts on biodiversity and are directly linked to illegal deforestation.

Unlike other environments, such as the Cerrado, which developed several fire resistance strategies, most species found in Amazonian biomes are devoid of characteristics that create resistance to fire, resulting in high mortality rates of arboreal creatures when the fire intensity is weaker[3].

In the Amazon, forest fires are more frequent during the year's dry season, between the months of May and September. Every year, particularly from July on, there is an increase in the number of fires. In order to understand this trend, it is crucial to understand what are the main factors that lead to forest fires in the region:

- First, illegal deforestation is one of the main vectors of fire. During deforestation, viable timber is taken, and afterwards, the fire is used to clear away remaining smaller vegetation on the ground.
- Burnings conducted in pastures and farms which already exist is a second important factor to consider. In the case of pastures, fires occur to eliminate dry grass and promote regrowth in the rain. In agricultural areas, on the other hand, burnings are carried out to clean the land and make planting easier. Despite depleting the soil, fire is still used in this way. In both cases, if the fire is mishandled, it can become out of control and advance through forest adjacent areas. These forests, close to open spaces, have vegetation with different characteristics from the others and are generally more conducive to fire.
- The third important factor to consider is forest fires with no identified or specific cause. They can affect vast areas of vegetation cover, causing a direct impact on animals, rivers and traditional riverside populations. Even in cases where the cause cannot be correctly identified, the fires are related to the burning for human practices.

In this context, it is clear that deforestation and fires are closely related to human activities and consequential to one another. Especially in the case of the Amazon, which has dense and humid vegetation, several studies indicate that deforestation is generally a precursor to fires, allowing for the lowest vegetation to dry with sun exposure making it easier for fire to spread. Therefore, fire acts as a catalyst for aggravates deforestation because, in addition to making deforestation possible by clearing the area, it can impact and destroy other areas not yet cleared.

In 2011, the Amazon Fund (AF) widened its support to include efforts related to preventing and containing unauthorized burning and burnings in the Legal Amazon. In 2011 and 2012,

3. Myers, RL. (2006). Living with Fire-Sustaining Ecosystems & Livelihoods Through Integrated Fire Management. The Nature Conservancy. 36p. Available at: https://www.conservationgateway.org/Documents/Integrated_Fire_Management_Myers_2006.pdf.

five projects focused on the matter were approved in Acre, Mato Grosso, Pará, Rondônia and Tocantins. Together, these projects received an investment of approximately R$ 62.7 million[4] for the development of initiatives related directly to the prevention and containment of forest fires. For these projects, a contract was drawn up directly with their states' governments, having their respective Military Fire Brigade (CBM - Portuguese abbreviation of Military Fire Brigade) as the implementing institution. This evaluation considers projects in Acre, Mato Grosso, Pará and Tocantins, covering a total of 61 municipalities in their original proposal, which is equivalent to an area of approximately 47.29 million hectares (ha), or 18.2% of the territorial extension of these states (9.1% of the total area of the Amazon).

In 2013, the Amazon Fund approved another project related to fighting forest fires and burnings, with the Instituto Brasileiro do Meio Ambiente e dos Recursos Naturais Renováveis [Brazilian Institute of Environment and Renewable Natural Resources] (IBAMA) as the implementing institution. The project received R$ 14.7 million to strengthen the Sistema Nacional de Prevenção e Combate aos Incêndios Florestais -Prevfogo/Ibama[5]. [National System of Prevention and Control of Forest Fires] logistics centre in Brasília, as well as to improve monitoring and response capabilities in case of forest fires.

Until 2018, financial support from the Amazon Fund to projects directly linked to the theme of forest fires and unauthorized burning amounted to R$ 73.4 million[6]. CBM projects in Acre, Mato Grosso, Pará and Tocantins received different contributions from their respective state governments, totalling approximately R$ 12.6 million. Thus, the total investment made amounted to over R$ 70.9 million in the region.

The supported projects focused on strengthening measures to prevent and control forest degradation caused by fires in native vegetation and were presented by government agencies operating in the Brazilian Amazon, CBM or NGOs in partnership with government agencies. Possible support activities were included in Component 2 - Monitoring and Control - of the Amazon Fund's Logical Framework, which concerns actions taken by state governments that ensure human activities follow environmental legislation.

The initiatives supported by the Amazon Fund follow many guidelines and project implementation objectives to follow the [Action Plan for Prevention and Control of Deforestation in the Legal Amazon] Plano de Prevenção e Controle do Desmatamento na Amazônia Legal (PPCDAm) and each states' Planos de Prevenção, Controle e Alternativas ao Desmatamento (PPCD) [Plans for Prevention, Control and Alternatives to Deforestation]. When projects with the CBM were signed in 2012 and 2013, PPCDam was in its third phase[7] (2012-2015), with strategic guidelines demonstrating the need to improve monitoring systems and strengthen preventive and control measures. The Comissão Executiva Unificada [Unified Executive Commission] (Amazon and Cerrado), while reevaluating the PPCDAm update in its Operational Plan[8] for 2016 to 2020, kept fire prevention and control operations as strategic priorities.

4. Amazon Fund. 2012 Report Activities.Available at: http://www.fundoamazonia.gov.br/export/sites/default/pt/.galleries/documentos/rafa/RAFA_2012_port.pdf

5. Prevfogo / Ibama. Available at: http://www.fundoamazonia.gov.br/pt/projeto/Prevfogo---Ibama/

6. Amazon Fund. Activity Report 2018. Available at: http://www.fundoamazonia.gov.br/export/sites/default/pt/.galleries/documentos/rafa/RAFA_2018_port.pdf.

7. Plano de Ação para Prevenção e Controle do Desmatamento na Amazônia Legal (PPCDAm). 3rd phase (2012-2015). Available at: https://www.mma.gov.br/images/arquivo/80120/PPCDAm/_FINAL_PPCDAM.PDF,

8. PPCDAm Operative Plan (2016-2020). Available at: https://www.mma.gov.br/images/arquivo/80120/Anexo%20II%20-%20PLANO%20OPERATIVO%20DO%20PPCDAm%20-%20GPTI%20_%20p%20site.pdf.

3. Introduction

Effectiveness evaluations for completed projects have been carried out since 2016 by the Amazon Fund. As these projects grew, the Amazon Fund saw the opportunity to evaluate blocks of projects that had their work centred around a similar component, topic, or benefited target audience; i.e., these initiatives accounted for similar indirect effects within the Fund's Logical Framework. To this end, a document was developed and attached to the Conceptual Framework for Evaluating Supported Projects' Effectiveness[9].

This document addresses, based on the Organisation for Economic Co-operation and Development (OECD) methodology, the main actions taken and results achieved by projects aimed at fighting forest fires and unauthorised burnings. It is worth noting that the projects from the Instituto Brasileiro do Meio Ambiente e dos Recursos Naturais Renováveis [Brazilian Institute of Environment and Renewable Natural Resources] (Ibama - Prevfogo, and that of the Rondônia state - Rondônia Mais Verde [Greener Rondonia], are not covered in this evaluation, as they still have not yet finished.

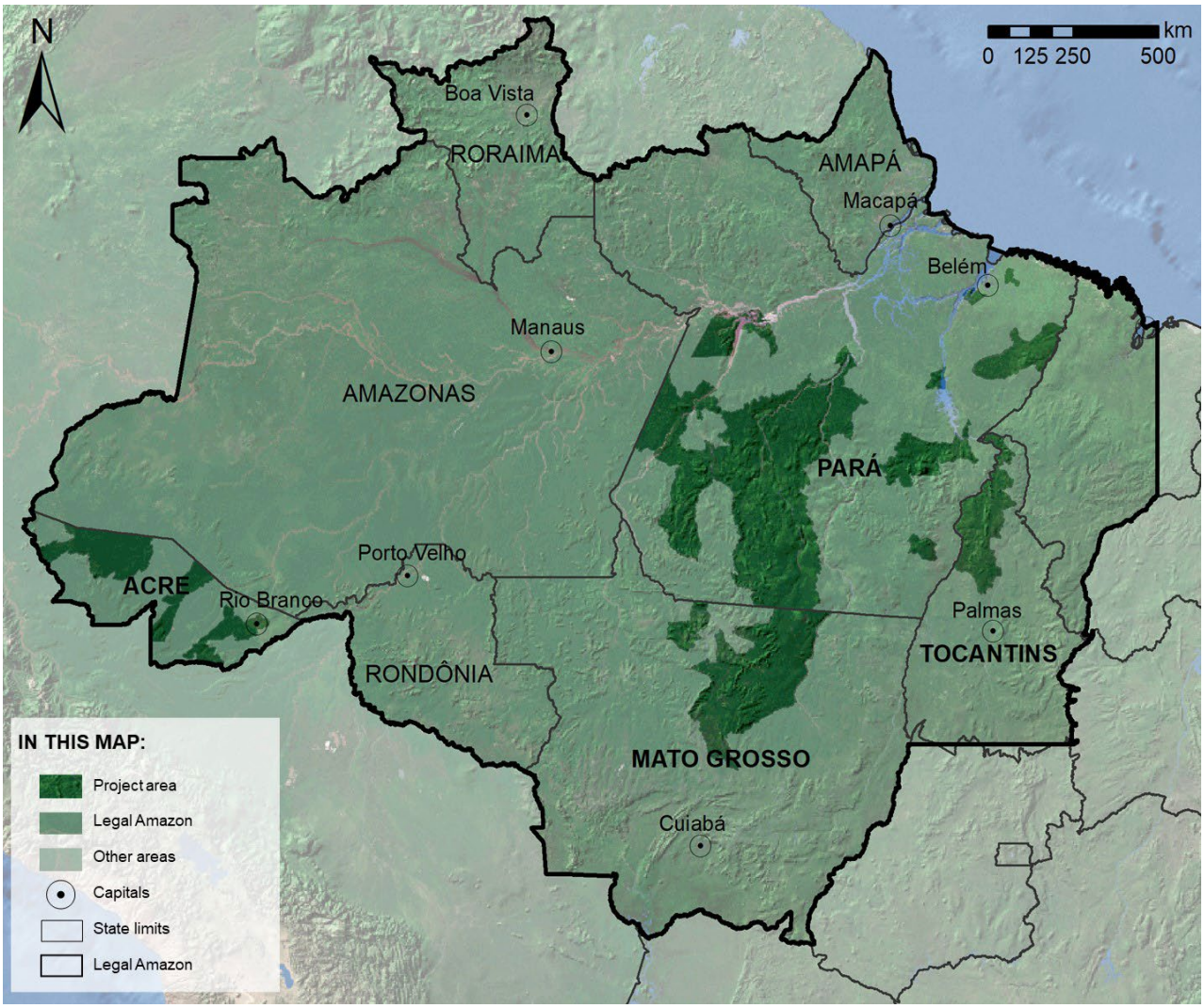
These projects are under Component 2 - Monitoring and Control - from the Logical Framework of the Amazon Fund. The indirect effect expected for these projects is "...government actions that ensure human activities follow environmental legislation," and the direct effects relate to improving the structure of fire brigades for monitoring and controlling deforestation caused by forest fires and unauthorised burning.

In Figure 1, the areas covered by proposals from four of the evaluated projects implemented are highlighted in dark green, being: : (i) Acre: Incêndios Florestais Zero - Acre: Zero Forest Fires; (ii) Bombeiros Florestais de Mato Grosso - Mato Grosso Forest Firemen; (iii) Pará Combatendo os Incêndios Florestais e Queimadas não Autorizadas - Pará Fighting Forest Fires and unauthorised burning; and (iv) Proteção Florestal Tocantins - Tocantins Forest Protection.

To summarize, all of the projects evaluated showed institutional strengthening as a chief reason for investment and use of funds, with the most significant focus of these resources on acquiring permanent materials and equipment. The largest investments were related to acquiring aircraft, large vehicles, buses for transporting troops and smaller vehicles (usually 4x4 trucks). Equipment to control forest fires was acquired, including a firefighting kit, motor pumps, dampers, chainsaws, anti-fire backpacks, and personal protective equipment (PPE). In addition to these acquisitions, training activities with different implementation characteristics for each of the projects were developed. Generally, training, typically designated for current Military Fire Brigade (CBM - Portuguese abbreviation of Military Fire Brigade) personnel, was conducted through short courses (from 20 to 80 hours) about different themes. Specialization courses and Lato Sensu postgraduate courses were also offered, with a courseload totalling more than 600 hours.

9. Conceptual Framework for Effectiveness Assessment of the Amazon Fund supported projects. Available at: http://www.fundoamazonia.gov.br/export/sites/default/en/.galleries/documentos/monitoring-evaluation/Amazon-Fund-impact-evaluations-projects-supported-2016.pdf

Figure 1 - Location of the initial territorial scope proposed by the evaluated projects.



The environmental monitoring actions also represent another support focus on some projects. Resources have additionally been used for the purchase of computers, laptops, furniture for the situation room or other similar spaces.

In summary, based on OECD's methodology, the evaluation aimed to verify if the projects were efficient, effective, sustainable and if they generated the direct and indirect effects expected by the Amazon Fund. This report hopes to contribute to the improvement and improved use of the Amazon Fund's financial resources to support the monitoring and control of deforestation caused by forest fires and unauthorised burnings.

4. Applied Methodology

The applied methodology for the effectiveness evaluation highlighted the effects achieved, the goals proposed, and the projects' results. The analysis focused on verifying the impacts and the sustainability of the changes generated by the projects' implementation. Despite being presented in a unified way, the evaluations were done individually, and each of the projects' facets were examined.

The entire methodological evaluation strategy followed the guidelines established in the [Effectiveness Evaluation for Projects Supported by the Amazon Fund - Conceptual Mark] "Avaliação de Efetividade dos Projetos Apoiados pelo Fundo Amazônia – Marco Conceitual" and its addendum[10]. The evaluation's creation was meant to help hold Amazon Fund (AF) accountable to its donors, characterising the results and the effects related to its supported projects. The evaluation process also seeks to promote institutional learning within the Amazon Fund itself, contributing to the improved quality of the projects, prioritising investments and subsidising decision-making.

The observance of the Cancun safeguards was verified in the evaluation process. The safeguards were agreed upon under the United Nations Framework Convention on Climate Change (UNFCCC) for initiatives made to reduce greenhouse gas emissions caused by deforestation, taking into consideration the role of forest carbon stocks, sustainable development of forests, and the increase of forest carbon stocks (REDD+). Project alignment with the Plano de Ação para Prevenção e Controle do Desmatamento na Amazônia Legal [Action Plan for Prevention and Control of Deforestation in the Legal Amazon] - PPCDAm[11], was also verified, as well as compliance with state plans regarding deforestation prevention and control.

The evaluation went through the following phases : (i) drawing up the design of the project report, (ii) interviews, (iii) visiting local experts, (iv) effectiveness evaluation report, (v) consultation round and (vi) dissemination of results. During the preparation phase, a survey was made using documents that could contribute to the memorandum of each project. Planning for evaluation activities took place during the structuring of the "Effectiveness Evaluation Report Design", which ironed out the specifics of the methodological procedures, risks associated with the evaluated actions operations and the potential risk mitigation strategies.

As a consequence of the Covid-19 pandemic, interviews were done completely virtually via video conference, from July 3rd to November 3rd, 2020. Thirty-one interviews were done, taking about 46 hours to complete in total (Annex 5 - List of Interviewees). In order to get the most out of the interviews, local experts were hired to collect specific information based on a predetermined script. At the time of the visits, photographic records of the projects' acquisitions and videos with CBM teams were also made.

10. Adendo do Marco Conceitual. Available at: http://www.fundoamazonia.gov.br/export/sites/default/en/.galleries/documentos/monitoring-evaluation/Addendum-to-the-Conceptual-Framework-Thematic-Evaluations-2020.docx

11. Plano de Ação para Prevenção e Controle do Desmatamento na Amazônia Legal. Disponível em: https://www.mma.gov.br/informma/item/616-preven%C3%A7%C3%A3o-e-controle-do-desmatamento-na-amaz%C3%B4nia.html.

For the evaluation of deforestation data and hotspots (reference satellite), different levels of observation were adopted, such as:

a. area of the entire state;

b. area of the municipalities indicated in the proposals and;

c. most active areas for state CBMs.

This report's criteria defined the most active CBM areas, as an area within a radius of up to 100km from the Military Fire Brigade teams, within the municipalities included in the proposals. The 100km distance was determined based on the information reported during the interview time and an understanding of the logistical capacity for the displacement of military personnel and equipment. Areas under federal protection and indigenous lands were not counted due to other institutions that operate directly in these locations.

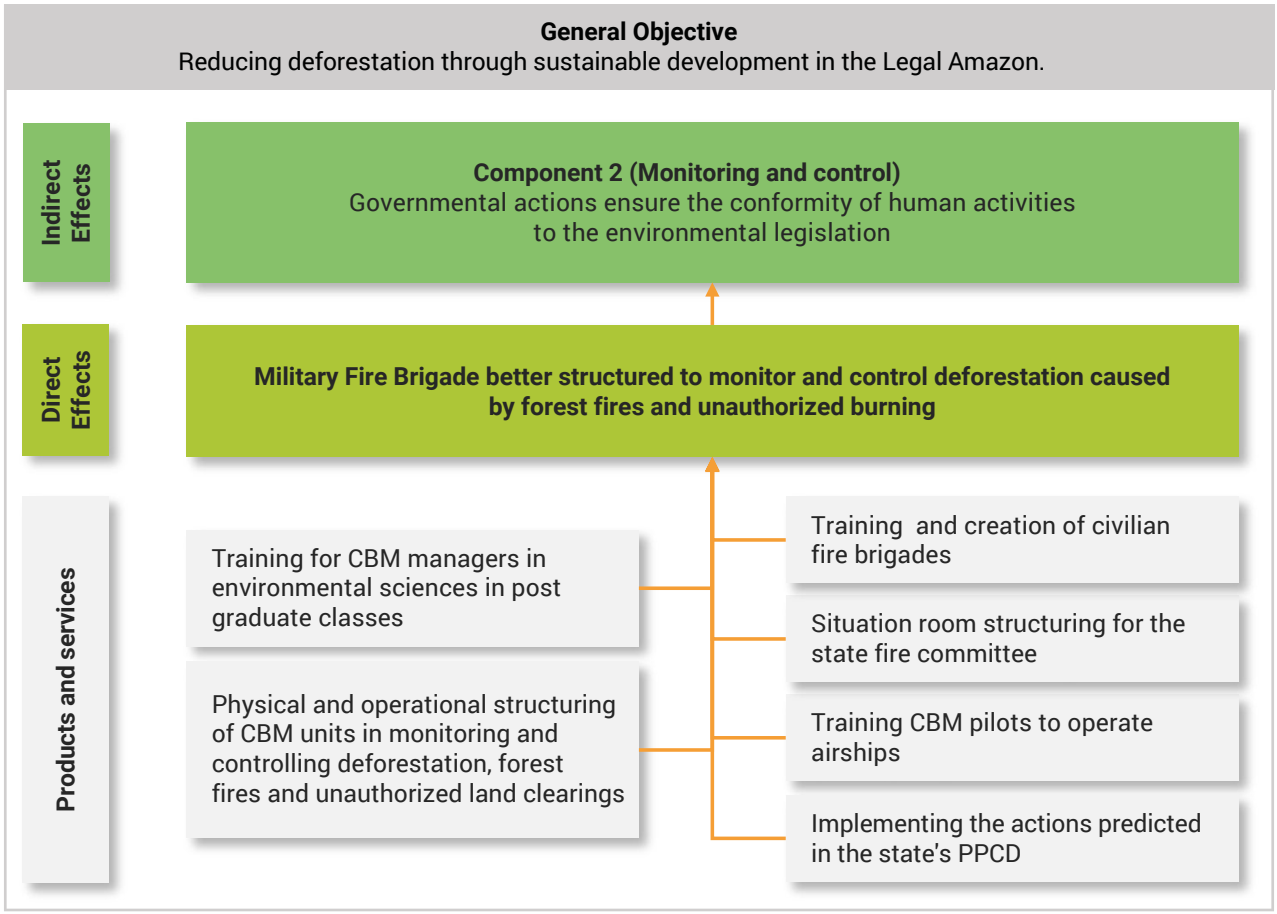
A counterfactual analysis to observe the impact of contributions from the Amazon Fund (AF) was also done, in order to compare it to a CBM unit that didn't get the Fund's financial support. For this analysis, the 10th Companhia Independente Bombeiro Militar [10th Independent Military Firemen Battalion] (10ª CIBM) was selected, located in the city of Sorriso, MT (Mato Grosso), and the 1º Pelotão Destacado de Incêndio Florestal e Meio Ambiente [1st Detached Battalion for Forest Fires and Environment], located in Humaita, AM (Amapa). Data collection of interviews (via videoconferencing) took place from October 7th to November 3rd, 2020.

The evaluation results will be presented in a consultation round that will be held in a virtual workshop format through videoconference. The consultation round will involve the evaluation team, representatives from the Ministry of the Environment (MMA), the German Cooperation for Sustainable Development through Gesellschaft für Internationale Zusammenarbeit GmbH (GIZ) and the National Bank for Economic and Social Development (BNDES), and key people from the projects in addition to representatives of the evaluated institutions, and including our peers, who are specialists with the responsibility for topics related to those of the evaluated projects.

5. Results

The evaluation of a project's effectiveness to control forest fires was based on the construction of a goal chart, put together by the evaluation team, which shows the intervention logic and the indirect effect associated with Component 2, "Government actions which ensure human activities follow environmental legislation". Next, the expected direct effect is that the Military Fire Brigade (CBM - Portuguese abbreviation of Military Fire Brigade) of each state has become better structured for monitoring and control of deforestation caused by forest fires and unauthorised burnings. At the top is the general goal of the Amazon Fund (AF).

Figure 2 - Flow chart of the assessed projects' effects. Each project has its own logical tree they all are presented in the individual evaluations (Annex 2)



Based on the logical framework of the supported project and in the goal chart above, it is possible to see the similarity and compatibility between the indirect and direct effects of each of them. In this way, it was decided to create a visual that would highlight the aggregate effects and the main points of the products and services that each project aimed to achieve.

In short, the products and services were grouped into:

- Training for CBM managers in Environmental Science in post-graduate classes
- Training and creating civilian volunteer fire brigades

- Training CBM pilots to operate airships
- Physical and operational structuring of CBM units regarding monitoring and controlling deforestation, forest fires and unauthorised burnings
- Situation room structuring for the state fire committee
- Implementing the actions foreseen by the state's PPCD

The results based on the aggregate indirect and direct effects of the projects are presented below:

Indirect Aggregate Effects

By establishing the indirect effects to be achieved by the Amazon Fund, the components supported by the program were adopted as a starting point. The evaluated projects are within Component 2: Environmental control, monitoring and inspection, with the anticipated indirect effect being:

Government initiatives ensure human activities follow environmental legislation.

The indicators of this component were intended to measure the capacity to enforce and implement environmental legislation. These broad nature indicators are monitored annually based on information provided by states' Amazonian environmental agencies, and its evolution is the result of various causes, including strengthening actions and technical modernization supported by the Amazon Fund.

The indirect effect indicator used for the four projects was the correlation of the annual deforestation occurring in the areas in which the projects were active. This indicator implies the contribution that such projects have had to reduce deforestation in their respective areas in the states of Acre, Mato Grosso, Pará and Tocantins. As such, projects do not directly combat deforestation but against fire. This indicator was observed and evaluated in a way that complemented the reflections of the evaluation.

The five years prior to project implementation and the seven years in which CBMs acted with resources supported by the Fund were chosen for deforestation analysis based on the available data.

When taking the states' areas under consideration, a reduction of 10.9% was observed between the periods. For the supported municipalities, the value was 2.65%. For the areas where CBMs were most active, an increase of 3.70% was observed.

Table 1 - Average deforestation at the different levels od CBM projects observation

State	Observation level	Area (km²)	Average deforestation prior to project implementation (2008-2012)	Average deforestation during project implementation (2013-2019)	Variation between the previous perios and during project duration
AC	Supported State	164.124,59	256,31	364,42	42,2
	Supported Municipalities	52.335,33	83,81	129,39	54,4
	Most Active Areas	61.374,04	171,32	228,38	33,3
MT	Supported State	903.212,03	1.373,81	1.413,98	2,9
	Supported Municipalities	84.432,32	275,81	317,26	15,0
	Most Active Areas	107.474,46	296,38	318,02	7,3
PA	Supported State	1.245.879,93	3.344,01	2.659,25	-20,5
	Supported Municipalities	289.380,18	640,58	595,89	-7,0
	Most Active Areas	237.047,84	437,63	414,14	-5,4
TO	Supported State	277.468,77	59,58	44,31	-25,6
	Supported Municipalities	36.693,68	32,73	17,76	-45,7
	Most Active Areas	55.407,54	40,27	20,04	-50,3

Source: Terrabrasilis/INPE

Deforestation decreased in two states and increased in two others. The reasons that led to this variation in the data are numerous and diverse in origin, which may or may not be related to forest fires. Currently, the direct relationship between deforestation and forest fires can be better analysed using the Painel de Controle da Amazônia[12] [the Amazon Control Panel], which is part of the Global Fires Emission Database. The platform divides the outbreaks into four categories according to the type of area where it occurs: deforestation areas, small woods, small clearings and agricultural areas, pasture areas and savanna patches.

This evaluation judged the projects to determine if they were adequate, and if so, if they also complied with another one of the component's indirect effects indicators, which is the following:

Number of state environmental agencies' outposts (regional units)

This indicator can be understood as the increase in these institutions' activity outreach, facilitating people's access to their services, therefore, contributing to the improvement of prevention, monitorization and firefighting activities.

Considering the indirect effect of adapting human activities to environmental legislation and the direct effect of CBM structuring, support for projects is necessary to make supported institutions partner with other states institutions regarding forest fires and unauthorised burnings.

Once the analysed projects establish this premise, the results of the aggregate indirect effects are as follows:

12. https://globalfiredata.org/pages/pt/amazon-dashboard

A. Territorial Distribution

Before outside actors stepped in, the CBM primarily focused its efforts on metropolitan areas. With the support of the Amazon Fund, it was possible to better spread out its initiatives and expand its efforts to five other regional battalions. Each of the CBM units involved was strengthened by acquiring equipment, materials and vehicles for field action.

The logistics of preventing, monitoring and, especially, controlling forest fires are a significant obstacle to CBMs. Their occurrences in the Amazonian forests hinder the access of agents, in addition to the constant monitoring of land grabbers who burn illegally deforested areas.

The initiatives of the projects in these states improved logistical capacity, be it by structuring municipal agreements, advanced bases, or even, in some cases, by increasing the ability to reach fires by air through purchased aircraft.

In Mato Grosso, on the other hand, the Base of Operations was built in partnership with the town of Sorriso's mayorship, with funds from the Secretaria de Infraestrutura e Logística [Secretary of Infrastructure and Logistics] (SINFRA) and the town's Conselho de Segurança Pública [Public Safety Council]. In addition, terms of technical cooperation were signed with other municipal governments, which allowed the structuring of mixed municipal brigades in 2015 and 2016.

In Pará, the [Environmental Protection Operational Base] (BOPA) was implemented in Marabá along with the Núcleos Operacionais de Resposta Rápida [Rapid Response Operational Core] (NORRs), reaching all 12 integrated regions in the state of Pará. The Centro Regional de Monitoramento, Prevenção Ambiental e Desastres [Regional Core for Monitoring, Disaster and Environmental Prevention], was also implemented, and functions as a centre for critical situations management and supports decision-making by the Corpo de Bombeiros Militar do Estado do Pará [Military Fire Brigade of the Pará State] (CBMPA).

The improvement of outposts led to a better institutional territorial distribution and made it easier to offer services quickly in any area of the states.

The expansion of CBMs combat and outreach capacity is represented in Table 4, though there was an increase in check-ins and field activity against fires.

B. Troops Displacement and response speed

In addition to outposts, fast transport capacity is required as well. As a result, projects enabled equipment procurement that sped up the CBM's action response time.

In Acre, 11 trailer-trucks, 20 trucks, 20 motorcycles, 21-tow tanks and seven tows to transport equipment were acquired. In Mato Grosso, two fixed-wing aircraft, five forest tank trucks, six 4x4 vehicles and one tank truck to supply aircraft and radio communication equipment were acquired. In Pará, 6 heavy forest fire fighting vehicles, 12 light vehicles, 4 heavy vehicles for troop transport, 15 pickup trucks, 10 floating motor pumps, and various other forest firefighting equipment were procured. Finally, in Tocantins, 3 forest trucks, 13 4x4 type vehicles (pickup trucks), 1 truck, 2 buses, communication and location equipment and mobile fire fighting kits were gained.

The equipment allowed for greater CBM efficiency and effectiveness, mainly by ensuring a shorter waiting period between troops and the arrival of firefighting material. With equipment arriving faster at the scene, it becomes possible to find a more favourable scenario to control the fire before it has completely overtaken the area. In summary, less commuting time, greater success in fire control and less burn impact help avoid fires of far greater proportions and impact.

Figure 3 - Materials and equipment purchased with support from the Amazon Fund projects. The top row of pictures are of a truck purchased in CBM-AC. In the middle row are two photos of the air tractor aircraft acquired by CBM-MT. The bottom row shows the truck acquired with support from the Fund in the CBM-PA project.

Source: CBM files and records from field missions carried out between April 13th to September 5th, 2020.

Once new base structuring and implementation was no longer taking place, the focus shifted to systematically training local brigades to increase rapid response times to meet the demands of the location at that time. It was reported during the interviews that a quick combat response is often more effective, cheaper, and low cost.

In Acre, actions were taken to mobilise and train rural farmers in fire prevention and firefighting techniques. One thousand eight hundred fifteen individuals were trained in fire and forest fire prevention and firefighting techniques in order to form civilian fire brigades, surpassing their anticipated goal of 1,000 volunteers. Equipment such as hoes, rakes, hearing protection, and sprayers was also delivered to the brigades for use during the first intervention in possible forest fires.

Figure 4 - Firefighting training with equipment acquired in the CBMAC Project.

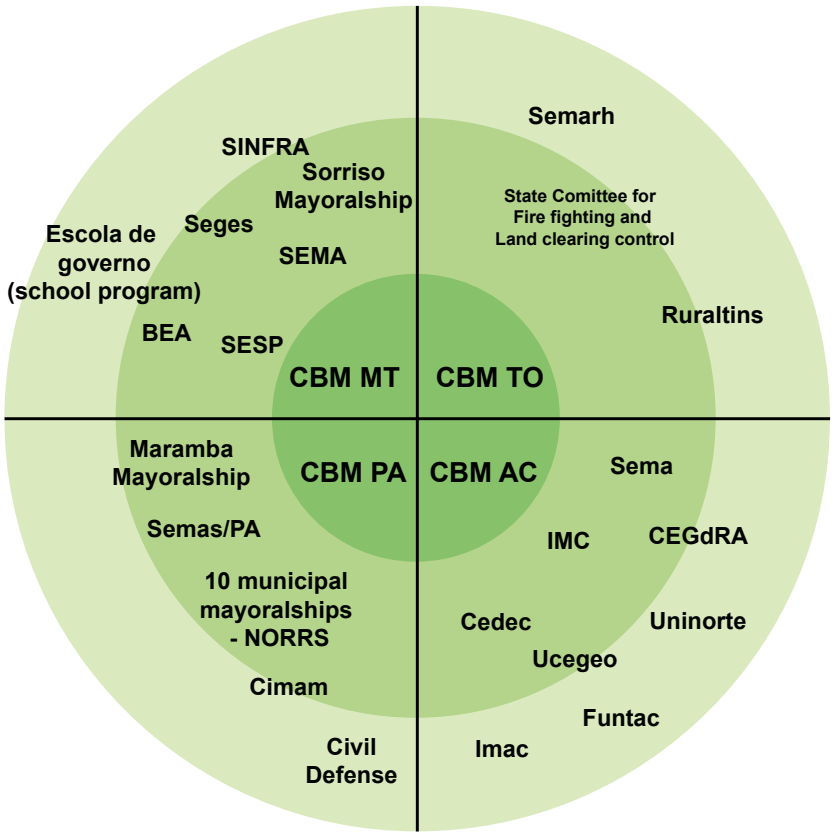
Source: CBM files and records from field missions carried out between 07/13/2020 and 09/05/2020.

In Mato Grosso, the Brigada Municipal Mista [Mixed Municipal Brigade] was implemented as a new concept based on integrating efforts between state, municipality, rural companies and class entities, who jointly commit to the creation of the first response to forest fires unit in municipalities that do not have firefighting military units. The brigade consists of two military firefighters, and at least six brigadiers hired or provided exclusively by city administration.

C. Institutional Links

One crucial project result was the development of new institutional agreements, which go beyond the traditional model of public institutions actions taken in an isolated and centralised manner. Such arrangements, identified in the projects, move towards developing more functional institutional networks that can bring together various actors, involving intersectoral, intergovernmental links and between different government branches, universities and civil society.

Figure 5 - Map of actors in projects supported by the Amazon Fund.



A map of actors was drawn up to reflect this result, separating agents by their project approach generating an image of the moment when the projects took place. Using the map of identified project actors, shown in Figure 5 below, it is possible to identify the institutional networks that have formed over the projects.

This map serves to identify and present the relevant project actors and the relationships between them. These actors can influence the results according to their abilities, their knowledge and their position of power. From this map, we can identify scope, potential, information gaps and participation deficits.

The graphic composition of the map is made up of circles, and the smaller and darker circles represent the implementation core of projects or key actors in the intervention. Next are the primary actors, those directly affected by the projects, and the supporting actors, who indirectly participated in the projects.

Progress in articulation advances with state agents, as previously mentioned during the conclusions of the projects, along with the creation of the Comitê de Proteção da Amazônia Legal [Protection Committee for the Legal Amazon] (COPAL) in 2017, is credited with drawing attention to the need to observe integrated firefighting efforts in the Amazon. This committee was disbanded in 2019 and was replaced by the Legal Amazon General Commanders' Consortium within the Governors' Consortium. This committee had no role in defining the projects' actions but was a part of the CBMs' role in creating proposals for the Amazon Fund itself, aiming at joint and complementary firefighting and preservation efforts.

In the case of the increased links between CBMs with other state agents, it was observed that there are still factors limiting better-integrated actions. Despite agreements or joint efforts within the scope of state monitoring centres - such as the [Integrated Center of Environmental Monitoring] (CIMAM) no Pará and the Centro Integrado Multiagências de Coordenação Operacional [Integrated Center of Operational Coordination for Multiagencies] in Mato Grosso - there is still a need for better integration between the strategic and operational plans by state and federal agents to reduce response times to forest fires and illegal burnings, and other efforts to prevent and combat deforestation.

Furthermore, the greater integration between CBM takes place within Secretarias de Segurança Pública [Public Security Secretary], mainly in regards to financial resources. The dialogue with the environmental and production secretaries and even INCRA was substantial in Acre, where work is coordinated by SEMA, and the Instituto de Meio Ambiente do Acre [Environmental Institute of the State of Acre] (IMAC), which facilitates preventive actions, is considered essential by the CBM - AC.

D. Process Internalisation

Connectivity is reflected in the optimisation of CBM's internal processes as well. During the interviews, the idea that the project had a significant impact on state institutions, involved directly or indirectly, was frequently noted. It was also possible to see a broader culture change in these organisations, which intended to internalise strategic processes and achieve greater effectiveness and efficiency in the formulation, implementation and evaluation of public policies related to monitoring, prevention and fire fighting in the forest.

Agreements were made with the Secretary of the Environment (SEMAs), mayorships and universities. Additionally, situation rooms and fire committees brought several institutions together to plan and carry out initiatives on several fronts. Using the map of actors, one will note that the four projects dialogued with at least thirty-three state or municipal agents, which enhanced their presence as well as joined efforts relating to fire control and prevention.

Direct Aggregate Effects

According to the logical framework, the direct effect expected from the analysed projects is that each state's CBM are better structured for monitoring and fighting deforestation caused by forest fires and unauthorised burnings.

To monitor and evaluate the direct effects, the main indicators to consider for this component are the number of trained professionals using acquired knowledge effectively and the number of forest fires or unauthorised burnings attended by the fire brigades.

