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2021 | Evaluation Report

Bolivia

Evaluation of a Triangular Cooperation Programme on Alternatives to Fire Use in the Amazon Region of Bolivia (Amazonia sin fuego), phases I-II-III"

AID 9316

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The opinions expressed in this document represent the evaluators' opinions and do not necessarily reflect the client's opinions.

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Acronyms and Abbreviations

ABC	Brazilian Cooperation Agency (Agência Brasileira de Cooperação)
ABT	Forest and Land Social Control Authority (Autoridad de Fiscalización y Control Social de Bosques y Tierra)
AICS	Italian Agency for Development Cooperation
ANMI	Integrated Management Natural Area (Área Natural de Manejo Integral)
PA, MPA	Protected Area(s);
MPA	Municipal Protected Area(s)
APMT	Plurinational Authority of Mother Earth (Autoridad Plurinacional de la Madre Tierra)
TA,	Technical Assistance,
ITA	International Technical Assistance
AFU	Alternative(s) to Fire Use
BRIF	Forest Fire Prevention and Control Corps (Brigadas para la prevención y control de Incendios Forestales)
Bs., MBs.	Boliviano(s), Million Bolivianos; 1 € ≈ 8 Bs.
CAF	Development Bank of Latin America (former Andean Development Corporation
chap.	(sub-) chapter or section of the report
CC	Climate Change
CDM	Amazonia Sin Fuego Multilateral Steering Committee
CIDOB	Confederation of Indigenous Peoples of Eastern Bolivia (Confederación de Pueblos Indígenas del Oriente de Bolivia)
CIPCA	Centro de Investigación y Promoción del Campesino
COEM	Municipal Emergency Operations Centre (Centro de Operaciones de Emergencia Municipal)
COED	Departmental Emergency Operations Centre (Centro de Operaciones de Emergencia Departamental)
COMURADE	Municipal Committee for Risk Reduction and Disaster Response - Law 602 (Comité Municipal de reducción de Riesgos y Atención a Desastres (Ley 602))
COP	United Nations Framework Convention on Climate Change Conference of the Parties
CPE	Political Constitution of the Plurinational State of Bolivia (Constitución Política del Estado Plurinacional de Bolivia)
TC	Amazonia Sin Fuego Technical Committee
DDPMA	Municipal Directorate of Productive Development and Environment (Dirección municipal de Desarrollo productivo y Medio ambiente)
DGGDF	Directorate-General for Forest Management and Development - MMAyA (Dirección General de Gestión y Desarrollo Forestal (MMAyA))
HR	Human Rights
SD	Supreme Decree
EPMIF	Plurinational Strategy for Integrated Fire Management - MMAyA 2018 (Estrategia Plurinacional de Manejo Integral de Fuego (MMAyA 2018))
FAN	Friends of Nature Foundation (Fundación Amigos de la Naturaleza)
FAO	Food and Agriculture Organisation of the United Nations
FCBC	Chiquitano Forest Conservation Foundation (Fundación para la Conservación del Bosque Chiquitano)
FES	Economic and Social Function (Función Económico-Social)
FFAA	Bolivian Armed Forces (Fuerzas Armadas de Bolivia)
FONADIN	National Fund for Integral Development - Vice Ministry of Integral Development with Coca – MDRyT (Fondo Nacional para el Desarrollo Integral (Viceministerio de Desarrollo integral con Coca – MDRyT))
FUNSAR	Search and Rescue Foundation (Fundación de Búsqueda y Rescate)
GAD	Departmental Autonomous Government (Gobierno Autónomo Departamental)
GAM	Municipal Autonomous Government (Gobierno Autónomo Municipal)
GdB	Government of Bolivia
GEF	Global Environment Facility
GISBA	Programme to Strengthen the Community Social Economy through the Comprehensive and Sustainable Management of the Amazon Forest (implemented by FAO, financed by AISC, guardianship by MMAyA)
GP	park ranger(s)
ha, Mha	hectare(s), million hectare(s)
HRBA	Human Rights Based Approach
IBAMA	Instituto Brasileiro do Meio Ambiente e dos Recursos Naturais Renováveis
ICU	*Institute for University Cooperation (Istituto per la Cooperazione Universitaria)*

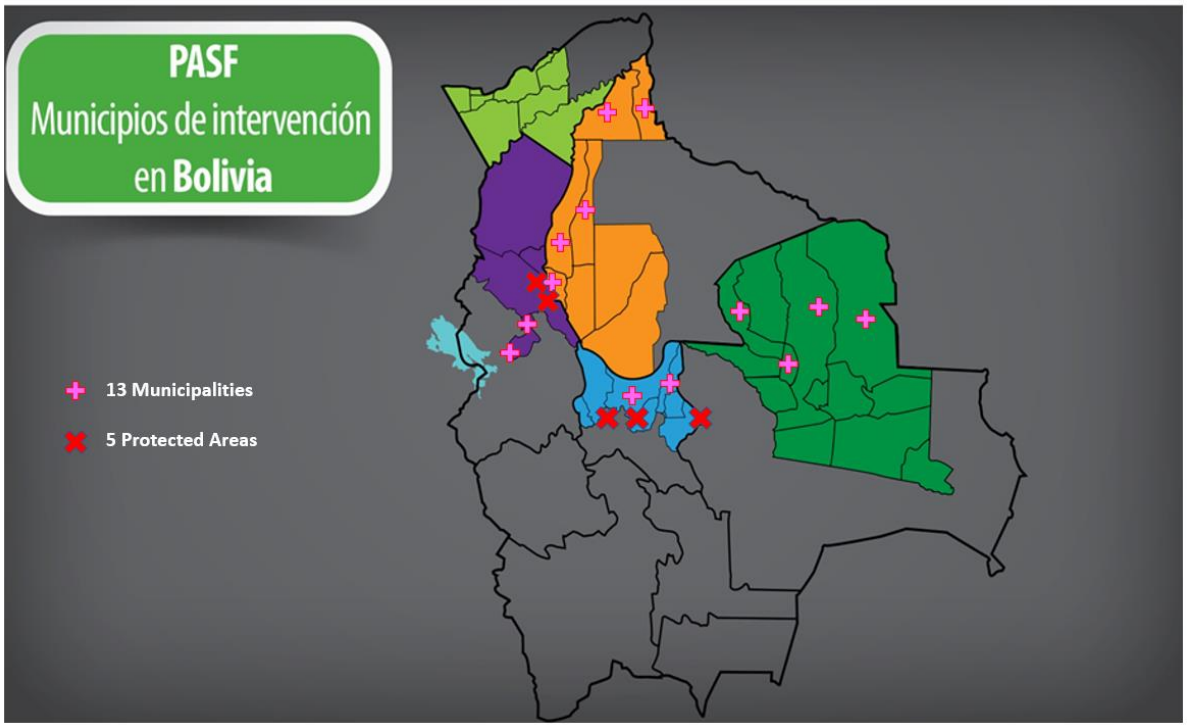
INE	National Institute of Statistics (Instituto Nacional de Estadística)
INIAF	National Institute of Agricultural and Forest Innovation - MDRyT (Instituto Nacional de Innovación Agropecuaria y Forestal (MDRyT))
INRA	National Agrarian Reform Institute (Instituto Nacional de Reforma Agraria)
LB	baseline (study conducted by PASF in 2012)
MDRyT	Ministry of Rural Development and Land
IFM	Integrated Fire Management
MMA	Ecuador's Ministry of the Environment
MMAyA	Bolivia's Ministry of the Environment and Water
ACTO	Amazon Cooperation Treaty Organisation
SO, GO	specific objective, general objective
NGDO(s)	non-governmental development organisation(s)
PAR	Rural Partnerships Programme - MDRyT with World Bank funds (Programa Alianzas Rurales (MDRyT con fondos del banco Mundial))
PASF	Amazonia Sin Fuego Programme
PDES	2016-2020 Economic and Social Development Plan
EQ	Evaluation Question(s)
NP	National Park
PNCC	National Climate Change Programme (Programa Nacional de Cambio Climático)
UNDP	UN Development Programme
PPMF	Fire Prevention and Management Plans - Departments (Planes de Prevención y Manejo del Fuego (Departamentos))
PPARB	Food Production and Forest Restoration Programme - PPARB-MDRyT (Programa de
PREFOGO	Producción de Alimentos y Restitución de Bosques (PPARB-MDRyT)) Sistema Nacional de Prevenção e Combate aos Incêndios Florestais
AOP	Annual Operating Plan
PSDI	Sectoral Comprehensive Development Plan(s) - ministerial level (Plan(es) Sectorial(es) de Desarrollo Integral (a nivel ministerial))
PTDI	Comprehensive Territorial Development Plan(s) (GAM/GAD level) (Plan(es) Territorial(es) de Desarrollo Integral (a nivel de GAM/GAD))
MR	Ministerial Resolution
AFS	Agroforestry System(s)
SAR	Search and Rescue Volunteer Group (Grupo de Voluntarios de Búsqueda, Salvamento y Rescate)
SATIF	GAD Santa Cruz Forest Fire Early Warning System (Sistema de Alerta Temprana de Incendios Forestales del GAD Santa Cruz)
SATRIFO	FAN forest fire risk monitoring and early warning system (Sistema de monitoreo y alerta temprana de riesgos de incendios forestales de la FAN)
PS	Production System(s)
SENAMHI	National Meteorological and Hydrological Service - decentralised entity of MMAyA (Servicio Nacional de Meteorología e Hidrología (entidad descentralizada del MMAyA))
SERNAP	National Protected Areas Service - decentralised entity of MMAyA (Servicio Nacional de Áreas Protegidas (entidad descentralizada del MMAyA))
SIMB	Forest Monitoring Information System - DGGDF-MMAyA (Sistema de información para el monitoreo de bosques (DGGDF-MMAyA))
SISCO	Collection system (SERNAP)
MES	Monitoring and Evaluation System
SOB-OTCA	ACTO Bolivian Observation Room (DGDF-MMAyA, subsequesntly SIMB)
SUSTENTAR	MMAyA Decentralised Unit
TCO / TOIC	Origin Community Territory (Territorio Comunitario de Origen)
TIOC	/ Original Indigenous Farmers Territory (Territorio Indígena Originario Campesino)
ToR	Terms of Reference
TGN	General Treasury of the Nation
UAGRM	Universidad Autónoma Gabriel René Moreno de Santa Cruz
UAP	Universidad Amazónica de Pando
UCAB	Food Production and Forest Restoration Programme Coordination Unit - MDRyT (Unidad de Coordinación del Programa de Producción de Alimentos y Restitución de Bosques (MDRyT))
UMSS	Universidad Mayor San Simón de Cochabamba
DU	Demonstration Unit(s)
UFM	Municipal Forest Unit (Unidad Forestal Municipal)
UGP	PASF Programme Management Unit (Unidad de Gestión del Programa del PASF)
UGR	Risk Management Unit (Unidad de Gestión de Riesgos)

URF	Forest Risk Unit of the DGGDF (Unidad de Riesgos Forestales de la DGGDF)
UMAIB	Forest Information Monitoring and Analysis Unit - planned by EPMIF in the DGGDF (Unidad de Monitoreo y Análisis de Información de Bosques (prevista por EPMIF en la DGGDF))
UMATI	Coordination Unit of Mother Earth - APMT (Unidad de Coordinación de la Madre Tierra (APMT))
UMSA	Universidad Mayor San Andrés de La Paz
UMSS	Universidad Mayor San Simón de Cochabamba
USD, MUSD	United States dollar(s), million USD
VCDI	Vice Ministry of Coca and Integral Development of the MDRyT
VIDECI	Vice-Ministry of Civil Defence
VIPFE	Vice-Ministry of Public Investment and External Financing (Ministry of Development Planning)
VMABCCGDF or VMA	Vice-Ministry of the Environment, Biodiversity, Climate Change and Forest Management and Development of MMAyA

Location

The programme has operated in five modules of the Bolivian Amazon[1] where forest fires are most intense and destructive, in the departments of Pando, La Paz, Beni, Cochabamba and Santa Cruz.