The acquisition of new equipment, organisation and training of CBMs alone does not guarantee an improvement or the expansion of the actions related to the monitoring and control of deforestation caused by unauthorised forest fires and burnings. There is a need for adequate management of resources, prioritisation of initiatives and monitoring of results, as well as mobilisation for the internalisation of new processes in institutions. In this context, the response capacity of the supported CBMs, institutional involvement in training people and the support for the implementation of public policies were observed.

A. Hotspots

The reference satellite's hotspots are important indicators when verifying trends in the increase or decrease in burnings and forest fires, making this information a useful tool for evaluating the direct prevention and control effects.

For the evaluation of deforestation and hotspots (reference satellite) data, different levels of observation were adopted:

a. the area of the entire state;

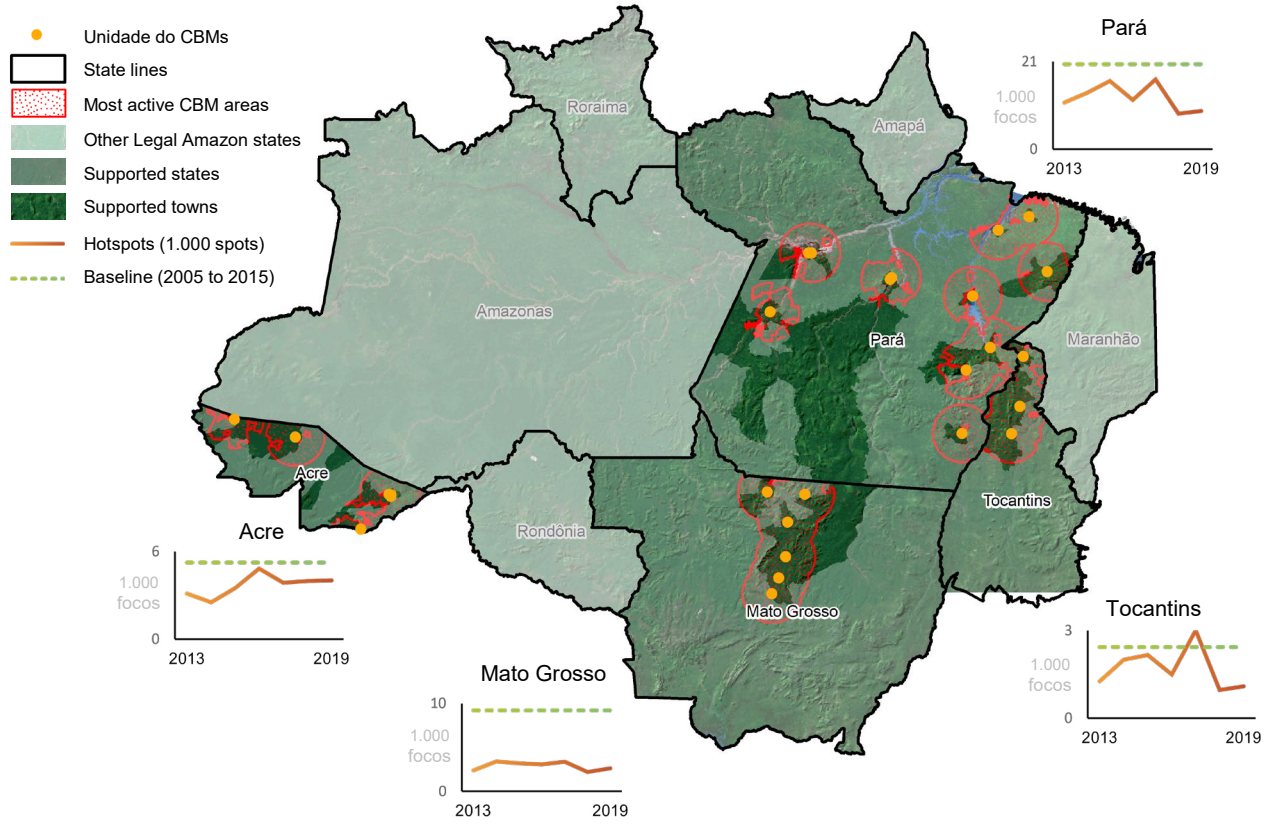
b. the area of the municipalities indicated in the proposals and;

c. states' most active areas;

To define the most active CBM areas, this report considers a radius of up to 100km from the Military Fire Brigade or battalion to meet its criteria, within the municipalities included in the proposals. A 100km distance was chosen based on the information reported at the time of the interviews and an understanding of the logistical capacity for the displacement of military personnel and equipment. Areas under federal protection and indigenous lands were not counted due to the existence of other institutions that exist and operate directly in these regions.

When comparing the average number of hotspots from 2003 to 2012, before AF support, with hotspots from 2013 to 2019, and after the adoption of CBM projects, one can note a significant reduction in the total number of outbreaks. The hotspots reduction can be seen at three different observation levels: state, supported municipalities and most active CBM areas).

Figure 6 - hotspots history evaluation (reference satellite) in the most active CBM areas: compared with the following implementation of AF projects.



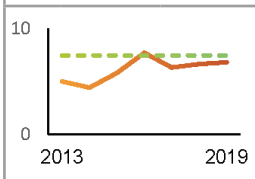
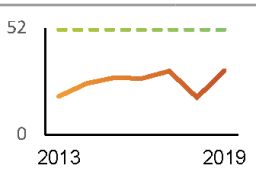
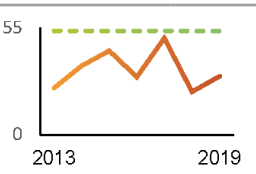
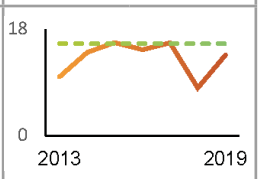
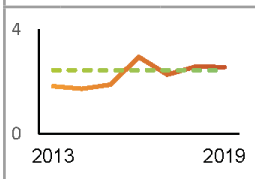
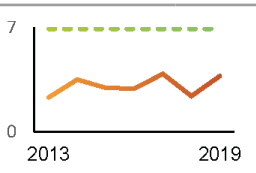
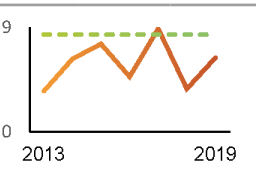
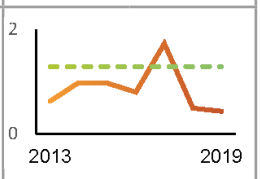
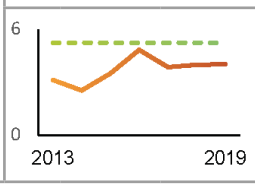
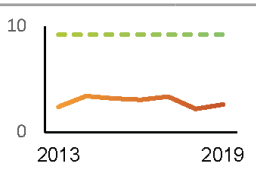
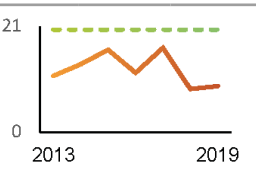
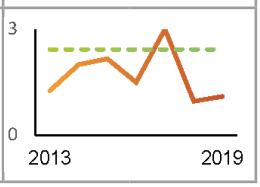
Internally generated.

The reduction of the number of hotspots was more significant in the supported municipalities territory than in the areas defined as most active when compared with the total reductions for each state. The strategy of using different geographic units to evaluate the dynamics of each hotspots shows that, effectively, there were actions that were human-made mistakes and resulted in a reduction of most of the hotspots in areas close to CBMs. Considering the four states, one can note a reduction of about 30.3% of hotspots between 2003-2012 and 2013-2019. The same observation can be made regarding supported municipalities, where the reduction is 31.5%. Lastly, when observing the level of the most active area, one will discover that the reduction is much higher, around 41.7%.

The most significant reductions in high focus action areas were in Mato Grosso and Pará, presenting reductions of 68.8% and 38.8%, respectively. Acre and Tocantins showed similar patterns, with a 29.5% reduction in Acre and a 29.7% in Tocantins (Table 2).

In the graphs below, the y-axis represents the hotspots, on the reference satellite, in 1,000 focus. The green line represents the average of the reference satellite's hotspots from 2003 to 2012 (baseline). The red line shows the hotspots average (in the reference satellite) for the years 2013-2019.

Table 2 - Baseline and hotspots history of CBM projects supported by the Amazon Fund

Observed level	UF	Base-line	2013	2014	2015	2016	2017	2018	2019	Average (13-19)	Variation (%)
Supported states	AC	7.432	4.980	4.398	5.779	7.684	6.295	6.626	6.802	6.081	-18,2
	MT	51.197	18.554	24.955	27.741	27.305	30.911	18.032	31.169	25.524	-50,1
	PA	53.416	24.046	35.526	43.164	29.724	49.770	22.080	30.165	33.496	-37,3
	TO	15.514	9.935	14.075	15.705	14.494	15.673	8.033	13.625	13.077	-15,7
	Acre			Mato Grosso			Pará			Tocantins	
											
Supported municipalities	AC	2.433	1.822	1.715	1.877	2.940	2.263	2.571	2.548	2.248	-7,6
	MT	6.880	2.301	3.488	2.931	2.892	3.866	2.382	3.740	3.086	-55,1
	PA	8.361	3.487	6.270	7.567	4.739	8.884	3.689	6.375	5.859	-29,9
	TO	1.284	621	980	966	797	1.727	490	429	859	-33,1
	Acre			Mato Grosso			Pará			Tocantins	
											
Most active CBM area	AC	5.237	3.133	2.537	3.496	4.840	3.853	3.983	4.011	3.693	-29,5
	MT	9.229	2.392	3.403	3.177	3.059	3.348	2.190	2.603	2.882	-68,8
	PA	20.350	11.135	13.500	16.334	11.799	16.729	8.564	9.105	12.452	-38,8
	TO	2.434	1.262	2.003	2.164	1.494	3.004	965	1.094	1.712	-29,7
	Acre			Mato Grosso			Pará			Tocantins	
											

Source: Adapted from INPE (2020)

BOX 1. Analysis of forest fires statistics based on geographic data

A The main source of information used in Brazil, principally used for the development of historical data and the definition of the areas of greatest intensity of forest fires, is the database of hotspots from the National Institute for Space Research (INPE).

To better visualise the spatial and temporal distribution of hotspots data, technical data processing is usually applied, as is done with the kernel map. This technique enables the transformation of a set of data points in a density map through smoothing,

enabling the visualisation of the distribution and frequency of the fires and allowing a comparable performance analysis between different locations.

By observing the 2003 to 2012 kernel map (Figure 7), which came before Amazon Fund supported CBM projects for Acre, Mato Grosso, Pará and Tocantins began, it is clear that supported states include areas with a high concentration of hotspots.

The most active CBM areas defined in projects, from the states of Acre, Mato Grosso and Pará, are mostly in places with a high concentration of hotspots in the state. Tocantins, however, presents climate conditions and vegetation types that are rather distinctive from the other states, creating a greater concentration of forest fires in the areas with savannah-like type of herbaceous vegetation, of a savannah-like type, that is somewhat concentrated in the northern region of the state.

When comparing the kernel map of the hotspots from 2003 to 2012 pre-project implementation to the 2013-2019 post-project implementation kernel map, changes to the location of the concentration and distribution of forest fires and burns are present.

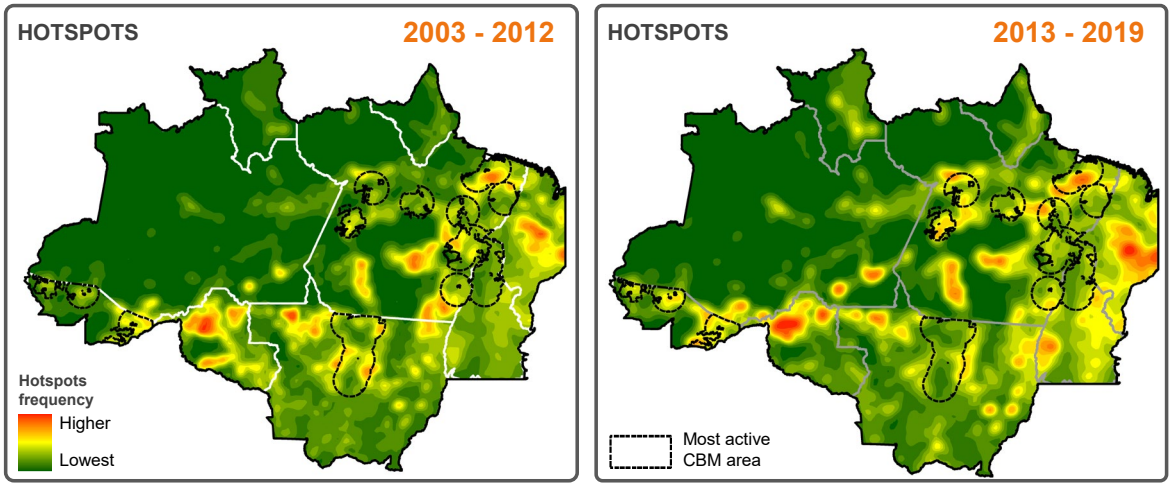
Prior to the projects' implementation, in the areas of greatest action focus of the four CBM projects, the annual average of hotspots was 37.2 thousand and during the period the projects took place, the annual average decreased to 20.7 thousand hotspots, representing a reduction of 44.3%.

Despite the data showing a reduction in the location of the hotspots in CBMs most active areas, there are some specific sites that showed an increase in frequency, mainly located in the northern state of Pará.

hotspots data have several limitations, and their use should be made carefully so that the inferences reported express a local reality. Thus, considering hotspots focuses and the implementation of firefighting projects supported by the Amazon Fund, we can infer that effective reduction in the frequency of forest fires in the areas of greater activity for CBMs took place when compared with the other areas.

Importantly, the results do not allow for inferences about a possible increase or decrease in the area damaged by fire. The results indicate, exclusively, that the most active areas for CBM showed a decrease in the frequency of forest fires. It is still a challenge to keep up with changes in the dynamics of places with higher fire frequencies. To this end, it is still necessary to create a strategy that accompanies this dynamic, especially along the arc of deforestation, in order to correctly follow developments in forest areas most threatened by the displacement of burning activities/fires.

Figure 7 - hotspots distribution, from the reference satellite, before (2003 to 2012) and after (2013 to 2019) AF support of the CBM projects.



B. Capacity development at CBM and partners

The fight against forest fires in Brazil has been carried out, predominantly, by land fire brigades that move through the forest to the fire site, a journey that can take hours. Due to the long time taken for the brigades to arrive at the scene, the fire spreads easily, which makes it even more difficult to put out. Thus, training local brigades is an excellent strategy so that firefighting actions are faster and more effective.

In addition to firefighting, the local fire brigades also act to prevent fires through local population awareness initiatives on the issue and other measures, such as creating firebreaks and doing maintenance of access trails. The analysed projects promoted extensive training for civilian brigadiers, resulting in a total number of 3.771 trained people (Table 3).

Table 3 - Training Results

Group	Acre	Mato Grosso	Pará	Tocantins	Total
Civilian Firefighters	1.815	330		1.626	**3.771**
Managers	5	45	13		**63**
Civil servants		774		466	**1.240**
Pilots		5			**5**

In addition to civilian brigades, civil servants and managers were also trained. This kind of training, and focus on firefighting initiatives, also vastly improves the planning and coordination of field efforts. In total, 63 managers and 1240 civil servants were trained in the states' CBMs.

Classes dedicated to managers and public servants, in addition to the creation of civilian fire brigades, were complementary and fundamental initiatives that developed skills within the scope of CBMs actions.

Figure 8 - Training carried out in the field.

Despite this, trained managers throughout the projects will be able to better apply the knowledge acquired in future initiatives. In the case of the brigades, it was noted that the activities required prior communication with other state and municipal bodies in order to mobilise rural producers with the effective ways of firefighting, coupled with the importance of fire management for cleaning productive areas. In this way, support for projects laid the foundations for the next CBM initiatives, as well as leading rural producers to make use of correct fire management.

Specifically, in Mato Grosso, postgraduate studies in Environmental Management carried out via a partnership with the state's governing school and aircraft pilot training, boosted management skills and actions in the field. In the case of Pará, 13 managers were trained in postgraduate courses in Environmental Management and Safety, using the acquired knowledge effectively. In Acre, skill development was relevant mainly in the formation of civilian brigades and the dissemination of knowledge regarding the use and prevention of fire in rural production. In Tocantins, workshops were held to train 1,626 civilian brigade members and provide training in preventing and fighting forest fires. For managers, workshops were also held on mapping risk areas, coordinating fire operations and analysing and interpreting images.

C. Operational Capacities and Effectiveness

During the interviews, especially in the contacts made with the CBMs' commands and other officials, people frequently reported that, after the acquisitions and structuring, there was a significant increase in the capacity to take on forest fire occurrences at CBM units. In many units, the increase in operational capacity made it possible to take on suppressed demand.

The information reported by the CBMs (Table 4) in their Monitoring Plans demonstrates that there is a 600% growth trend in verification and 500% in firefighting operations.

Increased operational capacity shows a strong relationship with greater efficiency of field firefighting operations, with this greater efficiency being directly related to the acquisition of equipment and vehicles specific to firefighting forest operations, in some states, such as Tocantins, the project promoted the creation and implementation of new CBM units, which could then expand its operation areas.

Monitoring and controlling fires capacity, in general, have been in constant growth in these institutions. However, it should be noted that this data is directly evaluated by CBMs, based on Inpe's daily reports observation and their ability to physically go to the site to witness the occurrence, which leads to the conclusion that there are limitations to the institution's performance in the field.

The projects were fundamental so that CBM could expand its monitoring capacity, since they all are maintained through resources from the Fundo Especial do Corpo de Bombeiros Militar [Special Fund for Military Fire Brigades for the State of Amazonas] (FUNESBOM) and the Secretarias de Segurança Pública [Public Security Secretaries] of their states, which limits the expansion of investments. Amazon Fund support developed the capacity to raise other funds in addition to those that maintain the CBM structures.

In the case of Acre and Pará, part of the financial resources come from the Union and also from the Empresa Brasileira de Infraestrutura Aeroportuária [Brazilian Airport Infrastructure Company] (Infraero). Recently, Acre received support of R$ 200.000.00 from the World Wide Fund for Nature (WWF) and R$ 1.5 million from KfW under the Sistema de Incentivos a Serviços Ambientais (SISA). Both initiatives are aimed at the acquisition of equipment for firefighting and to carry out missions to train rural producers on the use of fire.

The Mato Grosso CBM should receive approximately R$ 23.8 million[13] to fund operations and purchase equipment in the context of resources from Operation Lava Jato (Operation Car Wash) at Petrobrás, in addition to financial resources from initiatives for Redd Early Movers (REM). The state of Tocantins absorbed the costs of maintaining the acquisitions made during the project, in addition to maintaining its shares through the State Security Fund.

Table 4 - Registered indicators in the monitoring plan of the CBM projects supported by the Amazon Fund

Indicator	UF	baseline	2013	2014	2015	2016	2017	2018	2019	Variation between 2019 to baseline
Number of hotspots verified by CBMs	AC	562	1.152	1.488	2.052	10.844	10.837	2.251	2.070	
	MT	-	-	3.924	3.473	2.892	3.866	2.382	3.739	
	PA	4.105		4.755	8.787	29.724	49.770	22.080	30.165	
	TO		734	861	1.003	-	-	-	-	
TOTAL		**4.667**	**1.886**	**11.028**	**15.315**	**43.460**	**64.473**	**26.713**	**35.974**	**670,82%**

13. Available in: http://www.mt.gov.br/-/12662099-mt-vai-receber-r-23-8-milhoes-para-combater-queimadas-e-desmatamento

Number of forest fires or unauthorised burnings directly fought by CBM	AC	281	576	744	1.026	209**	416**	2.251	2.070	
	MT	-	-	80	320	342	313	414	1.191	
	PA	596	-	1.254	2.835	1.609	2.591	1.852	2.157	
	TO	-	734	861	1.003	-	-	-	-	
TOTAL		**877**	**1.310**	**2.939**	**5.184**	**2.160**	**3.320**	**4.517**	**5.418**	**517,79%**

D. State PPCD

The initiatives developed in CBM projects with the Amazon Fund support act in a complementary manner and contribute directly to various goals and strategies set out in the Prevention and Control of Deforestation Plan of each of the projects' states (Table 5).

In Acre, the main action foreseen by their PPCD that is directly related to the project supported by the AF was structuring IMAC and its partners to act in the control of deforestation and fires. In Mato Grosso it was systemising the identification of hotspots and the quantification of areas affected by fire. In the state of Pará, however, an investment was made in the promotion and implementation of sustainable technologies (rural farming without burning by fire). In Tocantins, the main action was to strengthen and equip the support structure for the Prevention, Control and Combat of forest fires, in addition to strengthening the capacity to prevent, control and fight forest fires.

In summary, it was observed that the four CBM projects showed a strong alignment with the goals and strategies foreseen in the Planos de Prevenção, Controle e Alternativas ao Desmatamento [State's Deforestation Prevention and Control Plan] (PPCD).

Table 5 - Aims and strategies directly related to the prevention and control actions in forest fires in the state PPCD.

UF	Year	Action
AC	2010[14]	Structuring IMAC and its partners to act in deforestation and fire control;
MT	2009[15]	Systemising hotspots identification and quantification of areas affected by fire.
PA	2009[16]	Investing in the promotion and implementation of sustainable technology (rural farming without fire)
TO	2009[17]	Strengthening and structuring the supporting bases to the Prevention, Control and Combat of forest fires*
	2015[18]	Strengthening fire prevention, control and combat capacities.

* Planned Activities

14. Acre (2010). Plano estadual de prevenção e controle do desmatamento do Acre – PPCD/AC / Governo do Estado do Acre. - Rio Branco: SEMA Acre, 2010. 108p. Available at: http://sema.acre.gov.br/wp-content/uploads/sites/20/2020/05/PPCD.pdf.

15. Mato Grosso (2009). Plano de Ação para Prevenção e Controle do Desmatamento e Queimadas do Estado do Mato Grosso PPCDQ/MT. 69p. 2009. Available at: http://www.fundoamazonia.gov.br/export/sites/default/pt/.galleries/documentos/prevencao-e-controle-do-desmatamento/Plano_Estadual_Mato_Grosso.pdf.

16. Pará (2009). Plano de Prevenção, Controle e Alternativas ao Desmatamento do Estado do Pará. 30p. Available at: http://www.amazonfund.gov.br/export/sites/default/pt/.galleries/documentos/prevencao-e-controle-do-desmatamento/Plano_Estadual_Para.pdf.

17. Tocantins (2009). Plano de Ação para Prevenção e Controle do Desmatamento e Queimadas do Estado do Tocantins, 107p. Available at: https://www.mma.gov.br/estruturas/168/_arquivos/plano_estadual_de_preveno_e_controle_do_desmatamento_do_tocantins_168.pdf.

18. Tocantins (2015). Plano de Ação para Prevenção e Controle do Desmatamento e Queimadas do Estado do Tocantins, 89p. Available at: http://www.mma.gov.br/estruturas/168/_arquivos/plano_estadual_de_preveno_e_controle_do_desmatamento_do_tocantins_168.pdf

6. Management and monitoring projects

In this section, it was possible to observe the management and the monitoring of the projects supported so far regarding the structure, the dedicated human resources and the targeted flows of the management teams and the project implementation.

It should be noted that the evaluated CBMs had, prior to the projects, structures guided towards small agreements and initiatives aimed mainly at acting in urban areas.

The projects had military personnel dedicated to management and with pre-existing structures, such as logistical and heritage support directors, responsible for management of tasks and necessary activities. These teams, formed from four to ten military personnel, depending on the evaluated project, dedicated part of their work to the elaboration of terms of reference (ToR), to the dialogue with the bodies responsible for funding in the state and with the technical team of the Amazon Fund to provide accountability.

Such interventions also had direct support from state agencies dedicated to public tenders and procurement, and from public security secretaries, the body closest to CBMs' activities. This monitoring was essential for the ToR and procurement. In the case of CBMMT, the existence of an Diretoria de Administração Institucional [Institutional Administration Board] (DAI) stands out, which facilitated the dialogue with the Secretaria de Estado de Segurança Pública [State Public Security Secretary] (SESP) to carry out the processes.

The lack of experience in forms of accountability and monitoring of the AF forms, in addition to the presentation of counterparts to the donor, generated delays and difficulties, which were overcome through direct dialogue with technicians and project managers in the AF. It is noteworthy that, after AF support, there was continued development within CBM teams, as in the case of CBMAC, which has a planning board with eight dedicated military personnel focused on preventive efforts.

Regarding the planning schedule and the execution and completion time of the project's partnership with BNDES, the average predicted schedule was 42 months (3.6 years). However, in the end, it took 69 months (5.8 years). Payments occurred, in general, in three installments, meaning that the AF made the total agreed payment after three performance reports (RED) and proper accountability. The CBM of 4 states showed the ability to develop the planned activities and provide accountability for the resources; however, there are still difficulties in monitoring achievements and communicating them to society, noting the key role of these agents in preventive efforts and firefighting.

Below are the results presented from this management and the monitoring evaluation. It primarily sought to comprise a qualitative interpretation of CBM capacity as a defined range.

Strengths

The four projects evaluated had significant amounts of financial resources, which made CBMs motivated to successfully implement and use these resources. The ready availability of partially AF financed resources to supported projects facilitated the procedures for public bids. It is also worth noting that the CBMPA has its own bidding structures, which optimized the project's acquisition project.

The bids have also been made easier due to the purchased items being common in everyday CBM activities. Some of them are below the budgeted value, providing the possibility of resources reallocation and income for priority CBM activities.

The general commanders of the evaluated CBM were in charge of management and dialogue with state partners and were dedicated to facilitate internal and operational processes, and create plans with the AF as a guide for their actions.

The project management teams had defined responsibilities for accountability, acquisitions and the preparation of ToR, sometimes with legal support within each CBM. In some of the CBMs, there is a defined flowchart on process execution, making the understanding of how activities in the internal directories are carried out, which facilitates the understanding of the performed processes. This allowed for the better organization in the processes referring to the project.

The CBMs matured with AF support with regards to management and development capacities, and it is believed that the knowledge acquired can facilitate new initiatives to prevent and fight fires. In the case of Mato Grosso, it is emphasized that, since 2014, the Diretoria de Gestão Estratégica [Strategic Management Board] (DGE) is dedicated to agreements on state and, in the emergency context caused by the fires in the second half of 2020, about R$ 10.6 million was raised for activities and equipment purchases, which were promptly put into action.

Monitoring results have also been optimized with the proposal and adoption of indicators aggregated by SMART (Specific, Measurable, Attainable, Relevant and Time Bound[19]) defined by the crew and FA by acting agencies[20]. In 2016, even once projects started, it was possible to define aggregate indicators that demonstrate the extent of the expansion of CBM monitoring and combat capacity (Table 4).

Challenges

In project management, among its activities and resources, whether financial or human, it can be highlighted that, in a management dedicated to results, monitoring and scheduling are key items for good practices in the execution of an intervention.

The CBM capacity for management also goes through challenges in the adoption of best practices for project implementation, which means there is a need to optimize observation capacity and readjust schedules, the use of financial and human resources and to mitigate risks.

19. In Portuguese: Específico, mensurável, atingível, relevante e temporal.

20. Combate e prevenção ao fogo. Guia para monitoramento de impactos de projetos dos corpos de bombeiros militares. Available at: www.fundoamazonia.gov.br/export/sites/default/pt/.galleries/documentos/monitoramento-avaliacao/modelos-guias/Guia_Monitoramento_Impactos_Projetos_Bombeiros.pdf.

For most projects, it is still a challenge to develop the CBM capacities as project managers, directing them to raising resources, partnerships and expanding assets dedicated to management as well as the CBMs reach in states' more isolated areas.

Among the challenges, changes in the CBMs general command influenced the speed in which the projects were put to practice. These changes contributed to delays in schedules and to the need for updates on deliveries with the technical team of the AF.

Another challenge is related to process management. The quality of some ToRs led to constant improvements, which, inevitably, caused delays in the planned acquisitions and accountability. In the case of Mato Grosso, there was the first public bidding for equipment without national models, in the case of the purchase of air tractor aircrafts, which led to the need for better studies with SESP in order to carry out the acquisition. In addition to that, building the hangar intended for the aircraft also delayed the planned deliveries in state.

Although they have work plans for guidance, the key managers - general commanders - have yet much to do to strengthen accountability to like minded partners and civil society to demonstrate the advances in fighting forest fires and in carrying out actions aimed at fire prevention in many communities.

Despite the organization of the CBM boards, the leading analogical form of monitoring project results plus the technological limitations for accountability demonstrate the need for technological improvement and as well as better capacity for delivering concrete results that can strengthen new forms to raise resources and put them to action.

Even though the monitoring of project results has been optimized, this resulted from an intervention by the FA technical team during the project's implementation. Thus, there was a need for these agents to dedicate themselves to best define indicators, in ways that are measurable and relevant, to demonstrate their capacity for preventing and fighting forest fires. Thus, CBMs will make their collaboration with state and federal agencies in the fight against deforestation easier to understand.

7. Counterfactual analysis: CBM performance advances in the municipalities of Sorriso (MT) and Humaitá (AM)

In addition to the results of this evaluation, a counterfactual analysis was conducted in which it would be possible to observe the impact of the support of the Amazon Fund compared to somewhere without financial support through an AF project. For this, we selected the 10ª Companhia Independente Bombeiro Militar [10th Independent Fire Brigade] do CBMMT, located in Sorriso (MT), supported by the project in Mato Grosso and the 1º Pelotão Destacado de Incêndio Florestal e Meio Ambiente do CBMAM, in the town of Humaitá (AM).

The municipality of Sorriso is located in the North of the state of Mato Grosso, with a land area of 9300 square kilometres. Its registered population in the last census of the IBGE (2010) was of 66,251 inhabitants and the estimated current population (2020) is 92,769. The population growth from Sorriso was 40% in the last 10 years, much higher than the Brazilian average, which was approximately 11%. Based on the biome map of Brazil by IBGE[21], Sorriso has 67% of the territory in the Cerrado biome and 33% in the Amazon biome. Currently, less than 30% of its area is covered by forests.

One of the contributions within the scope of the project was support for the structuring of the operations base for the 10ª Companhia Independente Bombeiro Militar do CBMMT, in Sorriso (MT). The implementation of the project enabled the acquisition of vehicles, equipment and specific tools for forest fire operations. Two aircrafts were acquired, making it possible to carry out aerial operations, also making this the first air base to fight forest fires in the Amazon. Training operations for pilots and CBMMT managers were also carried out.

The CBMMT project stimulated investments from other institutions. The entire physical structure, infrastructure and furniture of Sorriso's base was financed as an investment by the state, the city hall and local businessmen. The project implementation fostered interinstitutional links for the development of prevention, combat and training efforts.

Humaitá, in the other hand, is located in the south of Amazonas, and fully covered by the Amazon biome, with 92% forest area, although in some areas of Humaita, Labrea and Manipur, there are Amazonian savannas, which are very similar environments to the cerrado, where spontaneous fires also take place. Its area is of 33.1 thousand km², the population in the last IBGE census (2010) was of 44,227 inhabitants and the current population estimate (2020) is 53,144 inhabitants. In the last decade, the population growth in Humaitá was 20% and it presented 3,790 hotspots, which is equivalent to 3.7% of the state outbreaks.

21. Biomas e Sistema Costeiro-Marinho do Brasil (2019) Available at: https://biblioteca.ibge.gov.br/visualizacao/livros/liv101676.pdf

The CBMAM reports directly to the Secretaria de Segurança Pública [Public Security Secretary] and is currently present in ten of the sixty-two municipalities in the state. Operationally, the management is divided between two commands, as follows: Comando de Bombeiros da Capital [Capital Fire Headquarters] (CBC) and Comando de Bombeiros do Interior [Rural Fire Headquarters] (CBI). CBI is responsible for commanding and managing the activities of corporations within the state. In total there are 9 units in the state's hinterland, distributed in the municipalities of Itacoatiara, Rio Preto da Eva, Humaitá, Presidente Figueiredo, Manacapuru, Iranduba, Novo Airão, Parintins, Tefé and Tabatinga.

In 2017 the 1º Pelotão Destacado de Incêndio Florestal e Meio Ambiente [First Forest Fire and Environmental Battalion Detachment] was created in the town of Humaita. The unit's creation was motivated, mainly, to meet the demands related to forest fires and was part of the CBMAM's interior structuring plan.

In recent years, the municipalities of Lábrea, Manicoré, Apuí and Boca do Acre concentrate the largest extent of deforestation in the state of Amazonas. In 2019 they represented 61% of the state's deforestation. Humaitá is in the same region, and it has been the subject of forest fires and burning and use of fire in the expansion of areas for livestock .

The battalion works in cooperation with the Army in preventive actions. This work takes place in context of the forest brigades training in the last three years.

The Humaitá Battalion was created in the context of the Batalhão de Incêndio Florestal e Meio Ambiente [Forest Fires and Environment Battalion] (BIFMA), located in Manaus, which integrates the structure of the state of Amazonas to combat fires, forest fires and rescues. It is observed that the creation of this unit took place with the support of the Projeto de Prevenção e Combate ao Desmatamento e Conservação da Floresta Tropical do Estado do Amazonas [Deforestation Prevention and Combat and Tropical Forest Conservation in the State of Amazonas] (PROFLORAM) with support from the German government, through the Financial Cooperation Germany / Brazil.

The use of monitoring information generated by CENSIPAM and the INPE hotspots is not common within BIFMA and in the Humaitá battalion. The procedures for verification or validation of fires and burnings are extremely reduced. More recently, BIFMA acquired a drone, which has been used for locating burning or burnt areas, but its performance is limited due to its reduced personnel and the difficulties in reaching the affected locations.

In 2013, the law for the creation of the Fundo Especial do Corpo de Bombeiros Militar do Estado Amazonas [Special Fund for Military Fire Brigades for the State of Amazonas] (FUNESBOM) was approved under the Secretaria de Segurança Pública [Public Security Secretary] (SSP); however, it was only in December 2015 that the fund was effectively created and operationalized, with the aim to raise funds to buy the battalion equipment. In this context, noting the demand and acquisition flux, it was possible to verify that it was not always that fundraising took place in time for the battalion to be ready for action.

In addition to these issues, in its administrative structure, CBMAM does not have a specific directorship or department for the development of managerial and administrative project activities, which makes it difficult to raise funds to meet the battalion's demands in the south of the state.

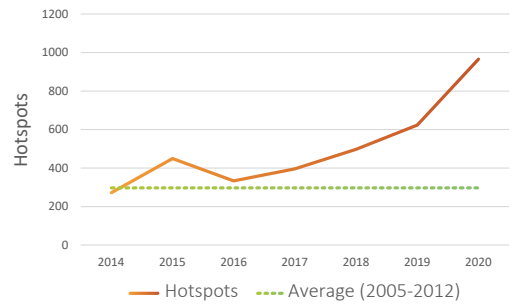
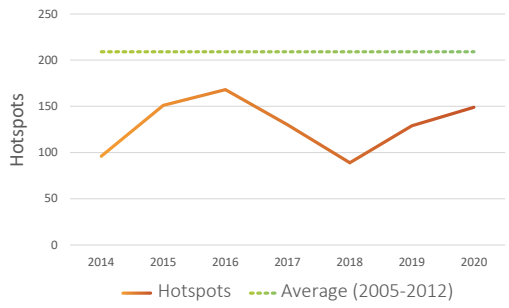
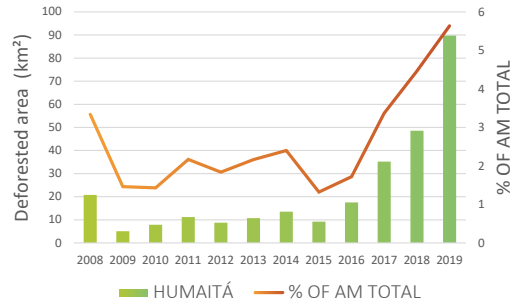
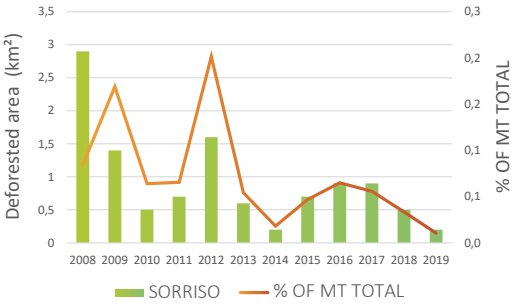
Unlike in Mato Grosso, where CBMMT has administrative autonomy in action, CBMAM does not have this feature, which falls to the Instituto de Proteção Ambiental do Amazonas [Environmental Protection in Amazonas Institute] (IPAAM), linked to the State Secretary of Environment, which develops environmental control activities in the state of Amazonas.

Since 2017 there has been, annually, the implementation of Operation Céu Limpo [Clear Skies] for preventing and fighting fires. The formation of rural fire brigades is also developed in this context. The training process takes place through a partnership between CBMAM and municipal governments. In 2020, 853 brigadiers were trained in 15 municipalities. For next year training for these brigades is expected to be moved earlier in March, because of the fires advances in 2020.

Observing the records of hotspots, considering the periods from 2005 to 2012 and 2013 to 2020[22], respectively, periods prior to the project (baseline) and periods during and after project implementation in Mato Grosso, it is possible to verify that Humaitá (AM) shows a significant growth in the period from 2013 to 2020, from 186 to 966 hotspots.

Another important aspect is that the hotspots of the last five years have remained above the average of the period from 2005 to 2012, for Humaitá, but in the same period in Sorriso (MT), hotspots have been stable and well below average.

Board 1 - History of hotspots and deforestation in the municipalities of Humaitá (AM) and Sorriso (MT).

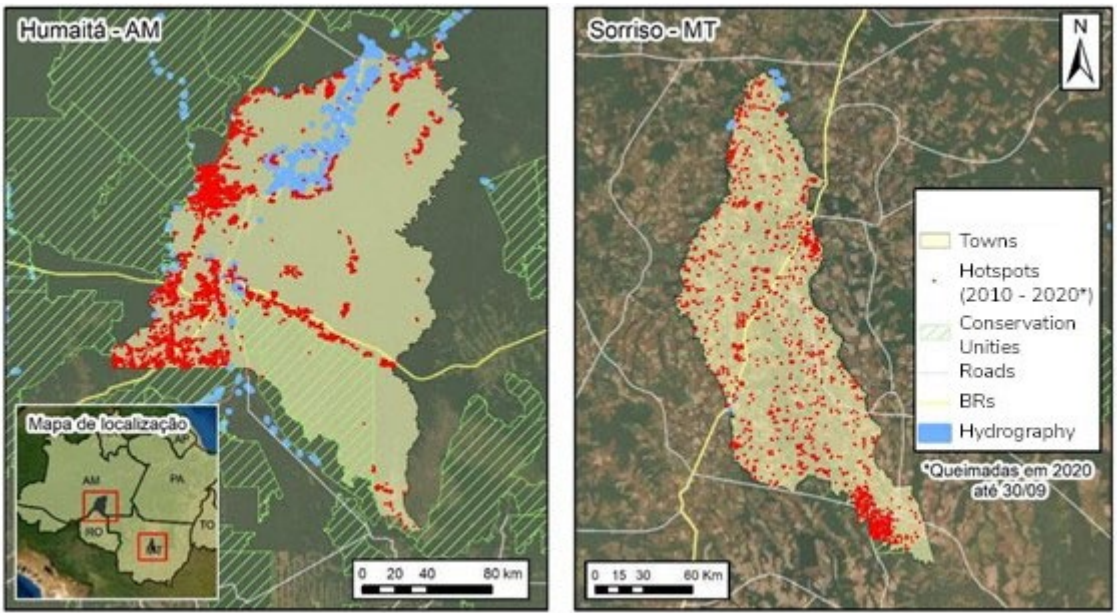
Factor	Humaitá (AM)	Sorriso (MT)
hotspots		
Deforestation		

Source: adapted from INPE (hot spot data from 2020 is partial, referring to 01/01 to 03/11/2020)

22. The data from 2020 is partial and includes the period from January 1st to November 3rd, 2020.

With regard to deforestation, Humaitá has recorded constant growth since 2016, corresponding to almost 6% of the total deforestation in the state. Meanwhile, in Sorriso, there has been a downward trend since 2012, considering that only 30% of the municipalities's forests are under preservation.

Figure 9 - Record of hotspots in Humaitá (AM) and Sorriso (MT) between 2010 and 2020.



Source: BDQueimadas - National Institute for Space Research (INPE) and Brazilian Institute of Geography and Statistics (IBGE). Self made.

There are challenges to improve the efficiency of CBMAM in Humaitá in forest fire operations, among which we can highlight investments in infrastructure, vehicles, equipment, tools, training and hiring of personnel. The difficulty with the reduced number of military personnel is mitigated with the creation of local brigades. In addition to it, there are also difficulties in carrying out preventive actions. Such initiatives strengthen education and, as they do not act in a punitive manner (inspection initiatives), they deepen ties with communities and rural producers.

In view of the scenario of growing hotspots and possible forest fires in the state, such as it happened in 2020, the battalions' performance is at risk due to the various existing limitations.

The implementation of projects could stimulate the local, state and municipal public authorities, in expanding effective personnel or even committing to temporary hires in the activities to prevent and fight forest fires.

Next, the details of the counterfactual evaluation are presented, where the analysis was segmented into CBM developed initiatives. For the analysis, a scale for evaluating the attendance of the actions was used, being: i) no: when the actions were not developed or the results obtained are reduced; ii) Partial: displaying limited growth and iii) effective: when significant changes are presented.

Board 2 - Counterfactual analysis of the actions supported by CBMMT in comparison with the actions of CBMAM in Humaitá.

Actions	CBM Sorriso (MT)			CBM Humaitá (AM)			Situation analysis for Humaita
	No	Partial	Effective	No	Partial	Effective	
Links with local partners or regional ones to monitor and fight local fire.			✔		✔		As a matter of priority, connections are defined by the Comando de Bombeiro de Interior [Rural Militar Fire Brigade] (CBI) and are related to forest fire fighting operations, in partnership with the army. Local links with other monitoring partners are non-existent.
Conducting actions to monitor hotspots / illegal burnings / forest fires			✔	✔			The unit CBMAM Humaita doesn't possess regular data monitoring. Occasionally, monitoring information is used in inspection operations carried out by CENSIPAM, responsible for statewide monitoring.
Periodic productivity and efficiency evaluation of the developed operations		✔		✔			General annual evaluations of the actions are empirically developed; based on these informations and perceptions, future actions are defined and planned.
Fire-fighting actions (forest fires)			✔		✔		There are limitations on the availability of specialized equipment for forest fire operations and human resources are insufficient for existing demand.
Increase in meeting repressed demands			✔		✔		There was an increase in actions with the Battalion's creation in Humaitá, however , the growth was less than the demand and the recorded forest fires.
Internalization of CBM's forest fire fighting and prevention activities			✔		✔		The internalization of firefighting actions is punctual and usually developed in partnership with other institutions, especially the army. Prevention activities are reduced and often lacking, mainly due to the prioritization of firefighting actions.
Improvement in the efficiency of forest fire fighting operations		✔		✔			There is an improvement in operations efficiency due to the developed training and practical experiences. In order for efficiency levels to be higher, it is necessary to purchase specific equipment and expand the staff or hire personnel.
Reduction of travel time when handling forest fires		✔			✔		The creation of the Humaitá unit facilitated the CBM's activities in the city and surrounding municipalities. Locally, after its creation, investments were not expanded, which, at the same time, did not result in a reduction in travel time when dealing with incidents.
Strengthening of local infrastructure/ CBM's activities base			✔		✔		The infrastructure was established in 2017, however there is a need to expand and purchase equipment and tools.
Acquisition of equipment aimed at fighting forest fires			✔	✔			Procurement of vehicles and equipment are carried out by the Secretaria de Segurança Pública [Public Security Secretary] based on the demands forwarded by the CBMAM Comando Geral [General Command]. Due to the high cost of firefighting equipment, many of these equipments do not cover the necessary specificities and quantity needed

Acquisition of tools for actions to combat forest fires			✔	✔			The tools for fighting forest fires are quite specific and have a reduced useful life. The Humaitá unit has a low quantity for operations. There is no possibility to grant or lend tools for the formation of municipal brigades.
Training and integration of civilian brigades in operations and fighting forest fires			✔		✔		Municipal brigades have been training for 3 years. The initiative has been expanded and improved upon over the years. However, there is a need for an expanding training and greater integration of the brigades trained in CBM operations.
Training of CBM's technical staff on issues related to environmental management			✔	✔			There is no training directly linked to environmental management issues. Training developed is mainly related to command and control actions.
Outreach with producers about controlled use or fire-fighting.			✔	✔			Activities in the controlled use of fire are not yet implemented in Humaitá; dedicated only to fighting fire
Inspection / Verification / Rounds / Fines			✔	✔			Inspection activities are not carried out, occasionally the Humaitá unit provides support to SEMA inspection teams. Preventive visits and rounds are very low.

8. Conclusions

The report noted that all projects had as an aim to support monitoring, prevention and fight deforestation due to forest fires and fires in unauthorised burnings in the states. These projects have three structural axes: capacity, equipment purchase and improvement of physical structures. Next, the conclusions based on these structuring axes will be highlighted.

The equipment acquired, which are specific to the fight against forest fires were central to the project, as they allowed for field initiatives, improving skills, training and firefighting efforts. In the interviews carried out, it became clear that the acquired equipment was the key success factor for all projects. Despite the acquisition effort, the equipment is meant for direct use, needs constant maintenance and is necessary to monitor possible damage over time. Some are for individual use and need constant replacement.

One important point for this evaluation is that, during the visits of local experts only part of the CBM acquisitions were actually observed. In the case of CBMMT, part of the equipment was being used for fire-fighting missions in the Amazon and the Pantanal, that is, they were distributed in different units.

The physical structures improvements have allowed for the creation of the advanced CBM posts and monitoring rooms that facilitated the completion of military and civilian brigades training. They also allowed the conditions necessary for action planning and to improve logistics, enabling greater efficiency of actions.

It is noteworthy that training taking place had as a focus the use and management of fire, providing a paradigm shift in the institutions. Some respondents were adamant that before the project, to firefighters, fire was to be only fought and not managed. In addition to the concept of fire management, training contributed to the improvement of environmental monitoring.

It is also relevant that the creation and training of volunteer brigades in rural areas to prevent and combat forest fires contributed to understanding better options at the expense of slash and burn techniques. In addition to that, learning about the bad consequences of the indiscriminate use of fire for burnings helped environmental awareness. These are complementary actions that were and are fundamental to the prevention of forest fires, requiring coordination with the Secretaries of each city hall to put outreach and involvement of local people in motion.

An important point in the project was the institutional links accomplished through the action of integrated public agencies in various levels of government, with the necessary mobilization of civil society, aimed at the prevention and control of forest fires. For the full project implementation links and partnership with several key players were necessary, Sistema Nacional de Prevenção e Combate aos Incêndios Florestais [National System of Prevention and Control of Forest Fires] (Prevfogo), the Instituto Brasileiro do Meio Ambiente e dos Recursos Naturais Renováveis [Brazilian Institute of Environment and Renewable Natural Resources] (Ibama), municipal and state agencies dedicated to environment matters and other institutions interested in the theme.

There were also improvements in the internal processes of battalions that provide better effectiveness in fighting forest fires. There should be noted that, before the projects, there was no data on hotspots or fires put out in some states, which indicates that the adoption of effective monitoring and evaluation techniques is one of the favourable aspects that are being incorporated by military corporations in the Amazon from their experience of Amazon Fund support.

Some difficulties and limitations were also observed in the management of the evaluated projects. According to the interviewees, the absence of a dedicated structure focused on the expected results made it difficult for the activities to be carried out. For example, difficulties were encountered in carrying out the bidding procedures and accessing funds from the state government.

Regarding the monitoring of the project effects, it was identified that there are variables that can distort the measurement of the achieved results, such as the dry periods, which vary cyclically and are out of control of public officials responsible for fighting fire. This characteristic impacts the dynamics of some indicators, which should not be analysed in isolation.

It was possible to detect a flaw in the project data and information management. This point is not an exclusive feature of these initiatives, but an aspect intrinsic to many government agencies, although there are several digitizing and systematization initiatives in progress. There is a gap in the systematization of data and metadata on the fight against forest fires as a whole in Brazil .

Measuring the causal effect between deforestation and forest fires is not trivial and is often impossible with historical data. For the 4 analysed projects, conducting an objective analysis with concrete data on the projects' contribution to reducing deforestation in the Amazon is a challenge. The data from the historical series of deforestation and hotspots do not allow an adequate correlation and can generate very subjective results. There are countless other variables that contribute to the increase or decrease in numbers, making it practically impossible to isolate the direct effect of the relationship between hotspots and deforestation.

However, this does not mean that the projects were not relevant and that they did not contribute to the reducing deforestation in the Amazon. Quite the contrary, actions to combat forest fires are fundamental activities in the fight against deforestation and enable an enormous reduction of the damages caused to the environment, the economy, health and several other areas. This increases the need to recommend the adoption of new technologies to improve the planning of field actions and that they are closely associated with the activities of deforestation monitoring, prevention and firefight itself.

In terms of public policy, it was found that the initiatives developed by the CBM projects, supported by the Amazon Fund, not only act in a complementary manner with other state agencies that operate in firefighting, contributing directly to several of the aims and planned strategies in the Planos de Prevenção e Controle do Desmatamento of each of the projects' states. This is yet another factor that adds relevance to the supported projects, contributes in a positive manner to other important initiatives and opens up the possibility of an integrated action between CBMs in the areas where fires occur the most.

9. Recommendations and Lessons Learned

In regards to recommendations, we opted for the development of a framework to make proposal and stakeholder relationship easier to evaluate.

Board 3 - Recommendations and Lessons Learned.

	Recommendation	Actors	States	Amazon Fund	MMA	Donors
Indirect effects	Develop a spatial strategy to identify "priority areas" for the creation of new outposts to fight forest fires in the Legal Amazon, increasing territorial coverage and decreasing the response time of field firefighting.	✔	✔		✔	
	Ensuring project proposals are linked to specific resources and mechanisms to promote institutional coordination.			✔		✔
	Support the development of a data system that integrates state and federal forest firefighting in the Legal Amazon data.		✔	✔	✔	✔
	Assess the legal possibility of creating paid local brigades to assist in preventing and fighting forest fires.		✔		✔	
	Discuss the possibility of diversifying support and increasing contributions for actions to prevent deforestation and forest fires.			✔	✔	✔
	Consider protected areas that are at risk of advancing fires, to prioritize initiatives to support deforestation and fire control bodies at the federal and state levels, as well as to strengthen traditional peoples and communities to consolidate their ownership to land.			✔	✔	
	Strengthen law bills or proposals that aim to punish illegal deforestation, by preventing access to rural credit, and the possibility of blocking economic exploitation of illegally deforested and cleared areas.		✔		✔	✔
	Observe and consider, adding the aims of the National Policy for Integrated Fire Management (MIF) proposal, as well as its governance structure within the scope of the "Guidelines for the support of the Amazon Fund to the Military Fire Brigades of the states of the Legal Amazon for the prevention and combat of forest fires and unauthorised burnings" to facilitate dialogue with federal agencies.	✔	✔		✔	
Direct Effect	Implement a continuous training cycle for public servants on monitoring, preventing and fighting forest fires.	✔	✔		✔	
	Carry out an extensive publicity campaign on the consequences of forest fires for the population, focusing on environmental, economic and health aspects.	✔	✔	✔	✔	✔
	Encourage exchange between federal, state and municipal spheres, sharing monitoring and combat equipment and infrastructure.		✔		✔	
	Improve the monitoring of appropriate indicators of firefighting actions.	✔				

Monitoring and Management	Create working groups specialized in project management in the institutions.	✔				
	Develop, implement and use a data system that facilitates project data management, taking into account the documentation required by the AF.			✔	✔	
	Promote project engaged agents, for aim observation, as well as for activity participation and in the dissemination of results aimed at civil society.	✔				
General	Get greater universities and research institutions involvement in the projects, collaborating with fire brigades to develop new methodologies.	✔		✔		
	Seek non-reimbursable external resources, such as those provided by the Amazon Fund.	✔				
	Assess the possibility of having a small external scientific technical committee to assist the management of the project as well as the monitoring of technical activities.			✔	✔	

About the lessons learned, we can mention:

- The maintenance of automobiles, motorcycles and aircraft acquired through projects raises CBM's operating costs. Federal agencies operate under lease agreements, which could be alternatives to CBM's operations.
- The increased reach of CBM's activities in the states has considerable costs for maintaining human resources and equipping local bases. It is necessary to observe the possibility of forming local brigades as an alternative to new installations.
- The low connections with municipal governments has compromised part of the brigade creation in scope of the projects. Better coordination with state agencies and municipal governments is needed to facilitate the introduction and understanding of the work by managers and rural producers.
- CBMs had low project management and monitoring capacity. The experience with the Amazon Fund, with the need to report progress, perform periodic accounts and learn from impacts monitoring, opened the possibility of raising funds for initiatives complementing its fire fighting and preventive actions.
- An important lesson is that when projects with public sector entities are analysed, it must be taken into account that their teams are not necessarily trained to manage operations of this nature. That is why it is vital that the most important partners are already duly attached to the project and committed to their obligations.
- It was learned that forecasting in a project that includes institutional networks and interventions to prevent forest fires and unauthorised burnings is not enough. It is necessary to ensure the allocation of specific resources for these activities and the adoption of mechanisms that guarantee their implementation.

Annex 1 -REDD Questionnaire

For the evaluation of individual projects carried out under the Amazon Fund, the Cancun safeguards are considered a specific criteria defined by the UNFCCC for REDD + actions. These Safeguards were agreed in 2010 during COP16 in Cancun, Mexico, and in 2016 they were included in the Conceptual Framework for Evaluation of finished Fund projects

Thus, it is necessary to take into account that, between 2010 and 2016, the projects were already being implemented or in the hiring phase, so not all of them fully comply with the safeguards. In the thematic evaluation, a matrix (Board 4) was developed to evaluate whether the safeguards apply fully, partially or not at all to projects. Following the general analysis, there is a detailed version for each project.

When analyzing the scope of safeguards, it is important to highlight the contribution to Safeguard 1. Complementary actions or actions consistent with the objectives of national forest programs and other relevant international conventions and agreements". All projects were in line with the Plano de Proteção e Combate ao Desmatamento Ilegal na Amazônia [Action Plan for Prevention and Control of Deforestation in the Legal Amazon] (PPCDAm), in addition to other state policies to combat fires and illegal deforestation.

Board 4 - Cancun Safeguards (REDD +) applied to projects

Safeguard / issue	*Acre: Zero Forest Fires*	*Mato Grosso Forest Firemen*	*Pará Fighting Forest Fires and unauthorised burnings*	*Tocantins Forest Protection*
1. Actions complementary or consistent with the aims of national forest programs and other relevant international conventions and agreements	yes	yes	yes	yes
2. Transparent and effective national forest governance structures, aimed at national sovereignty and national legislation	yes	yes	yes	yes
3. Respect for the knowledge and rights of indigenous peoples and members of local communities, taking into account relevant international obligations, circumstances and national laws and noting that the UN General Assembly adopted the United Nations Declaration on the Rights of Indigenous Peoples.	Not applicable	Not applicable	Not applicable	Not applicable
4. Full and effective participation of stakeholders, in particular indigenous peoples and local communities, in the actions referred to in paragraphs 70 and 72 of Decision 1 / CP 16	Not applicable	Not applicable	Not applicable	Not applicable

5. Actions consistent with the conservation of natural forests and biological diversity, ensuring that the actions referred to in paragraph 70 Decision 1 / CP 1611 are not used for the conversion of natural forests, but rather to encourage the protection and conservation of natural forests and their ecosystem and to improve other social and environmental benefits	Not applicable	Not applicable	Not applicable	Not applicable
6. Actions to address the risks of reversals in REDD + results	Partially	Partially	Partially	Partially
7. Actions to reduce the displacement of carbon emissions to other areas	Partially	Partially	Partially	Partially

Cross-cutting criteria

Poverty reduction

The analysis and contribution to the poverty reduction criteria in the scope of the projects is limited due to its nature. As these are projects with the aim of structuring and equipping Fire Brigades, there were no activities with economic purposes.

However, when analysing the indirect effect that the projects have in their operating region, it can be inferred that the projects' actions contribute to reducing poverty in the region, since the reduction in the number of fires is advantageous for local producers, who suffer less economic losses on their plantations. Hiring of local brigades is also another factor that positively influences the economy of these places, since most of the people hired are from the region. In Board 5, we can see a systematized matrix form of each project's contribution.

Board 5 - Contribution to poverty reduction

Cross-cutting criteria / question	*Acre: Zero Forest Fires*	*Mato Grosso Forest Firemen*	*Pará Fighting Forest Fires and unauthorised burnings*	*Tocantins Forest Protection*
1. Contributes to poverty reduction	Partially	Partially	Partially	Partially
2. Empowers the poorest	Not applicable	Not applicable	Not applicable	Not applicable

Gender Equality

The projects in their conception and implementation did not have strategies or activities focused on gender equality. If the institutions are analysed, it can be said that they have strategies that strive for gender equality, but this type of action depends on state and institutional policies. The activities within the corporations are institutional and state policies, which often do not depend exclusively on the actions of external sources.

On Board 6 the contribution of the projects to gender equality was systematized.

Board 6 - Contribution to gender equality

Criteria	*Acre: Zero Forest Fires*	*Mato Grosso Forest Firemen*	*Pará Fighting Forest Fires and unauthorised burnings*	*Tocantins Forest Protection*
Gender Equality	Partially	Partially	Partially	Partially
1. Has a gender strategy	no	no	no	no
2. Empowers women	no	no	no	no

Annex 2 – Individual project evaluation

Acre: Zero forest fires

Project title:	Acre: Zero Forest Fires
Responsible body:	State of Acre - Military Fire Brigade of the State of Acre (CBMAC)
Project length	2012-2016
Territorial scope (municipalities)	Cruzeiro do Sul, Tarauacá, Manoel Urbano, Rio Branco, Brasiléia
Beneficiaries:	State of Acre population
Aims:	Support actions to monitor, prevent and combat deforestation resulting from forest fires and unauthorised burnings in the state of Acre, through training and acquisition of vehicles and support equipment for the Education, Protection and Firefighting Forest Battalion of the Military Fire Brigade of the State of Acre.
Total Project worth:	R$ 13.337.700,00
Amazon Fund support	R$ 13.280.709,56

Source: Amazon Fund/BNDES.

1. Project Summary

The state of Acre occupies an area of 164 thousand km², which represents 1.9% of the Brazilian territory, and borders the states of Amazonas and Rondônia and the countries of Peru and Bolivia. The state has 22 municipalities and its three main urban centres are: Rio Branco, Cruzeiro do Sul and Sena Madureira. The IBGE population census estimates[23] that, in 2020, its population will be approximately 894,500 inhabitants, which represents a population density of 5.44 inhabitants/ km².

The "Acre: Incêndios Florestais Zero - Acre: Zero Forest Fires" project aimed to support actions to monitor, prevent and combat deforestation resulting from forest fires. With the project's implementation, it was possible to structure the battalions of the Corpo de Bombeiros Militar do Estado do Acre [Military Fire Brigade of the State of Acre] (CBMAC), through the acquisition of special vehicles, tank towing trucks, forest fire fighting kits and other equipment.

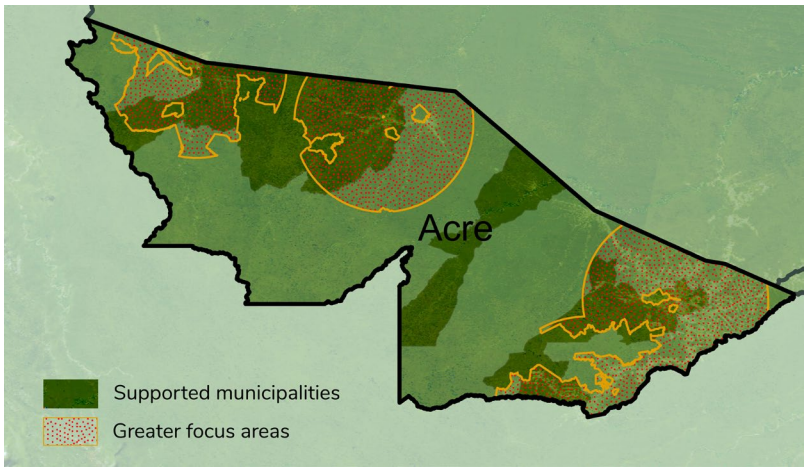
The main acquisitions were: 11 heavy forestry trucks for transporting water and fighters; 20 pickup trucks; 20 motorcycles; 21 tank-trailers, with a capacity of 1,200 litres of water; and 7 towing trucks for transporting material. 21 fire fighting mobile kits with the capacity for up to 600 litres of water, 500 individual and collective kits and 500 personal protective equipment kits, as well as a special bus to transport the troops were also purchased.

In addition to these acquisitions, training was also provided to civilian brigadiers on techniques for preventing and combating forest fires and illegal burnings. The state government, in turn, provided post graduation courses in environmental expertise, audit and management for CBMAC officials.

23. Disponível em: https://www.ibge.gov.br/cidades-e-estados/ac.html.

CBMAC also developed actions to engage and train rural producers in fire prevention and fire fighting techniques to form civilian brigades. Equipment was also delivered to the brigadiers (hoes, rakes, dampers and coastal pumps) to use in the first contact intervention against possible forest fires.

Figure 1 - Location of supported municipalities and most active areas of the Acre project.

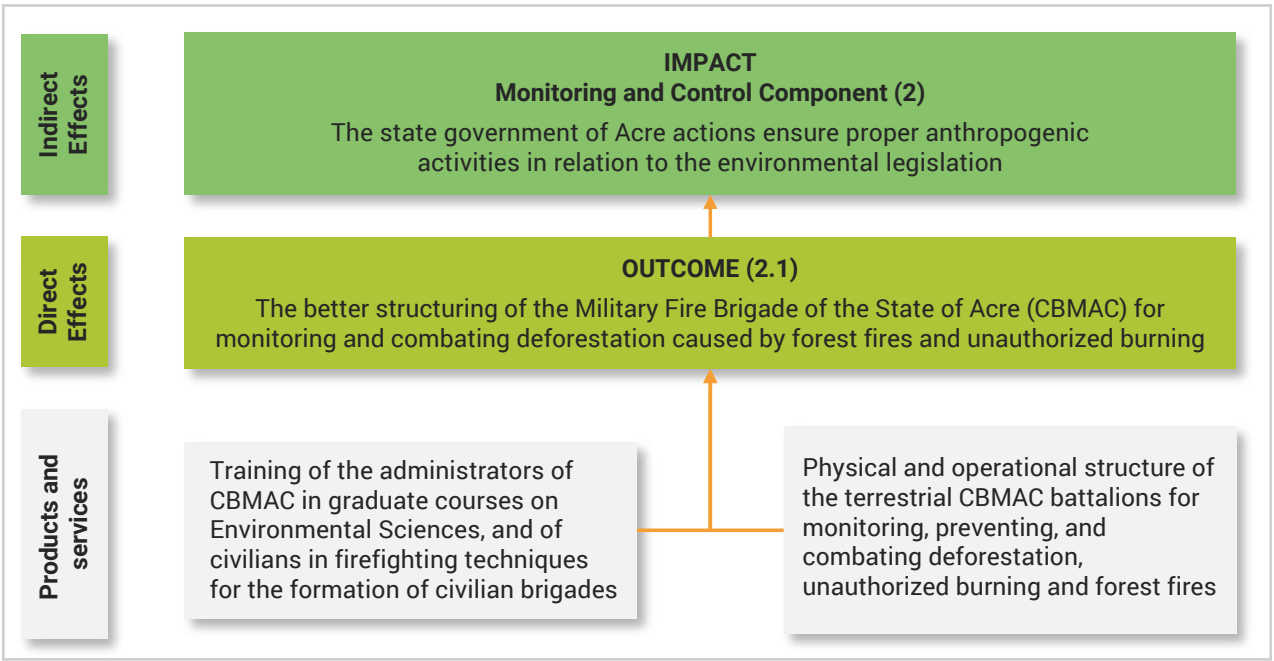


Source: Brazilian Institute of Geography and Statistics (IBGE). Self made.

2. Intervention Logic

Within the logical framework of the Amazon Fund (AF), the "Acre: Incêndios Florestais Zero" project is included in Component 2 : "Monitoring and Control" , with the specific objective of: "Better structuring for the Corpo de Bombeiros Militar do Acre (CBMAC) as to improve the monitoring and control of deforestation caused by forest fires and unauthorised burnings" (Figure 2).

Figure 2 - Objectives Trees of the Logical Framework of the Acre project.



Source: Amazon Fund/BNDES. Self made.

3. Specific Methodology

The criteria and methodologies used to evaluate the effectiveness of the CBMAC project followed the procedures presented in the main part of the evaluation.

In the development phase, data collection was carried out mainly through videoconferences. Initial contacts were made primarily with the current CBMAC commands. Afterwards, we sought to contact the Commanders and other officers involved in the creation and implementation of the projects. Contacts were also made with other institutions and actors related directly or indirectly to forest fires, as well as a field mission to collect data with the CBMAC.

For the evaluation of the data logging and hotspots (satellite reference) different levels of observation were adopted, as follows:

a. area of the entire state;
b. area of supported municipalities and;
c. most active areas for state CBM;.

For the definition of the most active CBM areas, this report uses as a criteria the area within a radius of up to 100km of the Military Fire Brigade or battalion, within the municipalities included in the proposals. The 100km distance was defined based on the information reported at the time of the interviews and an understanding of the logistical capacity for the displacement of military personnel and equipment. Areas under federal protection and indigenous lands were not counted, due to the existence of other institutions that operate directly in these locations.

4. Results Evaluation

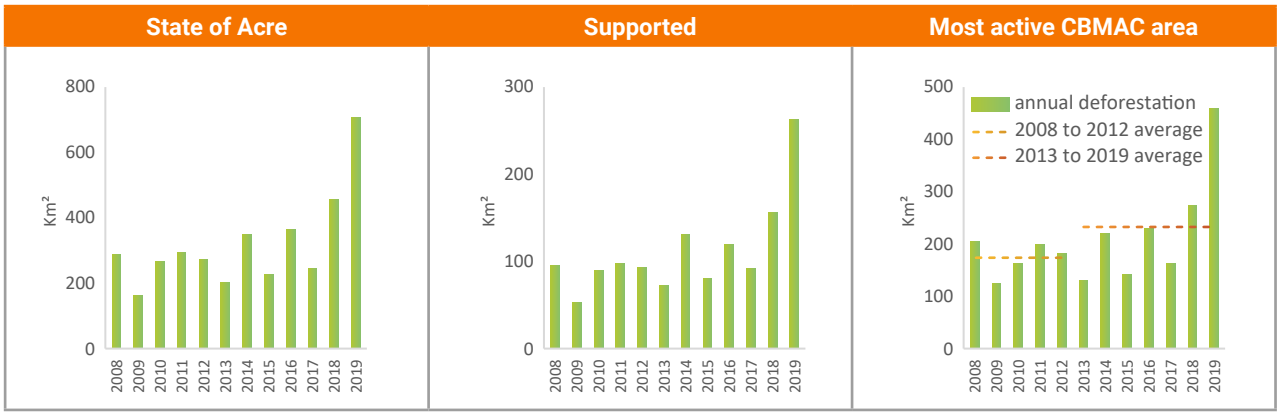
Indirect effects

In order to evaluate government actions that ensure the adequacy of human activities to environmental legislation in this project, we sought to evaluate components that could estimate the capacity for inspection and the effective implementation of environmental policies in Acre. The indicator used for the state was based on the annual deforestation rates in the total area of the state, in the areas of supported municipalities and in those areas considered to be the most active for CBMAC. It is worth mentioning that because CBM does not act directly in the fight against deforestation, but in the fight against forest fires, this indicator is considered in a complementary manner to the conclusions of this project.

Based on data available from PRODES, which has been systematized in the Platform TerraBrasilis, the deforestation rates five years before the implementation (2008 to 2012) and seven years after the signing of the project (2013-2019)[24] were observed(Figura 3).(Figure 3). In the period from 2008 to 2012, which predates the support of the Amazon Fund (AF), the most active area for CBMAC featured an annual deforestation average of 171 km². After the implementation of AF support, in the years 2013 to 2019, the average deforestation was 228 km², which represents an increase of 33%.

24. The period between 2008 to 2019 was defined exclusively due to the data availability in Inpe.These informations are systematized for the municipalities within the CBMAC's acting range.

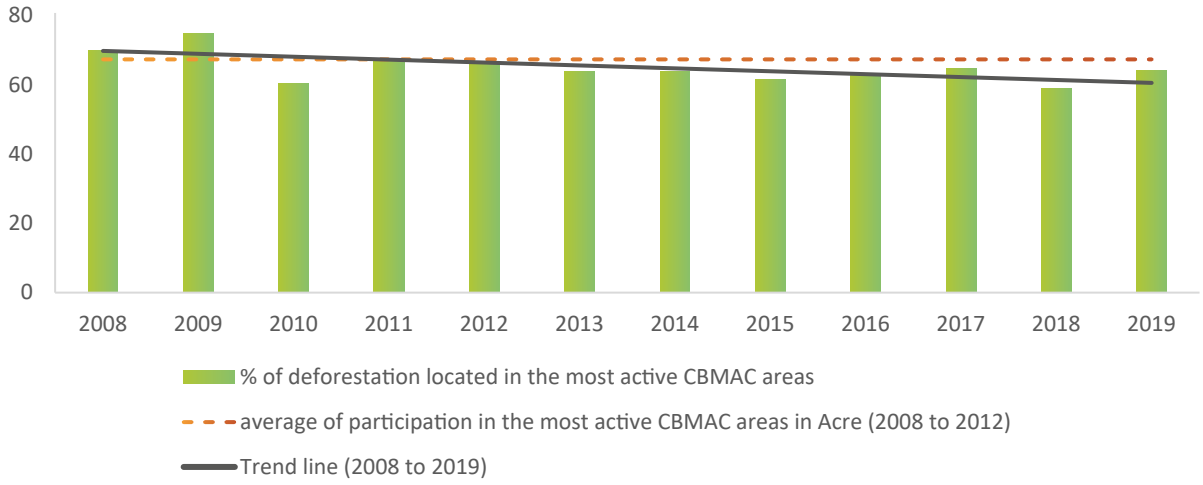
Figure 3 - Historical deforestation at different observation levels in the evaluation of the CBMAC project.



Source: BDQueimadas/Inpe. Self-elaboration.

However, in the period 2008 to 2012, which precedes the support of the Amazon Fund, 67.4% of the deforestation in the state was concentrated in the area where CBMAC is most active, with the implementation of the support, in the years 2013 to 2019, there was a mean reduction of 4.7% of the concentration of deforestation in areas of higher activity for CBMAC (Figure 4). In other words, despite the increase in deforestation rates in the state, this growth has been occurring less intensely in the areas where CBMAC units are most active.

Figure 4 - Percentage of deforestation in the areas where CBMAC is most active in relation to the state of Acre.



Source: BDQueimadas/Inpe. Self Made.

It is clear, therefore, that the structure of CBMAC allowed one greater mobility and reach with a more effective presence and therefore a smaller increase in deforestation.

The project also stimulated institutional coordination, carried out through the integrated action of public agencies of various levels of government with the necessary mobilization of civil society, aimed at preventing and fighting irregular burnings and forest fires. In this context, there were numerous developed initiatives, such as firefighting operations, preventive efforts and support in monitoring and inspections carried out by other institutions. Institutions sought to strengthen and improve partnerships, which has made this process sustainable and of great relevance to CBMAC's actions.

Direct Effects

hotspots are important indicators to check trends in the increase or the decrease of burnings and forest fires, which in turn makes this information a useful tool to evaluate the direct effects of prevention and firefighting initiatives.

CBMAC data were evaluated at 3 different levels, being

a. area of the entire state of Acre;
b. area of supported municipalities and;
c. most active areas for state CBM;

In the state of Acre, the average number of hotspots in the period prior to support from the Amazon Fund (2003 to 2012) is higher than the average for the period after the implementation of the project. In the years from 2013 to 2019, the number of hotspots was 6,081, representing a reduction of 18.2% in hotspots after the implementation of the Amazon Fund project.