Figure1: PASF Area of intervention and municipalities sampled for evaluation



Executive summary

The Amazonia Sin Fuego Programme (PASF) was initially implemented in Brazil between 1999 and 2009. The initiative, based on the non-use of fire in agricultural activities, contributed to the decrease in forest fires. Brazil made it a national public policy. Bolivia joined this multilateral technical cooperation initiative (Italy, Brazil, Development Bank of Latin America - CAF) in 2012.

During its 3 phases, the PASF pursued the same general objective (GO): “to reduce the incidence of fires in Bolivia’s Amazon region through the implementation of alternative practices to fire use, helping to protect the environment and improve the living conditions of indigenous and rural communities." Their SOs, with phased variations, were to strengthen national and local governments’ capacities to design and implement forest fire control and prevention policies.

A significant programme, but with insufficient diagnosis

According to the Bolivia's Ministry of the Environment and Water (MMAyA) Comprehensive Development Sector Plan - PSDI (2016), Bolivia loses 239,000 ha/year of forests. There is a close relationship between deforestation and fire: approximately 1/3 of the fires are forest fires and 2/3 are grassland burns. It is estimated that 69% of greenhouse gas emissions come from agriculture

1 The PASF defines Amazonia as the lowlands that belong to the Amazon River Basin, so it includes the Santa Cruz and Cochabamba Departments. The CPE defines the Amazon as the territory covered by the Pando Department, and partially the regions north of the Beni and La Paz Departments

and land-use change, from forestry to agriculture. The enormous damage that fires cause in Bolivia to biodiversity, the climate, the economy, and to people's lives, fully justifies the PASF.

The PASF was conceived within the principles of the Framework Law on Mother Earth and Integral Development for Living Well (2012) (*Ley Marco de la Madre Tierra y Desarrollo Integral para Vivir Bien*) and the Joint Mitigation and Adaptation Mechanism for the Integral and Sustainable Management of Forests and Mother Earth. However, starting in 2015, the Ministry of Rural Development and Land (MDRyT) promoted a production-oriented approach, with plans and standards that facilitated deforestation and burning. Neither the PASF nor the MMAyA, its guardian ministry, succeeded in influencing these policies. The political environment imposed was not conducive to the PASF objective.

The PASF baseline and design did not characterise the Bolivian Amazon's great geographical and social diversity, gender differences, nor contradictions among public policies and the actors' interests. Being a programme that aimed to reduce symptoms, it did not identify the root causes of burns and fires. While the PASF is significant at the global, national, soil and forest preservation levels, most actors' interests and needs, on the contrary, point to the continued use of burning. As a result of limited diagnoses, the PASF training and technical proposal has been uniform. It does not respond to the needs of the diversity of life systems and types of producers.

Proper consistency in terms of strategic and design framework, but limited by a political environment that was not conducive to its objective.

The PASF rightly relied on its sponsors' experiences in Brazil and Bolivia, as well as those of FAO. Clear cooperation and synergy have been established regarding strengthening of the SIMB and other sectoral initiatives also financed by Italian Cooperation.

The PASF was conceived within the principles of the Framework Law on Mother Earth and Integral Development for Living Well (2012) (*Ley Marco de la Madre Tierra y Desarrollo Integral para Vivir Bien*) and the Joint Mitigation and Adaptation Mechanism for the Integral and Sustainable Management of Forests and Mother Earth. However, starting in 2015, the Ministry of Rural Development and Land (MDRyT) promoted plans and standards that facilitated deforestation and burning.

Neither the PASF nor the MMAyA, its guardian ministry, succeeded in influencing these policies. Similarly, the necessary synergies and cooperation with other MDRyT programmes related to technical outreach and food production did not exist.

An efficient programme

The total cost of the three phases was €4,832,647; the sources made their contributions available to the PASF in a timely manner: €3,530,000 (73%) from the Italian contribution, €612,133 (14%) from the Brazilian Cooperation Agency (ABC), €385,047 (8%), national contribution and €245,467 (5%) contributed by the CAF.

The PASF implementation was smooth; under the AOPs, it achieved practical implementation and high budget execution. Efficient planning, implementation and monitoring of activities included conducting a large number of training events and demonstration units (DUs), training more than 19,500 people in 440 communities. These outcomes were achieved through a network of some 200 partners. A key positive factor was the recruitment and training of high-level professionals and providing them with job stability.

An effective programme

The main PASF achievement was a paradigm shift in the State and in society, proving that the problem of forest fires was structural and establishing comprehensive fire management on national and local agendas. It has achieved almost all of the logical framework outcomes at the municipal and community levels. Institutional strengthening was capitalised on by 1) the Directorate-General for Forest Management and Development of MMAyA (DGGDF), which obtained regulatory and programmatic tools, and improved its information system with algorithms for interpreting satellite images; 2) most of the 48 Municipal Autonomous Governments (GAM), which have implemented and/or strengthened, with budget and personnel, their Risk Management Units (UGR) and their technical units for productive development, thus allowing a certain projection towards rural communities, but in general with a production-oriented approach without sufficient concern for the protection of forests and water sources.

On the other hand, with the Vice Ministry of Civil Defence (VIDECI), the Armed Forces (FFAA), the Bolivian Police (on which firefighters depend), the National Protected Areas Service, decentralised entity of MMAyA (SERNAP), 5 Departmental Autonomous Governments (GAD) and 3 Universities, the PASF basically contributed to training human talents, present in these years, and with equipment, but without evidence of transformation in the institutions responsible for fighting fires or responsible for university training.

While it is true that the PASF encouraged the participation of women, 32% of participants in training and DU are women, it did not have a gender strategy.

Poor sustainability of the actions promoted

The guardianship entity – DGGDF – generated the necessary strategy and budgetary programme to continue the PASF activities; then, during its management in 2018 and 2019, it carried out actions related to capacity building, DU monitoring, creation of forest brigades (CAF and UNDP consultancy) and has registered TGN resources for the 2019-2020 management. However, it has not obtained sufficient resources to maintain the same scale of actions as the PASF.

On the other hand, the continuity of training in Integrated Fire Management (IFM) by the GADs of Santa Cruz and Cochabamba, VIDECI and several NGOs and projects is notable. In the case of the GADs of Santa Cruz and some municipalities, community brigades continued to be formed and supported in the most fire-prone locations.

A limited impact

In 2019, the burnt area increased noticeably in the Amazon, and in particular in Chiquitanía (3Mha). The same happened, to a lesser extent, in 2020. This means that the PASF did not have the expected global impact of reducing the incidence of fires in the Bolivian Amazon region, the environmental variable mentioned in the logical framework as GO. The indicator was ambitious but inaccurate. It is subject to year-on-year climate variations, but also to the policies favouring deforestation, which intensified in 2019, and to a continental upward trend due to climate change that translates into greater droughts.

Now, on a more local scale, the demonstration units that are still being maintained and their duplicates have been successful in eradicating fire. The directors of the Tunari and Carrasco National Parks (NP) mentioned a positive impact in reducing burnt areas in their Protected Areas (PA) and related it to the PASF.

Likewise, the PASF contributed directly to providing the DGGDF with important regulatory instruments, such as the Plurinational Strategy for Integrated Fire Management - MMAyA 2018 (EPMIF) approved in 2018, the creation of the UGR and the Forest Information Monitoring and Analysis Unit (UMAIB), and the improvement of the Forest Monitoring Information System (SIMB). Unfortunately, these contributions have not been used since 2018 due to a reduction in DGGDF staff.

Finally, with regard to the Alternative(s) to Fire Use (AFU) techniques promoted through the 141 PASF DUs and oriented towards 10 AFU techniques, about half of DUs visited during the evaluation process (a total of 25) are still active. This confirms that producers received some benefits, although no income increase could be demonstrated. Likewise, about 12 cases of extensions or duplications on other farms or stays have been reported in the 13 municipalities visited. Among the different AFU techniques, the management of grasslands through the use of electric fences was best-received and had a positive impact.

Some lessons learned from the PASF and South-South triangular cooperation in fire reduction in the Amazon region.

About the project

The strategy that Italian Cooperation adopted to achieve a regional approach to common problems has been a decisive, enabling harmonisation of national strategies on the most relevant aspects.

In this context, Brazil's experience has been a fundamental reference point for the design of the programmes in Ecuador and Bolivia, as well as in terms of technical content (IFM and AFU strategy).

Institutional integration within national environment ministries is a key success factor in implementing a national Integrated Fire Management (IFM) strategy.

Integration and adoption of AFUs by competent services at all levels, sectoral and municipal, is crucial and needs to be carefully planned from the outset by defining programmes' role as process facilitators and not merely as implementers.

AFU technology packages have been promoted and disseminated on a massive scale, but it failed to consider a mid-term evaluation of its validity and implementation process. Alternatively, Ecuador's experience is interesting, as it first seeks to identify the most promising practices through the direct participation of producers.

No processes have been formally established for an independent evaluation of the regional experience promoted and implemented by South-South triangular cooperation, nor the capitalisation of lessons learned, useful to improve the intervention logic and design.

About institutionalisation

1) Institutionalisation is the first step, not the last. It requires the allocation of economic resources to strengthen the significant MMAyA institutions as a first step towards the realisation of policy principles and objectives.

2) In Brazil, the programme for deforestation prevention and control in the Amazon involves thirteen ministries and became a national priority of the Presidency.