The reduction of hotspots is not only verified at the state level, but also occurs at other levels of observation. The main reduction, of 29.5%, occurred in the areas where CBMAC is most active, which can be related to the better structuring of CBMAC. The support of the Amazon Fund provided an increase in the number of occurrences attended, a reduction in the time for troop movements and an increase in the response speed.

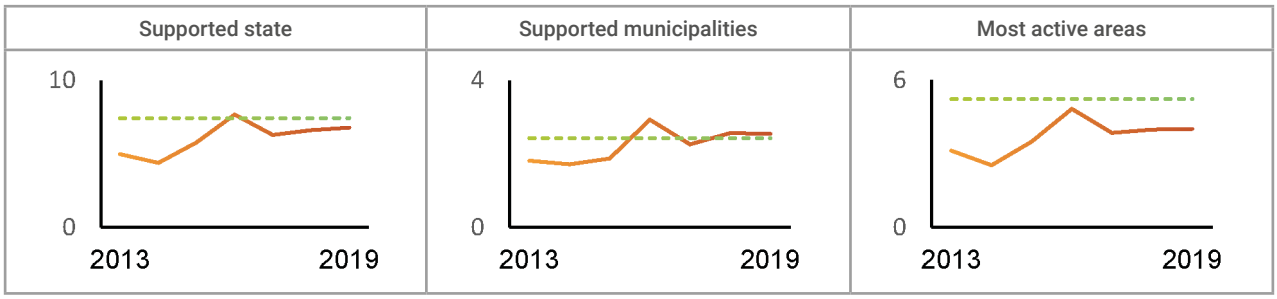
The purchase of tools and equipment specific to forest fires operations also provided greater effectiveness to operations. In addition to the acquisition of specific vehicles for the forest fire fighting operations, 20 4x4 trucks were also acquired, which allowed greater mobility of staff and greater reach, making CBMAC's presence more frequent.

In Chart 1, the historical data of the hotspots and the CBMAC evaluation graphs at the different observation levels are reported. In the graphs, the y axis represents the hotspots in the reference satellite (in 1000 fires), the green line represents the baseline (2003-2012 average) and the red line represents the annual number of outbreaks.

Chart 1 - Baseline and history of hotspots in the CBMAC project supported by the Amazon Fund.

Observation level	Baseline[25]	2013	2014	2015	2016	2017	2018	2019	Average (13-19)[26]	Variation (%)[27]
Supported state	7.432	4.980	4.398	5.779	7.684	6.295	6.626	6.802	6.081	-18,2
Supported municipalities	2.433	1.822	1.715	1.877	2.940	2.263	2.571	2.548	2.248	-7,6
Most active areas	5.237	3.133	2.537	3.496	4.840	3.853	3.983	4.011	3.693	-29,5

25. Average between 2003 a 2012 (reference satellite).
26. Average between 2013 to 2019 (reference satellite).
27. Variation between baseline and average in 13 to 19.



Source: BDQueimadas / Inpe. Self made.

In addition to the structuring of CBMAC units, training efforts were carried out for five public managers and 1,815 civilian brigades. The project provided important support regarding civilian brigade training, which were mainly formed by rural producers. These activities cover the 22 counties Acre and are being periodically developed.

In this training prevention and combat techniques are taught, such as: (i) first aid in forest fires; (ii) use of GPS; (iii) carrying out authorized burnings with the use of fire; (iv) preparing and constructing firebreaks. Usually, training is carried out for a group of 40 rural producers, in which practical activities are also carried out, in addition to the theoretical knowledge passed on.

During the support of the Amazon Fund, in addition to training, there was also the distribution of tools for firefighting operations and for carrying out authorized burnings, as well as personal protective equipment. Training, combined with the structuring of the brigades with the provision of appropriate tools for operations, resulted in greater effectiveness for the brigades and the initiatives accomplished their goals.

The realization of the project “Acre: Incêndios Florestais Zero - Acre Zero Forest Fires” was “a turning point for CBMAC’s operations in forest fires.” The units’ structuring enabled an increase in operational capacity and greater effectiveness of operations. This situation was evidenced by the CBMAC command and its officers during the interviews. The monitoring indicators show a significant increase in the actions to verify hotspots and of forest fires fought by CBMAC (Table 2) during the Amazon Fund’s support period (2013 to 2019).

Board 2 - Main indicators of the project "Acre: Incêndios Florestais Zero- Acre: Zero Forest Fires"

Indicators	Indicator description	Reference (2011)	Situation in the last year of the project (2016)	Situation after the project (2019)
hotspots (INPE)	Number of hotspots in the state of Acre, from the reference satellite	3.191 (2011)	7.684 (2016)	6.802 (2019)
	Number of hotspots in the supported municipalities of Acre, from the reference satellite	1.132 (2011)	2.940 (2016)	2.548 (2019)
	Number of hotspots in the areas where the CBMAC is most active, from the reference satellite	2.147 (2011)	4.840 (2016)	4.011 (2019)
Number of hotspots verified by CBMAC	hotspots from the INPE database, which were verified in loco by the Fire Department of Acre (or another region covered by the project)	562 (2011)	10.844 (2016)	2.070 (2019)
Forest fires directly fought by CBMAC	Forest fires or unauthorised burnings that have been successfully identified and put out by the Fire Brigade.	281 (2011)	209 (2016)[28]	2.070 (2019)
Forest fires fought by partners without the presence of CBMAC	Forest fires or unauthorised burnings that were identified and fought by civilian brigadiers trained and / or equipped by the Fire Department under the project's scope.	--- (2011)	1.219 (2012 a 2016)	2.070 (2019)
Trained civil servants	CBMAC workers effectively using the knowledge acquired	0 (2011)	330 (2012 a 2016)	64 (2019)
Qualified civilian brigadiers	Number of civilian brigadiers trained in fire-fighting techniques to form civilian brigades	0 (2011)	2.080 (2012 a 2016)	1.200 (2019)

The actions carried out by the CBMAC project have aligned with the specific objectives of the Acre state's Plano Estadual de Prevenção e Controle do Desmatamento [Plan for Prevention and Control of Deforestation] (PPCD)[29]. The efforts of the project, in addition to their complementary nature, directly contribute to several of the envisaged goals and strategies.

In the program for the recovery of degraded areas, from the Acre PPCD, one of the expected impacts is the reduction of the use of fire and a more sustainable way to accomplish burnings. Training activities developed by the project and appropriate equipment provision to rural producers directly collaborated to this component of the plan. In the integrated environmental control action plan, CBMAC played an important role in reducing the number of hotspots, in supporting inspection activities and in monitoring deforestation and unauthorised burnings.

28. The results of the years 2016 and 2017 were smaller because, if added to the instances in the capital of the previous years, the results represented the totality of all added events in all municipalities

29. Acre (2010). Plano estadual de prevenção e controle do desmatamento do Acre – PPCD/AC / Governo do Estado do Acre. - Rio Branco: SEMA Acre, 2010. 108p. Available at: http://sema.acre.gov.br/wp-content/uploads/sites/20/2020/05/PPCD.pdf

The project was also important within the scope of the Plano Integrado de Prevenção, Controle e Combate às Queimadas e aos Incêndios Florestais do Estado do Acre[30] [Integrated Plan for Prevention, Control and Combat of Burnings and Forest Fires in the State of Acre] which is an important management tool for the activities to prevent and fight forest fires in the state, strengthening the links between the different institutions and enabling more effective cooperation.

The structuring of CBMAC units resulted in a significant improvement in transport conditions and in the entire logistical process. After the start of a forest fire, there is a general tendency to expand the line of fire over time, with the reduction of time for the start of the active firefighting being a key element in the efficiency of operations. The reduction in CMBAC's response time and the availability of specific equipment have made firefighting operations more efficient, which has made it possible to deal with a greater number of occurrences. However, the maintenance and sustainability of these operations are related to the maintenance and replacement of equipment and vehicles, the cost of which is being absorbed by the state government.

The CBMAC is demonstrating improvement in their project management and fundraising capacity. After the support from the Amazon Fund, came the start of new projects with the R$ 1 million support from KFW; parliamentary amendments in the amount of R$ 1,5 million of support; and the donation of equipment for fire fighting by the Ministry of Environment of Acre (SEMA) in the amount of R$1,2 million.

Civilian brigades' training initiatives continue even with the end of the project. However, the supply of firefighting tools, which occurred during the project, did not. Some new initiatives are being developed, such as junior firefighter training and workshops in urban and rural public schools.

5. Project management and monitoring

In this section, we will present the positive points and challenges observed in relation to the structure, human resources devoted and work flows directed to project implementation.

Strengths

CBMAC has a logistical support department, which helped its management and the dialogue with state partners at the time of the project. It is made up of eleven soldiers, who are dedicated to the projects and agreements management.

This board was responsible for preparing terms of reference (ToRs), also counting on the expertise of other CBMs in the Amazon to prepare such ToRs, in addition to the support of the Secretaria de Estado de Planejamento e Gestão [Management and Planning Secretary] (Seplag) to carry out the bids.

At the same time, and in part reflecting the support of the project, a planning board with civil engineers and eight military officers was incorporated into the structure of the CBM, aimed at developing preventive actions in the state.

30. Acre (2013). Plano Integrado de Prevenção, Controle e Combate às Queimadas e aos Incêndios Florestais do Estado do Acre. Available at: http://imc.ac.gov.br/wp-content/uploads/2016/09/Plano_Integrado_Queimadas.pdf

For the monitoring of results, the project involved SEMA, Incra, ICMBio, IMAC and Environmental Battalion in dialogue about use and management of the acquisitions made. It can be noted that this dialogue occurred, mainly, through the risk management commission in the state.

Challenges

Even with the dedication of the logistical support department, the lack of experience in the preparation of ToRs and the carrying out of bids led to delays in the expected project acquisitions. In addition to that, the possibility of reallocating the income resources led to the need to review the action planning and extended the length of time to complete the project by eleven months.

The director of logistical support, responsible for the project, had difficulties carrying out the evaluation and accountability reports to the AF, which was mitigated through the dialogue with the Fund's technical team to answer questions and referrals about income use.

6. Conclusions

The CBMAC project made it possible to monitor, prevent and fight deforestation resulting from forest fires and unauthorised burnings in the state, thus contributing to the Amazon Fund's overall objective of "reducing deforestation with sustainable development in the Amazon region".

Based on the project's results, it was found that the supported actions enabled CBMAC to be better equipped with appropriate and specific operational resources for forest fire fighting operations. The training and creation of civilian brigades encouraged the commitment of rural producers to combat and prevent forest fires, as well as to make correct use of fire.

The project strengthened and stimulated the institutional links through integrated action by public bodies from the various spheres of government, with the necessary mobilization of civil society, aimed at preventing and fighting forest fires.

7. Lessons learned and Recommendations

	Recommendation	Actors	States	Amazon Fund	MMA	Donors
Indirect effect	Develop a spatial strategy to identify "priority areas" for the creation of new outposts to fight forest fires in the Legal Amazon, increasing territorial coverage and decreasing the response time of field firefighting.	✔	✔		✔	
	Assess the legal possibility of creating paid local brigades to assist in preventing and fighting forest fires.		✔		✔	
	Consider protected areas that are at risk of advancing fires, to prioritize initiatives to support deforestation and fire control bodies at the federal and state levels, as well as to strengthen traditional peoples and communities to consolidate their ownership to land.			✔	✔	
	Strengthen law bills or proposals that aim to punish illegal deforestation, by preventing access to rural credit, and the possibility of blocking economic exploitation of illegally deforested and cleared areas.		✔		✔	✔
Direct effect	Implement a continuous training cycle for public servants on monitoring, preventing and fighting forest fires.	✔	✔		✔	
	Carry out an extensive publicity campaign on the consequences of forest fires for the population, focusing on environmental, economic and health aspects.	✔	✔	✔	✔	✔
	Improve the monitoring of appropriate indicators of firefighting actions.	✔				
Management and Monitoring	Create working groups specialized in project management in the institutions.	✔				
	Promote project engaged agents, for aim observation, as well as for activity participation and in the dissemination of results aimed at civil society.	✔				
General	Get greater universities and research institutions involvement in the projects, collaborating with fire brigades to develop new methodologies.	✔		✔		
	Seek non-reimbursable external resources, such as those provided by the Amazon Fund.	✔				

8. Cancun Safeguards (REDD+)

Safeguard	Answer	Note
1. Actions complementary or consistent with the aims of the national forest programs and other relevant international conventions and agreements	**yes**	**The project's focus is on reducing deforestation related to forest fires and irregular use of fire in burnings.**
Were the projects aligned with the PPCDAm and the state plans for prevention and control of deforestation?	yes	The actions, in addition to acting in a complementary manner, directly contribute to various aims and strategies in the plans.

Which other federal public policies or international agreements did the projects align with? What aspects?	yes	Estratégia Nacional para REDD+ do Brasil.(National Strategy for REDD + in Brazil)
Have the projects contributed or could they contribute directly or indirectly to reducing emissions from deforestation or forest degradation? In what way?	yes	The actions developed in the project aim to reduce degradation and deforestation. Strengthening the presence of public authorities and the monitoring and inspection actions developed during partnerships in the project contribute to the reductions.
2. Transparent and effective national forest governance structures, with a view to national sovereignty and national legislation.	**yes**	
To what extent have the projects promoted links between different actors (public, private, third sector or local communities)? Has shared governance been used? On what occasions?	yes	Promotion of the actions of the Comitê Estadual de Prevenção e Controle às Queimadas e Incêndios Florestais [State Committee for Forest Fires and Burning Control and Prevention] in the state of Acre.
To what extent have the projects contributed to strengthening public instruments and forestry and territorial management processes?	yes	Joint actions with other municipal, state and federal public institutions.
3. Respect for the knowledge and rights of indigenous peoples and members of local communities, taking into account relevant international obligations, circumstances and national laws and noting that the UN General Assembly adopted the United Nations Declaration on the Rights of Indigenous Peoples	**Not applicable**	**Not applicable**
To what extent have the projects influenced the constitutional rights associated with the formal use and ownership of land?	Not applicable	Not applicable
To what extent have the projects influenced the sustainable use of natural resources in your area?	Not applicable	Not applicable
If the projects directly benefited indigenous peoples, traditional communities or family farmers: were their socio-cultural systems and traditional knowledge considered and respected throughout the projects?	Not applicable	Not applicable
Are there any effects that interfere with the traditional way of life of these groups? What kind of effects: on the social, economic organization or the use of available spaces and resources? How do they interfere: positively, negatively or both?	Not applicable	Not applicable
4. Full and effective participation of stakeholders, in particular indigenous peoples and local communities, in the actions referred to in paragraphs 70 and 72 of Decision 1 / CP 16 .	**Not applicable**	**Not applicable**
How did the projects guarantee prior consent and the local / traditional way of choosing representatives of their beneficiaries (especially indigenous peoples and traditional communities)?	Not applicable	Not applicable

What participatory planning and management tools did the projects apply during planning and decision making?	Not applicable	Not applicable
In the case of projects with economic purposes: were any benefits from the projects accessed in a fair, transparent and equitable manner by the beneficiaries, avoiding resource hoarding?	Not applicable	Not applicable
To what extent have the projects provided the general public and their beneficiaries with free access and easy understanding of information related to its actions?	Not applicable	Not applicable
Was the project able to build a good system for monitoring results and impacts? Did the projects systematically monitor and spread out the achieved results and their effects?	Not applicable	Not applicable
5. Actions consistent with the conservation of natural forests and biological diversity, ensuring that the actions referred to in paragraph 70 Decision 1 / CP 16[31] are not used for the conversion of natural forests, but to encourage the protection and conservation of natural forests and their ecosystem services and to improve other social and environmental benefits .	**Not applicable**	**Not applicable**
How did the projects contribute to the expansion or consolidation of protected areas?	Not applicable	Not applicable
How did they contribute to the recovery of deforested or degraded areas?	Not applicable	Not applicable
In the case of area restoration and reforestation activities, did the methods used prioritize native species?	Not applicable	Not applicable
To what extent have the projects contributed to establishing recovery models with an emphasis on economic use?	Not applicable	Not applicable
6. Actions to address the risks of REDD + results reversals.	**Partially**	
What factors constitute risks to the permanence of REDD + results? How did the projects approach them?		
7. Actions to reduce the displacement of carbon emissions to other areas.	**Partially**	
Was there a shift in emissions avoided by project actions to other areas?		

31. Decision 1/CP 16: Reducing deforestation emissions; reducing emissions from forest damage; conservation of forest carbon stock; sustainable use of forests and the increase of carbon stocks.

Cross-cutting criteria

Cross-cutting criteria		Answer	Note
Poverty reduction	To what extent have the projects contributed effectively to economic alternatives that value the standing forests and the sustainable use of natural resources?	**Partially**	Training efforts regarding proper fire usage with burnings enables the correct use of fire, reducing the occurrence of forest fires.
	To what extent have the projects positively influenced poverty reduction, social inclusion and improved living conditions for beneficiaries living in the area?	**Partially**	The reduction of forest fires provides better air quality conditions and reduces the occurrence of respiratory diseases.
	Have the projects managed to promote and increase the production of timber and non-timber forest products value chains originating from sustainable practices?	**Not applicable**	Not applicable
Gender equality	Did the projects manage to integrate gender issues into their strategies and interventions, or did they address the issue in isolation? How so?	**no**	
	Was there gender separation in data collection for project planning and monitoring?	**no**	
	How did the projects contribute to gender equality?	**no**	

Mato Grosso Forest Firemen

Project title:	Mato Grosso Forest Firemen
Responsible body:	State of Mato Grosso - Corpo de Bombeiros do Estado de Mato Grosso (CBMMT)
Project length	2012-2017
Territorial scope (municipalities)	Nova Santa Helena, Cláudia, Colíder, Feliz Natal, Ipiranga do Norte, Itaúba, Marcelândia, Matupá, Peixoto de Azevedo, Santa Carmem, Sinop, Sorriso, União do Sul, Vera and Alta Floresta
Beneficiaries:	Population of the operational scope of the of the [Air and Land Operational Base of the Military Fire Brigade] [Air and Land Operational Base of the Military Fire Brigade] Base de Operações Aéreas e Terrestres do Corpo de Bombeiros Militar located in Sorriso
Aims:	Support deforestation monitoring, prevention and control actions resulting from unauthorized forest fires and illegal burning in the state of Mato Grosso, through training and acquisition of an aircraft, vehicles and support equipment for the [Air and Land Operational Base of the Military Fire Brigade] Base de Operações Aéreas e Terrestres do Corpo de Bombeiros Militar in the state of Mato Grosso located in the city of Sorriso
Total Project worth:	R$ 16.742.500,00
Amazon Fund support	R$ 12.518.230,09

Source: Amazon Fund / BNDES.

1. Project Summary

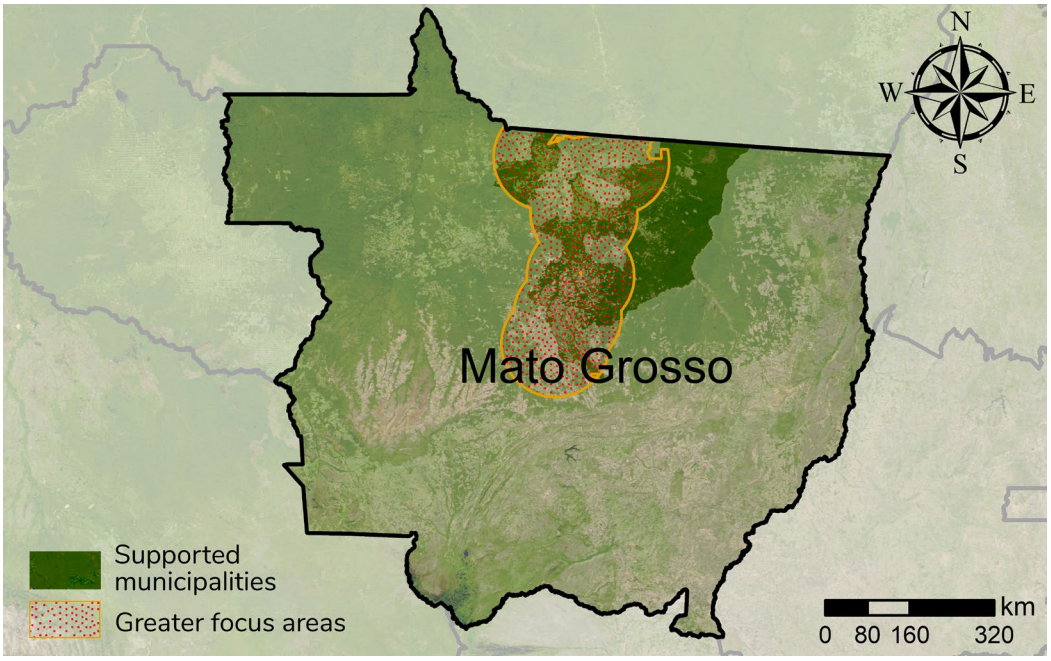
The state of Mato Grosso occupies an area of 903 thousand km², which represents 10.6% of the Brazilian territory, and borders the states of Mato Grosso do Sul, Goiás, Pará, Amazonas, Rondônia and Tocantins and the country of Bolivia. The state has 141 municipalities, and its three main urban centers are: Cuiabá, Várzea Grande and Rondonópolis. IBGE[32], estimates that in 2020, the population will stand at 3.5 million which represents a density of 3.9 inhabitants by square kilometers.

The "Bombeiros Florestais de Mato Grosso" - Mato Grosso Forest Firemen project aimed to support actions to monitor, prevent and control deforestation due to forest fires. The project implementation contributed to the structuring of the Base de Operações Aéreas e Terrestres [Air and Land Operational Base of the Military Fire Brigade], located in the town of Sorriso, through building its infrastructure and the acquisition of trucks - forestry car tanks, 4x4 vehicles, forest fire fighting kits and communication equipment. They also acquired two fixed - wing aircraft to fight the forest fires (Air Tractor 802F) and a pump car tank.

Training activities for aerial firefighting operations and specific classes for officers and managers of the Military Fire Brigade of Mato Grosso (CBMMT) in partner agencies on preventing, controlling and fighting forest fires were also developed.

32. Available at: https://www.ibge.gov.br/cidades-e-estados/mt.html

Figure 5 - Location of supported municipalities and most active area of the Mato Grosso project.

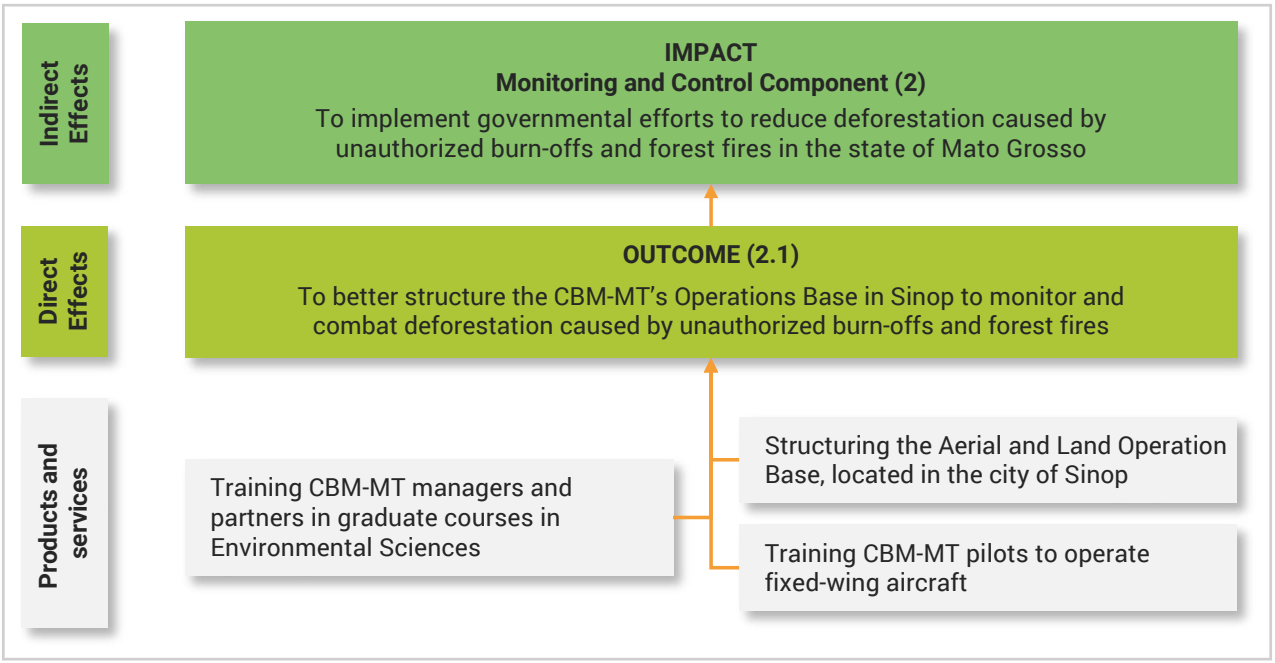


Source:Brazilian Institute of Geography and Statistics (IBGE). Self made.

2. Intervention Logic

In the Amazon Fund (AF) logical framework, the project "Bombeiros Florestais de Mato Grosso" - Mato Grosso Forest Firemen is included in component 2 : "Monitoring and Control" , with the specific aim: "Better structuring of the Sorriso (MT) Operational base used by the Corpo de Bombeiros Militar de Mato Grosso [Mato Grosso Military Fire Brigade] (CBMMT) for monitoring and combating deforestation caused by forest fires and illegal burnings. (Figure 6)

Figure 6 - Objectives Tree of the Mato Grosso Forest Firemen project Logical Framework.



Source: Amazon Fund / BNDES. Self made.

3. Specific Methodology

The criteria and methodologies used to evaluate the effectiveness of the CBMMT project followed the procedures presented in the main part of the evaluation.

Through development, data collection was carried out mainly through videoconferences. Initial contacts were primarily made with the current CBMMT commands. Subsequently we attempted to contact the commanders and other officers involved at the time with the project development. Contacts were also made with other institutions and actors directly or indirectly related to forest fires, in addition to a field mission to collect data with CBMMT.

For the evaluation of data of logging and hotspots (reference satellite) different levels of observation were adopted, as follows:

a. area of the entire state;

b. area of supported municipalities;

c. most active areas for state CBM;

For the definition of the most active CBM areas, this report uses as a criteria the area within a radius of up to 100km of the Military Fire Brigade or battalion, within the municipalities included in the proposals. The 100km distance was defined based on the information reported at the time of the interviews and an understanding of the logistical capacity for the displacement of military personnel and equipment. Areas under federal protection and indigenous lands were not counted, due to the existence of other institutions that operate directly in these locations.

4. Results Evaluation

Indirect effects

In order to evaluate government actions that ensure human activities follow environmental legislation, this project sought to evaluate components that could estimate the effective use of inspections and the implementation of environmental policies in Mato Grosso. The indicator used was based on the annual deforestation rates in the total area of the state, both in the areas of supported municipalities and the most active areas for CBMMT, as proposed in the methodology. It is worth noting that since CBMs do not act directly in the fight against deforestation, but in the fight against forest fires, this indicator is observed in a complementary manner.

Deforestation rates of 5 years before implementation (2008 to 2012) and 7 years during and after the project (2013 to 2019)[33] were observed based on the available data from PRODES, systematized in the Terrabrasílis Platform.

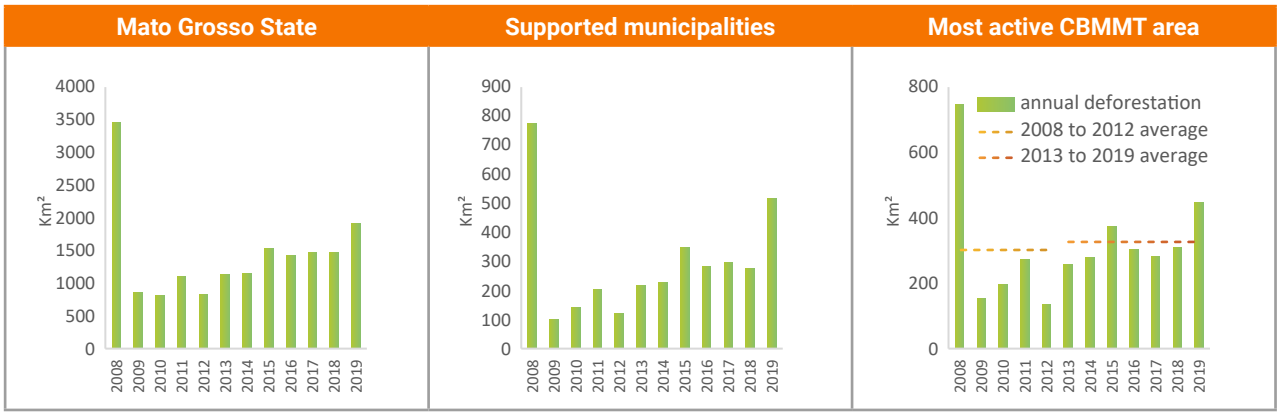
In the period 2008 to 2012, which precedes support from the Amazon Fund (AF), the CBMMT's most active area had an average annual deforestation of 296 km². After the implementation

33. The period from 2008 to 2019 was defined due to the data availability in the Inpe Platform.These data find themselves systemized in the municipalities within CBMMT range.

of AF support, in the years 2013 to 2019, the average deforestation is 318 km², which represents an increase of 7.4%.

Based on the data available from PRODES, systematized in the Terrabrasílis Platform, deforestation rates were observed for five years before implementation (2008 to 2012) and seven years during and after the project (2013 to 2019)[34] (Figure 7). In the period from 2008 to 2012, prior to the support from the Amazon Fund (AF), the most active CBMMT area had an average annual deforestation rate of 296 km². After implementing support, in the years 2013 to 2019, the average deforestation was 318 km², which represents an increase of 7.4%.

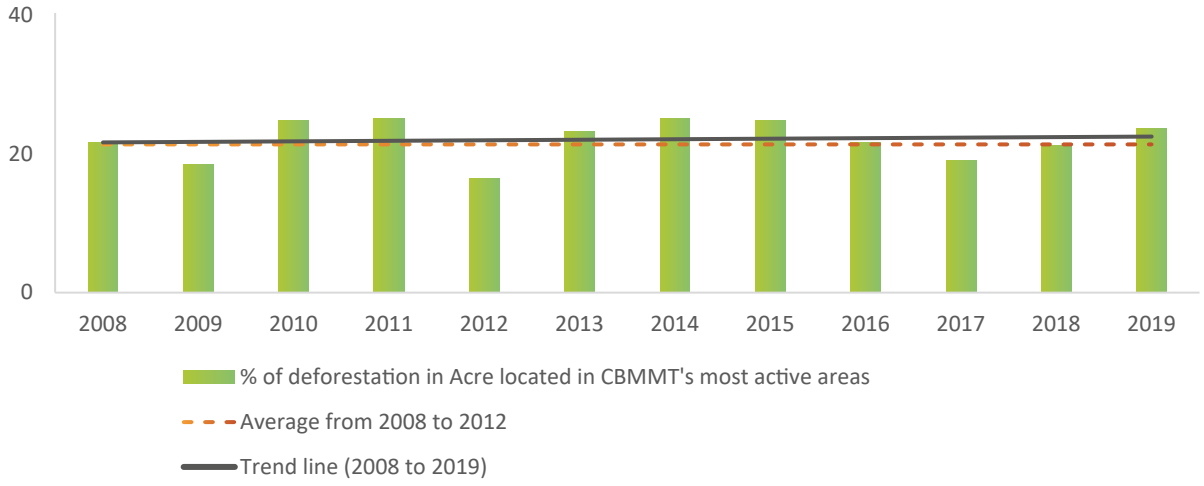
Figure 7 - Deforestation history at different levels of observation in the CBMMT project evaluation.



Source: Terrabrasilis / Inpe. Self made.

In the period from 2008 to 2012, prior to the support from the Amazon Fund, 21.3% of the state's deforestation was focused in most active CBMMT areas. With the implementation of the support, in the years 2013 to 2019, there was an average increase of 1.2% of deforestation focused in the areas where CBMMT is most active (Figure 8).

Figure 8 - Percentage of deforestation in the areas where CBMMT is most active in relation to the state of Mato Grosso.



Source: Terrabrasilis / Inpe. Self made.

34. The period from 2008 to 2019 was defined due to the data availability in the Inpe Platform.These data find themselves systemized in the municipalities within CBMMT range.

The project also stimulated institutional links, carried out through the integrated action of public bodies from different spheres of government, with the necessary mobilization of civil society, aimed at preventing and fighting forest fires. In this context many initiatives were developed, such as firefighting and prevention operations and support in monitoring actions and inspections carried out by other institutions. Institutions have sought to strengthen and improve partnerships, which has made this process sustainable and of great relevance in CBMMT's actions.

Direct effects

hotspots are important indicators to check trends in the increase or the decrease of burnings and forest fires, which in turn makes this information a useful tool to evaluate direct effects of preventive and firefighting actions.

CBMMT data was evaluated at three different levels, as indicated in the methodology: (i) state area; (ii) areas of supported municipalities; and (iii) the most active areas.

In the state of Mato Grosso, the average number of hotspots in the period prior to the support of the Amazon Fund (2003 to 2012) is higher than the average for the period after the implementation of the project. In the years 2013 to 2019, the number of hotspots was 25,524, representing a 50.1% reduction in hotspots after the implementation of the Amazon Fund project. The reduction of hotspots is not only verified at the state level, but also occurs at other levels of observation. The main reduction, to 68.8%, occurred in the most active CBMMT areas, which can be traced to a better CBMMT structuring.

This structure was provided by Amazon Fund support and was carried out through the acquisition of aircrafts, vehicles and specialized equipment, allowing the CBMMT to act more intensely in forest fire operations. The better structuring of CBMMT allowed them to be present during more events, reduced travel time and increased response speed.

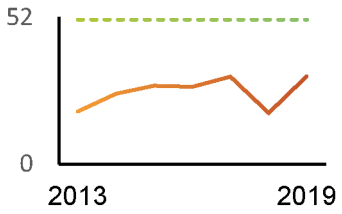
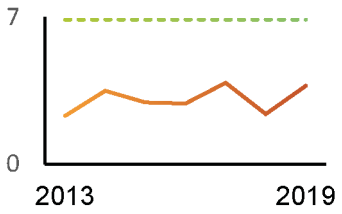
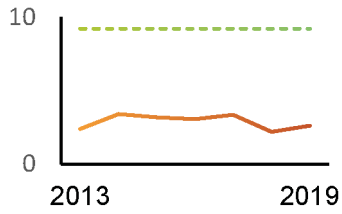
In Mato Grosso, in addition to aircrafts, fuel tanks for aircrafts, special vehicles for combat operations against forest fires and 4 x 4 trucks called fast auto forest, which allowed greater mobility and CBMMT reach in their areas of expertise have also been acquired. With this structuring, the CBMMT now has greater autonomy, reducing the equipment loan dependence from other institutions to conduct firefighting operations.

In the project implementation, the building site of the Batalhão de Emergências Ambientais [Environmental Emergency Battalion] (BEA) was changed, which was initially planned in Sinop. This change was due to the start of a partnership between CBMMT and the town of Sorriso, which took place with the signing of an agreement between the Secretaria de Estado de Infraestrutura [State Secretary for Infrastructure] (SINFRA) and the city hall, enabling the transfer of resources for the construction of the Base Aérea e Terrestre [Air and Land Base] in Sorriso.

Table 3 reports the historical data of the hotspots and the evaluation graphs of the CBMMT at the different levels of observation. In the graphs, the axis y represents the hotspots in the reference satellite (in 1,000 outbreaks), the green line represents the baseline (average 2003-2012) and the red line represents the annual number of outbreaks.

Table 3 - Baseline and history of hotspots in the CBMMT project supported by the Amazon Fund.

Observation level	Baseline[35]	2013	2014	2015	2016	2017	2018	2019	Average (13-19)[36]	Variation (%)[37]
Estado apoiado	51.197	18.554	24.955	27.741	27.305	30.911	18.032	31.169	25.524	-50,1
Municípios apoiados	6.880	2.301	3.488	2.931	2.892	3.866	2.382	3.740	3.086	-55,1
Área de maior atuação	9.229	2.392	3.403	3.177	3.059	3.348	2.190	2.603	2.882	-68,8

Supported States	Supported municipalities	Most active areas
		

Source: BDQueimadas/Inpe. Self made.