3) It is difficult to reduce the incidence of fires without reducing legal uncertainty, non-compliance with existing rules, and lack of clarity or conflicts in institutional competence. For the State to have an impact and ownership, a strong social base and/or allies at the highest State level are required, as well as ensuring that fire control is part of the political agenda.

4) Regarding IFM, the body invested with national leadership is the Ministry of the Environment and Water. This involves taking a number of initiatives such as i) coordinating with other ministries and stakeholders through an institution specializing in IFM and AFU; ii) refining the EPMIF; iii) exchanging information and providing guidance to GADs, who in turn coordinate with GAMs.

Climate Change, Indigenous Identity and Knowledge

5) The life of the indigenous peoples of Eastern Bolivia cannot be separated from forests. Where forests disappear, indigenous peoples disappear; where forests exist, indigenous peoples exist.

6) The cause-effect relationship between training and reducing fire incidence is not immediate. Moreover, change of consciousness does not appear as such in logical frameworks. A number of aspects beyond the PASF's control weigh more than training and prevent the announced impact from being achieved.

7) The PASF challenge indicates that the best way to fight fire is by investing in the plot. This is what both indigenous farmers and entrepreneurs already do. This means agricultural intensification. It consists of an investment in labour and capital in the plot; it can be through tree planting (plantations, agroforestry systems), beekeeping, irrigation, soil improvement, etc.

Main recommendations

1) **DGCS**: Continue to promote a South-South regional approach that aims at a common fire-fighting strategy in the Amazon within a clearly defined policy and institutional framework from cooperation programmes' design phase. Also, ensure that alternative technical proposals to fire use are adequately evaluated and, if necessary, commonly disseminated through the appropriate institutional channels (ministries of agriculture and livestock, municipal governments).

2) **DGCS**: Ensure a consistent, inter-ministerial and long-term strategy in Bolivia that seeks to eradicate the root causes of fires and accordingly develop the required political dialogue with the sector's authorities. Any new IFM strategy requires, as a precondition, a broad agreement between the MDRyT and the MMAyA on forest conservation. This translates into a single and common strategy to support forest, agricultural and livestock production that preserves water, soil and biodiversity.

3) **DGCS**: Institutionalisation of initiatives should be the first step in any IFM intervention where the MMAyA – DGGDF take the lead at the national level regarding IFM. In this context, the Cooperation Programme Management structure and functions must integrate into the institutional framework and integrate the technical assistance of Italian Cooperation and sector's governing institutions in a balanced way.

4) **DGCS**, **MMAyA**: Balancing perceptions about fire: it is not always negative as the PASF used to approach it. Analysing risks and benefits (drawing inspiration from the FAN and Myers 2006 experience). In particular, importance should be given to "prescribed burnings"

as a method to limit the expansion of fires. In this framework, carrying out diagnostics of territorial and production patterns and complementary studies to specify cooperation axes: a cultural and socio-economic diagnosis of intervention communities, feasibility study of an incentive project for livestock production without deforestation, etc.

5) **DGCS**, **MMAyA**: Training is a powerful weapon; its use is recommended as long as it is based on a dialogue of knowledge and is customised according to the target groups' interests and knowledge.

6) **DGCS**, **MMAyA**: Modify the way of identifying, promoting and generating AFUs. Deepen and differentiate perceptions of fire use according to area and type of producers and identify current fire control practices and standards.

7) **MDRyT**, **DGGDF** (**MMAyA**), **GAD**, **GAM**: Promote production that requires maintenance and enrichment of the forest. Protect chestnut, açai, wild cocoa, honey, and other non-timber forest products producing forests, and strengthen their harvesting systems. Inspired by the Non-Carbon Benefits of the World's Forests (Denmark) in Chiquitanía.

8) **MDRyT**, **DGGDF** (**MMAyA**), **GAD**, **GAM**: Implement and institutionalise modes of financing AFUs through grants and loans; these cannot depend on external financing, nor on limited duration programs, but should become a long-term public policy.

9) **MMAyA** as guardianship agency should take the initiative to coordinate with other ministries, through an institution or programme specialising in IFM. It should also coordinate, exchange information and provide guidance to GADs, which in turn coordinate with GAMs. Sta Cruz's experience is suggested for the other GADs

10) **MMAyA MDRyT**: Promote a combination of the legal framework among protection and conservation standards, control of deforestation and burning and agricultural production promotion standards, prioritising food sovereignty.

Report structure and evaluation process implementation logic

Under the ToR, in Chapter 1, the report presents the introduction and location of the PASF programme. Chapter 2 describes the Bolivian context in which the intervention, and mainly its evaluation, were carried out, highlighting aspects of deforestation, the 2019 political crisis, and the pandemic. Chapter 3 sets out the objectives to be achieved by the evaluation. Chapter 4 explains the evaluation methodology detailing the evaluation questions, the tools used, the sample selected, and the challenges met. Chapter 5 details the results for each evaluation question by ranking them according to criteria of relevance, efficiency, effectiveness, sustainability, impact, and cross-cutting issues of equity, gender, and indigenous communities. Chapter 6 presents the overall evaluation findings with respect to the organisational environment and changes generated by the programme. Chapter 7 proposes recommendations for the design of future programmes and actions for a better regulatory, communication, and coordination environment. Finally, Chapter 8 tests some lessons learned regarding institutionalisation, fire management, and the potential of alternatives to fire use.

Additionally, in support of these findings, there are a series of annexes such as the list of 200 people interviewed, the documentation consulted, an expansion of the arguments for answers to the evaluation questions (EQ), and 18 fact sheets that are case studies in the 13 municipalities and 5 protected areas visited during the evaluation.

Dynamic of the evaluation process.

This assessment was postponed for the first time due to the October-November 2019 socio-political crisis and then interrupted in early 2020 by travel restrictions in the COVID-19 pandemic.

On 16 March 2020, after a week of evaluation in Bolivia, the evaluation team had to suspend the information gathering, interviews and field visits due to travel restrictions, and the biosecurity measures implemented by the Government ended with a tight quarantine for the entire population.

The field assessment was summarised in December 2020 and completed in January 2021, when visits and interviews were carried out in all 13 municipalities and 5 Protected Areas (PA) planned.

Intervention context

Socio-economic context

Bolivia had an average GDP annual growth of 4.9% between 2008 and 2017, with a recent tendency to stagnation due to price decrease of its main export goods (hydrocarbons and minerals). Between 1990 and 2017, the value of Bolivia's Human Development Index increased from 0.536 to 0.693, positioning Bolivia in 118 of 189 countries and territories, but still below the average of 0.758 of the Latin American and Caribbean countries.

In the last decade, Bolivia has made substantial social advances: extreme poverty decreased from 37.7% in 2006 to 15.2% in 2018, and moderate poverty from 59.9% to 34.6% in 2018. Despite improvements, geographic, social and economic inequalities remain high: the GINI factor fell from 0.611 in 2002 to 0.453 in 2015, although it has stagnated since 2011 (0.44 in 2018). Bolivia has a marked rural emigration to cities, from the Andes to the Amazon, and to foreign countries.

With an area of 109.8 Mha, Bolivia and altitudes varying from 180 to 6,500 meters, presents both an Andean and Amazonian ecosystem. This peculiarity explains the country’s great biological and ecosystem diversity and its classification as “mega-diverse country.”

Bolivia is also a country highly vulnerable to climate change. Fires, floods, droughts, and melting glaciers are increasingly frequent and intense, and are the tangible expression of profound climatic changes, which affect the most vulnerable populations and involve emigration to new areas. This, in turn, causes conflicts for livelihoods.

The Brazilian agribusiness model replica reaches a continental level and exerts strong deforestation pressure on lowland forests in Eastern Bolivia.

In Bolivia, the deforestation rate is increasing

According to the FAO Global Forest Resources Assessment 2020 report, the global forest area continues to decline, but at a less accelerated rate; it went from a rate of -7.8% per year during the 1990-2000 decade, to a rate of -4.7% during the 2010-2020 decade. In South America, this annual rate rose from -5.1% to -2.6% in the same decades.

MMAyA estimated that Bolivia had 52.1 Mha of forest, or 47.3% of its territory; and mostly in the Amazon. In 1976, the forest cover reached 58 Mha, or 52.8% of the Bolivian territory. According to the PSDI-MMAyA (2016), 239,000 hectares of forest are lost each year. The relationship between deforestation and fire is complex: 1/3 of the fires are estimated to be forest fires and 2/3 are grassland burns. Deforestation is illegal in 80% of the cases. The Department of

Santa Cruz counts 72% of authorised deforestation events, and 96% of illegal deforestation events that occur at the national level.

The main causes of deforestation are industrialised agriculture on the corn/soybean model (50%), extensive livestock farming (30%) and small-scale farming (20%). In the country, 69%[2] of greenhouse gas emissions come from agriculture and land-use change.

Political context

Between 2006 and 2016, Bolivia experienced a decade of stability. There were periodic elections in which the Movement to Socialism (MAS), the party of Evo Morales, won and remained in the presidency of the plurinational State of Bolivia, holding a majority in the Plurinational Legislative Assembly. In 2009, a new State political constitution (CPE) and a series of rules were adopted that updated, among others, access to natural resources, land, and forests. The three PASF implementation phases happened in this scenario.

The October 2019 election results were invalidated based on an OAS report. The leaders resigned and an interim government was installed. The October-November 2019 socio-political crisis affected all national actors and, in particular, those linked to the PASF. New general elections were postponed twice due to the Covid-19 pandemic, and took place in October 2020. Luis Arce, MAS candidate, won and a new government was installed in November 2020.

This whole context forced this assessment to be postponed for the first time and then carried out under different authorities.

The fires that occurred in Chiquitanía in September 2019 (5.3 Mha of forest burned, setting a record for Santa Cruz, although not for Bolivia, since 2010 was the largest area burnt, especially in Beni) were mentioned in the electoral campaign, which is indicative of a structural problem.

COVID-19 in Bolivia

COVID-19 arrived in Bolivia relatively late, and containment measures and restrictions managed to restrict its progress compared to countries such as Ecuador, Peru, or Brazil. But the many families' severe economic hardships limited compliance with confinement and favoured the spread towards May 2020. The Bolivian hospital system's low care capacity made the situation critical in the country.

2 2016 data according to CAIT-World Resources Institute http://cait.wri.org/

1 The programme's intervention logic

The Amazonia Sin Fuego Programme (PASF) in Bolivia was a multilateral technical cooperation initiative that aimed to reduce the incidence of forest fires in Bolivia's Amazon region, through the implementation of Integrated Fire Management (IMF) and Alternatives to Fire Use (AFU) practices, contributing to environmental protection and guaranteeing rural and indigenous communities' quality of life.

The PASF initially emerged in Brazil in the period 1999-2009, thanks to the support of Italian Cooperation. This initiative proposed, for the first time, a methodology based on avoiding fire use in agricultural activities in the targeted communities. The initiative achieved positive results regarding the incidence of forest fires and achieved the Brazilian State's effective appropriation of the initiative; through its Ministry of the Environment, it converted the experiences developed into national public policies.

In this context, the Memorandum of Understanding between the Governments of the Federative Republic of Brazil and the Italian Republic on cooperation activities with third countries (trilateral cooperation) was signed in March 2007, which positively evaluated the possibility of extending the bilateral PASF initiative at the regional level.

The PASF in Bolivia was based on the principles of the Framework Law on Mother Earth and Integral Development for Living Well (2012) (*Ley Marco de la Madre Tierra y Desarrollo Integral para Vivir Bien*). From its very beginning, it was related to the Joint Mitigation and Adaptation Mechanism for the Integral and Sustainable Management of Forests and Mother Earth.

The PASF was implemented in three phases: the 36-month PASF I, between 2013 – 2015 (AID 9316), the 12-month PASF II in 2016 (AID 9316), and PASF III in 2017, with an extension that did not affect the budget ceiling until January 2018 (AID 11056). The three phases have been implemented within trilateral cooperation between the Governments of Bolivia, Italy and Brazil. Financing of the Bolivia initiative was approved based on the programme drafted by the Trilateral Commission in December 2010; afterward, on 6 January 2012, the Memorandum of Understanding among the Governments of Bolivia, Italy and Brazil for the effective Programme activation was signed.

The PASF start in 2013 was preceded by a Previous Emergency Phase financed by the Development Bank of Latin America (CAF), in 5 Municipalities and 140 Beni Department communities particularly affected by forest fires. The CAF continued to cooperate in phase I, II and in the follow-up phase during 2018.

The total PASF cost in its 3 phases was €4,776,410, including €3,530,000 (74%) as a contribution from the Italian Cooperation; €612,133 (14%) from the Brazilian Cooperation Agency (ABC) to finance the technical assistance provided by the Instituto Brasileiro do Meio Ambiente e dos Recursos Naturais Renováveis (IBAMA) (PREVFOGO programme), and €189,230 (4%) contributed by the CAF, addressing the financing of the PASF Coordinator (phases I and II) and specialised consultants. Bolivia contributed with €385,047 (8%) allocated to the valuation of personnel, real estate, among others.

During its 3 phases, the PASF pursued the same general objective (GO): "To reduce the incidence of fires in the Amazon region of Bolivia, through implementation of alternative practices to fire use, helping to protect the environment and improve the living conditions of indigenous and rural communities."

In its intervention strategy, the PASF proposed the development of training and technical coaching processes, accompanied by extensive awareness-raising and information campaigns on the consequences caused by forest fires[3]. It clearly appears that the main assumption is that the fire problem's correct management is essentially preventive in nature and involves strengthening national institutions and local governments and the relative capacity to implement and coordinate governance actions in the sector, especially in cooperation with producer organisations through the dissemination of alternatives to fire use (AFU) in production processes. According to a digital PASF closure report prepared by the MMAyA, the cost for forest fire fighting actions ranges from €7,000 to €50,000 per hour. Therefore, the PASF did not perform combat actions, but deals with fire prevention and training in alternatives to fire use in agricultural activities. They point out that in four years, the PASF used the amount corresponding to 60 hours of firefighting actions, carrying out Awareness, Training and Technology Transfer activities[4].

Ultimately, the programme aimed to improve local public policies, positioning itself, from a regional perspective, as an example of a strategy to adopt for protecting the Amazon rainforest.

The main direct beneficiaries were, on one hand, public entities competent in fire management such as MMAyA, the National Protected Areas Service (SERNAP), the Vice Ministry of Civil Defence (VIDECI), 5 Departmental Autonomous Governments (GADs), and 48 Municipal Autonomous Governments (GAMs), and, on the other, 440 indigenous farmers' communities and producer organisations.

2 Evaluation objectives

Every fire prevented is a fire that need not be put out. *Office of Disaster Assistance in Latin America and the Caribbean, quote by Martínez et al. 2003*

Providing useful recommendations for the future of Italian cooperation and DGCS activities in environmental protection and development aid planning, as well as informing the design of AICS (Italian Agency for Cooperation and Development) cooperation actions.

Refining the operation of the triangular (South-South) cooperation scheme of Italian cooperation.

The evaluation objectives mainly focus on PASF programme relevance (the three phases), and on its consistency, effectiveness, impact and sustainability according to the OECD/DAC criteria and the principles of the results-based approach.

Providing elements of reflection to the MMAyA to enrich and refine its policies, strategies, plans and programmes.

3 Evaluation methodology

3.1 Evaluation Questions (EQ)

The Inception *Report approved* in February 2020 raises 22 evaluation questions (EQ, see Annex 2). Chapter 5, Results of this report, is structured based on our responses to these same 22 EQs.

The EQs cover the five OECD/DAC criteria:

3 2018. Results Book "Programa Amazonía Sin Fuego, 2011 - 2018", PASF-MMAyA, 2018 (p. 9)
4. MMAyA, 2018. A sustainable development proposal for the reduction of forest fires PASF-MMAyA.

Relevance (EQ1, EQ2,EQ3 and EQ4). The evaluation measures the degree of correspondence between PASF outcomes and objectives with national policies and the identification of problems or needs. EQ 3 examines the PASF consistency and approach, as well as its assumptions of what changes are expected to be achieved and how. EQ 4 refers to how stakeholders' capacity building was integrated into the programme design (crucial for overall impact).

Consistency (EQs 5 and 5a). Compatibility of the project with policies, strategies and other actions in a country, sector or institution.

Efficiency (EQ6). Both EQs allow evaluating how the activities and implementation mechanisms have enabled transforming the available resources (financial, technical, institutional and human resources) into products, in quantitative and qualitative terms. Compliance with the time required to achieve results and the monitoring system quality are also evaluated.

Effectiveness (EQs 7 - 11). Here, the degree of achievement of specific objectives (SO) and expected results are evaluated. The efficacy analysis must confirm (or reject) the intervention approach validity identified as per its relevance. The four EQs detail how the activities' outputs are transformed into outcomes and effects at the SO level (since there was a slightly different SO for each phase).

Sustainability (EQs 12 and 13). It refers to actors' capacity to continue to benefit from the services promoted by the PASF after its conclusion, by examining the degree of political support and participation of national and local institutions and considering financial and economic sustainability, as well as the sustainability of technical, economic, socio-cultural and environmental factors.

Impact (EQs 14-21). The degree of GO achievement is assessed by measuring long-term changes in the behaviour of environmental variables and of the different categories of actors. The impact results from the consolidation of the findings in effectiveness and sustainability and external factors that can have a positive or negative influence.

3.2 Tools used for evaluation

The Evaluation Matrix, attached to the Start-up Report, specifies the indicators to be evaluated, their source of information or verification, and the proposed methods for collecting the data for each EQ.

The evaluation has adopted both a qualitative and quantitative methodology to provide a robust and consistent response to evaluation questions and their objectives and usefulness, as well as to triangulate the results achieved.

The following assessment tools have been used for data collection:

(i) Documentation analysis (planning documents, programme documentation, follow-up reports, thematic documentation and existing studies on issues related to the evaluation problem).

(ii) Field visit in a minimum of 13 representative municipalities of 5 protected areas (included during Phase II). Priority was given to the municipalities of Beni and Santa Cruz, where the highest number of fires is recorded (source SIMB, 2019).

(iii) Focus Group Analysis, (DFG): a representative group of people have been interviewed to gather their opinions and know their perceptions related to the results achieved and their impact, best practices, factors that favour or invalidate the PASF's effectiveness and potential impact. The

DFG has been addressed to municipal staff, Forest Fire Prevention and Control Brigades (BRIF) and DU representatives (inside and outside the protected areas - PA).

The field visit has been conducted according to a Standard Municipality Visit Protocol that includes the main actors. In this context, four information-gathering tools were developed, consisting of interview guides adapted to each category of actors interviewed: a) national public and private entities, b) sub-national entities (GADs and GAMs), c) producers, d) protected areas (PA). Information received by national entities is mainstreamed in the body of this report, while information received by the municipalities and PAs was processed further in the format of a "sheet" for each of the entities visited (see annexes 6 and 7).

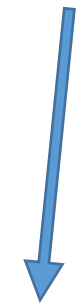
The tools for gathering information in the field cover three phases: the past, in which an attempt is made to reconstruct the PASF work; the present, in which a series of observations are made on the current situation; and the future, for which interviewees are asked about their perception of perspectives.

3.3 Sample of municipalities, PAs and DUs

The qualitative and quantitative approach has been duly used.

All types of beneficiaries have been visited in the PASF beneficiary municipalities with the highest fire incidence.

The 13 municipalities visited and 5 PA (See map in Figure 1 in Introduction) and where interviews were conducted with authorities and municipal technicians, and where visits to producer plots were conducted (ordered from east to west):



EAST	1	San Ignacio de Velasco	Santa Cruz	
	2	Concepción	Santa Cruz	
	3	San Javier	Santa Cruz	
	4	Ascención de Guarayos	Santa Cruz	1 Amboró NP
	5	Chimoré	Cochabamba	2 Tunari NP
	6	Villa Tunari	Cochabamba	3 Carrasco NP
	7	Guayamerin	Beni	
	8	Riberalta	Beni	
	9	Santa Rosa	Beni	
	10	Reyes	Beni	
	11	Rurrenabaque	Beni	4 Pilón Lajas BR
	12	Caranavi	La Paz	5 Madidi NP
WEST	13	Coroico	La Paz	

The sample represents 24% of the municipalities and 55% of the PAs where PASF intervened. The initial selection of the sample covered the Pando department. However, when the field work was resumed in December 2020, logistical considerations led to a land route in the department of Beni and expanding the sample in the department of Santa Cruz.

Considering that the choice of municipalities was made with qualitative criteria, the geographical coverage and sample are significant in terms of indicating the main trends. Also, in view of what happened in 2019 and 2020, we consulted the main national sources (SIMB, ABT, FCBC, scientific articles) regarding fire incidence.

As for the DUs registered in the 13 municipalities in the sample (50 in total), 25 were visited during the evaluation, which represents 50% of the total population. Further details on the DUs visited can be found in the analysis carried out in EQ 10.

3.4 Challenges in the evaluation process

Since the first field visit, the challenge of finding informants aware of the PASF became clear, so we had to rely on information about the present. As a result, the same data could not be collected in a statistically exploitable form in all municipalities. The imposed survey rationale was to perform "case studies" in each municipality and PA: that is, to mix in to understand the dynamics of each territory and interpret what was done and left by the PASF, and obviously draw some observations and conclusions of regional or national scope.