Training efforts were also supported in the CBMMT project. Pilot training for the acquired aircraft was developed, in which the project trained and qualified five CBMMT officers to operate a single-engine aircraft (class in which the Air tractor 802F is located).

Graduate courses "lato sensu" in prevention, control and firefighting of forest fires with a total workload of 900 hours, 460 hours of actual classes, distributed in 12 disciplines also took place. Its main aims were the professional and military training of CBMMT members and civil servants - from the Secretaria de Estado de Meio Ambiente [State Secretary of Environment] (SEMA), do Instituto Chico Mendes de Conservação da Biodiversidade [Chico Mendes Institute for Biodiversity Conservation] (ICMBio), do Instituto Brasileiro do Meio Ambiente [Brazilian Institute of Environment and Renewable Natural Resources] (IBAMA), da Secretaria Adjunta de Proteção e Defesa Civil [Adjunct Secretary of Protection and Civil Defense] and the municipalities of Sinop and of Alta Floresta - and of independent professionals from the Regional Engineering and Agronomy Council (CREA). This training resulted in the 45 trained professionals, 15 more than initially planned in the project.

Training developed through the project, enabled a more specialized look in forest fires, which resulted in a greater effectiveness of operations. Geotechnics and fire control skills training enhanced their expertise within the CBMM framework.

In Mato Grosso, Brigadas Municipais Mistas [Mixed Municipal Brigade] (BMMs), a new concept based on the integration of state, county, rural enterprises and professional associations efforts have offered commitments in order to structure the first response to forest fires in municipalities that do not have military firefighter units. The brigade is composed of two military firefighters and at least six brigadiers hired exclusively or assigned to the town.

In 2015, BMMs were structured in four municipalities: Sinop, Claudia, Sapezal and Campo Novo do Parecis. At the time of the implementation of these brigades, the state of Mato Grosso

35. Average between 2003 a 2012 (reference satellite).
36. Average between 2013 to 2019 (reference satellite).
37. Variation between baseline and average in 13 to 19.

showed an increase in the number of hotspots in relation to the average of the preceding ten years (2005 to 2014), while in the municipalities with BMMs, there was a reduction.

In 2016, the CBMMT visited 15 municipalities reporting to municipal managers the proposal for the creation of BMMs. At the time of the visits, the draft of the intentions protocol was delivered, presenting the information regarding the attributions and counterparts of each of the institutions. In total, we structured CBMs in six municipalities: Sinop, Claudia, Sapezal, Comodoro, Aripuanã and Porto Esperidião.

Table 2 - Main indicators of the project "Bombeiros Florestais de Mato Grosso" Mato Grosso Forest Firemen

Indicators	Indicator description	Reference (2011)	Situation in the last year of the project (2017)	Situation after the project (2019)
hotspots (INPE)	Number of hotspots in the state of Mato Grosso, from the reference satellite	17.371 (2011)	30.911 (2017)	31.169 (2019)
	Number of hotspots in the supported municipalities of Mato Grosso, from the reference satellite	2.355 (2011)	3.866 (2017)	3.740 (2019)
	Number of hotspots in the areas where the CBM of Mato Grosso is most active, from the reference satellite	2.147 (2011)	3.348 (2017)	2.603 (2019)
Trained CBMMT civil servants and partners	hotspots, INPE, which were verified in loco by the Military Fire Brigade of Mato Grosso (or region covered by the project)[38]	0 (2011)	3.866 (2017)	3.739 (2019)
Qualified partner institution employees	Forest fires or unauthorised burnings that have been successfully identified and combated by the Corpo de Bombeiros do Mato Grosso [Mato Grosso Military Fire Brigade]	0 (2011)	313 (2017)	1.191 (2019)
CBMMT firemen trained	Trained CBMMT servers and partners using the acquired knowledge	0 (2011)	1.296 (2012 a 2017)	605 (2019)
Qualified pilots	Employees from partner institutions trained by CBMMT	0 (2011)	1.110 (2012 a 2017)	526 (2019)
Air combat and monitoring missions	Employees of the Corpo de Bombeiro Militar do Mato Grosso [Mato Grosso Military Fire Brigade] trained	0 (2011)	183 (2012 a 2017)	79 (2019)
Pilotos capacitados	Number of pilots trained effectively using the acquired knowledge	0 (2011)	7 (2012 a 2017)	2 (2020)
Missões de monitoramento e combate aéreo	Hours of forest fire monitoring and aerial forest fires missions carried out	0 (2011)	22.993 (2012 a 2017)	3.091 (2019) 11.889 (2020)

38. Sinop, Alta Floresta, Claudia, Colíder, Feliz Natal, Ipiranga do Norte, Itaúba, Marcelândia, Nova Santa Helena, Santa Carmem, Sorriso, União do Sul, Vera, Matupá and Peixoto Azevedo

The actions carried out in the CBMMT project are aligned with the specific aims of the Plano de Ação para Prevenção e Controle do Desmatamento e Queimadas [Action Plan for Deforestation and Burning Prevention and Control] (PPCDQ) in Mato Grosso[39] and boosted the Plano Estadual de Prevenção e Combate a Incêndios e Queimadas [Action Plan for Deforestation and Burning Prevention and Control]. The project's efforts, in addition to acting in a complementary manner, directly contribute to various goals and strategies provided for in the PPCDQ.

The structuring of CBMMT units resulted in a significant improvement in transport conditions and in the entire logistics process, leading to an increase in the number of occurrences addressed, reduction of travel time and improvements in the speed of response and capacity to tackle a greater number of occurrences. The sustainability of these operational gains is related to the maintenance and replacement of equipment and vehicles, which will be financed by CBMMT and the state government.

Training initiatives, even with the end of the project, continue. An example is the retraining of about 90% of the CBMMT personnel via digital learning mode in 2020. Another action developed, also in 2020, was training more than 1,000 forest brigades alongside several institutions, especially the Brazilian army. Decentralized situation rooms were also structured, established in the CBMMT Regional Commands.

5. Project management and monitoring

In this section, positive points and challenges observed in relation to the structure, the human resources and the work flows during the implementation of assistance will be presented.

Strengths

From the beginning of the project, there was a dedicated team at CBMMT. In 2014, the Diretoria de Gestão [Management Board] was created, dedicated to the management of projects and agreements, which strengthened the project activities and started to refine proposals for new projects.

Bids made were supported by the Diretoria de Administração Institucional (Institutional Administration Board) (DAI), dedicated to preparing the terms of reference (ToR), to support the construction of the hangar and the commitment of funds received by the project. A Secretaria de Estado de Segurança Pública [State Secretary of Public Security] (SESP) carried out procurement within the scope of the project, including the first international procurement, aimed at the acquisition of air tractor aircraft.

CBMMT has matured with the support of the Amazon Fund and, through DGE, has acquired a team with know-how for project implementation and management. It is noteworthy that, in the second half of 2020, with the state of emergency decreed by the advance of fires in rural, forest and wetland areas, CBMMT managed to raise R$ 10.6 million for activities and equipment purchases.

39. Mato Grosso (2009). Plano de Ação para Prevenção e Controle do Desmatamento e Queimadas do Estado do Mato Grosso PPCDQ/MT. 69p. 2009. Available at: http://www.fundoamazonia.gov.br/export/sites/default/pt/.galleries/documentos/prevencao-e-controle-do-desmatamento/Plano_Estadual_Mato_Grosso.pdf

Challenges

The command changes in CBM stands out as a challenge during the project implementation, which, in addition to influencing delays, led to the need to raise awareness and prioritize project activities with the new commanders.

Even with the existence of directorates dedicated to management and procurement, the project had difficulties in monitoring results, as well as the fulfilment of the contractual terms, due to the bidding procedures.

The difficulties in establishing partnerships for the construction of the hangar (base of operations) in Sinop led to redesigns and internal reviews, and, with the support of SEMA, the municipality of Sorriso was defined as the base. Another challenge encountered was the completion of the postgraduate course in prevention, control and fighting forest fires. After unsuccessful attempts of procurement for the course, a partnership was established with the Secretaria de Estado de Gestão [State Management Secretary] (SEGES) to carry out the course through the School of Government.

6. Conclusions

The CBMMT project improved the effectiveness of efforts in regards to monitoring, preventing and fighting deforestation resulting from forest fires and unauthorised burnings in the state, thus contributing to the general aim of the Amazon Fund of "reducing deforestation with sustainable development in the Amazon region".

Based on the results of the "Bombeiros Florestais de Mato Grosso"- Mato Grosso Forest Firemen, project, it was found that supported initiatives enabled CBMMT to be better equipped with appropriate and specific operational resources for forest fire fighting operations. Civilian brigade training encouraged the commitment of rural producers in these prevention and combat initiatives, as well as the correct use of fire.

The support from the Amazon Fund was an important impetus for the formation of Brigadas Municipais Mistas [Mixed Municipal Brigade] (BMM), which is an important breakthrough, especially in promoting new institutional arrangements, overcoming the traditional model of public institutions with isolated and centralized efforts. The use of these brigades promotes and strengthens the construction of functional institutional networks, involving intergovernmental and civil society links.

The project implementation promoted and stimulated the institutional links carried out through the integrated action of public bodies from the various spheres of government, with the necessary mobilization of civil society aimed at preventing and fighting forest fires.

7. Lessons learned and recommendations

	Recommendation	Actors	States	Amazon Fund	MMA	Donors
Indirect effect	Develop a spatial strategy to identify "priority areas" for the creation of new outposts to fight forest fires in the Legal Amazon, increasing territorial coverage and decreasing the response time of field firefighting.	✔	✔		✔	
	Ensuring in project proposals specific resources and mechanisms to promote institutional coordination.			✔		✔
	Expand the creation of Brigadas Municipais Mistas [Mixed Municipal Brigade] to help prevent and fight forest fires.		✔		✔	
	Consider protected areas that are at risk of advancing fires, to prioritize initiatives to support deforestation and fire control bodies at the federal and state levels, as well as to strengthen traditional peoples and communities to consolidate their ownership to land.			✔	✔	
	Strengthen law bills or proposals that aim to punish illegal deforestation, by preventing access to rural credit, and the possibility of blocking economic exploitation of illegally deforested and cleared areas.		✔		✔	✔
Direct effect	Implement a continuous training cycle for public servants on monitoring, preventing and fighting forest fires.	✔	✔		✔	
	Carry out an extensive publicity campaign on the consequences of forest fires for the population, focusing on environmental, economic and health aspects.	✔	✔	✔	✔	✔
	Improve the monitoring of appropriate indicators of firefighting actions.	✔				
	The structured base in Sorriso must be used in cooperation with municipal and federal actors to strengthen firefighting actions.	✔				
Management and Monitoring	Strengthen the working groups specialized in project management in the institutions.	✔				
	Promote project engaged agents, for aim observation, as well as for activity participation and in the dissemination of results aimed at civil society.	✔				
General	Get greater universities and research institutions involvement in the projects, collaborating with fire brigades to develop new methodologies.	✔		✔		
	Seek non-reimbursable external resources, such as those provided by the Amazon Fund.	✔				

8. Cancun Safeguards (REDD +)

Safeguard	Answer	Note
1. Actions complementary or consistent with the aims of the national forest programs and other relevant international conventions and agreements	**yes**	**The project's focus is on reducing deforestation related to forest fires and irregular burnings.**
Were the projects aligned with the PPCDAm and the state plans for prevention and control of deforestation?	yes	The actions, in addition to acting in a complementary manner, directly contribute to various goals and strategies provided in the plans.
Which other federal public policies or international agreements did the projects align with? What aspects?	yes	Estratégia Nacional para REDD+ [National Strategy for REDD+] in Brazil , in addition to being aligned with the State's Deforestation Control Plan.
Have the projects contributed or could they contribute directly or indirectly to reducing emissions from deforestation or forest degradation? In what way?	yes	Yes. The better structured CBMMT has greater logistical capacity and has been developing integrated monitoring and inspection actions.
2. Transparent and effective national forest governance structures, with a view to national sovereignty and national legislation.	**yes**	
To what extent have the projects promoted links between different actors (public, private, third sector or local communities)? Has shared governance been used? On what occasions?	yes	The implementation of the project counted with the connections with public actors such as the Secretary of Environment.
To what extent have the projects contributed to strengthening public instruments and forestry and territorial management processes?	yes	Links with other municipal, state and federal public institutions.
3. Respect for the knowledge and rights of indigenous peoples and members of local communities, taking into account relevant international obligations, circumstances and national laws and noting that the UN General Assembly adopted the United Nations Declaration on the Rights of Indigenous Peoples	**Not applicable**	**Not applicable**
To what extent have the projects influenced the constitutional rights associated with the formal use and ownership of land?	Not applicable	Not applicable
To what extent have the projects influenced the sustainable use of natural resources in your area?	Not applicable	Not applicable
If the projects directly benefited indigenous peoples, traditional communities or family farmers: were their socio-cultural systems and traditional knowledge considered and respected throughout the projects?	Not applicable	Not applicable
Are there any effects that interfere with the traditional way of life of these groups? What kind of effects: on the social, economic organization or the use of available spaces and resources? How do they interfere: positively, negatively or both?	Not applicable	Not applicable

4. Full and effective participation of stakeholders, in particular indigenous peoples and local communities, in the actions referred to in paragraphs 70 and 72 of Decision 1 / CP 16 .	**Not applicable**	**Not applicable**
How did the projects guarantee prior consent and the local / traditional way of choosing representatives of their beneficiaries (especially indigenous peoples and traditional communities)?	Not applicable	Not applicable
What participatory planning and management tools did the projects apply during planning and decision making?	Not applicable	Not applicable
In the case of projects with economic purposes: were any benefits from the projects accessed in a fair, transparent and equitable manner by the beneficiaries, avoiding resource hoarding?	Not applicable	Not applicable
To what extent have the projects provided the general public and their beneficiaries with free access and easy understanding of information related to its actions?	Not applicable	Not applicable
Was the project able to build a good system for monitoring results and impacts? Did the projects systematically monitor and spread out the achieved results and their effects?	Not applicable	Not applicable
5. Actions consistent with the conservation of natural forests and biological diversity, ensuring that the actions referred to in paragraph 70 Decision 1 / CP 16[40] are not used for the conversion of natural forests, but to encourage the protection and conservation of natural forests and their ecosystem services and to improve other social and environmental benefits .	**Not applicable**	**Not applicable**
How did the projects contribute to the expansion or consolidation of protected areas?	Not applicable	Not applicable
How did they contribute to the recovery of deforested or degraded areas?	Not applicable	Not applicable
In the case of area restoration and reforestation activities, did the methods used prioritize native species?	Not applicable	Not applicable
To what extent have the projects contributed to establishing recovery models with an emphasis on economic use?	Not applicable	Not applicable
6. Actions to address the risks of REDD + results reversals.	**Partially**	
What factors constitute risks to the permanence of REDD + results? How did the projects approach them?		
7. Actions to reduce the displacement of carbon emissions to other areas.	**Partially**	
Was there a shift in emissions avoided by project actions to other areas?		

40. Decision 1/CP 16: Reducing deforestation emissions; reducing emissions from forest damage; conservation of forest carbon stock; sustainable use of forests and the increase of carbon stocks.

Cross-cutting criteria

Cross-cutting criteria		Answer	Note
Poverty reduction	To what extent have the projects contributed effectively to economic alternatives that value the standing forests and the sustainable use of natural resources?	**Partially**	The reduction of forest fires allows a greater source of income for producers, due to the smaller loss in production.
	To what extent have the projects positively influenced poverty reduction, social inclusion and improved living conditions for beneficiaries living in the area?	**Partially**	The reduction of forest fires provides better conditions for air quality and reduces the occurrence of respiratory diseases.
	Have the projects managed to promote and increase the production of timber and non-timber forest products value chains originating from sustainable practices?	**Not applicable**	Not applicable
Gender equality	Did the projects manage to integrate gender issues into their strategies and interventions, or did they address the issue in isolation? How so?	**no**	In the design of the project, no actions were defined with the aim of working on gender equality.
	Was there gender separation in data collection for project planning and monitoring?	**no**	
	How did the projects contribute to gender equality?	**no**	

Pará fighting forest fires and non-authorized burning

Project title:	Pará Combatendo os Incêndios Florestais e Queimadas não autorizadas - Pará Fighting Forest Fires and non-authorized burning
Responsible body:	State of Pará - Corpo de Bombeiros Militar do Estado do Pará [Military Fire Brigade of the State of Pará] (CBMPA)
Project length	2013-2020
Territorial scope (municipalities)	Altamira, Castanhal, Itaituba, Parauapebas, Paragominas, Marabá, Tucuruí, Santarém, Redenção, Abaetetube
Beneficiaries:	Population of the state of Pará
Aims:	Supporting actions to monitor, prevent and fight deforestation resulting from forest fires and unauthorised burnings in the state of Pará, through the physical and operational structuring of units of the Corpo de Bombeiros Militar [Military Fire Brigade].
Total Project worth:	R$ 23.469.023,55
Amazon Fund support	R$ 16.830.280,00

Source: Amazon Fund / BNDES.

1. Project Summary

The state of Pará occupies an area of 1,246 thousand km², which represents 14.6% of the Brazilian territory, and borders the states Amapá, Roraima, Amazonas, Mato Grosso, Tocantins and Maranhão and the countries of Suriname and Guyana. The state has 144 municipalities and its three main urban centers are: Belém, Ananindeua and Santarém. IBGE estimates[41], that, in 2020, the population was 8.7 million inhabitants, which represents a population density of 6.97 inhabitants/km².

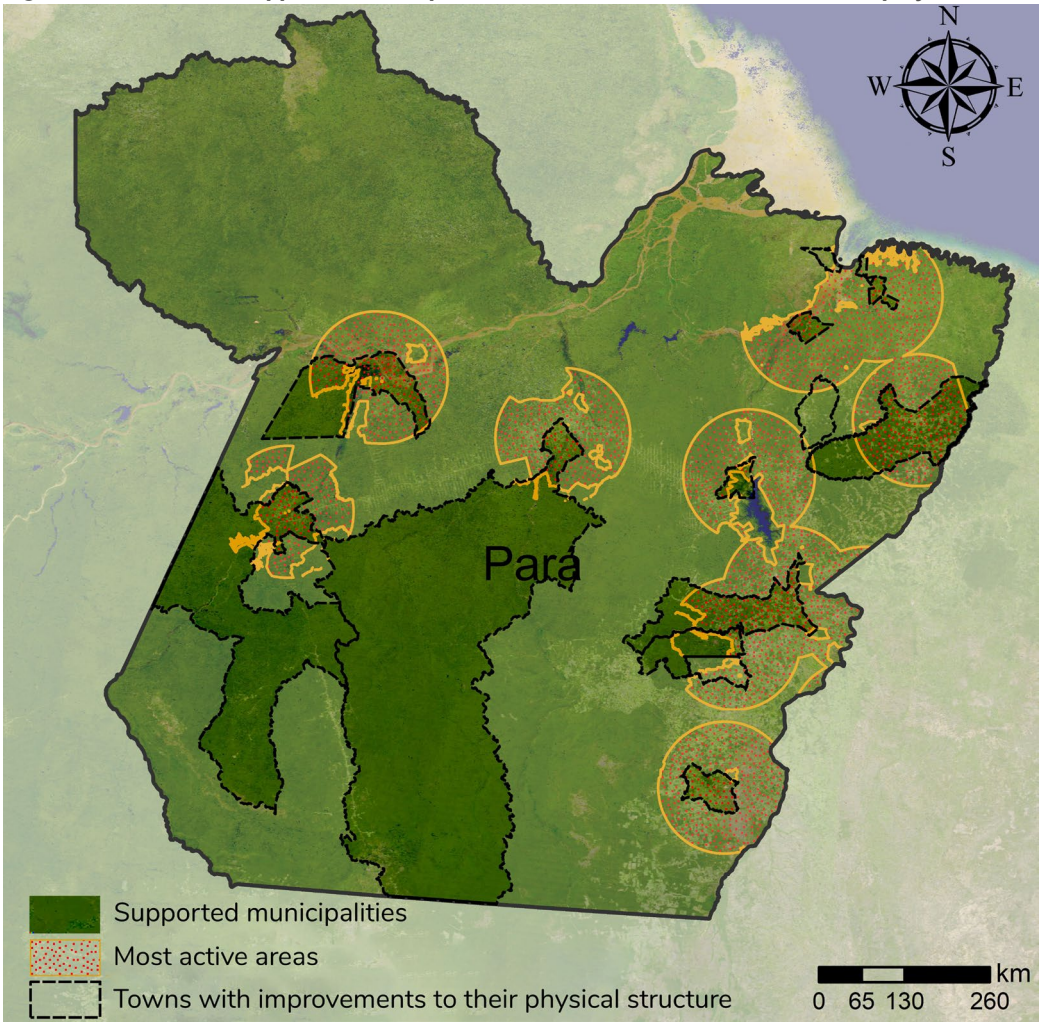
The project "Pará combatendo os incêndios florestais e queimadas não autorizadas" aimed to support the monitoring, prevention and fighting deforestation due to forest fires and unauthorised burnings. The support from the Amazon Fund enabled the structure of the Corpo de Bombeiros Militar do Pará [Pará State Military Fire Brigade] (CBMPA) by acquiring various equipment, such as heavy vehicles to fight forest fires (10,000 liters), light vehicles to fight forest fires (4000 liters), heavy vehicles for troop transport, trucks, combat kits for truck, personal protective equipment (PPE) and other equipment to fight forest fires.

The project supported the improvement and expansion of the physical structure of CBMPA with the construction and the structure of the Grupamentos de Bombeiros Militares [Military Fire Group] in the municipalities of Tailândia, Vigia and Salvaterra and with the reform of the units of the municipalities of Castanhal, Marabá and Canaã dos Carajás. There was also the implementation of the Centro Regional de Monitoramento, Prevenção Ambiental e Desastres [Regional Center for Monitoring, Environmental and Disasters] (CRMPAD), functioning as a situation room, located in the Comando Geral do Corpo de Bombeiros Militar [Military Fire Brigade General Command].

41. Available at: https://www.ibge.gov.br/cidades-e-estados/pa.html

Training activities have been developed at a specialization level on management and environmental security, similar to those carried out for CBMPA managers. There were also training sessions related to fighting, prevention and expertise in forest fires. In order to form civilian brigades, actions were also taken to mobilize and train rural producers in techniques for preventing and fighting fires.

Figure 9 - Location of supported municipalities and most active areas of the Pará project.

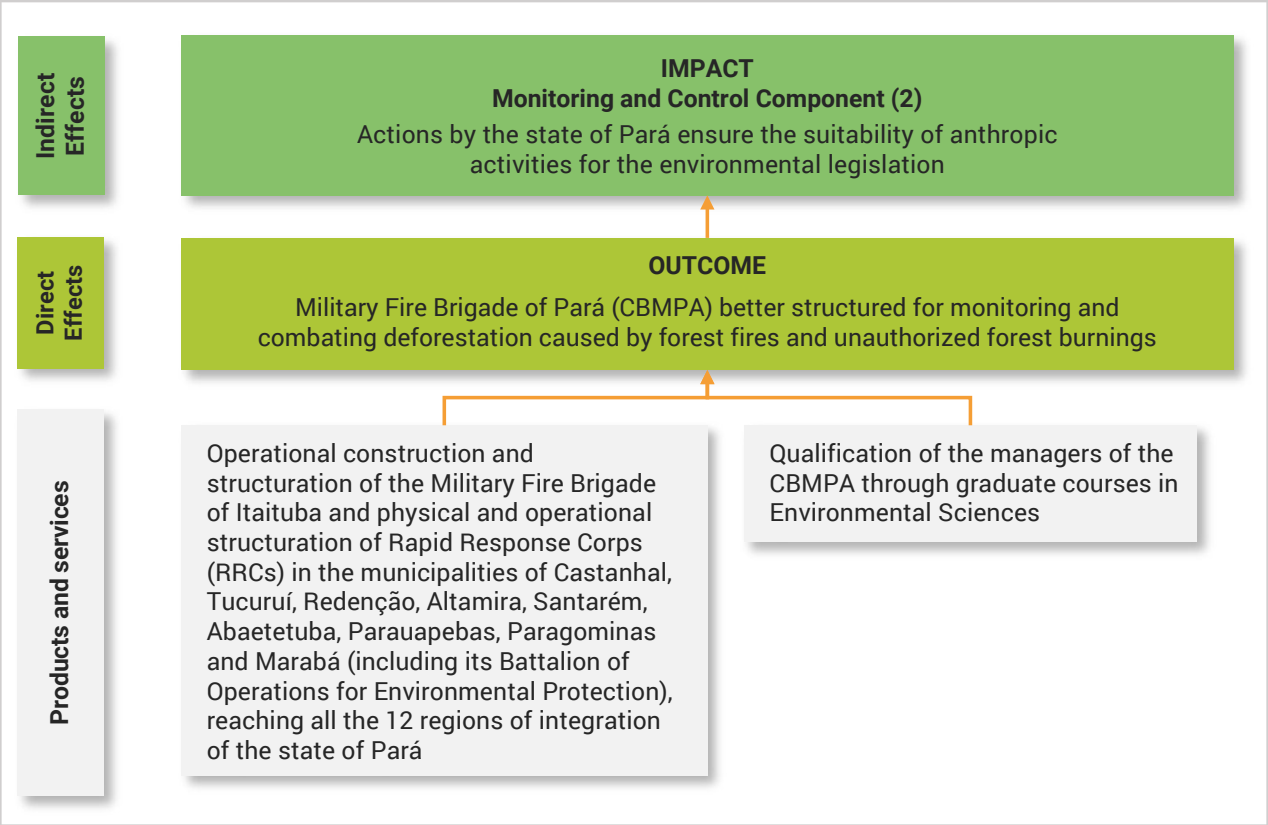


Source: Brazilian Institute of Geography and Statistics (IBGE). Self made.

2. Intervention Logic

The logical framework of the Amazon Fund, the project "Pará combatendo os incêndios florestais e queimadas não autorizadas" - Pará fighting forest fires and unauthorized burning is inserted in the component 2: "Monitoring and Control" , with the specific aim: "Military Firefighters Corps of Pará (CBMPA) better structured for monitoring and fighting deforestation caused by forest fires and unauthorised burnings ". (Figure 10)

Figure 2 - Aims trees of the logical framework of the project Pará Combatendo os Incêndios Florestais e Queimadas não Autorizadas.



Source: Amazon Fund / BNDES. Self made.

3. Specific Methodology

The criteria and methodologies used to evaluate the effectiveness of the CPMPA project followed the procedures presented in the main part of the thematic report of the evaluation.

In the development of the work, data collection was carried out mainly through videoconferences. Initial contacts were made primarily with the current CBMPA commands. Subsequently, we attempted to contact the individual commanders and other officers at the time of the project's implementation. Contact was also made with other institutions and actors directly or indirectly related to forest fires, in addition to a field mission to collect data from CBMPA.

For the evaluation of the data on logging and hotspots (satellite reference) different levels of observation were adopted, as follows:

a. area of the entire state;

b. area of supported municipalities and

c. areas where CBM is most active

For the definition of the areas of most active CBMPA areas, it was used as a criterion the area in a radius of up to 100 km of companies or their inserted battalions in the municipalities supported . The 100km distance was defined based on the information reported at the time of the interviews and on the understanding of the logistical capacity for displacement of

military personnel and equipment. The areas of federal protected areas and indigenous lands were not counted, since they exist in other institutions that work directly in these locations.

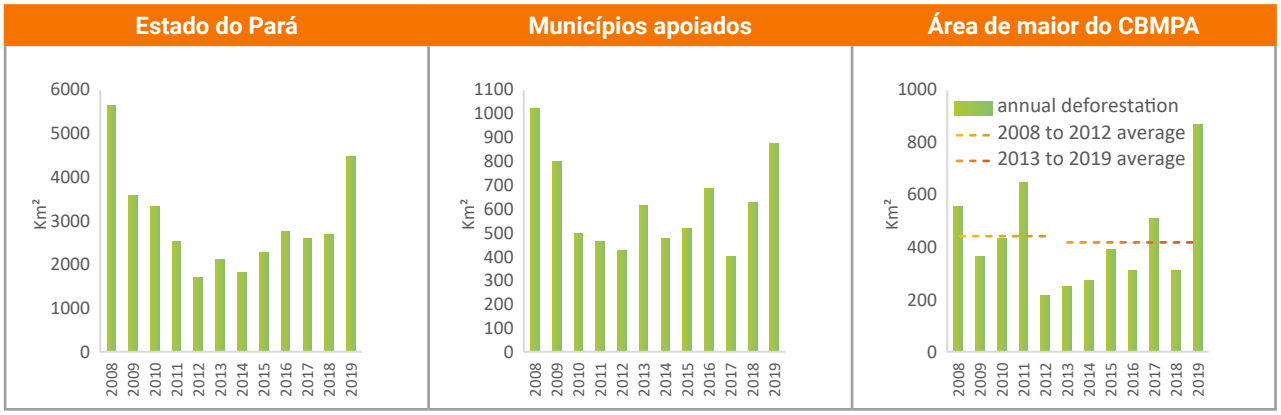
4. Results Evaluation

Indirect effects

In order to evaluate government actions that ensure that human activities are following environmental legislation in this project, we sought to evaluate components that could estimate the capacity for inspection and the effective implementation of environmental policies in Pará. The indicator used by the state was based on rates of annual deforestation in the total area of the state, in the areas of the municipalities that were supported and considered at most active for CBMPA. CBMs do not act directly in the fight against deforestation, but rather to fight forest fires, and this indicator observed in a manner complementary to project reflections.

Based on the data available from PRODES, systematized in the Terrabrasílis Platform, deforestation rates of five years before implementation (2008 to 2012) and seven years after implementing the project (2013 to 2019) were observed (2013 a 2019)[42] (Figure 11). In the period from 2008 to 2012, which predates the support of the Amazon Fund (AF), the most active areas for CBMPA feature an average annual deforestation rate of 438 km². After implementing support, in the years 2013 to 2019, the average deforestation was 414 km², which represents a reduction of 5.5%.

Figure 11 - Deforestation history at different levels of observation in the CBMPA project evaluation.

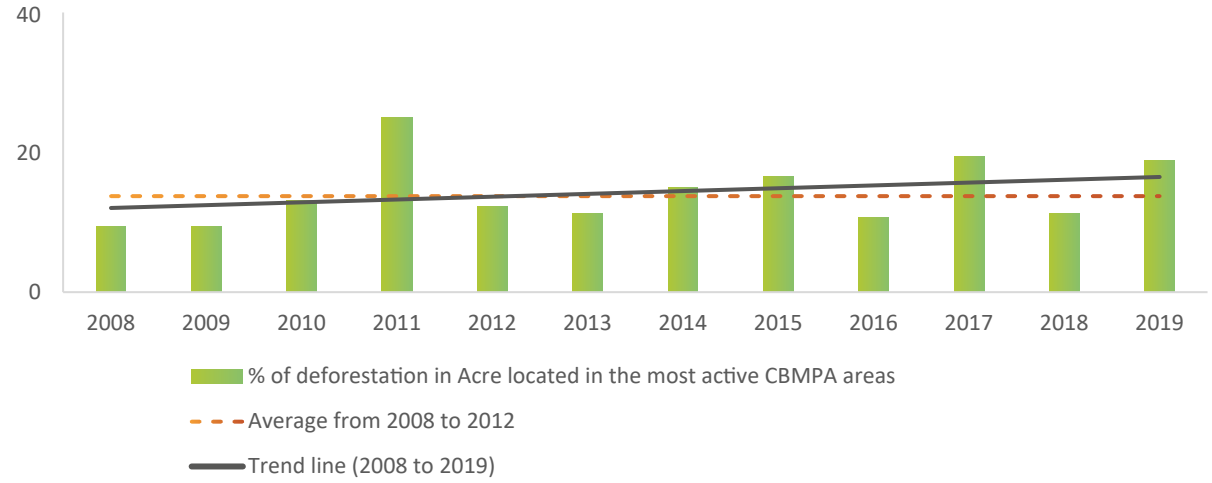


Source: Terabrasilis/Inpe. Self made.

In the period from 2008 to 2012, which precedes the support of the Amazon Fund, 14.1 % of deforestation was concentrated in the area where CBMPA is most active. With the implementation of support in the years 2013 to 2019, there was an increase of 1% in the average of deforestation concentrated in CBMPA's most active areas (Figure 12).

42. The period between 2008 to 2019 was defined due to, exclusively, the availability of data in the Inpe platform. These data find themselves systemized in the CBMPA municipalities range.

Figure 12 - Percentage of deforestation in the areas where CBMPA is most active in relation to the state of Pará.



Source: Terrabrasilis / Inpe. Self made.

The project also stimulated the institutional links carried out through the integrated action of public bodies from the various spheres of government with the necessary mobilization of civil society, aimed at preventing and fighting forest fires and burnings. In this context numerous actions are developed, such as firefighting operations, prevention and support in monitoring actions and inspections carried out by other institutions. Institutions have sought to strengthen and improve partnerships, which has made this process sustainable and of great relevance in CBMPA's actions.

Direct effects

Hotspots are important indicators to check trends in the increase or the decrease of burnings and forest fires, which in turn makes this information a useful tool to evaluate the direct effects on prevention and firefighting.

CBMPA data was evaluated at three different levels, as presented in the methodology: (i) the state area, (ii) areas of the supported municipalities and (iii) CBM's most active area .

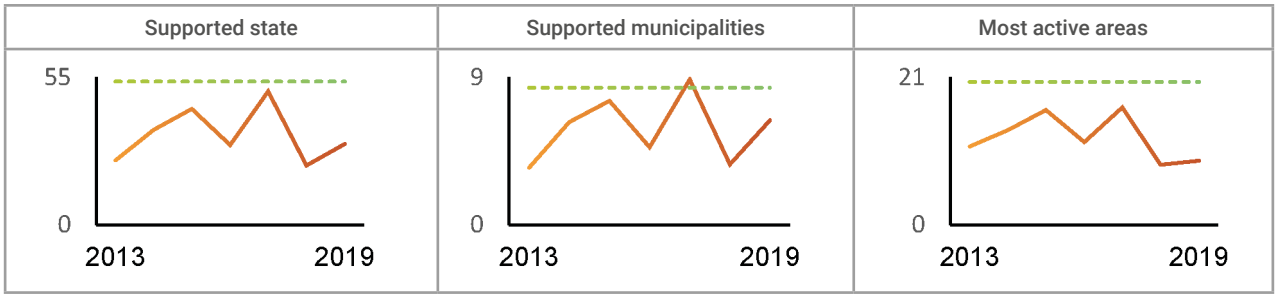
In the state of Pará, the average number of hotspots in the period prior to the support of the Amazon Fund (2003 to 2012) is higher than the average for the period after the implementation of the project. In the years 2013-2019, the number of fires was 33,496, representing a reduction of 37.3% of hotspots in the state after the implementation of the Amazon Fund project.

Of the main reduction of hotspots, 39.8%, occurred in the most active areas for the CBMPA, which may be related to its better structuring. The support from the Amazon Fund helped increase the number occurrences checked, reducing battalions' travel time and increased response speed. The acquisition of specific tools and equipment for forest fire-fighting operations provided greater effectiveness. The acquisition of specific vehicles for the forest fire fighting operations, enabled greater reach and consequently made CBMPA tackle fire outbreaks more frequently.

On Table 5, the historical data of the hotspots and the evaluation graphs of CBMPA at different levels of observation are reported. In the graphs, the axis y represents the hotspots of the reference satellite (in 1,000 outbreaks), the green line is the baseline (average 2003-2012) and the line in red is the annual number of outbreaks.

Table 5 - Baseline and history of hotspots in the CBMPA project supported by the Amazon Fund.

Observation level	Baseline[43]	2013	2014	2015	2016	2017	2018	2019	Average (13-19)[44]	Variation (%)[45]
Supported States	53.416	24.046	35.526	43.164	29.724	49.770	22.080	30.165	33.496	-37,3
Supported Municipalities	8.361	3.487	6.270	7.567	4.739	8.884	3.689	6.375	5.859	-29,9
Most active areas	20.350	11.135	13.500	16.334	11.799	16.729	8.564	9.105	12.452	-38,8



Source: BDQueimadas / Inpe. Self made.