From the first visits in the department of Cochabamba (Tunari PA and municipality of Villa Tunari) it was possible to glimpse how difficult it would be to systematically track what was done by the PASF and the relationship with the current situation. Still, we decided to keep trying to quantify the effects. Some statistics were prepared from the sample and must be interpreted as simple trends and serve to call for reflection, not to draw transferable conclusions.

We had to face the following challenge:

- The change of ministry personnel due to government changes in 2019 and 2020. As of the date of writing of this report, the Director of the DGGDF has not been appointed.
- New staff in PAs and GAMs not related to the PASF. Institutional memory could not always be rebuilt.
- Little or no documentation in the GAMs and beneficiary institutions allowing for a review of the interaction with the PASF.
- Lack of knowledge in the GAMs about the DUs implemented in their municipalities and in other cases, scarcity of resources to follow them up.
- Having to ask for support from former officials or persons disconnected from public institutions and the PASF to obtain necessary information.
- Many trained staff were no longer employed in the visited institutions
- The restrictions imposed by the Covid19 pandemic, with differentiated and changing security measures in regions and municipalities.

4 Results

This chapter provides answers to the 22 evaluation questions.

4.1 Relevance and quality of design

4.1.1 EQ 1. To what extent are the results achieved by the programme due to the smooth functioning of the triangular (south-south) cooperation mechanisms?

The response to EQ1[b] is totally positive: the PASF Bolivia was designed, financed and implemented by decision of the Trilateral Cooperation Commission (Brazil-Bolivia-Italy) and of the CAF; it was entirely inspired by the Brazilian experience and the PASF components in Brazil that were successful.

The PASF Programme was created in Brazil in the period 1999-2009, thanks to the support of Italian Cooperation. It achieved positive results in the incidence of forest fires, which decreased

between 70% and 94% in the states of Acre, Mato Grosso and Pará[5]. The most important impact was the Brazilian State's effective appropriation of the initiative; through its Ministry of the Environment, it converted the experiences developed into national public policies.

Another key player was the Development Bank of Latin America (CAF), which, in the period 2011–2012, initiated a previous phase of prevention and control of forest fires (with funding of $75,921), which consisted of: training 35 duplicators; training settlers in controlled burning techniques in 5 Municipalities and 140 Beni Department communities, particularly affected by forest fires; and promoting a communication campaign for the prevention of forest fires. The CAF also funded a subsequent follow-up phase, mainly focused on DUs, during 2018, after officially completing the PASF (31 January 2018), and with the budget approved for phase III.

Table 1 summarises the contributions of each actor in each of the PASF phases in Bolivia, demonstrating that continuity and consistency were met.

Table1: Contributions to the PASF Bolivia by source and phase – in euros

Economic contributions	Preliminary phase 2010-11	Phase I 2012-14	Phase II 2015-16	Phase III 2017-18	Follow-up 2018	Total	%
Italy (AICS)		1,500,000	930,000	1,100,000		3,530,000	73
Brazil (ABC)		604,125	30,888	37,120		672,133	14
CAF	56,237*	66,816	55,598		66,816	245,467	5
Bolivia		82,914	67,700	234,433		385,047	8
Grand TOTAL	56,237	2,253,855	1,084,186	1,371,553	66,816	4,832,647	100

* CAF contribution - previous phase - of 75,921 USD at the average InforEuro 2011 exchange rate (1 € = 1.35 USD).

Annex 5.3.2 details the characteristics of Brazil and Ecuador's PASFs and proposes table 4 for comparison between the three PASFs, the conclusions of which are:

- The Trilateral Cooperation system in Bolivia and Ecuador was maintained, characterised by the signing of trilateral agreements between the beneficiary state and the Cooperation Agencies of Italy (AICS) and Brazil (ABC). In both cases, the CAF maintains an important role as co-financer of one-time actions.
- The 3 FSAPs' intervention logic is very similar; they were able to adapt to the local issues and institutional conditions.
- The 3 FSAPs have sought to be institutionally integrated within the national environment ministries, Brazil alone achieved that objective through the *Sistema Nacional de Prevenção e Combate aos Incêndios Florestais* (PREVFOGO) programme (which currently has about 60 staff on a fixed payroll).
- The 3 PASFs managed to formulate a national IFM strategy, but Bolivia and Ecuador do not have the institutional capacity to implement them.
- Regarding the impact on land management, especially at the municipal level, the PASF pushed for the integration of an IMF and AFU strategy in municipal governments' planning with different methods and results depending on the provinces / departments.

5 In Brazil, the deforestation rate has decreased from 27,000 km2 in 2004 to 4,650 km2 in 2012; this reduction explains much of the reduction in forest fires. This reduction cannot be attributed to the PASF alone. The favourable institutional context should be noted: in fact, the National Programme for the Prevention and Control of Deforestation was under the direct responsibility of the Brazilian Federal Presidency (Sist. et al. 2013, in Perspective nº22, CIRAD). See Learnings chap.8.1.

- The promotion and dissemination of the AFU technology package have been achieved on a massive scale, with the exception of Ecuador, which seeks first to identify the most promising practices through a participatory process developed with the methodology of field schools (FAO).
- The dissemination and validation of the best AFU practices have been directly carried out by the PASF; however, the continuity of their transfer is in the hands of those responsible for the rural extension. In Brazil, that falls on the states and local governments. Bolivia and Ecuador, however, find it difficult to ensure the adoption of AFUs by competent services at all levels.
- There is no evidence of evaluations carried out in Brazil or Bolivia to identify useful lessons learned to improve the focus and design of the following initiatives. Only considerations included in performance reports are available.

4.1.2 EQ 2. To what extent do the intervention approach and the results achieved so far meet the beneficiaries' needs?

The response to EQ2 is globally negative: the baseline and design of PASF did not characterise the Bolivian Amazon's great geographical and social diversity or the contradictions among public policies and the actors' and public officials' interests. While the PASF is significant at the global, national, and soil and forest preservation levels, it is not perceived as such from most actors' viewpoint on interests and needs.

As a result of limited diagnoses, the PASF training and technical proposal was uniform. This does not respond to the needs of the diversity of life systems and types of producers.

The name "Amazonia sin fuego" has many advantages: it is simple, easy to remember, poses a continental challenge, and sounds like a slogan capable of uniting many efforts. However, it uses negative wording: by saying "without fire" (sin fuego), it clearly explains what is not desirable and that fire is something negative, bad for the Amazon. This poses a challenge, as a number of actors do not feel the same regarding the matter.

There is a substantial difference between forest fires and clearings, and they have different timings, intensities and scales[6]: forest fires refer to events out of control and occur in the dry season, at the end of June, July, August, and September; clearings, instead, are made after the first rains in October, November, and December to start sowing. Therefore, clearings do not usually cause forest fires. Martinez (2003) states that "to avoid forest fires, we must admit that they are an issue" and the subject of specific studies.

The PASF diagnosis in Bolivia was little differentiated in geographical, demographic and sociological terms and regarding pressure on forests. The PASF conducted a baseline (LB) study in 2012. Fire is a problem that mainly affects the Amazon, and also to a lesser extent the Andean area, but the uniqueness of the symptom[7] hides multiple causes:

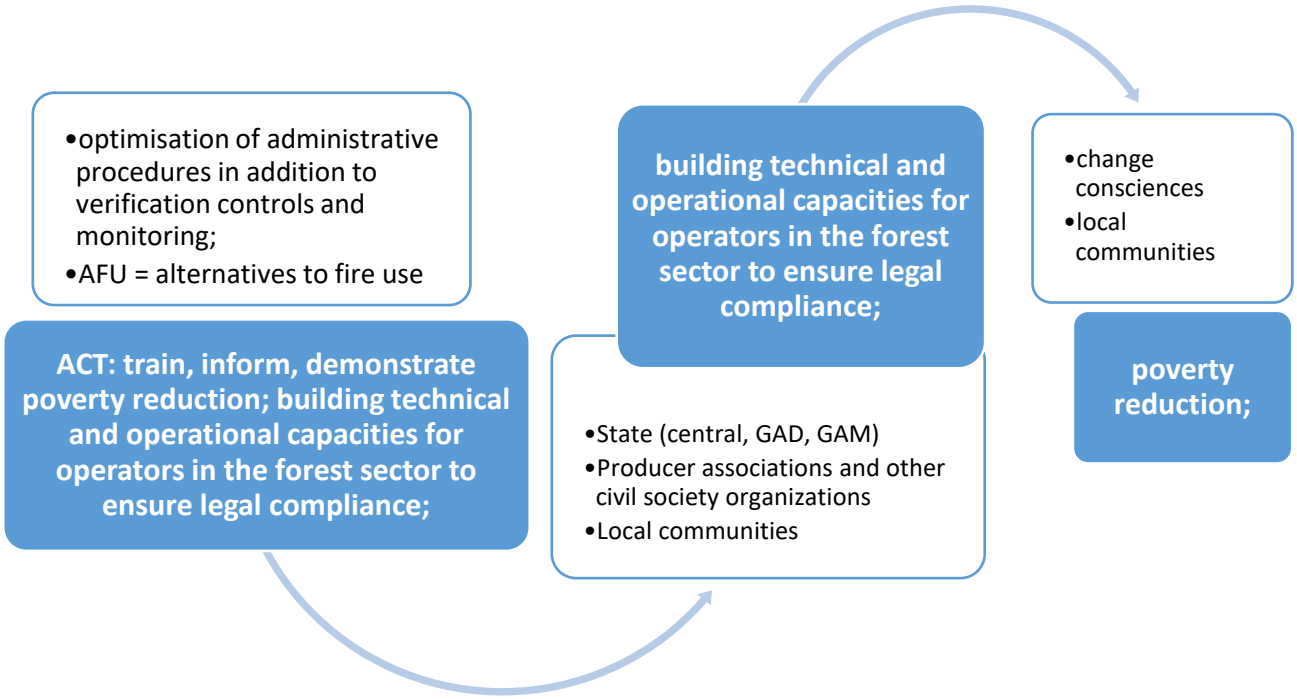
6 Source: Martínez et al. 2003, Fuego en el pantanal. "A variety of factors come together as triggers for fires. Namely: physical factors, such as climate, humidity, temperature... global warming in general. Despite these "triggers" of natural origin, forest fires reach the magnitude of disasters due to certain human actions enhanced by these physical-natural factors.
7 Uniqueness reinforced by the use of a main indicator: No. of heat sources; but as indicated above, it covers a variety of types of fire.

- Subjection; willingness to change land use and expansion of the agricultural borders, willingness to own/occupy government-owned land; sanctions have historically been soft and forgiveness common.
- A lot of biomass that does not allow implementing a crop.
- Low biomass and low fertility; weeds and grasslands need to be immediately mineralised.
- Shortage of labour and/or low profitability of agricultural activity.
- Others to be clarified.

The response to EQ2 is supported in Annex 5.3, which allows illustrating and deepening the diagnosis of the situation that the PASF found in 2012, consulting some sources. We have reconstructed the tree of problems, the vicious circle between fires and climate change, a typology of fires and Production System(s) (PS), the map of actors, an analysis of the logic of rural actors and public policies contrary to the PASF objectives, etc. It was not requested in the ToR, but, for a better understanding, it was necessary to develop some classic diagnostic tools, which we have not found in the PASF Bolivia documents. Other gaps are the absence of a gender diagnosis, a diagnosis of the State's capacities at its three levels to control and prevent both deforestation and fires, and, finally, a cultural diagnosis that explains the perception and attitudes, depending on the areas, of the different categories of actors regarding fire use and fires. The PASF design did not propose alternatives for the interests opposed to its objectives.

Figure 2 outlines the intervention logic that supports the three PASF phases. The proposal makes sense because a cause-effect relationship is correctly captured and constructed between the activities, the results, the Specific Objectives – SO (different in each phase), and the GO (the same for the 3 phases). But this rationale meets some challenges:

Figure 2: Outline of the chain of impacts proposed by the PASF



- To achieve the reduction of fire incidence in the Bolivian Amazon between 2013 and 2017, the proposed process required more time, more resources, and more institutional convergences than was provided for in the PASF. In 2012 (and at the signing of the Phase II and III agreements),

in a context of legal uncertainty and non-compliance with existing rules, the likelihood was high that the PASF would not reach its GO[8].

- It is a "cultural" strategy; but without a diagnosis that analyses in depth the cultural, agronomic and economic reasons that justify fire use and the existing knowledge and practices regarding the control of practices in the territory, nor the contradictions in the legal and institutional framework that explain the authorities' and public officials' behaviours.
- The examples of life systems mentioned in annex 5.3.3 are living proof that some Bolivians have known how to prevent and control fire for decades and centuries. The PASF's mistake was not to rely on them.

The cause-effect relationship between training and reducing the incidence of fire is not immediate. Moreover, change of consciousness does not appear as such in logical frameworks. There are a number of aspects beyond the PASF's control that weigh more than training and prevent the announced impact from being achieved.

Everything happens as if the PASF design assumes that: a) people burn without knowing how to control or prevent fires or because they do not know alternatives to fire use; b) people are unaware[9] of the consequences of fires, and c) training will reduce the incidence of fires (GO). These assumptions are not true in the vast majority of cases. There are also other factors that prevent people from applying the powerful knowledge and reasons that limit the PASF impact and that completely exceed it:

- Economic rationality: the practice of fire is cheap and has an immediate effect[10].
- Socio-political strategies: occupy the land, demonstrate possession when tenure is not assured. The law and decrees allow INRA to perform individual endowments such as collective degrees in government-owned land. The condition is that the beneficiary performs the economic and social function (ESF); i.e., residence in the plot and making "improvements" aimed at producing. In practice, INRA inspectors and farmers interpret the FES in only one way: deforestation.[11]

Although the CPE and Law 300 propose a knowledge dialogue, the PASF design does not plan an open dialogue with existing knowledge from the Andean-Amazonian tradition of burning to enable small areas of cultivation and the community tradition of land management. The baseline does not identify or mention communal land control practices including fire control.

8 The PASF design in Bolivia was too optimistic, under the influence of the achievements in Brazil. The achievements in Brazil are explained by the centralization, consistency and convergence of different programmes at the federal level (see learning 1 in chap.8.1).

9 For example, in the Project Document for phase III, p. 26, i.e., after 2 phases and 4 years, the "wrong belief" of the "chaqueadores" (farmers preparing the soil with burnings) regarding the perception of fire as a mode of fertilization or control of predators and pests is highlighted. In our view, it is not a matter of belief, but of rationality: in their living and production conditions, most chaqueadores have good economic reasons to use fire. "Fire has an economic function in the framework of productive activities; in this sense, the use of fire is a necessity". (Martínez et al., 2001: 97).

10 Read testimonies in most municipal sheets (Annex 6). One interviewee said "fire is the herbicide of the poor".

11 In the northern areas of La Paz, Pando and Beni, there was a rejection of the 1999 "barraquero" decree that favoured individual ownership and the farmers preferred collective ownership (plots around 20,000 ha), because it best adapts to create community standards of forest control and care. The PSs of these communities (timber extraction, chestnut harvesting, wild cocoa harvesting, diversified and associated crops and plantations, etc.) are incompatible with fire.

4.1.3 EQ 3. Is the proposed intervention strategy adequate, valid and replicable to achieve SOs and the overall objective (impact)?

The response to EQ3 was positive overall. The intervention approach was consistent with a good hierarchy of its levels. 1) Institutional support at the MMAyA central level; 2) Support to GAMs in territorial planning, risk management, and implementation of training events; 3) Support at the property level with producers interested in non-use of fire practices, generating AFU demonstration units. Although the intervention approach did not resolve the contradictions mentioned in EQ1 and EQ2 that cast doubt on the impact, it opened the way for swift implementation of the activities.

The message and menu of training events and AFUs were simple and easy to transfer, but they were quite uniform and rigid, leaving each regional manager the task of adapting them to their module's specific requirements.

In general, the design is consistent in that it proposes a good hierarchy of levels and actors, in turn well synthesised in the formulation of SOs. It recognises the national level as the DGDDF and VIDECI, the municipal level with support to the capacities of GAMs and local actors, and the property level for the implementation of DUs with community and private producers.

The institutional support component evolved positively through the extension to other significant institutions articulated to fire control policies and mechanisms (phase II), highlighting the creation of the Risk Management Unit (UGR) /Forest Risk Unit (URF) of the DGGDF and the monitoring unit (Forest Information Monitoring and Analysis Unit of the (planned by EPMIF in the DGGDF - UMAIB) and the elaboration of EPMIF in phase III, in addition to the DGGDF's greater communication capacities. However, there is no evidence that the policy dialogue has addressed the institutional sustainability factor from the outset.

The local capacity-building component focuses precisely on the Municipalities and their technical, environmental, and risk management units. It set aside the departmental level and did not sufficiently consider the communal level of Community Territory of Origin (TCO/TOIC), which are key actors that manage their territory in a customary manner. It did not provide for coordination with public rural extension institutions (MDRyT programmes), private non-governmental development organisations (NGOs), breeders' or farmers' associations, or indigenous economic organisations.

The training and promotion of IFM and AFU practices component was successfully nourished by the offer of techniques that come from the experience of IBAMA (Brazil). It focused on training and practice promotion events (IFM and AFU) that remained virtually constant (only the intensity of implementation varied between the 3 phases).

Unfortunately, the evaluation and mainstreaming of results, causes, effects and limitations of adoption of practices (IFM and AFU) were not planned. The opportunity for the DGGDF to take greater advantage of the achievements and lessons learned from the PASF was missed.

The LB noted the geographical diversity at the level of climate and vegetation, but superficially evoking the social reality of each department. The PASF developed an intervention strategy without social or regional differentiations: the same training package was applied in IFM and the same AFU menu; the specific criteria and assumptions that justify the choice of DUs (their relationship with the dominant PSs in a given area) have not been reflected. It all happened as if the same medicine was prescribed for everyone!

4.1.4 EQ 4. Have the chosen implementation mechanisms (methods of implementation and governance, contractual / cooperation agreements, etc.) and the main stakeholders' human, financial (and strengthening) capacities, proved adequate to achieve the expected results?

The response to EQ4 was positive overall. The implementation and governance mechanisms chosen have responded to the institutional situation imposed by the MMAyA's internal dynamics. However, the option for an autonomous PASF Programme Management Unit (UGP), while laying the foundations for efficient execution, implies the risk of low appropriation by the national guardianship.

A timeline, details of the complex unit changes of the MMAyA responsible for coordination with the PASF, as well as an outline of the governance structure are presented in Annex 5.4.

4.1.4.1 PASF governance

The management structure includes the three levels required for a programme of this nature, with the following compositions and functions:

The **Multilateral Steering Committee – CDM** is made up of a representative of MMAyA; a representative of the Ministry of Foreign Affairs and/or International Cooperation of Italy (AICS) of La Paz; a representative of the Government of Brazil (ABC) and/or a representative of the Brazilian Embassy in Bolivia, and a representative of the CAF. The CDM worked at the strategic level and its functions were: to accompany, analyse, evaluate and guide the programme. The Vice-Ministry of the Environment, Biodiversity, Climate Change and Forest Management and Development (VMABCCGDF) was responsible for reviewing and approving the POAs and Programme progress reports. The CDM was to meet officially every year in La Paz, during the implementation of each programme phase.

The **Technical Committee - TC** is composed of the National Program Coordinator (MMAyA), the General Coordinator (international responsible), the module coordinators, and Brazilian and Italian specialists. The TC accompanied the implementation of the activities, proposing topics for discussion on technical development, as well as support for preparing progress reports and Annual Operational Plan (AOP).

However, the governance mechanisms' design did not overcome the institutional weaknesses of introduction of the PASF:

- The Committees' dynamics were not always satisfactory for the VMA due to UGP autonomy. There is no evidence of an internal UGP regulation defining each of the two coordinators' roles (national and international).
- The DGGGDF only approved the agreements for each phase. It was not involved in the implementation or evaluation of PASF activities.
- The participation of the Forest and Land Social Control Authority (ABT), a decentralised entity of MMAyA that ensures greater land use capacity and the authorisation of agricultural and forest management instruments, was not considered.
- There is no evidence of any mechanism or channel of coordination or exchange with the MDRyT, despite it being the ministry responsible for productive issues and promoter of expanding the agricultural borders.

The **Programme Management Unit (UGP).** The three agreements provided for a multidisciplinary team consisting of a National Coordinator, the General Coordinator supported by a technical adviser, a communicator, an administrator, an accounting assistant, a secretary, and a messenger, plus the technical teams of the 5 modules. As indicated in Annex 5.3.3, the modules did not reflect the severity of the fires in the Amazon. The UGP ensured the continuity, implementation, coordination, and articulation of the planned actions and prepared the POAs and their respective technical and financial progress reports.

4.1.4.2 A project-centric design

The PASF is managed directly by the main donor agency (AICS) through an ad-hoc UGP that coordinates with an APMT or DGGDF focal point. This management mode is based on a centralised project rationale that, while allowing gains in efficiency, generally implies a loss in impact and sustainability. This option was justified from the first bilateral agreement as the best way to achieve implementation efficiency. The opinions gathered during the interviews with the representatives of AICS and CAF affirm the relevance of this option.

4.2 Consistency

4.2.1 EQ 5. Was the program consistent with the policies and strategies of the Bolivian government and Italian cooperation?