One of the main actions carried out exclusively with resources from the Amazon Fund was the installation of the Base Operacional de Proteção Ambiental [Environmental Protection Operational Base] (Bopa) in Marabá and the Núcleos Operacionais de Resposta Rápida [Rapid Response Operational Core] (NORRs) in the municipalities of Itaituba, Castanhal, Tucuruí, Redenção, Altamira, Santarém, Abaetetuba, Parauapebas and Paragominas. In addition to that, the operational structuring of the battalion in Tailândia was included in the scope of the project.

This territorial distribution provided greater efficiency in the response to fighting forest fires, as it drastically reduced the time needed to deploy troops. The structuring of CBMPA units resulted in a significant improvement in transport conditions and in the entire logistical process.

The acquisition of specific tools and equipment for forest fire-fighting operations provided greater effectiveness of the operations. Various equipment was purchased , such as 6 heavy forest fire fighting vehicles (10,000 liters), 12 light forest fire fighting vehicles (4,000 liters), 4 heavy vehicles for troop transport, 10 floating motor pumps, 150 hoses, 150 adjustable jet nozzles, 800 approach suits for combat, 15 trucks, 15 fire fighting kits for trucks, 200 coastal fire extinguishers, 18 GPS devices, 25 camping tents, 200 camping mattresses, 200 fire mufflers and combat helmets for forest fires. It is important to highlight that, before the support of the Amazon Fund, CBMPA did not have its own vehicles for fighting forest fires and it was very difficult to carry out the actions in the field.

43. Average between 2003 a 2012 (reference satellite).
44. Average between 2013 to 2019 (reference satellite).
45. Variation between baseline and average in 13 to 19.

During project implementation, 13 managers at CBMPA were trained, in a partnership with Universidade Federal do Pará [Federal University of Pará] (UFPA) who received a degree in Specialization in Environmental Management and Safety, with a workload of 500 hours. 32 military firefighters were also trained in preventing and fighting forest fires and 33 military firefighters received training in environmental expertise during the implementation of the physical and operational structuring of the 7º Grupamento de Bombeiros Militar [Military Fire Grouping] in Itaituba. Training is extremely relevant, as it adds greater institutional capacity related to the theme of fighting forest fires.

Regarding the monitoring theme, the Centro Regional de Monitoramento , Prevenção Ambiental e Desastres [Regional Center for Monitoring, Environmental Prevention and Disasters] (CRMPAD) was implemented. It functions as a situation room, located in the building of the Comando Geral do Corpo de Bombeiros Militar do Pará [Military Fire Brigade of Pará General Command], in Belém

All these CBMPA structuring actions carried out by the project generated a greater capacity for action and, consequently, practical results. For example, the monitoring indicators show a significant increase in the actions to verify the hotspots and forest fires combated by CBMPA (Table 8), during the support period of the Amazon Fund (2013 to 2019).

Table 8 - Main indicators of the project "Pará - Combatendo os incêndios florestais e queimadas não autorizadas - Pará fighting forest fires and unauthorized burning"

Indicators	Indicator description	Reference	Situation in the last year of the project (2020)
hotspots (INPE)	Number of hotspots in the state of Pará, from the reference satellite	37.221 (2012)	30.165 (2019)
	Number of hotspots in the supported municipalities of Pará, from the reference satellite	6.692 (2012)	6.375 (2019)
	Number of hotspots in the areas where the CBM of the state of Pará is most active, from the reference satellite	11.135 (2012)	9.105 (2019)
Number of hotspots verified by the CBMPA	hotspots, INPE, that were verified in loco by the Corpo de Bombeiros do Pará [Pará Military Fire Brigade] (or region covered by the project)	0 (2012)	30.165 (2019)
Forest fires directly fought by CBMPA	Forest fires or unauthorised burnings that have been successfully identified and fought by the Corpo de Bombeiros do Pará [Pará Military Fire Brigade] .	0 (2012)	2.157 (2019)
Trained Civil Servants	CBMPA employees effectively using the acquired knowledge	0 (2012)	71 (2014 a 2020)
Municipalities that will have mobilized COMDECs and NUDECs	Number of municipalities that will have mobilized COMDECs and NUDECs	0 (2012)	95 (2019)
Members of COMDEC and NUDEC members trained	Number of COMDEC and NUDEC members trained	0 (2012)	1.025 (2014 a 2020)
Number of rural producer trained to fight forest fires	Number of rural producer trained in controlled use of fire in burnings techniques, alternatives to the use of fire and forest fire prevention	0 (2012)	420 (2014 a 2020)
Military firefighters qualified to fight forest fires and gain fire expertise	Measurement of the number of Military Fire Brigade trained in courses to combat forest fires and gain fire expertise	0 (2012)	71 (2014 a 2020)

In general, the reduction in the CBMPA response time and the availability of specific equipment have made combat operations more efficient, which has made it possible to deal with a greater number of occurrences. The maintenance and sustainability of these operating gains are related to the maintenance and replacement of equipment and vehicles, which has been absorbed by the state government.

During the evaluation it was also observed that the actions carried out in the CBMPA project were aligned with the specific aims of the Plano de Prevenção, Controle e Alternativas ao Desmatamento do Estado do Pará[46]. The actions of the project, in addition to acting in a complementary manner, directly contribute to several goals and strategies envisaged.

5. Project management and monitoring

In this section, the positive points and challenges observed in relation to the structure, dedicated human resources and workflows during support implementation.

Strengths

Project management was prioritized in the high command, led by the commander-general with the support of a lieutenant colonel, a major and a captain, which strengthened the dialogue with local commanders.

In addition to these efforts, the logistical support and finance departments supported the implementation of the project. Such involvement in activities contributed to the growth of internal expertise and the CBMPA potential capacity to manage new resources within CBMPA.

The Secretaria de Segurança Pública [Public Safety Secretary] (SEGUP) supported the financial management of the project and the facilitation for the preparation of terms of reference (ToRs) and procurement. Project bids were facilitated by the immediate availability of the resources of the Amazon Fund - the CBMPA received the full funding of the project in a single payment - as well as the support of the state's bidder, which acts on the institution's behalf.

Challenges

The management was not carried out by a board or sector of CBMPA, which overloaded the high command regarding the dedication of time for such activities. For the construction of the Base Operacional de Proteção Ambiental [Environmental Protection Operational Base] (Bopa) in Marabá and the Núcleos Operacionais de Resposta Rápida [Rapid Response Operational Core] (NORRs), it was not anticipated to decide on a technical manager who could carry out a direct dialogue with the command-general on the monitoring of planned interventions, which compromised the monitoring and reporting of results.

In addition, there was low institutional coordination with state partners, for monitoring and awareness of the project, and with the project's target municipalities. In the latter case, firefighting actions were prioritized at the expense of those that would strengthen the prevention of the use of burning areas for rural production.

46. Pará (2009). Plano de Prevenção, Controle e Alternativas ao Desmatamento do Estado do Pará. 30p. Available at: http://www.amazonfund.gov.br/export/sites/default/pt/.galleries/documentos/prevencao-e-controle-do-

Despite the ready availability of funding, the project had difficulties in identifying suppliers that could provide specific products to act in the fight against fires, which caused a delay in the anticipated procurement.

The CBMPA did not know the methodologies and methods proposed by the Amazon Fund and it was difficult to have accountability for the CBMs' capacity, which was a part of the project. The payments were adjusted through elaboration, presentation and direct dialogue with the Amazon Fund team.

As evaluated, the CBMPA is undergoing a restructuring of its staff, which may be opportune to reflect on the skills development aimed at institutional links and better reachout in the themes and policies of fire fighting and prevention proposed by the state, within the scope of Política Estadual Amazônia Agora [State Policy Amazon Now] (PEAA), as well as strengthening their knowledge about project management and agreements.

6. Conclusions

Based on the results of the project "Pará combatendo os incêndios florestais e queimadas não autorizadas - Pará fighting forest fires and unauthorized burning" it is clear that the actions supported made possible for the CBMPA to be more efficient in all its monitoring, prevention and fighting of forest fires.

In the area of monitoring, the creation of the Regional Center for Monitoring, Environmental Prevention and Disasters (CRMPAD) fosters institutional integration and intelligence actions. As a result, CBMPA has access to detailed information, resulting in planning for appropriate actions in the field.

Regarding prevention, despite the efforts made to train managers and a greater territorial presence in several regions of the state, there is still a need for actions to raise awareness and train rural producers and traditional communities on the correct management of fire. Prevention is a continuous and necessary work, requiring the internalization of these actions by CBMPA. On the other hand, institutional links were strengthened through the integrated action of public bodies from different spheres of government, with the necessary mobilization of civil society aimed at preventing and fighting forest fires and burnings.

The fire fighting capability in the field was undoubtedly one positive aspect of the project. The acquisition of appropriate and specific operational resources for forest fire fighting operations generated greater efficiency in CBMPA's actions. In the period prior to the project, there were no vehicles suitable for fighting forest fires.

The project contributed to a better territorial distribution of the actions for monitoring, preventing and fighting forest fires. The operating regions were defined by the state and consider characteristics of population concentration, accessibility, complementarity and economic interdependence.

In summary, the CBMPA project has enabled greater effectiveness in the actions of monitoring, preventing and fighting deforestation resulting from forest fires and unauthorised burnings in the state, thus contributing to the general objective of the Amazon Fund of "reducing deforestation with sustainable development in the region of the Amazon".

7. Lessons learned and recommendations

	Recommendation	Actors	States	Amazon Fund	MMA	Donors
Indirect effect	Develop a spatial strategy to identify “priority areas” for the creation of new outposts to fight forest fires in the Legal Amazon, increasing territorial coverage and decreasing the response time of field firefighting.	✔	✔		✔	
	Assess the legal possibility of creating paid local brigades to assist in preventing and fighting forest fires.		✔		✔	
	Consider protected areas that are at risk of advancing fires, to prioritize initiatives to support deforestation and fire control bodies at the federal and state levels, as well as to strengthen traditional peoples and communities to consolidate their ownership to land.			✔	✔	
	Strengthen law bills or proposals that aim to punish illegal deforestation, by preventing access to rural credit, and the possibility of blocking economic exploitation of illegally deforested and cleared areas.		✔		✔	✔
Direct effect	Implement a continuous training cycle for public servants on monitoring, preventing and fighting forest fires.	✔	✔		✔	
	Carry out an extensive publicity campaign on the consequences of forest fires for the population, focusing on environmental, economic and health aspects.	✔	✔	✔	✔	✔
	Improve the monitoring of appropriate indicators of firefighting actions.	✔				
Management and Monitoring	Create working groups specialized in project management in the institutions.	✔				
	Promote project engaged agents, for aim observation, as well as for activity participation and in the dissemination of results aimed at civil society.	✔				
General	Get greater universities and research institutions involvement in the projects, collaborating with fire brigades to develop new methodologies.	✔		✔		
	Seek non-reimbursable external resources, such as those provided by the Amazon Fund.	✔				

8. Cancun Safeguards (REDD +)

Safeguard	Answer	Note
1. Actions complementary or consistent with the aims of the national forest programs and other relevant international conventions and agreements	**yes**	**The project's focus is on reducing deforestation related to forest fires and irregular burnings.**
Were the projects aligned with the PPCDAm and the state plans for prevention and control of deforestation?	yes	The actions, in addition to acting in a complementary manner, directly contribute to various goals and strategies provided for in the plans.
Which other federal public policies or international agreements did the projects align with? What aspects?	yes	National Strategy for REDD + in Brazil and Plan for the Control of Deforestation in the state.
Have the projects contributed or could they contribute directly or indirectly to reducing emissions from deforestation or forest degradation? In what way?	yes	The CBM is better equipped and with its trained staff is capable of fighting fires efficiently, preventing the fire from causing further damage and, consequently, increasing the number of emissions from deforestation or unauthorised burnings to open new areas.
2. Transparent and effective national forest governance structures, with a view to national sovereignty and national legislation.	**yes**	
To what extent have the projects promoted links between different actors (public, private, third sector or local communities)? Has shared governance been used? On what occasions?	yes	There were integrated monitoring and inspection actions, in addition to the creation of a new support base in the Legal Amazon region of the state.
To what extent have the projects contributed to strengthening public instruments and forestry and territorial management processes?	yes	
3. Respect for the knowledge and rights of indigenous peoples and members of local communities, taking into account relevant international obligations, circumstances and national laws and noting that the UN General Assembly adopted the United Nations Declaration on the Rights of Indigenous Peoples	**Not applicable**	**Not applicable**
To what extent have the projects influenced the constitutional rights associated with the formal use and ownership of land?	Not applicable	Not applicable
To what extent have the projects influenced the sustainable use of natural resources in your area?	Not applicable	Not applicable
If the projects directly benefited indigenous peoples, traditional communities or family farmers: were their socio-cultural systems and traditional knowledge considered and respected throughout the projects?	Not applicable	Not applicable
Are there any effects that interfere with the traditional way of life of these groups? What kind of effects: on the social, economic organization or the use of available spaces and resources? How do they interfere: positively, negatively or both?	Not applicable	Not applicable
4. Full and effective participation of stakeholders, in particular indigenous peoples and local communities, in the actions referred to in paragraphs 70 and 72 of Decision 1 / CP 16 .	**Not applicable**	**Not applicable**
How did the projects guarantee prior consent and the local / traditional way of choosing representatives of their beneficiaries (especially indigenous peoples and traditional communities)?	Not applicable	Not applicable
What participatory planning and management tools did the projects apply during planning and decision making?	Not applicable	Not applicable

In the case of projects with economic purposes: were any benefits from the projects accessed in a fair, transparent and equitable manner by the beneficiaries, avoiding resource hoarding?	Not applicable	Not applicable
To what extent have the projects provided the general public and their beneficiaries with free access and easy understanding of information related to its actions?	Not applicable	Not applicable
Was the project able to build a good system for monitoring results and impacts? Did the projects systematically monitor and spread out the achieved results and their effects?	Not applicable	Not applicable
5. Actions consistent with the conservation of natural forests and biological diversity, ensuring that the actions referred to in paragraph 70 Decision 1 / CP 16[47] are not used for the conversion of natural forests, but to encourage the protection and conservation of natural forests and their ecosystem services and to improve other social and environmental benefits '.	**Not applicable**	**Not applicable**
How did the projects contribute to the expansion or consolidation of protected areas?	Not applicable	Not applicable
How did they contribute to the recovery of deforested or degraded areas?	Not applicable	Not applicable
In the case of area restoration and reforestation activities, did the methods used prioritize native species?	Not applicable	Not applicable
To what extent have the projects contributed to establishing recovery models with an emphasis on economic use?	Not applicable	Not applicable
6. Actions to address the risks of REDD + results reversals.	**Partially**	
What factors constitute risks to the permanence of REDD + results? How did the projects approach them?		The increase in the number of fires associated with the increase in deforestation represents great risks. However, with better equipped CBM and with more qualified teams, the speed of response to contain fires and prevent them from spreading are important factors to ensure the results achieved.
7. Actions to reduce the displacement of carbon emissions to other areas.	**no**	
Was there a shift in emissions avoided by project actions to other areas?		

47. Decision 1/CP 16: Reducing deforestation emissions; reducing emissions from forest damage; conservation of forest carbon stock; sustainable use of forests and the increase of carbon stocks.

Cross-cutting criteria

Cross-cutting criteria		Answer	Note
Poverty reduction	To what extent have the projects contributed effectively to economic alternatives that value the standing forests and the sustainable use of natural resources?	**Partially**	Training actions in carrying out prescribed burnings enable the correct use of fire, reducing the occurrence of forest fires.
	To what extent have the projects positively influenced poverty reduction, social inclusion and improved living conditions for beneficiaries living in the area?	**Partially**	The reduction of forest fires provides better air quality conditions and reduces the chances of respiratory diseases.
	Have the projects managed to promote and increase the production of timber and non-timber forest products value chains originating from sustainable practices?	**Not applicable**	Not applicable
Gender equality	Did the projects manage to integrate gender issues into their strategies and interventions, or did they address the issue in isolation? How so?	**no**	
	Was there gender separation in data collection for project planning and monitoring?	**no**	
	How did the projects contribute to gender equality?	**no**	

Tocantins Forest Protection

Project title:	Proteção Florestal Tocantins (Tocantins Forest Protection)
Responsible body:	State of Tocantins - Corpo de Bombeiros Militar do Estado do Tocantins [Tocantins State Military Fire Brigade] (CBMTO)
Project length	2012-2019
Territorial scope (municipalities)	Araguanã, Araguaína, Aragominas, Arapoema, Bernardo Sayão, Bandeirantes do Tocantins, Carmolândia, Colinas do Tocantins, Colméia, Couto de Magalhães, Esperantina, Fortaleza do Tabocão, Guaraí, Itaporã do Tocantins, Brasilândia do Tocantins, Araguantins, Juarina, Ananás, Angico, Buriti de Tocantins, Muricilândia, Nova Olinda, Pau D'Arco, Piraquê, Presidente Kennedy, Riachinho, Santa Fé do Araguaia, São Sebastião do Tocantins, Wanderlândia, Xambioá, Pequizeiro
Beneficiaries:	Population of the state of Tocantins, especially its central-north region
Aims:	Support actions to monitor, prevent and combat deforestation due to forest fires and unauthorized burning state of Tocantins, with an emphasis on its central-north region, through training and structuring of integrated management mechanisms as well as the acquisition of materials and equipment for the a better functioning of the Batalhão de Proteção Ambiental [Environmental Protection Battalion], located in the municipality of Araguaína.
Total Project worth:	R$ 6.697.880,00
Amazon Fund support	R$ 4.958.910,00

Source: Amazon Fund / BNDES..

1. Project Summary

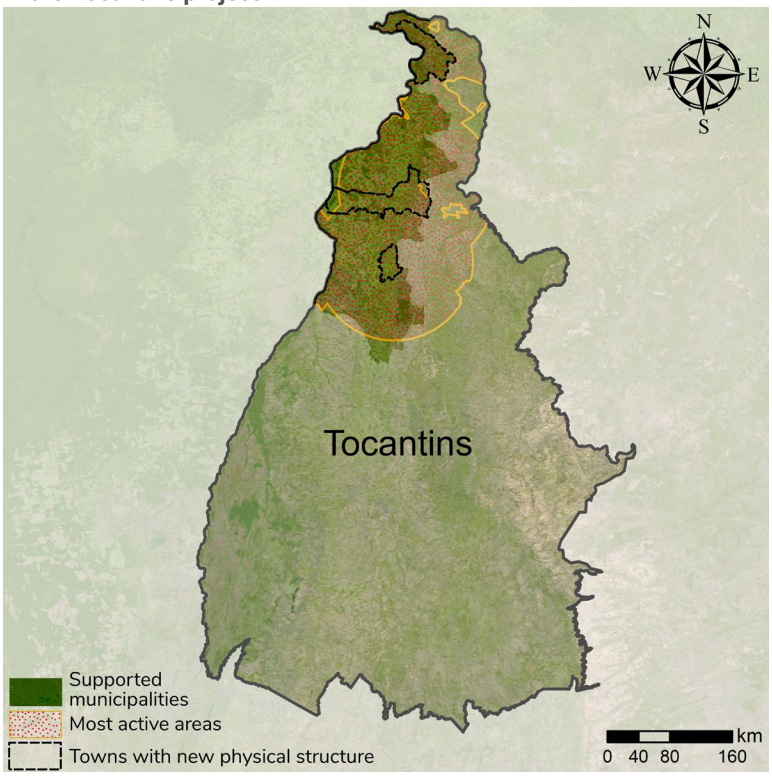
The state of Tocantins occupies an area of 277 thousand km², which represents 3.25% of the Brazilian territory, and borders Goiás, Mato Grosso, Pará, Maranhão, Piauí and Bahia. The state has 139 municipalities and its three main urban centers are: Palmas, Araguaína and Gurupi. Information from the IBGE census (2010) indicates a population of 1.38 million inhabitants, being 78.8% urban and 21.2% rural. The IBGE's population estimates[48],indicate that, in 2020, the population is 1.59 million inhabitants, which represents a demographic density of 5.73 inhabitants / km².

The "Tocantins Proteção Florestal - Tocantins Forest Protection" project sought to support efforts to monitor, prevent and fight deforestation resulting from forest fires and unauthorised burnings in the state, with an emphasis on its central-north region. The implementation of the project made it possible for the creation of the 2º Batalhão de Bombeiro Militar do Estado [2nd Military Fire Brigade], located in the municipality of Araguaína. The Colinas do Tocantins and Araguatins operational units were also created. The expansion of its operations, with units of the Corpo de Bombeiros Militar do Estado do Tocantins [Tocantins State Military Fire Brigade] (CBMTO) in these locations, provided an increase in its operational capacity and greater reach in the areas of the Amazon biome in the state.

The project supported the acquisition of a truck to transport materials and logistical support, a forestry vehicle, cars, buses, mobile fire fighting kits, forest fire fighting tools and IT items for the structuring of the CBMTO situation room.

48. Available at: https://www.ibge.gov.br/cidades-e-estados/to.html

Figure 13 - Location of supported municipalities and most active area of in the Tocantins project.

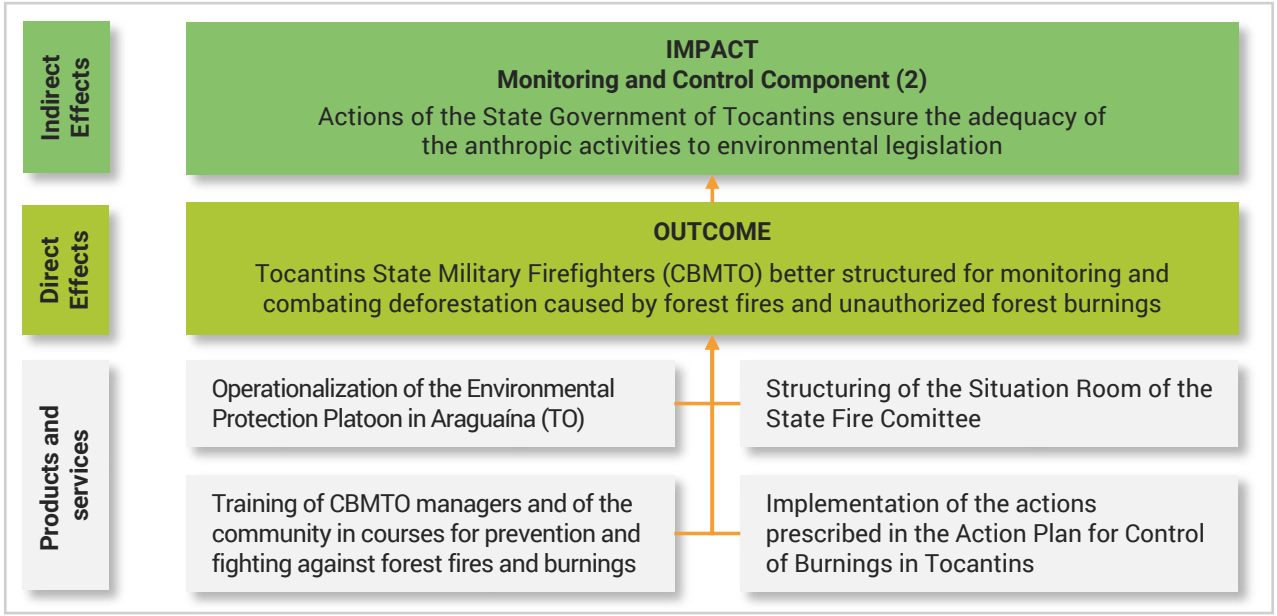


Source: Brazilian Institute of Geography and Statistics (IBGE).Self made.

2. Intervention Logic

In the logical framework of the Amazon Fund, the project is included in component 2: "Monitoring and Control", with the specific objective: "A better structured Corpo de Bombeiros Militar do Tocantins [Military Fire Brigade of Tocantins State] (CBMTO) for monitoring and combating deforestation caused by forest fires and unauthorised burnings". (Figure 14)

Figure 14 - Logical Framework Objectives Tree for the Proteção Florestal Tocantins project.



Source: Amazon Fund / BNDES. Self made.

3. Specific Methodology

The criteria and methodologies used to evaluate the effectiveness of the CBMTO project followed the procedures presented in the main part of the thematic report of the evaluation.

In the development of the work, data collection was carried out mainly through videoconferences. Initial contacts were made primarily with the current CBMTO commands. Subsequently, efforts were made to contact commanders and other officers involved in the hiring and implementation of projects. Contacts were also made with other institutions and actors directly or indirectly related to forest fires.

For the evaluation of the data on logging and hotspots (satellite reference) were adopted different levels of observation, as follows:

a. area of the entire state;
b. area of supported municipalities and;
c. areas where CBM is most active.

To define the areas where CBMTO is most active, the area within a radius of up to 100km of CBM companies or battalions in the supported municipalities was used as a criterion. The 100km distance was defined based on the information reported at the time of the interviews and on the understanding of the logistical capacity for displacement of military personnel and equipment. The areas of federal protected areas and indigenous lands were not counted, due to the existence of other institutions that operate directly in these locations.

4. Evaluation Results

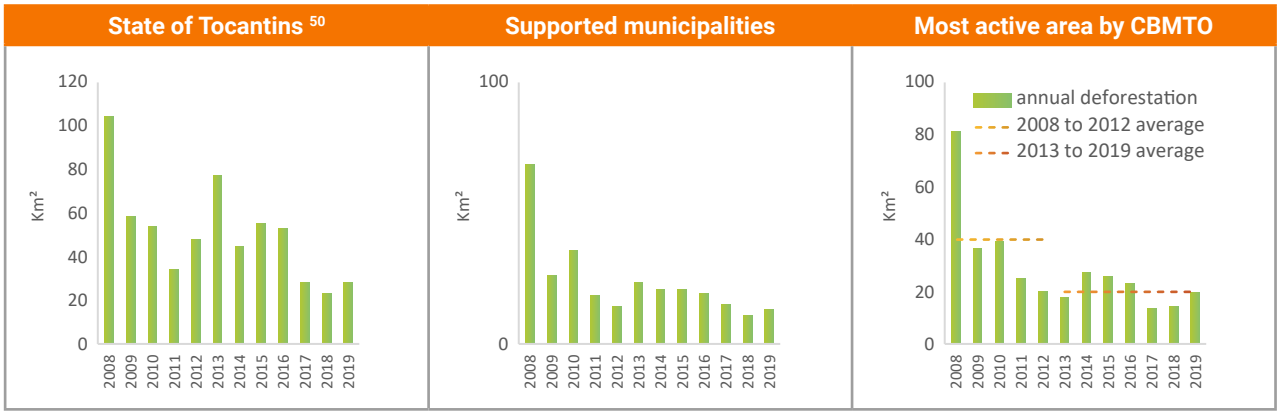
Indirect effects

In order to evaluate government actions that ensure human activities follow environmental legislation in this project, we sought to evaluate components that could estimate inspection capacities and the effective implementation of environmental policies in Tocantins. The indicator used was based on the annual deforestation rates that occurred in the total area of the state, in the areas of the supported municipalities and in those areas considered to be the most active by the CBMTO. CBM does not act directly in the fight against deforestation, but in the fight against forest fires, this indicator is observed in a complementary manner to the reflections of the project.

Based on the available data from PRODES, systematized in the Terrabrasílis Platform, deforestation rates of five years before implementation (2008 to 2012) and seven years after the project (2013 to 2019) began were observed[49] (Figure 15). In the period 2008 to 2012, which precedes support from the Amazon Fund (AF), the CBMTO's most active area had an average annual deforestation of 40 km². After implementing this support, in the years 2013 to 2019, the average deforestation was 20 km², which represents a 50% reduction.

49. The period between 200 to 2019 was defined due, exclusively, the data availability of the Inpe Platform. This data can be found in the CBMTO system for municipalities in its reach.

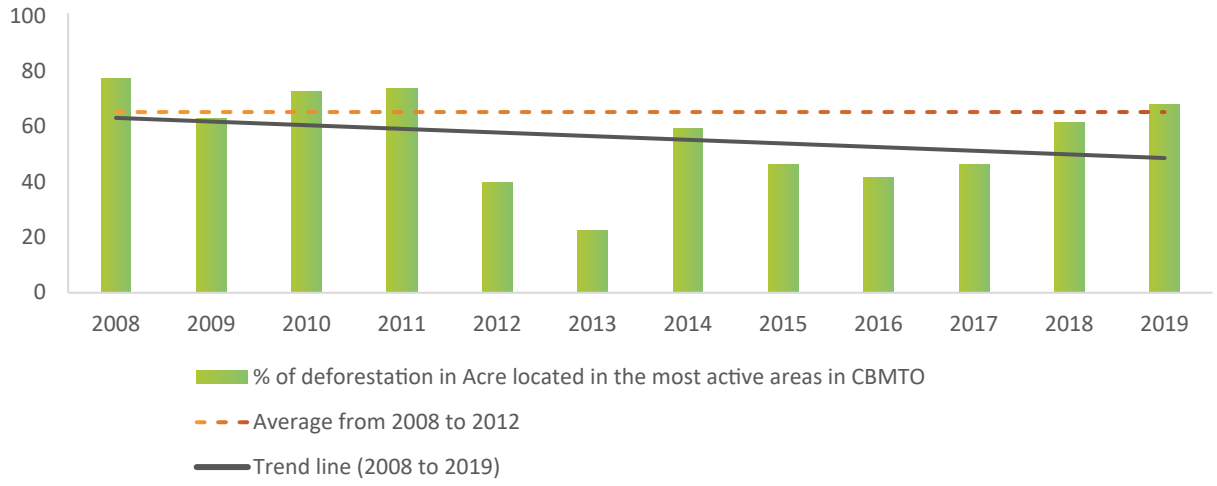
Figure 15 - Deforestation history at different levels of observation in the evaluation of the CBMTO project.



Source: Terrabrasilis / Inpe. Self made.

In the period between 2008 to 2012, which precedes support from the Amazon Fund, 65.7% of deforestation was concentrated in the area where CBMTO is most active. With the implementation of the support, in the years 2013 to 2019, there was an average reduction of 15.6% in the concentration of deforestation in the areas where CBMTO is most active (Figure 16).

Figure 16 - Percentage of deforestation in the areas where CBMTO is most active in relation to the state of Tocantins.



Source: Terrabrasilis / Inpe. Self made.

Deforestation rates for forest areas from PRODES[51] data, showed a reduction for the state of Tocantins. However, in the areas where CBMTO is most active, the reduction has a greater tendency than those registered for the state. The creation of new units and their structuring CBMTO allowed wider outreach, with a more effective presence and therefore a greater reduction in deforestation.

50. Deforestation areas from PRODES data refer to forest coverage in the Legal Amazon, more information on the methodology can be found in:http://www.obt.inpe.br/OBT/assuntos/programas/amazonia/prodes/pdfs/Metodologia_Prodes_Deter_revisada.pdf

51. Deforestation area in PRODES data, referring to forest coverage area in the Legal Amazon, more information about the methodology can be found in:http://www.obt.inpe.br/OBT/assuntos/programas/amazonia/prodes/pdfs/Metodologia_Prodes_Deter_revisada.pdf

The project also stimulated the institutional links carried out through the integrated action of public bodies from the various spheres of government with the necessary mobilization of civil society, aimed at preventing and fighting forest fires and burnings. In this context, numerous initiatives are developed, such as forest fire prevention and support operations in the monitoring and inspection initiatives carried out by other institutions. Institutions have been seeking to strengthen and improve partnerships, which has made this process sustainable and of great relevance in CBMTO's actions.

Direct effects

hotspots are important indicators for verifying trends in the increase or decrease of forest fires and burnings, which consequently makes this information a very useful tool for evaluating the direct effects of prevention and firefighting actions.

CBMTO data was evaluated at three different levels, being: (i) area of the entire state of Tocantins; (ii) area of supported municipalities; and (iii) areas where CBM is most active.

In the state of Tocantins, the average number of hotspots in the period prior to the support of the Amazon Fund (2003 to 2012) is higher than the average for the period after the implementation of the project. In the years 2013 to 2019, the number of hotspots was 13.077, representing a 15.7% reduction in hotspots after the implementation of the Amazon Fund project.

The reduction of hotspots is not only verified at the state level, but also occurs at other levels of observation. The main reduction, 29.7%, occurred in the areas where CBMTO is most active, which can be related to the creation of new units and the better structuring of CBMTO. The support of the Amazon Fund provided an increase in the number of occurrences attended, a reduction in the time for troop movements and an increase in the speed of response.

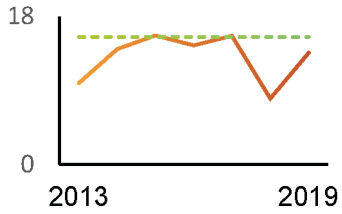
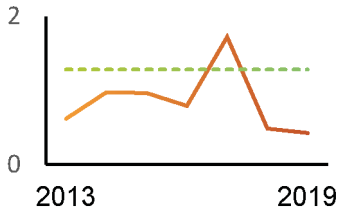
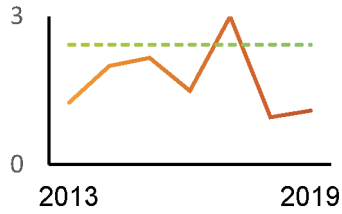
The acquisition of specific tools and equipment for operations to combat forest fires resulted in greater effectiveness of the operations. In addition to the acquisition of three specific vehicles for operations to combat forest fires, 13 4x4 trucks, 1 chest truck, 1 auto tank vehicle and 2 buses for troop transport were also acquired, which enabled greater mobility and reach for the CBMTO.

As an integral part of the project, the 2º Batalhão de Bombeiro Militar of the State of Tocantins was created, in the municipality of Araguaína. Currently, the battalion has 96 military firefighters. Additionally, the operational units of Colinas and Araguatins were created, both linked to the 2nd Battalion of CBMTO. The creation of these new units of the CBMTO, with the support of the Amazon Fund, enabled a more effective performance in the areas of the Amazon biome in the state of Tocantins.

In Table 7, the historical data of hotspots and the CBMTO evaluation graphs are reported in different levels of observation. In the graphs, the y- axis represents the hotspots of the reference satellite (in 1,000 spots), the green line represents the baseline (average from 2003 to 2012) and the red line represents the annual number of spots.

Table 7 - Baseline and history of hotspots in the CBMTO project supported by the Amazon Fund.

Observation level	Baseline[52]	2013	2014	2015	2016	2017	2018	2019	Average (13-19)[53]	Variation (%)[54]
Supported state	15.514	9.935	14.075	15.705	14.494	15.673	8.033	13.625	13.077	-15,7
Supported municipalities	1.284	621	980	966	797	1.727	490	429	859	-33,1
Most active areas	2.434	1.262	2.003	2.164	1.494	3.004	965	1.094	1.712	-29,7

Supported state	Supported municipalities	Most active areas
		

Source: BDQueimadas / Inpe. Self made.

Training efforts found in the CBMTO project included the realization of the first Protege Tocantins in 2016. The event was attended by 320 people and enabled the development of training related mainly to the proper use of firefighting techniques, management and the creation of prevention plans.

Individual protection equipment, various kits for fighting forest fires, computer and telecommunication equipment, among others, were also purchased during the support of the Amazon Fund, which allowed CBMTO to improve conditions for the development of monitoring efforts.

The strengthening of the initiatives of the Comitê Estadual de Combate a Incêndio Florestal e Controle de Queimadas do Tocantins [Tocantins State Committee of Deforestation and Burning Control and Combat] in recent years is evidence that issues related to forest fires have become an important component in the CBMTO. The monitoring indicators show a significant increase in actions to verify the hotspots and forest fires fought by CBMTO (Table 8) during the period of support from the Amazon Fund (2013 to 2019).

52. Average between 2003 a 2012 (reference satellite).
53. Average between 2013 to 2019 (reference satellite).
54. Variation between baseline and average in 13 to 19.