The response to EQ 1[a] is positive at the beginning and negative for the last years of the PASF. Initially, the PASF was included in the guidelines of the Law of Mother Earth and those of the Italian Cooperation in Bolivia. Then, a productivist agricultural approach became the focus of programmes and standards, causing the increase of creating agricultural areas from forests through deforestation and burning. The PASF, under the DGGGDF, failed to participate in or influence these policies implemented by the MDRyT.

4.2.1.1 Initial consistency with environmental and risk management public policies

In 2012, when its phase I was designed, the PASF was aligned with the Plurinational State policies for conservation and protection of natural resources. In particular, it is based on the principles established by the Political Constitution of the State (CPE) of 2009 and Law No. 300 of 15 October 2012, "Framework Law on Mother Earth and Integral Development for Living Well," which created the Joint Mitigation and Adaptation Mechanism for the Integral and Sustainable Management of Forests and Mother Earth.

Law No. 602 on Risk Management, promulgated in April 2014, is another regulatory instrument that creates a framework favourable to the PASF, in particular, because it requires the creation of Risk Management Units (UGR) at the central, departmental and municipal levels, bodies responsible for dealing with natural disasters, including forest fires.

SD No. 2914 of 27 September 2016 approves the Programme for Monitoring and Control of Deforestation and Forest Degradation; that is, when phase III of the PASF was being designed, and serving as a guideline. This SD delegates the monitoring of forest fires to the Forest Information and Monitoring System (art.11) and delegates to the DGGDF the prevention, control, and action to combat forest fires (arts. 12, 13 and 14). It proposes comprehensive fire management (art.15), coordination of institutional actions for the prevention, prediction, detection, fight, handling and use of fire in agricultural and sustainable forest management projects (art.16), as well

as the gradual replacement of burnings (art.18). It establishes that the MMAyA must coordinate with the MDRyT for the identification and authorisation of areas for food production (art.7) and the management and control of illegal deforestation (art.9).

4.2.1.2 Gap from public agricultural policies

"In the country, forest policy is determined by the MDRyT." ABT Officer

The PASF was implemented under MMAyA supervision because its actions aim to contribute to climate change (CC) mitigation. The reduction of grassland and forest fires reduces CO_2 emissions. However, its major component was AFU training and promotion of AFU demonstration units on producer plots. On the other hand, productive promotion is the responsibility of the MDRyT and not of the MMAyA. To this end, the question arises whether the MDRyT should not have had national guardianship or at least establish a direct channel with the MDRyT with the possibility of introducing the PASF objectives into agricultural policy. In other words, although the regulations establish coordination in practice, there is a lack of inter-ministerial coordination and among decentralised entities on the matter, such as the National Institute of Agricultural and Forest Innovation - INIAF, the National Fund for Integral Development (Vice ministry of Integral Development with Coca) FONADIN, PAR, the Coordination Unit of the Food Production and Forest Restoration Program - UCAB, the Forest and Land Social Control Authority (ABT) and the Plurinational Authority of Mother Earth (APMT).

The PASF did not have the mandate, nor was it able to adjust its design and intervention with respect to highly deployable and important agricultural regulatory instruments, such as Law 337 on Food Production and Forest Restoration, which allowed the regularisation of illegal deforestation that occurred between 1996 and 2011, or Law 741, which allows farmers to clear up to 20 hectares without management instruments or patent payments. The same perception applies with respect to the National Agrarian Reform Institute Act - INRA 1715 of 1996 and the Community Reconduction Act 3445 of 2006 of the INRA Act. Several regulatory contradictions exist regarding forest and agricultural uses (Pacheco 2011, Johnson 2011, Martinez 2011) and are exploited in favour of agricultural development[12] (see further details in annex 5.1.2). This context was unfavourable to the PASF GO.

The PSDI-MMAyA 2016-2020 makes a good diagnosis of deforestation and fires and orders coherence between the different national intervention programs. However, on one hand, it circumvents the Government of Bolivia's (GdB) strategy to expand the agricultural borders and provides for minimal coordination with the MDRyT or INRA, despite them being decisive actors for such expansion. On the other hand, it does not provide for a multiannual budget for the Nuestros Bosques Programme or the IFM.

Additionally, the MDRyT mechanisation program in the Amazon is conceived and practiced as a support for expanding the agricultural borders. However, mechanisation can be an effective method of preventing and even fighting fires. (See chap.7.4 recommendations on AFU). It is a

12 1st) Art.389 of the CPE establishes only penalties punishable for the conversion of land use, while art.401 provides for the reversal of ownership in the event of non-compliance with the FS and FES; knowing that, in practice, it is the deforestation that usually serves to verify the FS and FSE. 2nd) INRA grants property rights to farmers and ranchers in appropriate forest areas. 3rd) The provisions for human settlements provide for sustainable land use, but their implementation is based on agricultural use. 4th) For the consolidation of property with forest, the same requirements apply in practice as for agricultural property, that is, the FSE that usually requires that there was deforestation. 5th) Low fines for illegal deforestation and timber extraction and low patents end up encouraging deforestation.

completely absent aspect of the PASF or EPMIF design, also revealing the gap between MMAyA and MDRyT.

While Bolivia has many laws that promote agriculture, laws and regulations that protect and value forests are stalled by complex visions of conservation and integral development, over-regulation and bureaucracy, without resources, and under constant threat from more lucrative, short-term land-use change activities.

4.2.2 EQ 5a. To what extent have the necessary complementarities and synergies with other programmes been developed and established?

The response to EQ6 is partially positive. On the one hand, the PASF - as was logical - rightly relied on the experiences of its sponsors in Brazil and Bolivia, as well as those of FAO; thus constituting its main methodological identity.

Clear cooperation and synergy have been established regarding the strengthening of the SIMB and other sectoral initiatives also financed by Italian Cooperation.

However, there were not the necessary synergies with the MDRyT programmes, in particular with the Food Production and Forest Restoration Programme (PPARB) and several projects with activities in forests and regarding fire management, funded by other international cooperation agencies and NGOs.

At the central level:

- The experience of its counterpart programme developed in Brazil with the contribution of Italian cooperation (PrevFogo) was crucial; the PASF brought it directly to Bolivia, constituting a large part of its technical and methodological offer.
- PASF support for the Forest Information and Monitoring System - SIMB is part of the continuity of the Bolivian Observation Room of the Amazon Cooperation Treaty Organisation (ACTO), which was supported by Danish cooperation. The PASF contributed to the development of a specific algorithm and module together with other donors such as FAO, CAF, the Global Environment Facility (GEF).
- PASF Phase III has given rise to other support for the implementation of EPMIF, such as the CAF and UNDP-programme projects, implemented in 2018 and 2019.

At the local level, in the evaluation, we identified good cooperation with other sectoral initiatives, such as:

- Italian Coop.: programme to strengthen park rangers (on IFM / AFU and BRIF training topics, some BRIFs have also been equipped),
- Italian Coop.: FAO project Comprehensive and Sustainable Management of Amazon Forest.
- PacsBio, a sectoral budget support programme with EU funds, in coordination with which the Forest Fire Prevention, Control and Combating Brigades Training Workshop was organised in 2016.
- FAO chestnut development projects in Pando,
- FAO disaster management support projects in lowland municipalities.

On the other hand, it is noted that there was no or little coordination with projects in the same geographical areas and/or with objectives similar to those of the PASF:

- IFM projects implemented by GAD Santa Cruz.
- Friends of Nature Foundation (FAN) Projects for community fire management: 1) in the Chiquitano Bloc (San José de Chiquitos, Roboré y Pailón, 2011-2014), 2) in the Amazon North (Riberalta 2013-2015).
- Conservation and agroecology projects implemented by NGOs funded by the EU and member countries (Correct Coffee, CARITAS, ECOTOP, ACEAA, CIPCA, ECCOS project, led by the FCBC, etc.). (see Caranavi, Riberalta, Guayaramerin, SIV sheets)
- PROBOSQUE I, programme implemented by German Cooperation (GiZ).
- One-off coordination with decentralised entities of the VCDI-MDRyT that had and has sectoral budget support from the EU (FONADIN, UDESTRO and UDESY) and with the National Institute of Agricultural and Forest Innovation (MDRyT) - INIAF, the National Coffee Program (see Caranavi, Coroico, Villa Tunari, Chimoré sheets).
- PROMEC and Fondo Indígena (MDRyT), which facilitated the purchase of agricultural and heavy machinery for agricultural clearance in forested lands, but which could well have been used as a means to prevent and control fires.
- Rural Partnerships Programme - MDRyT with World Bank funds.

As the PASF documents do not contain an analysis of actors, Annex 5.6 presents a map of the significant actors that reflects alliances, but also existing conflicts. It is recurrent in state projects not to be encouraged to seek complementarities or synergies, as they have their own budgets and objectives. It is obvious that a cooperation programme with relatively few resources (€4.7 million for 5 years) cannot be meant to solve the problem that the government itself has not been able to solve, or to create opportunities that the political dialogue between guardianship and donors was not able to create, despite the discussions that were launched in the CDM (see annex 5.10.3).

4.3 Efficiency

4.3.1 EQ 6. To what extent has the programme achieved the desired results and/or effects through rational and efficient planning and the use of planned resources?

The response to EQ5 was positive overall. The PASF implementation was smooth, it achieved practical implementation under the AOPs, and high budget execution. Efficient planning and implementation of activities, reaching a large number of training events and DUs implemented, outcomes that were achieved through a vast network of partners. A key positive factor was the recruitment and training of high-level professionals and to give them stability. Initial training and stability produced a committed team, that took on itself the role of trainers without the need to hire trainers. The PASF Monitoring and Evaluation System (MES) allowed a good flow of information among the 5 territorial modules, the central team, and the steering and technical committees.

However, the MES did not consider monitoring for effects and impacts, and the network of allies was functional for the duration of the PASF and was not maintained thereafter.

In this question, we analyse the deployment of financial, human and institutional resources, activities and systems by PASF. In Annex 5.5, more detail is found in terms of activities carried out, the network of 200 partners that the PASF wove, and human talents.

4.3.1.1 Budget and financial provisions

The PASF budget was prepared in detail from the outset and was part of the overall agreement. The total amount of the three phases was €4,776,410; and covered all activities, including human resources, travel, equipment and supplies, field offices, other costs and services. 66% of the budget was distributed among the UGP (head office and offices in the 5 modules); 31% for activities in favour of the target groups (BRIF, DU, training, outreach and awareness, etc.); and 3% for governance and monitoring and evaluation expenses. Considering that the UGP directly executed the training, we can state that this distribution of the items was consistent with the action needs (Table 2).