Table 8 - Main indicators of the "Proteção Florestal Tocantins"

Indicators	Indicator description	Reference (2011)	Situation in the last year of the project (2019)
hotspots (INPE)	Number of hotspots in the state of Tocantins, from the reference satellite	10.637 (2011)	13.625 (2019)
	Number of hotspots in the supported municipalities of Tocantins, from the reference satellite	693 (2011)	429 (2019)
	Number of hotspots in the areas where the CBM of Tocantins is most active, from the reference satellite	1.599 (2011)	1.094 (2019)
Education and awareness actions	Number of education and awareness actions - Campaigns: Education and Awareness; Mobilization and Prevention; Inspection and Firefighting	0 (2011)	1.387 (2013 a 2015)

The actions carried out in the CBMTO project are aligned with the specific objectives of the Plano de Ação para Prevenção e Controle do Desmatamento e Queimadas do Estado do Tocantins[55] [Action Plan for Prevention and Control of Deforestation and Burnings in the State of Tocantins]. The efforts of the project, in addition to acting in a complementary manner, directly contribute to several aims and the strategies envisaged.

After the support of the Amazon Fund, there was an increase in the number of cases tackled, a reduction in the time needed to deploy troops and an increase in the speed of response. The acquisition of specific tools and equipment for forest fire-fighting operations provided greater effectiveness in the operations. In the state, in addition to the acquisition of specific vehicles for operations to fight forest fires, pickup trucks were also acquired, which enabled greater team mobility, resulting in greater reach.

5. Project management and monitoring

In this section, the positive points and challenges observed in relation to the structure, human resources and workflows during support implementation will be presented.

Strengths

For project management, the CBMTO's Logistics and Property Directorate dedicated itself to the necessary processes for acquisitions. This board is composed of four soldiers, who dedicate part of their time to agreements and project management. The commander-general and unit commanders supported the management and operational needs of the work plan.

The management team had divided responsibilities for accountability, acquisitions and drafting terms of reference (ToRs), also including legal monitoring within CBM and dialogue with the budget board.

55. Tocantins (2009). Plano de Ação para Prevenção e Controle do Desmatamento e Queimadas do Estado do Tocantins, 107p. Available at: https://www.mma.gov.br/estruturas/168/_arquivos/plano_estadual_de_preveno_e_controle_do_desmatamento_do_tocantins_168.pdf.

The bids made, dedicated to items that are relevant to the CBMTO's initiatives, were facilitated in the elaboration of terms. The bids were made with the support of the Superintendência de Compras e Central de Licitações [Purchase and Procurement Superintendence].

Challenges

The management project board faced obstacles related mainly to the lack of understanding regarding the deadlines defined by the technical team of the Amazon Fund and due to the difficulties in carrying out the bidding processes and doing the necessary evaluations to monitor results.

Throughout project implementation, the brigades' expertise was optimized for better communication with the Amazon Fund, so that they could answer questions that would improve the project's accounts. Despite the bids having items used commonly in CBMTO's actions, delays were registered in the processes, resulting from difficulties in understanding the necessary deadlines. This was resolved through a stricter adherence to price registrations.

Despite the internal links, the CBMTO did not connect with state and municipal partners for awareness and follow-up actions. Thus, despite the advances in performance and internal organization, there is a need to expand its staff and reach to accompany and monitor the municipalities targeted by the project.

6. Conclusions

The CBMTO project made it possible to monitor, prevent and fight deforestation resulting from forest fires and unauthorised burnings in the state, thus contributing to the Amazon Fund's overall objective of "reducing deforestation with sustainable development in the Amazon region".

Based on the project's results, it was found that the supported actions made it possible for CBMTO to be better equipped with appropriate and specific operational resources for forest fire fighting operations. The structuring of the situation room contributed to the CBMTO's monitoring and planning activities.

The completion of the "Proteção Florestal Tocantins" - Tocantins Forest Protection project significantly contributes to the CBMTO having a more effective role in forest fire operations. The creation of new units has enabled an increase in operational capacity and greater effectiveness, especially in the areas of the Amazon biome.

7. Lessons learned and recommendations

	Recommendation	Actors	States	Amazon Fund	MMA	Donors
Indirect effect	Develop a spatial strategy to identify “priority areas” for the creation of new outposts to fight forest fires in the Legal Amazon, increasing territorial coverage and decreasing the response time of field firefighting.	✔	✔		✔	
	Assess the legal possibility of creating paid local brigades to assist in preventing and fighting forest fires.		✔		✔	
	Consider protected areas that are at risk of advancing fires, to prioritize initiatives to support deforestation and fire control bodies at the federal and state levels, as well as to strengthen traditional peoples and communities to consolidate their ownership to land.			✔	✔	
	Strengthen law bills or proposals that aim to punish illegal deforestation, by preventing access to rural credit, and the possibility of blocking economic exploitation of illegally deforested and cleared areas.		✔		✔	✔
Direct effect	Implement a continuous training cycle for public servants on monitoring, preventing and fighting forest fires.	✔	✔		✔	
	Carry out an extensive publicity campaign on the consequences of forest fires for the population, focusing on environmental, economic and health aspects.	✔	✔	✔	✔	✔
	Improve the monitoring of appropriate indicators of firefighting actions.	✔				
Management and Monitoring	Create working groups specialized in project management in the institutions.	✔				
	Promote project engaged agents, for aim observation, as well as for activity participation and in the dissemination of results aimed at civil society.	✔				
General	Get greater universities and research institutions involvement in the projects, collaborating with fire brigades to develop new methodologies.	✔		✔		
	Seek non-reimbursable external resources, such as those provided by the Amazon Fund.	✔				

8. Cancun Safeguards (REDD +)

Salvaguarda	Atende	Observação
1. Actions complementary or consistent with the aims of the national forest programs and other relevant international conventions and agreements	**yes**	**The project's focus is on reducing deforestation related to forest fires and irregular burnings.**
Were the projects aligned with the PPCDAm and the state plans for prevention and control of deforestation?	yes	The actions, in addition to acting in a complementary manner, directly contribute to various goals and strategies stated for in the plans.
Which other federal public policies or international agreements did the projects align with? What aspects?	yes	National Strategy for REDD + in Brazil , in addition to being aligned with the State's Deforestation Control Plan.
Have the projects contributed or could they contribute directly or indirectly to reducing emissions from deforestation or forest degradation? In what way?	yes	The better equipped CBMs, with better trained staff, are capable of fighting fires efficiently, preventing the fire from causing further damage and consequently increasing the number of emissions from deforestation or unauthorised burnings to spread to new areas.
2. Transparent and effective national forest governance structures, with a view to national sovereignty and national legislation.	**yes**	
To what extent have the projects promoted links between different actors (public, private, third sector or local communities)? Has shared governance been used? On what occasions?	yes	There were integrated monitoring and inspection actions, in addition to the creation of a new support base in the Legal Amazon region of the state.
To what extent have the projects contributed to strengthening public instruments and forestry and territorial management processes?	no	
3. Respect for the knowledge and rights of indigenous peoples and members of local communities, taking into account relevant international obligations, circumstances and national laws and noting that the UN General Assembly adopted the United Nations Declaration on the Rights of Indigenous Peoples	**Not applicable**	**Not applicable**
To what extent have the projects influenced the constitutional rights associated with the formal use and ownership of land?	Not applicable	Not applicable
To what extent have the projects influenced the sustainable use of natural resources in your area?	Not applicable	Not applicable
If the projects directly benefited indigenous peoples, traditional communities or family farmers: were their socio-cultural systems and traditional knowledge considered and respected throughout the projects?	Not applicable	Not applicable
Are there any effects that interfere with the traditional way of life of these groups? What kind of effects: on the social, economic organization or the use of available spaces and resources? How do they interfere: positively, negatively or both?	Not applicable	Not applicable

4. Full and effective participation of stakeholders, in particular indigenous peoples and local communities, in the actions referred to in paragraphs 70 and 72 of Decision 1 / CP 16 .	**Not applicable**	**Not applicable**
How did the projects guarantee prior consent and the local / traditional way of choosing representatives of their beneficiaries (especially indigenous peoples and traditional communities)?	Not applicable	Not applicable
What participatory planning and management tools did the projects apply during planning and decision making?	Not applicable	Not applicable
In the case of projects with economic purposes: were any benefits from the projects accessed in a fair, transparent and equitable manner by the beneficiaries, avoiding resource hoarding?	Not applicable	Not applicable
To what extent have the projects provided the general public and their beneficiaries with free access and easy understanding of information related to its actions?	Not applicable	Not applicable
Was the project able to build a good system for monitoring results and impacts? Did the projects systematically monitor and spread out the achieved results and their effects?	Not applicable	Not applicable
5. Actions consistent with the conservation of natural forests and biological diversity, ensuring that the actions referred to in paragraph 70 Decision 1 / CP 16[56] are not used for the conversion of natural forests, but to encourage the protection and conservation of natural forests and their ecosystem services and to improve other social and environmental benefits .	**Not applicable**	**Not applicable**
How did the projects contribute to the expansion or consolidation of protected areas	Not applicable	Not applicable
How did they contribute to the recovery of deforested or degraded areas?	Not applicable	Not applicable
In the case of area restoration and reforestation activities, did the methods used prioritize native species?	Not applicable	Not applicable
To what extent have the projects contributed to establishing recovery models with an emphasis on economic use?	Not applicable	Not applicable
6. Actions to address the risks of REDD + results reversals.	**Not applicable**	**Not applicable**
What factors constitute risks to the permanence of REDD + results? How did the projects approach them?	Not applicable	Not applicable
7. Actions to reduce the displacement of carbon emissions to other areas.	**Not applicable**	**Not applicable**
Was there a shift in emissions avoided by project actions to other areas?	Not applicable	Not applicable

56. Decision 1/CP 16: Reducing deforestation emissions; reducing emissions from forest damage; conservation of forest carbon stock; sustainable use of forests and the increase of carbon stocks.

Cross-cutting criteria

Cross-cutting criteria		Answer	Note
Poverty Reduction	To what extent have the projects contributed effectively to economic alternatives that value the standing forests and the sustainable use of natural resources?	**Partially**	The reduction of forest fires allows a greater source of income for producers by reducing production losses.
	To what extent have the projects positively influenced poverty reduction, social inclusion and improved living conditions for beneficiaries living in the area?	**Partially**	The reduction of forest fires provides better air quality and reduces the chances of respiratory diseases.
	Have the projects managed to promote and increase the production of timber and non-timber forest products value chains originating from sustainable practices?	**Not applicable**	Not applicable
Gender equality	Did the projects manage to integrate gender issues into their strategies and interventions, or did they address the issue in isolation? How so?	**no**	In relation to gender equality, the projects did not provide for a specific strategy for women empowerment.
	Was there gender separation in data collection for project planning and monitoring?		
	How did the projects contribute to gender equality?		

Annex 4 – Applied questionnaire

Guiding questions assist the data collection process, regardless if the data comes from primary and secondary sources or interviews. The following are the guiding questions suggested according to the evaluated Project, raised in a preliminary manner.

Criteria	Guiding question	Acre	Mato Grosso	Pará	Tocantins
Relevance	Were the results obtained relevant for improving the fight against deforestation resulting from forest fires and unauthorised burnings?	✔	✔	✔	✔
	Did the results obtained contribute to the reduction of greenhouse gas emissions?			✔	✔
	What is the project's impact in improving the monitoring, prevention and fighting of forest fires and unauthorised burnings in the project's regions?	✔	✔	✔	✔
Effectiveness	Did the project fulfill its proposed aims? Was there a reduction or improvement in the response time to forest fires and unauthorised burnings?	✔	✔	✔	✔
	Were the activities carried out directly related to the project's main aims?	✔	✔	✔	✔
	What factors influenced the practical implementation of the project to achieve its aims?	✔	✔	✔	✔
	Was the relationship between the institutions involved a positive factor for the project's effectiveness?	✔	✔	✔	✔
Efficiency	What is the cost-benefit ratio of the activities carried out? Is it possible to identify which had the best and worst cost-benefit ratio?	✔	✔	✔	✔
	Was the project able to carry out all planned activities? If not, for what reasons?	✔	✔	✔	✔
	Is it possible to measure how efficient the results of the project were in combating deforestation due to forest fires and unauthorised burnings? Are there any metrics that can be monitored?	✔	✔	✔	✔
Impact	Has there been an improvement in internal processes due to managers' training at the main institutions?	✔	✔	✔	✔
	How did training managers from partner institutions influence the results of the project?		✔		
	Since a large part of the equipment was related to fire prevention and control, what were the impacts on monitoring activities?	✔	✔	✔	✔
	What impacts were caused by the project in the implementation region? Were the results assimilated by implementing agents, associations and communities?	✔	✔	✔	✔

Sustainability	Are the results obtained sustainable after the end of the project?	✔	✔	✔	✔
	Is it possible to estimate how long the project results will still have an impact on monitoring, preventing and fighting forest fires?	✔	✔	✔	✔
	To what extent was the project's sustainability considered in action planning? Was equipment maintenance accounted for and incorporated into the institutions' budget?	✔	✔	✔	✔
Gender equality	Did the project consider gender issues in its implementation strategy? How so?	✔	✔	✔	✔
Poverty Reduction	Did the impacts of the projects help to generate local income?	✔	✔	✔	✔
	Has there been any action to discourage forest fires and encourage economic alternatives that value standing forests and the sustainable use of natural resources?	✔	✔	✔	✔
REDD + Safeguards	Did the projects have any alignment with the PPCDAm and with the state plans to prevent and combat deforestation? Such has?	✔	✔	✔	✔
	Have the results of the projects been internalized in some way in public management processes to combat deforestation?	✔	✔	✔	✔
	How was the reduction in greenhouse gas emissions due to the project's results estimated?			✔	✔

Annex 5 — List of Interviewees

Interviewees	Organization	Role (during project)	Role (during evaluation)
André Luís Torres Baby	SEMA MT	Secretary of Environment	Outside consultant
Aristotales Barros de Medeiros	INCRA AC		
Carlos Edgard de Deus	SEMA AC	Secretary of Environment	Professor UFAC
Cassiana Moreira	GIZ	GIZ Technical Advisor in Cerrado/Jalapão cooperation (TO)	IBAMA Contract
Coronel Arthur	CBM PA		
Coronel BM Alessandro Borges Ferreira	CBM MT	General Commander	General Commander
Coronel BM Aluisio Metelo Junior	CBM MT		
Coronel BM Carlos Batista	CBM AC	Monitoring overseer captain	General Commander
Coronel BM Flávio Ferreira Pires	CBM AC	General Commander	Retired
Coronel BM Flávio Gledson Vieira Bezerra	CBM MT	Military trained for air operations	Commander of the [Environmental Emergency Battalion] Batalhão de Emergências Ambientais – BEA
Coronel BM Hayman Apolo Gomes De Souza	CBM PA		General Commander
Coronel BM Paulo André da Silva Barroso	CBM MT	General Commander	
Coronel BM Vanderlei Bonoto Cante	CBM MT	Responsible for the operation related to forest fires	Deputy Commander-in-Chief of the Military Fire Brigade (CBM)
Elaine Corsini	SEMA MT	Environmental analyst	Environmental analyst
Fábio Plotkowisc	BNDES	Project Manager	Another area at BNDES
Foster Brown	UFAC	Professor and researcher	Professor and researcher
Gabriel Constantino Zacharias	IBAMA	Centro Nacional de Prevenção e Combate aos Incêndios Florestais [National Center for Forest Fire Prevention and Combat] (Prevfogo)	Centro Nacional de Prevenção e Combate aos Incêndios Florestais [National Center for Forest Fire Prevention and Combat] (Prevfogo)
Jair Shmitt	IBAMA	General Coordinator of Environmental Inspection at IBAMA. Director of the [Department of Forests and Deforestation Combat at the Environment Ministry] Departamento de Florestas e de Combate ao Desmatamento no MMA	Environmental analyst
João Paulo Morita	ICMBio		Works in the Coordenação de Prevenção e Combate a Incêndios [Fire Prevention and Combat] - Coin

Lara Steil	IBAMA	Secretary of Environment	Outside consultant
Major Leonardo Gomes Coelho	CBM TO		
Major Tavares	CBM PA	Project manager	
Maria Gertrudes Alves de Oiveira	SEGUP PA	Manager at the Secretary of Public Security	Retired
Marlene Fátima Lima	Aprosoja – MT		Social and Environmental Sustainability Manager
Mauro Pires	ICMBio	DPCD MMA	
Pedro Ivo	BNDES	Project technician	Another area at BNDES
Rubens Pereira Brito	SEMARH TO	Environment Director at SEMARH TO	Inspetor Florestal no Instituto NATURATINS [Forest Inspector at NATURATINS Institute]
Tenente-coronel BM Sulemar Barroso	CBM AM	CBMAM Health Director Lieutenant Colonel	Comandante do Batalhão de Incêndio Florestal e Meio Ambiente [Forest Fire and Environment Commander] (Bifma)
Tenente-Coronel BM Peterson Queiroz Ornelas	CBM TO	Defesa Civil do TO [Tocatins State Civil Defense]	Director of Biodiversity and protected areas - NATUTATINS
Vera Reis Brown	SEMA AC	Technical director of the Instituto de Mudanças Climáticas [Institute of Climate Change] - IMC (2015 a 2018)	SEMA Executive Director

Annex 6 – Terms of reference (ToR)

Project:	Cooperation with the Amazon Fund / BNDES
PN:	15.2132.7-001.00
Output + activity:	3 + 3.5
Technician in charge:	Bernardo Anache
Objective:	Evaluate the effectiveness of four projects to fight forest fires and unauthorized burning in the scope of the Amazon Fund/BNDES

Evaluation of the Effectiveness of projects to fight forest fires and unauthorized burning in the scope of the Amazon Fund/BNDES

1. INTRODUCTION AND GENERAL INFORMATION

Within the scope of the cooperation project between Deutsche Gesellschaft für Internationale Zusammenarbeit GmbH (GIZ) and the BNDES/Amazon Fund, one of the actions supported by GIZ is the ex-post effectiveness evaluation of completed projects that were supported by the Amazon Fund, with the objective of giving visibility to the results and lessons learned from these projects, in addition to promoting institutional learning for the Amazon Fund itself. In addition, the evaluation of closed projects is a demand from donors and international cooperation actors for monitoring and evaluation actions, through an external and independent evaluation.

To date, eleven completed projects have been evaluated, and the results are publicly available on the Amazon[57] Fund website. The next projects to be evaluated, and object of the present Term of Reference (TdR), fit into the component "Governmental actions ensure the adequacy of anthropic activities to the environmental legislation, according to its objectives tree[58]".

It is also important to note that in 2019 the mid-term evaluation of the effectiveness of the Amazon Fund[59] was carried out , covering the period from 2008 to 2018. The evaluation was conducted by a team of independent consultants, with the technical coordination of the Economic Commission for Latin America and the Caribbean - ECLAC, of the United Nations (UN). Concomitantly to the evaluation, two complementary thematic studies were prepared, which served as inputs for the evaluation, being a study dedicated to the Distribution of Amazon Fund Benefits and another, dedicated to the Rural Environmental Registration (CAR) projects supported by the Amazon Fund.

57. Available at: http://www.fundoamazonia.gov.br/pt/monitoramento-e-avaliacao/avaliacoes-externas/

58. Available at: http://www.fundoamazonia.gov.br/export/sites/default/pt/.galleries/documentos/monitoramento-avaliacao/arvore_de_objetivos_FA_2018.pdf

59. Available at: http://www.fundoamazonia.gov.br/pt/monitoramento-e-avaliacao/avaliacoes-externas/

To understand the results and impacts achieved and identify possible ways to improve the efficiency of projects to fight forest fires and unauthorized burning, this ToR aims at conducting a joint evaluation of four closed projects that fall under this component, which are:

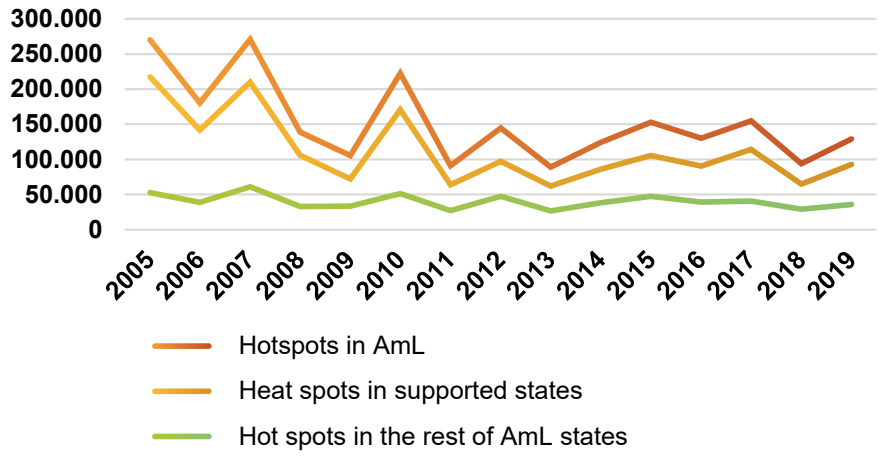
- Tocantins Forest Protection,
- Acre: Zero Forest Fires,
- Mato Grosso Forest Firefighters and
- Pará fighting forest fires and unauthorized burning.

The purpose of this ToR is to evaluate the closed projects of the Amazon Fund, within the scope of support for initiatives that had the objective of contributing to the reduction of greenhouse gas emissions from unauthorized burning and forest fires. The support to the four projects totaled a financial amount of R$ 47.6 million.

1.1. Background of the projects

Despite the reduction in deforestation over the last few years, the states involved in the evaluation, Tocantins, Acre, Mato Grosso, and Pará, correspond to at least 76% of the deforested areas[60] since 2004, highlighting the states of Mato Grosso and Pará that are responsible for 77% on average. The same occurs with respect to the number of hotspots[61], these states are responsible for 72% of the hotspots in the Amazon between 2005 and 2018, highlighting Mato Grosso and Pará with 68%.

Monitoring of active fires in the Legal Amazon (AmL), from 2005 to 2019.



Source: own preparation with data from BDQueimadas/Inpe.

Common to this scenario is the occurrence of burnings and forest fires, related to dry periods and the use of fire in productive activities, fire being a common element in rural practice, in which it is used to clear recently deforested areas or pastures. However, this fire often escapes the control of the person who started it and consequently becomes a wildfire. In cases of drought, the scenario can be worse, because the low humidity favors the advance of fires over the forests. The occurrence of fire can also be identified as one of the stages for

60. Source: Prodes/Inpe. Available at: http://www.obt.inpe.br/OBT/assuntos/programas/amazonia/prodes
61. Source: BDQueimadas/Inpe Available at: http://queimadas.dgi.inpe.br/queimadas/bdqueimadas/

illegal deforestation and land grabbing[62], when after cutting down trees, fire is used to open new areas for agriculture and cattle raising. It can be observed that the hotspots identified by Inpe are concentrated, mainly, in the states supported by the Amazon Fund. The rest of the Amazon concentrates about 28% of the hotspots.

The main drivers of deforestation are common to the target states of the projects to be evaluated, with agricultural and cattle raising activities standing out. For example, cattle ranching is common, as is grain agriculture, where the growth of soybean cultivation stands out.

Based on the 2006 and 2017 Agricultural Censuses, the growth of agricultural and ranching activities in the Amazon is highlighted, notably cattle ranching and soybeans, which are the main vectors responsible for the advance of deforestation and the consolidation of exploited areas. Thus, an increase of 9% in cattle ranching in the Amazon was registered, while for the rest of Brazil, there was a decrease of -7.6%. In relation to the area planted with soy, there was an 81.4% growth in the Amazon, with the areas of Tocantins and Maranhão standing out. For the rest of Brazil, the growth was 47%. Thus, a scenario of consolidation of exploited areas is observed, first for livestock and later for grains such as soy[63].

In this same period, there was a 63% growth of the arable area in the Amazon, consolidating 135 thousand km². The area of pastures, on the other hand, is 679,000 km² in 2018, with a 15% growth between 2005 and 2018. There was an increase in the area of planted forests in the Amazon from 469 km² in 2005, reaching 1,688 km² in 2018[64]. It can be seen that the expansion of the area dedicated to agriculture and cattle ranching is much faster than the reforestation and recovery of degraded areas.

The projects to be evaluated have as main focus to support the states, having the Military Fire Department (CBM) as executors, with the general objective of reducing greenhouse gas emissions, strengthening the monitoring, prevention, and combat of deforestation, unauthorized burning, and forest fires in the states,

Some of the projects were also dedicated to acquiring equipment for the Battalions, training local actors to monitor, prevent, and fight forest fires and wildfires, and training officers in surveying, auditing, and environmental management.

The projects are inserted in the state strategies to combat forest fires and illegal burning, foreseen in the State Plans for Prevention, Control and Alternatives to Deforestation (PPCDs), which in turn have the objective of ensuring compliance with the targets foreseen in the Action Plan for Prevention and Combating Deforestation in the Legal Amazon (PPCDAm). In the next topic, there is a description of the supported projects.

62. Land grabbing is the illegal practice of taking possession of public or third-party vacant land by falsifying documents, done by forging documents with crickets, which in turn contribute organically to giving such documents an aged appearance.

63. Source: Agricultural Census 2006 and 2017. IBGE. Available at: https://sidra.ibge.gov.br/pesquisa/censo-agropecuario/censo-agropecuario-2017.

64. Source: MAPBIOMAS. Cover: area data (ha) of land cover and land use by biome, state and municipality from 1985 to 2018. Available at: https://mapbiomas.org/download_estatisticas?cama_set_language=pt-BR and https://mapbiomas.org/downloads_referencia?cama_set_language=pt-BR

1.2. Summary of the projects

Project Title	Responsible Agency (Project and Financial Management)	Project period	Amount of support from the Amazon Fund	Goal	Territorial scope: municipalities
Acre: Zero Forest Fires	State of Acre/Military Fire Brigade of the State of Acre (CBMAC)	Q3 2012 to Q4 2016	R$13.280.709,56	To support the monitoring, prevention, and combat actions against deforestation resulting from forest fires and unauthorized burning in the state of Acre.	Cruzeiro do Sul, Tarauacá Manoel Urbano, Rio Branco, Brasiléia
Mato Grosso Forest Firefighters	Mato Grosso State Fire Department (CBMMT)	Q3 2012 to Q1 2017	R$12.518.230,09	To support the monitoring, prevention, and combat actions against deforestation resulting from forest fires and unauthorized burning in the state of Mato Grosso, through training and acquisition of aircraft, vehicles, and support equipment for the Air and Land Operations Base of the Military Fire Department of the state of Mato Grosso, located in the city of Sorriso.	Sinop, Alta Floresta, Feliz Natal, Marcelândia, Nova Santa Helena, Sorriso, Peixoto de Azevedo, União do Sul, Santa Carmen, Vera, Matupá, Ipiranga do Norte, Cláudia, Colíder, Itaúba
Pará Fighting Forest Fires and Unauthorized Burning Amazon Biome	Pará State (Military Fire Department of Pará State)	4th quarter 2013 to 1st quarter 2020	R$16.830.280,00	To support the monitoring, prevention, and combat actions against deforestation resulting from forest fires and unauthorized burning in the state of Pará, through the physical and operational structuring of the Military Fire Department units.	Altamira, Castanhal, Itaituba, Parauapebas, Paragominas, Maraba, Tucurui, Santarém, Redenção, Abaetetube
Forest Protection Tocantins	Tocantins State	Q4 2012 to Q2 2019	R$ 4.958.910,00	To support actions for monitoring, preventing and fighting deforestation caused by forest fires and unauthorized burning in the state of Tocantins, with emphasis on the north-central region, through training, the structuring of integrated management mechanisms and the acquisition of materials and equipment for the Environmental Protection Battalion, located in the city of Araguaína	Araguanã, Araguaína, Aragominas, Arapoema, Bernardo Sayão, Bandeirantes do Tocantins, Carmolândia, Colinas do Tocantins, Colméia, Couto de Magalhães, Esperantina, Fortaleza do Tabocão, Guaraí, Itaporã do Tocantins, Brasilândia do Tocantins, Araguantins, Juarina, Ananás, Angico, Buriti de Tocantins, Muricilândia, Nova Olinda, Pau D'Arco, Piraquê, Presidente Kennedy, Riachinho, Santa Fé do Araguaia, São Sebastião do Tocantins, Wanderlândia, Xambioá, Pequizeiro

2. PURPOSE AND OBJECTIVES OF THE EVALUATION

The main objective of the evaluation of the projects is to measure the results achieved, their effects, and the sustainability of the changes generated by their implementation, in addition to assessing the effectiveness of the four projects to fight forest fires and unauthorized burning in the scope of the Amazon Fund/BNDES

All projects supported by the Amazon Fund follow an individualized logical framework in which are defined results (products and services to be delivered or outputs), direct effects of the intervention (specific objectives or outcomes) and indirect effects (general objectives or impacts) to be achieved. This is the project's intervention logic, also called theory of change, as it represents a model of thinking that explains how the project is expected to bring about a desired change. The logical frameworks of the projects can be visualized in topic 3.2 or on the website of the Amazon Fund[65].

The specific objectives of this evaluation are:

- To assist the Amazon Fund in rendering accounts to its donors about the type of project supported and its effects;
- To enable the institutional learning of the Fund itself, contributing to improve the quality of the projects and the prioritization of the investments, thus subsidizing the decision making process;
- Verify the compliance of the projects supported by the Amazon Fund with the Cancun safeguards agreed upon under the UNFCCC for REDD+ actions;
- Verify the alignment of the projects with the PPCDAm[66] and the state plans for prevention and control of deforestation;
- Analyze the strengths and weaknesses of the project intervention;
- Identify challenges and lessons learned; and
- To see to what extent the project is relevant, efficient, effective, sustainable, and generates impacts.

2.1. Task description: object and focus of the evaluation

To achieve the objectives identified in the previous topic, the target projects of this evaluation will be observed, implemented between 2012 and 2020, in the states of Tocantins, Acre, Mato Grosso and Pará. Thus, the focus of the evaluation is the intervention areas of the projects and the observation of their direct and indirect effects explained in the objectives trees presented in the following topic (3.2). Thus, the following worked results should be observed:

65. Source: http://www.fundoamazonia.gov.br/pt/home/
66. Action Plan for Prevention and Control of Deforestation in the Legal Amazon - PPCDAm.

a. Contributions to monitoring and combating deforestation in general;
b. Structure the Military Fire Department (CBM) to monitor and combat deforestation caused by forest fires and unauthorized burning (indirect effect of the projects);
c. Strengthen the fire outbreak identification capacity of the CBM and state partners;
d. Strengthen the capacity to identify Forest Fires or unauthorized burning identified by the CBM and state partners;
e. Strengthen the capacity to fight forest fires or unauthorized burning by the CBM and state partners;
f. Train CBM's human resources in graduate courses for environmental management and sciences;
g. Train state partners in firefighting techniques;
h. Empower and train civilian fire brigades;
i. Expand the CBM's territorial coverage area.

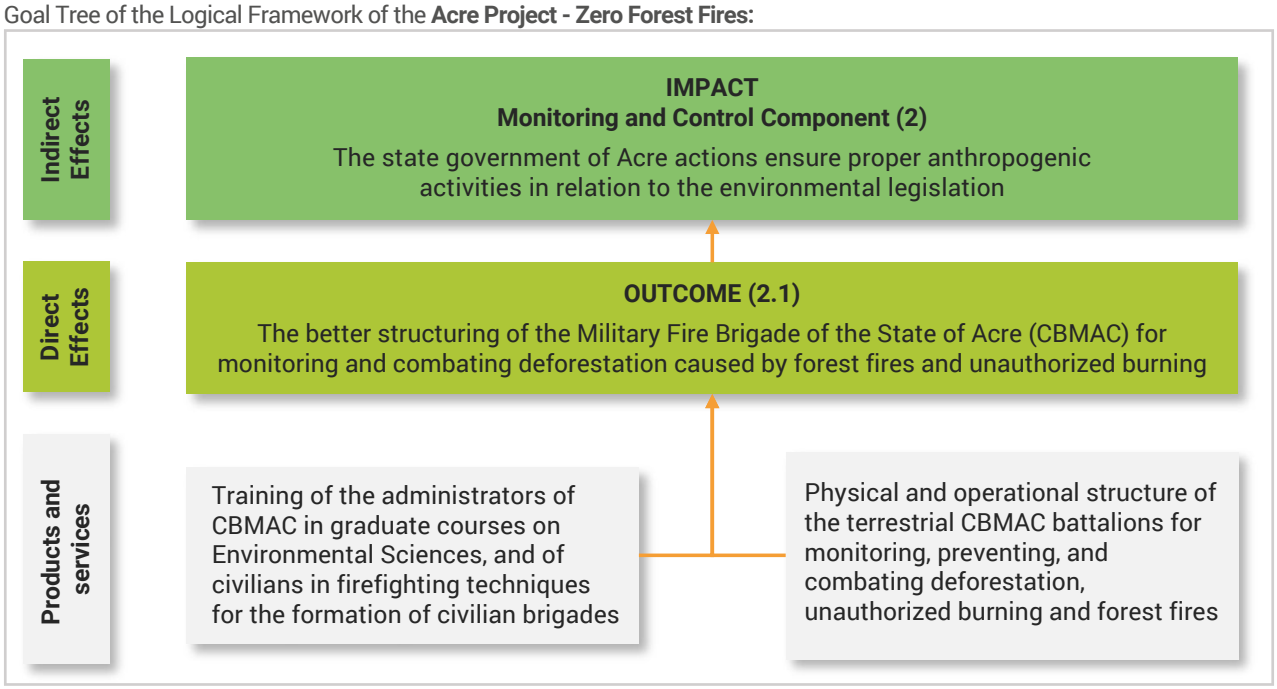
In addition, the scope of the indicators that should be monitored for the projects, within the scope of the Amazon Fund, should be observed in the following themes: monitoring and verification capacity; firefighting and; forest or rural fire prevention and dissemination of alternative methods, based on data from production sectors in the Environmental Secretariats (SEMA), Agricultural Secretariats and technical assistance and rural extension agencies (ATER) and; identify rural production units that use alternative methods. These observations can be guided by the work already done with such projects in the scope of the Guide for monitoring the impacts of projects by the military fire departments[67].

2.2. The intervention logic

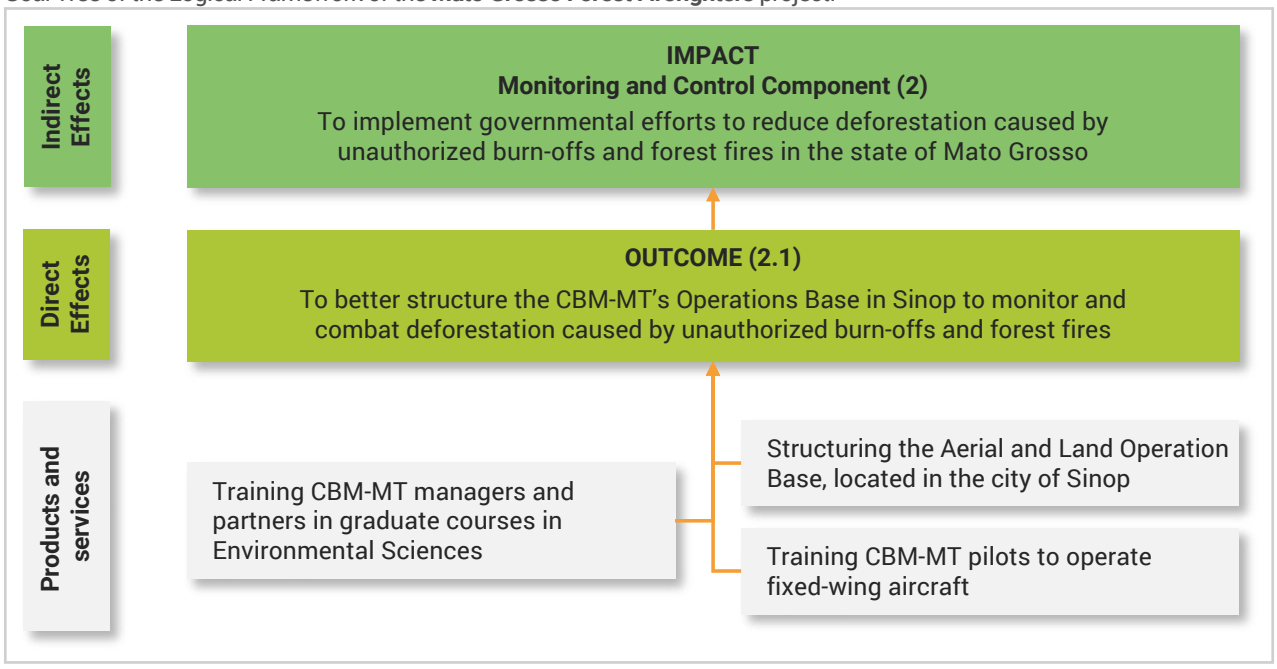
The logical frameworks of the projects discussed at the beginning of this section give rise to the project's objectives tree, which presents the indirect and direct effects and products and services of each one, thus facilitating the visualization for its monitoring and evaluation. Below are the objectives trees of the projects to be evaluated.

67. Available at: http://www.fundoamazonia.gov.br/export/sites/default/pt/.galleries/documentos/monitoramento-avaliacao/Guia_Monitoramento_Impactos_Projetos_Bombeiros.pdf.

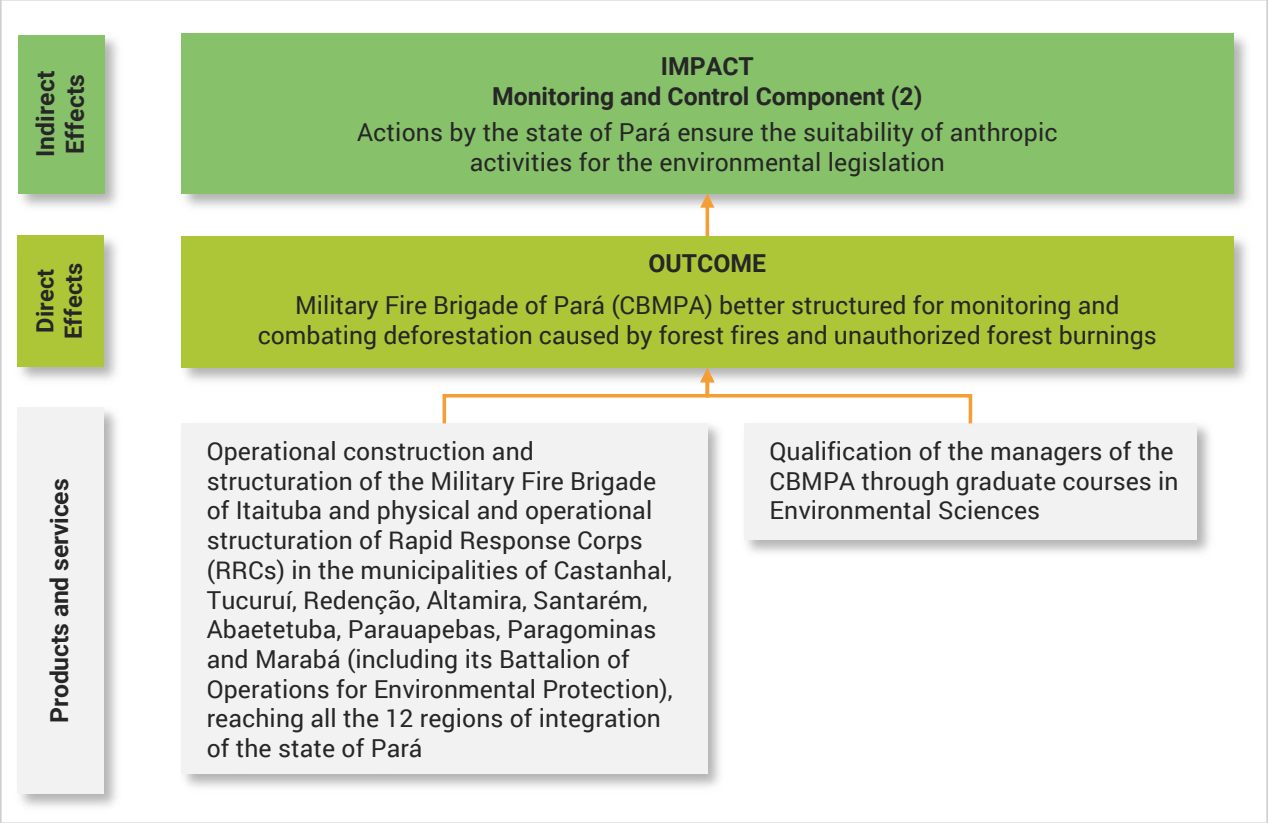
Goal Tree of the Logical Framework of the **Acre Project - Zero Forest Fires:**



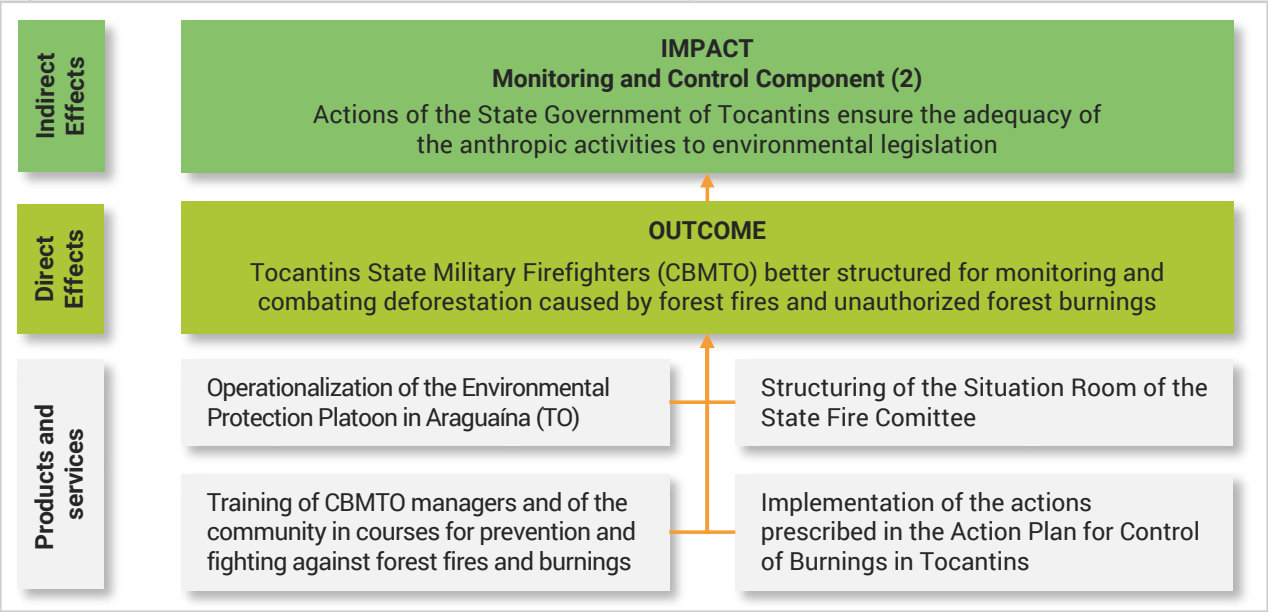
Goal Tree of the Logical Framework of the **Mato Grosso Forest Firefighters** project:



Goal Tree of the Logical Framework of the **Pará Combating Forest Fires and Unauthorized Burning** project:



Logical Framework Goal Tree for the **Tocantins Forest Protection** project:



2.3. Key questions and evaluation criteria

The effectiveness evaluation of the projects Forest Protection Tocantins, Acre: zero forest fires, Mato Grosso and Pará Forest Firefighters fighting forest fires and unauthorized burning will follow the guidelines and criteria specified in the document "Effectiveness Evaluation of the projects supported by theAmazon Fund - Conceptual Framework[68]".

68. http://www.fundoamazonia.gov.br/export/sites/default/pt/.galleries/documentos/monitoramento-avaliacao/FA_Marco_Conceitual_Avaliacao_Efetividade_Projetos_2016.pdf

These criteria are based on the Organization for Economic Cooperation and Development (OECD) and Reducing Emissions from Deforestation and Forest Degradation (REDD+) safeguards, which were defined by the Framework Convention (in Annex I of Decision 1/CP 1641 and the guidelines of Decision 12/CP 17), and on the selected cross-cutting criteria. Each criterion adopts a basic script of guiding questions to be applied and answered in the evaluation of the projects and that should be complemented in the Effectiveness Evaluation Design Report (1st Product to be presented by the evaluation team), as the evaluation team deems necessary. Since two different projects will be evaluated in this evaluation, the guiding questions that make sense according to the objectives of each project will be selected, and these can be complemented by project-specific questions if deemed necessary.

Below is the summary table of criteria and their guiding questions:

2.3.1. OECD Criteria, Crosscutting Themes and Evaluation Questions

Criteria	Guiding questions
Relevance	• To what extent are the objectives of the project still valid at the time of its completion? • Are the activities and immediate results of the project consistent with the achievement of the objectives defined for the project? • Are the project's activities and immediate outputs consistent with the expected outcomes and impacts?
Effectiveness	• Have the direct (specific) objectives of the project been or will they be met? • What are the main factors that influence the achievement or not of the direct (specific) objectives?
Efficiency	• What is the cost-benefit ratio of the activities performed? • Are the means applied in a reasonable relation to the results obtained? • Were the objectives achieved on time? • Are there alternative ways to get the same results with less cost/means?
Impact	• What were the main changes generated as a result of the project? • What main effects were achieved that contributed to the achievement of the goal? • What actions or events external to the project contributed to the achievement of the observed changes? • Has the project made any difference for the beneficiaries? • Does the project have scale in the region or influence other initiatives?
Sustainability	• To what extent do the benefits of the project endure after the Amazon Fund financing ends? • What were the main factors that influenced the achievement or not of the project's sustainability? • What risks must be monitored to ensure the sustainability achieved?
Cross-cutting criteria	
Poverty reduction	• To what extent has the project positively influenced the reduction of poverty, the social inclusion, and the improvement in the living conditions of the beneficiaries living in your area of operation?
Gender Equity	• Has the project managed to integrate gender issues in its strategies and interventions or has it dealt with the issue in isolation? How? • Was there gender separation in data collection for project planning and monitoring? • How has the project contributed to gender equity?

2.3.2. REDD+ Safeguards and Evaluation Issues

Criteria	Guiding questions
1. Actions complementary to or consistent with the objectives of national forest programs and other relevant international conventions and agreements	• Has the project proved to be aligned with the PPCDAm and the state plans for prevention and control of deforestation? • To which other federal public policies or international agreements has the project demonstrated alignment? In which aspects? • Has the project contributed or could it contribute directly or indirectly to reducing emissions from deforestation or forest degradation? In what way?
2. Transparent and effective national forest governance structures in view of national sovereignty and national legislation.	• To what extent has the project promoted articulation among various actors (public sector, private sector, third sector, or local communities)? Was use made of instances of shared governance? Which ones? • To what extent has the project contributed to strengthening public instruments and processes for forest and land management?
3. Respect for the knowledge and rights of indigenous peoples and members of local communities, taking into account relevant international obligations, national circumstances and laws, and noting that the UN General Assembly has adopted the UN Declaration on the Rights of Indigenous Peoples.	• To what extent has the project influenced the constitutional rights associated with formal land tenure and destination in your area? • To what extent has the project influenced the sustainable use of natural resources in your area? • If the project had indigenous people, traditional communities or family farmers as direct beneficiaries: were their socio-cultural systems and traditional knowledge considered and respected throughout the project? • Are there effects that interfere with the traditional way of life of these groups? What kind of effects: on social and economic organization or on the use of available spaces and resources? In what way do they interfere: positively, negatively, or both?
4. Full and effective participation of stakeholders, in particular indigenous peoples and local communities, in the actions referred to in paragraphs 70 and 72 of Decision 1/CP 16	• How did the project guarantee the free, prior, and informed consent, and the local or traditional way of choosing the representatives of its beneficiaries (especially indigenous peoples and traditional communities)? • Which participatory planning and management tools did the project apply during the decision making process? • In case of projects with economic purposes: were any benefits resulting from the project accessed in a fair, transparent and equitable way by the beneficiaries, avoiding a concentration of resources? • To what extent has the project provided the general public and its beneficiaries with free access and easy understanding of the information related to the project's actions? • Has the project succeeded in setting up a good system for monitoring results and impacts? Did the project systematically monitor and disseminate the realized results and their effects?
5. Actions consistent with the conservation of natural forests and biological diversity, ensuring that the actions referred to in paragraph 70 Decision 1/CP 16[69] are not used for the conversion of natural forests, but rather to encourage the protection and conservation of natural forests and their ecosystem services and to enhance other social and environmental benefits	• How has the project contributed to the expansion or consolidation of protected areas? • How did you contribute to the conservation of natural forests and biodiversity? • Were the investments in income generation projects proportional to the increase in areas under management and did they effectively contribute to avoid deforestation? • Has the project contributed to the recovery of deforested and/or degraded areas? • In the case of restoration and reforestation activities, did the methodologies employed prioritize native species? • To what extent has the project contributed to establishing recovery models with emphasis on economic use?
6. Actions to address risks of reversals in REDD+ results	• What factors pose risks to the permanence of REDD+ results? How has the project addressed them? Is there a strategy for continuous monitoring of these results?
7. Actions to reduce the displacement of carbon emissions to other areas	• Was there displacement of emissions avoided by the project's actions to other areas?

69. Decision 1/CP 16: Reducing emissions from deforestation; reducing emissions from forest degradation; conservation of forest carbon stocks; sustainable management of forests and enhancement of carbon stocks.

3. METHODOLOGY

The methodology to be applied in the evaluation must be based on the criteria and objectives contained in the document "Effectiveness Evaluation of Projects Supported by the Amazon Fund - Conceptual Framework".

The following products are expected to be generated: ***the Evaluation Design Report*** and the ***Effectiveness Evaluation Report of the projects Forest Protection Tocantins, Acre: zero forest fires, Mato Grosso and Pará Forest Firefighters fighting forest fires and unauthorized burning***. And also, in an intermediate stage, a ***Preliminary Effectiveness Evaluation Report***, a product to be used in the Consultation Round.

Below is the proposed methodology for each phase and its respective stages:

3.1. Preparation Phase

In this phase, you must define the objectives and plan the evaluation of the projects. After preparing the ToR and hiring the team of evaluators, key documents must be organized. To do so, the documents, data, and reports that will be used to conduct the evaluation must be identified, together with the BNDES and the organization responsible for executing the project. The evaluation team will systematically collect data from secondary sources, which aims to compose a "memorandum" that will serve as a reference source, leveling and aid-memory of all information related to the projects to be evaluated.

Next, a methodological proposal should be developed for the joint evaluation of the four projects, since this is the first evaluation in the scope of component 2 of the Fund. The methodology should be based on the document "Effectiveness Evaluation of Projects Supported by the Amazon Fund - Conceptual Framework", including survey methods that contribute to the understanding of the effectiveness of the projects according to the reality of each one of them; indications for options of the best places for field missions (considering the places with higher and lower effectiveness); previous analysis of the dialogue and risks between the effectiveness indicators of the projects and those of component 2 of the Fund and the list of actors to be interviewed, all these methodological elements should be detailed in the Effectiveness Evaluation Design Report, detailed in the next topic (3.2).

3.2. Implementation Phase

Evaluation design and tools. The Effectiveness Evaluation Design Report to be prepared by the evaluation team should present the evaluation work script, the detailed methodology, the choice of the field areas to be visited, and the tools that will be used during the evaluation work. This report should have the following script:

a. Basic data of the projects;
b. Introduction;
c. ToR Analysis;
d. Division of tasks, Work Plan and Logistics;
e. Design/Methodology. Here, specificities about the geographic areas of action of the projects must be considered, since they operate in more than one biome and deal with different forms of fire use and wildfire events;
f. Appendices. Project specifics should be taken into consideration, possibly with guiding questions and specific survey methods.

3.2.1. Data collection and analysis

The methodology to be developed should be of diverse format, using two forms of data collection: i) Non-reactive (secondary sources: project documentation, public and scientific data available in the projects' area of operation, in addition to key documents already organized in the preparation phase); ii) Survey (field research: application of standardized quantitative/qualitative questionnaires, conducting qualitative interviews with individuals or groups, use of situational analysis tools); and iii) Observation (during visits, participatory or individual; a counterfactual approach may be used, i.e. comparing with similar cases outside the projects).

This is the first phase of data analysis, which aims to analyze the logic of the intervention, the products and services provided by the projects and the results achieved. In this phase it is important to raise the doubts and questions that need to be answered by the executors and beneficiaries, as this will serve as input for the next stage, the field mission.

For the counterfactual analysis, the observation of areas that were not supported by the Fund and that have not experienced interventions or support from other initiatives should be considered. With this analysis it is expected to determine the differences between similar cases outside the projects. Also for this analysis, the location to be observed should be determined with the support of spatial analyses available in the Burning Program of the National Institute for Space Research (Inpe - BDQueimadas[70]); this visit should be made throughout the Field Mission.

3.2.2. Field mission

Its objective is to carry out part of the data collection, in person, in a representative sample of the universe of project activities, in a visit to the region of operation and its surroundings. The mission will take place through field visits, by the evaluation team, for the time deemed necessary (it must be detailed in the Effectiveness Evaluation Design Report), up to the limit of 22 days. During these visits, in addition to observing the physical results and benefits of the projects, it will also be possible to interview technicians who worked directly with the projects Forest Protection Tocantins, Acre: zero forest fires, Mato Grosso and Pará Forest Firefighters fighting forest fires and unauthorized burning during the reference period of the evaluation.

70. BDQueimadas/Inpe Available at: http://queimadas.dgi.inpe.br/queimadas/bdqueimadas/

3.2.3. Preliminary Report

After the field mission, the evaluation team must complement the analysis of the data collected. To this end, a Preliminary Evaluation Report of the effectiveness of the projects should be generated. This report should also include an analysis of the results achieved, as well as the aggregate impacts achieved by the four projects in light of component 2 indicators, in order to generate recommendations. The division of duties and tasks of each member of the evaluation team should be detailed in the Effectiveness Evaluation Design Report.

3.2.4. Consultation round

In this stage a workshop will be held, probably in Brasilia, with the participation of the evaluators team, representatives of the Ministry of Environment, key people of the projects and representatives of the evaluated institutions, besides some peers, who are the experts that have responsibilities on themes related to the evaluated projects. The workshop methodology will be described in the Effectiveness Evaluation Design Report.

3.3. Analysis and dissemination phase

Consolidation of the data analysis. Along with the complementary inputs of the Consultation Round there will be a new analysis based on the comments and justifications presented by the participants.

Final Report

The methodology and composition of the Effectiveness Evaluation Report of the projects Forest Protection Tocantins, Acre: zero forest fires, Mato Grosso and Pará Forest Firefighters fighting forest fires and unauthorized burning are specified in the document "Effectiveness Evaluation of Projects Supported by the Amazon Fund - Conceptual Framework", in items 5.3 and 5.4.

Dissemination of results

Presentation of the results and the final report to the project beneficiaries. The Effectiveness Evaluation Report of the projects and its executive summary will be published on the Amazon Fund website[71].

71. www.fundoamazonia.gov.br

4. ACTIVITIES, PRODUCTS, AND DEADLINES

The following schedule presents the basic roadmap for carrying out the evaluation of the projects. The table contains the activities, services, and products, as well as the process deadlines.

	Activities	Responsible	Working Days	Deadlines	Products
1	Divulge TdR	GIZ (responsible for contracting)	15	31/03/2020	Consultant proposals received organized
2	Receive and organize proposals from consultants and hire consultants and form the evaluation team (consultants + GIZ)	GIZ	20	15/05/2020	Consultants hired and team formed
3	• Prepare the team's initial meeting with the Amazon Fund. • Contact the institutions responsible for the projects to be evaluated. • Analyze relevant documents. • Consolidate the evaluation methodology developed and proposed by the external consultants. • Consolidate proposed Effectiveness Evaluation Design Report. • Deliver Effectiveness Evaluation Design Report to BNDES. • Presentation of the Report to BNDES.	GIZ	30	20/06/2020	Proposed Effectiveness Evaluation Design Report.
4	Comment on proposed Effectiveness Evaluation Design Report	GERAV/BNDES DEFAM/ BNDES	5	01/07/2020	Proposed Effectiveness Evaluation Design Report with comments
5	Review Effectiveness Evaluation Design Report	Evaluation Team	4	07/07/2020	Revised Effectiveness Evaluation Design Report.
6	Approve revised report	GERAV/BNDES DEFAM/ BNDES	2	09/07/2020	Effectiveness Evaluation Design Report (final)
7	Implement evaluation: - Collect and analyze secondary data, and - Perform field mission.	Evaluation Team	45	25/09/2020	
8	Prepare and deliver Preliminary Effectiveness Evaluation Report.	Evaluation Team	10	05/09/2020	

9	Present results (Consultation Round).	Evaluation Team	20	25/10/2020	Preliminary Effectiveness Evaluation Report with considerations reported in the Consultation Round.
10	Comment on Preliminary Effectiveness Evaluation Report.	GERAV/BNDES DEFAM/ BNDES Organização responsável pelo projeto	5	02/11/2020	Preliminary Effectiveness Evaluation Report with comments submitted after the Consultation Round.
11	Prepare Final Effectiveness Evaluation Report.	Evaluation Team	15	16/11/2020	Effectiveness Evaluation Report
12	Comment on the Final Effectiveness Evaluation Report.	GERAV/BNDES DEFAM/ BNDES	4	20/11/2020	
13	Incorporate the complementary contents of presentation, preface, executive summary to the Final Evaluation Effectiveness Report	Evaluation Team	3	25/11/2020	Effectiveness Evaluation Report in format for dissemination
14	Diagram and translate the Final Evaluation Effectiveness Report and its annexes. (version 1: Portuguese; version 2: English)	Editor/Translator/Evaluation Team	15	Version1 until 02/12/2020 Version2 until 12/20/2020	Report of the Effectiveness Evaluation in format for dissemination
15	Disseminate and distribute the Effectiveness Evaluation Report	The Amazon Fund Team	-	Version1 until 12/11/2020 Version2 until 12/30/2020	*Upload on the Amazon Fund/BNDES website*

5. TEAM OF EVALUATORS

The evaluation will be carried out by a team of four people, two (2) technical advisors from GIZ and two (2) external consultants to be hired by GIZ after a call for proposals published on the Brazilian Network for Monitoring and Evaluation. The GIZ technicians will have the following profile: one (1) full member with experience in project evaluation and public policies on the themes addressed, and one (1) full member to support data collection and preparation of thematic diagnoses under the team's orientation.

External consultants should have the following profile:

- one (1) senior or full consultant, with knowledge of national and state policies for preventing and fighting forest fires and wildfires, in the context of the Legal Amazon, and with experience in monitoring and evaluating policies in projects, and
- one (1) senior or full consultant, with knowledge of environmental policies and sustainability, as well as experience in monitoring and evaluation of socio-environmental programs and projects in the Legal Amazon. Knowledge of Geographic Information Systems (GIS) is desirable.

Regarding the qualifications of the team of evaluators, they include the following requirements:

- **Technical knowledge.** The multidisciplinary team of evaluators should have knowledge of national and state policies for fighting forest fires and wildfires, environmental policies and sustainability in the context of the Legal Amazon, in addition to having experience in monitoring and evaluating these policies and projects in the topics addressed.
- **Methodological knowledge.** The evaluation team must have knowledge of the methodologies that will be used to evaluate the projects, especially those related to data collection and analysis, measurement of the scope of results and qualification of the effects achieved. Furthermore, it is important to know instruments that allow the combination of methods to triangulate data collection, in order to increase the reliability of the results.
- **Regional knowledge.** The team of evaluators should have knowledge of the regional issues of the Amazon that are addressed in the projects supported by the Amazon Fund, such as social and economic dynamics, legislative and legal issues, logistics, etc. It is desirable that they have professional experience in the Amazon.

The consultants hired must not have any prior involvement or particular ties to the projects to be evaluated. The evaluation team will work without external interference, will have access to the data of the projects to be evaluated, and will be supported in gathering all necessary information. The experts from GIZ and the consultants must treat all documentation from the Amazon Fund and the projects to be evaluated with confidentiality and secrecy, except for the information that must be included in the Effectiveness Evaluation Report.

6. REPORTING, COORDINATION AND RESPONSIBILITIES

Two reports will be produced during the evaluation process: the Evaluation Design Report and the Evaluation of Project Effectiveness Report. The content of these reports will follow what is established in topic 8.1.7 of the document "Effectiveness Evaluation of Projects Supported by the Amazon Fund - Conceptual Framework".

The effectiveness evaluation of the projects will be monitored by a Project Reference Group, with the following composition:

a. Representatives from the Monitoring and Evaluation Management from the Planning Area of BNDES;
b. Representatives from the BNDES' Amazon Fund Management Department;
c. Representatives of GIZ, within the scope of the current cooperation project;
d. CBM representatives and partners, responsible for the execution of the projects to be evaluated; and
e. Members of the evaluation team.

The evaluation work will be coordinated by GIZ. The responsibilities of each party that make up the Reference Group are defined in topic 5.1 of the document "Evaluation of the Effectiveness of Projects Supported by the Amazon Fund - Conceptual Framework".

7. CONCLUDING REMARKS

A. Copyrights

All information and materials produced from the work under this contract will revert to the copyright of the GTZ. Reproduction, total or partial, requires express authorization, recognizing intellectual property. All maps, photos, films, and other records that may be used to provide information about the study will be duly credited, at the discretion of the contracting institution.

For publication and production of bibliographic material in the form of articles, academic papers, for congresses and scientific events, among others, produced from the information object of the contract by the consultant and his technical team, prior authorization must be requested from GTZ.

B. Code of Conduct

The internal management of GTZ aims to promote equity of opportunity and perspective, regardless of gender identity, sexual orientation, ethnicity, health status, social background, religion or age. The diversity of its personnel, as well as a corporate environment governed by mutual respect and appreciation, is a sign of success and excellence for GIZ. The GIZ prioritizes the nomination of women, LGBTI (Lesbian, Gay, Bisexual, Transgender and Transsexual, Intersex), black and indigenous people, and people with disabilities for lectures, representations, interviews, and even job openings.

Thus, the selected consultant or company must respect the diversity of gender, sexual orientation, ethnicity, health condition, social class, religion and age and assume attitudes that, with a multiplying effect, will help to promote equality among the various actors involved in the consulting of this ToR, adopting the following attitudes:

Personal Posture

- Listen to and credit the ideas of your co-workers regardless of gender, sexual orientation, ethnicity, health status, social background, religion, or age, keep an eye out for situations of vulnerability, respect their opportunity to speak, and support the ideas of your co-workers;
- Talk about gender-related issues, listen and empathize with those who are affected by the inequalities - especially women, read about the topic, and encourage this discussion in the spaces where you circulate, whether in the company, organization, meetings, or lectures;
- Question and combat sexual harassment, be an example of respect for women, and don't be silent when you report or witness harassment;
- Question the idea that there are men's activities and women's activities, and avoid attributing certain activities only to women, simply because they are considered to be "women's activities;

When you provide the service

- Be an example of respect for the rights of women, LGBTI people, black and indigenous people, people with disabilities, and older people to your co-workers. Avoid jokes that degrade these groups;
- Always try to be informed about the policies to promote gender equity in your workplace, try to disseminate and respect them. The implementation of strategies to promote gender equity aims at a transformation of the internal culture and can also have an impact externally;

Corporate guidelines

- Support initiatives for women, LGBTI people, black and indigenous people, and people with disabilities to access and remain in the field of sustainable development, who encounter numerous obstacles to occupying spaces of decision and power in our society.

8. ANNEXES

This ToR has two annexes referring to the hiring of two consultants for evaluation:

- Annex 1 - Consulting services to individuals - Consultant 1
- Annex 2 - Consulting Person - Consultant 2

Rio de Janeiro, March 30, 2020.

Christian Lauerhass

Project Director
Cooperation with the Amazon Fund/BNDES
Protection and Sustainable Management of Tropical Forests
German Society for International Cooperation (GIZ) GmbH

ANNEX 1 – CONSULTANT(S) 1: TERM OF REFERENCE FOR CONSULTING SERVICES FOR INDIVIDUALS

Call for tenders for the ToR for Evaluation of Effectiveness of four projects to fight forest fires and unauthorized burning in the scope of the Amazon Fund/BNDES

1. OBJECTIVE

Hiring one (1) senior or full consultant, with knowledge of national and state policies for preventing and fighting forest fires and wildfires, in the context of the Legal Amazon, and with experience in monitoring and evaluating policies in projects, and

2. CONSULTANT'S ACTIVITIES 1

The consultant must be part of the team of evaluators of the projects in question, having as activities:

Activity	Description
Design Report	Contribute, together with the team of evaluators, to the design report, consolidating the writing according to the Terms of Reference.
Data Collection and Analysis	Conduct data collection, analysis, and interpretation of the results, effects, and impacts of projects on topics related to environmental policy and sustainability, and especially in the area of Socioeconomic and Environmental Impact Measurement, as well as environmental legislation
Interviews	Conduct field interviews to evaluate the projects and, if possible, field workshops on SWOT analysis (Strengths, Weaknesses, Opportunities and Threats), together with the evaluation team
Preliminary Report	Prepare, with the support of the team of evaluators, the preliminary report, consolidating the writing according to the Terms of Reference. This includes the chapters related to the themes under their responsibility
Consultation round	Support the organization and participate in the consultation round for the presentation of the Preliminary Effectiveness Evaluation Report
Project Effectiveness Evaluation Report	Contribute, together with the team of evaluators, to the final version

3. WORK PERIOD

Activities are to be carried out between 06/04/2020 and 12/31/2020. The period for the field mission is scheduled for the second half of 2020.

4. CONSULTANT'S PRODUCTS 1

Products	Workdays	Deadline	Formats / technical specifications
Product 1 - Effectiveness Evaluation Design Report.	10	30/06/2020	Word document, Font Arial 12, 1.5 space and in digital format.
Product 2 - Preliminary Effectiveness Evaluation Report.	35	25/09/2020	Word document, Font Arial 12, 1.5 space and in digital format.
Product 3 - Effectiveness Evaluation Report.	05	27/11/2020	Word document, Font Arial 12, 1.5 space and in digital format.
TOTAL	**50 days**		

5. WORKPLACE AND TRAVEL

The work will be developed in Rio de Janeiro, Brasília, and the cities of the supported projects.

To this end they are planned:

Destination	Preview Date	Travel Days	Days of lodging(overnight stays)	Feeding Per Diems
1. Rio Branco/AC	August/2020	04 days	03 overnights	04 days
2. Cuiaba/MT	August/2020	04 days	03 overnights	04 days
3. Palmas/TO	September/2020	04 days	03 overnights	04 days
4. Belém/PA	September/2020	04 days	03 overnights	04 days
5. Brasília/DF	November/2020	02 days	01 overnight stay	02 days
TOTAL		**18 days**	**13 overnights**	**18 days**

Up to five (05) trips will therefore be required, for a total of up to eighteen (18) travel days, as specified above.

6. CONTRACT VALIDITY

Activities are to be carried out between 06/04/2020 and 12/31/2020. The period for the field mission is scheduled for the second half of 2020.

7. CONDITIONS FOR THE PROVISION OF SERVICES

The contracted consultant must comply with the following conditions:

- Signature of confidentiality of the data arranged for analysis contractually;
- Acceptance of the term of commitment not to publish information about the object of analysis;
- Access and reception of previous material made available by the responsible sector;
- Development and follow-up of the work in coordination with GIZ and Fundo Amazônia, including with regard to product approval or rectification requests.

8. PROFESSIONAL QUALIFICATION

- Senior or full consultant with 5 or more years of experience in the field;
- Knowledge of national and state policies for fighting forest fires and wildfires in the context of the Legal Amazon;
- Experience in monitoring and evaluation of socio-environmental programs and projects in the Legal Amazon region (desirable);
- Knowledge about public policies in the area of sustainable development, climate change, and environment;
- Knowledge about the regional issues of the Amazon that are dealt with in the projects supported by the Amazon Fund.

9. PAY

The payments will be made after the contract is signed, the products are approved, and the Invoice is presented.

Travel costs will be reimbursed against proof of expenses, as per GIZ guidelines to be informed in the contract.

The technical review and approval process for products includes evaluation by the GTZ technical advisor.

Final approval of the products and authorization for payment is the responsibility of the AV/DV of the project.

ANNEX 1 – CONSULTANT 2: TERM OF REFERENCE FOR CONSULTING SERVICES FOR INDIVIDUALS

Call for tenders for the ToR for Evaluation of Effectiveness of four projects to fight forest fires and unauthorized burning in the scope of the Amazon Fund/BNDES

1. OBJECTIVE

Hiring one (1) senior or full consultant with knowledge of environmental policies and sustainability, as well as experience in monitoring and evaluation of socio-environmental programs and projects in the Legal Amazon. Knowledge of Geographic Information Systems (GIS) and, in the training topics, the controlled use of fire is desirable.

2. CONSULTANT'S ACTIVITIES 2

The consultant must be part of the team of evaluators of the projects in question, having as activities:

Activity	Description
Design Report	Prepare, with the support of the team of evaluators, the design report, consolidating the writing according to the Terms of Reference.
Data Collection and Analysis	Conduct data collection, analysis, and interpretation of the results, effects, and impacts of projects on topics related to environmental policy and sustainability, and especially in the area of Socioeconomic and Environmental Impact Measurement, as well as environmental legislation
Interviews	Conduct field interviews to evaluate the projects and, if possible, field workshops on SWOT analysis (Strengths, Weaknesses, Opportunities and Threats), together with the evaluation team
Preliminary Report	Contribute to the elaboration as a whole, including the chapters related to the themes under your responsibility
Consultation round	Support the organization and participate in the consultation round for the presentation of the Preliminary Effectiveness Evaluation Report
Project Effectiveness Evaluation Report	Consolidate, together with the team of evaluators, the final version

3. WORK PERIOD

Activities are to be carried out between 06/04/2020 and 12/31/2020. The period for the field mission is scheduled for the second half of 2020.

4. CONSULTANT'S PRODUCTS 2

Products	Workdays	Deadline	Format/Technical Specifications
Product 1 - Effectiveness Evaluation Design Report	15	30/06/2020	Word document, Font Arial 12, 1.5 space and in digital format.
Product 2 - Preliminary Effectiveness Evaluation Report	30	25/09/2020	Word document, Font Arial 12, 1.5 space and in digital format.
Product 3 - Effectiveness Evaluation Report	05	27/11/2020	Word document, Font Arial 12, 1.5 space and in digital format.
TOTAL	**50 days**		

5. WORKPLACE AND TRAVEL

The work will be developed in Rio de Janeiro and Brasília, the cities of the supported projects.

To this end they are planned:

Destination	Preview Date	Travel Days	Days of lodging(overnight stays)	Feeding Per Diems
1. Rio Branco/AC	August/2020	04 days	03 overnights	04 days
2. Cuiaba/MT	August/2020	04 days	03 overnights	04 days
3. Palmas/TO	September/2020	04 days	03 overnights	04 days
4. Belém/PA	September/2020	04 days	03 overnights	04 days
5. Brasília/DF	November/2020	02 days	01 overnight stay	02 days
TOTAL		**18 days**	**13 overnights**	**18 days**

Up to five (05) trips will therefore be required, for a total of up to eighteen (18) travel days, as specified above.

6. CONTRACT VALIDITY

Activities are to be carried out between 06/04/2020 and 12/31/2020. The period for the field mission is scheduled for the second half of 2020.

7. CONDITIONS FOR THE PROVISION OF SERVICES

The contracted consultant must comply with the following conditions:

- Signature of confidentiality of the data arranged for analysis contractually;
- Acceptance of the term of commitment not to publish information about the object of analysis;
- Access and reception of previous material made available by the responsible sector;
- Development and follow-up of the work in coordination with GIZ and Fundo Amazônia, including with regard to product approval or rectification requests.

8. PROFESSIONAL QUALIFICATION

- Senior or full consultant with 5 or more years of experience in the field;
- With knowledge in environmental policies and sustainability and, in the themes of capacity building, controlled use of fire, as well as experiences in monitoring and evaluation of socio-environmental programs and projects in the Legal Amazon region
- Experience in monitoring and evaluation of socio-environmental programs and projects in the Legal Amazon region (desirable);
- Knowledge about public policies in the area of sustainable development, climate change, and environment;
- Knowledge about the regional issues of the Amazon that are dealt with in the projects supported by the Amazon Fund.

9. PAY

The payments will be made after the contract is signed, the products are approved, and the Invoice is presented.

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Final approval of the products and authorization for payment is the responsibility of the AV/DV of the project.