Table 2: Budget of the three PASF phases (in euros)

Items	PHASE I	PHASE II	PHASE III	Sub-Total	%
Human resources	757,980	484,565	539,101	1,781,646	37
UGP Operation	384,331	266,853	434,439	1,085,623	23
Travel expenses		107,298	161,335	268,633	6
Equipment and modules	22,495			22,495	1
UGP					66%
Meetings with community leaders	30,349			30,349	1
Community Brigades Training	182,500		99,113	281,613	6
Demonstration Units	317,200	76,582	59,400	453,182	10
Institutional strengthening	189,800	20,000		209,800	4
Expert consultancies	98,550	30,888	37,120	166,558	4
Dissemination	184,933	68,000	92,861	345,794	7
Activities in favour of the target groups					31%
Executive committee meetings	10,162			10,162	0
Baseline	2,555			2,555	0
Monitoring and evaluation	73,000	30,000	15,000	118,000	3
Other					3%
Grand Total	2,253,855	1,084,186	1,438,369	4,776,410	100%

By way of addendum, some transfers have been made between items without changing the budget ceiling in each of the three phases, mainly in the section on human resources and operating costs, reallocating funds to ensure efficient implementation of activities. Each budget modification was duly justified and approved by AICS La Paz and Rome in an appropriate and timely manner without interrupting the planned activities' continuity.

All parties have fulfilled their contributions in a timely manner[13]. In the case of the GdB, the contributions made correspond to the valuation of personnel and real estate. Thanks to the various extensions, budget implementation was complete and was carried out within the contractually agreed time-frame.

4.3.1.2 Monitoring and Evaluation System (MES)

The programme regularly monitored the use of resources; changes were discussed in the TC and submitted for approval to AICS and the Italian Embassy. The PASF had an administration and accounting system and an adequate internal management and control system. In addition, a baseline study was conducted in 2013 and the UGP structured an MES capable of following the execution of activities according to the logical framework. Reporting was well detailed following the structure of planned activities and had the approval of CDM members.

The shortcomings that could be detected in the MES are:

1) Narrative reports of activities, with little data and little reflection on effects and impacts.

2) Monitoring of each DU was not considered. Indicators specific to the AFU and AFU adoption rates were required (with the exception of a count of the DU duplications in phase II, an exercise that apparently was discontinued). This diminished the ability to appreciate the effectiveness of these practices, which are the basis of the intervention logic and the resources invested (80% of the training sessions and the DUs point to the adoption of the AFU).

It should be mentioned that during phase II (Activity 2.4.3), an attempt was made to establish the influence of the DUs on forest fires, using the report of burning scars and forest fires in the PASF intervention areas within a radius of 5 km around the DUs, concluding that the impact of fire on the 1DUs was not significant. However, the monitoring methodology and results are biased and questionable. An element highlighted in this evaluation is that the PASF, having the SIMB at its disposal, has not defined a solid system for monitoring the incidence of fires in the intervention municipalities.

Finally, AICS in La Paz and from Rome regularly monitored field activities during all implementation phases.

4.4 Effectiveness

4.4.1 EQ 7. To what extent has the programme contributed to the institutional and technical strengthening of the institutions involved and the communication capacity of the MMAyA (APMT, DGGDF, VMABCCGDF) and the other public administration entities (VIDECI, FFAA, PN, Firefighters, SERNAP, University) responsible for fire control?

The response to EQ7 was positive overall. The main institutional strengthening was captured during phase III by MMAyA's DGGGDF, which was provided with regulatory, programmatic, and technological tools (algorithms for interpreting satellite images for SIMB).

With the other actors, the PASF has contributed to the massive training of human talents, but without evidence of positive transformation in the institutions responsible for fighting fires (VIDECI, FFAA, Bolivian Police, SERNAP) or responsible for university training.

13 As a single exception, the CAF was unable to recruit the international coordinator in good time for the second half of 2017. to secure this position during the crucial closure phase, AICS has approved an addendum to cover this cost.

4.4.1.1 The PASF provided institutional and technical strengthening to MMAyA

The PASF did not have a stable national counterpart; it changed from Phase I initiated with PNCC, Phase II under the APMT and Phase III under the DGGDF. According to the documentary analysis, we note that the approach to comprehensive monitoring of forests and lands was initially promoted by the APMT through the Joint Mechanism; however, given the apparent weakness of this state body that failed to assimilate the program during its phase II, they pushed for the appropriation of the PASF proposals and initiatives to be transferred to the DGGDF in the field of prevention and control of forest fires and forest protection.

This explains the absence of evidence of a PASF contribution to the capacities of the APMT on which it relied during phase II. It is known that so far, the APMT continues to work on executing the joint CC mitigation and adaptation mechanism.

On the other hand, in 2016, SD Nº 2912 to Nº 2916[14] supported the justification and planning of phase III-PASF aimed at institutionalizing the IFM in the DGDF. In 2017, the PASF organised 4 inter-agency workshops to present and transfer its results to the DGGDF to integrate these new activities into its planning. The topics focused on presenting the AFU/DU/BRIF deserving duplication and the need for a new unit, the URF in the DGGDF. There were also joint field visits in the La Paz and Beni modules to show DGDF officials the achievements of the DUs.

At the same time, the PASF financed a consultancy to prepare a proposal for a Plurinational Strategy for Integrated Fire Management (EPMIF), following which the DGGDF formulated a multi-year programme for its implementation and processed its financing and the resources to be registered in the 2018 and 2019 AOPs before the VIPFE. These involved, among others, creation of 9 items for the 2 units, UMAIB and UFR, to be created in the DGGDF (aspects developed in the EQ11, chap.5.3.5).

The consultancies provided by the CAF (2018) and UNDP (2019) were used to follow up the Beni and La Paz DUs. The consultants worked in connection with the DGGDF, but there is no evidence that the results of the consultancies have been adopted by the DGGDF, other institutions, or local governments. In March 2020, the DGGDF indicated that it did not follow up on DUs; it was not informed about them, nor did it have a record. Between December 2020 and January 2021, field visits to 13 municipalities showed that only 40% of the DUs are known by municipal technicians; some are still supported or used in their training or exchange of experiences.

Regarding the development of the DGGDF communication capacities indicated in results 1 and 4 of phase III, the evidence shows that there were numerous communication activities and a large amount of printed and digital materials were developed. A demonstration of this strategy's success is that journalists took the initiative to request information and materials directly from the PASF. Unfortunately, these experiences and materials have not been registered in the DGGDF, which to date is limited to issuing bulletins of heat sources and forest fire risk.

PASF support was effective in developing the SIMB modules, thus contributing to the monitoring capacity of fires and forests. See further detail in the reply to EP 15 (chap.5.5.2).

14 SD 2912: Declares the National Forestry and Reforestation Programme to be strategic and of national priority. SD 2913: Authorizes the establishment of a trust for the granting of loans to the forest production sector. SD 2914: Creates the Programme for Monitoring and Control of Deforestation and Forest Degradation. SD 2915: Implements the Wood Production Service Centres Programme. SD 2916: Approves the National Forest Development Fund Statute.

4.4.1.2 It strengthened SERNAP to a reduced extent, but trained park rangers (GPs)

The biggest problem mentioned by SERNAP and PA Directorates is the lack of funding to pay GP salaries and equip them to fight fires within PAs. The PASF did not aim to solve these problems, but coordinated with another AICS project to collaborate on this path. At the level of the SERNAP national structure, PASF did not have a direct contribution. However, its support for the National Park ranger Training Plan, which sought to professionalise 200 of them at the level of middle technicians, was considered. The support consisted of specific courses organised at the Madidi PN training centre in San Buenaventura and also by GP's participation in the open PASF courses, considering that many of them are also forest firefighters and therefore a human talent that can be mobilised in the face of any fire inside and outside PAs. In the evaluation, positive testimonies were obtained from GPs about the training received (see PA sheets, Annex 7), but no statistics were available on how many have been trained, the degree of professionalisation, and performance from said training.

EQ8 (chap.5.3.2.3) and the Mainstreamed Assessment Sheets for PAs (Annex 7) describe the strengthening of the PASF at the level of the specific protected areas.

4.4.1.3 VIDECI, FFAA, National Fire Police

We did not obtain evidence of institutional strengthening or technical capacity development in the VIDECI, FFAA, or Bolivian Police.

4.4.2 EQ 8. To what extent has the programme contributed to improving the territorial governance capacities of GAMs and rural communities?

The response to EQ8 is negative at the GAD level of Protected Areas (PA) and rural communities; but it is positive at the GAM level.

Institutional strengthening was capitalised on by a good number of GAM, which under the impetus of the PASF have implemented and/or strengthened with budget and with personnel their UGR and their technical units for productive development and the environment, thus allowing a certain projection towards rural communities, but in general with a production-oriented approach without concern for the protection of forests and water sources. Between 2012 and 2017, but without the influence of the PASF, 4 municipalities were declared Municipal Protected Areas with their respective management plans.

On the other hand, the PASF failed to sufficiently involve GAD and PA management capacities and failed to integrate communities, a key social, economic and territorial link in Bolivia, into its strategy. Rather, communities have been seen as a merely instrumental link in accessing producers.

4.4.2.1 Low incidence in Departmental Autonomous Governments (GAD)…

The PASF signed agreements with the GADs of La Paz and Pando. The GADs of La Paz, Pando, Beni and Cochabamba did not have an IFM programme, nor did they incorporate AFUs into their agricultural programs. On the other hand, we note the involvement of the UGR of GAD Cochabamba in the creation of BRIFs in the Trópico municipalities (see Villa Tunari sheet).

Good coordination with GAD Santa Cruz did not exist, supposedly for political-party reasons. This explanation, mentioned on several occasions, is not consistent with what people experience in the countryside, where fires affect people without any difference and, on the contrary, preventing or controlling them requires regional and national unity.

At least 2 GAD technicians participated in meetings and training events with Brazilian experts promoted by the PASF. The criticism of the PASF by those responsible for the IFM programme of S^{ta} Cruz was that it did not select the municipalities with the highest incidence of fires. Parallel to the PASF, this GAD implemented two programmes and planned a third[15], without influence or support from the PASF, despite the convergence of objectives.

GAD S^{ta} Cruz programmes focused on improving the detection and interpretation of heat sources, training and equipping forest firefighters, promoting AFUs (orchards, AFS, beekeeping), and stimulating GAM participation through regulations, UGR and registration of municipal budgets for risk management. It is worth noting the GAD's current alliance with the *Centro de Investigación y Promoción del Campesinado* (CIPCA), *Fundación de Búsqueda y Rescate* (FUNSAR) and FAN to form and equip community brigades in several municipalities (see San Ignacio y Concepción sheets). We regret to note the duplication of efforts in the case of remote sensing systems (see EQ11) and the large number of courses for brigades and firefighters with different scopes and approaches.

4.4.2.2 … Emphasis on Municipal Autonomous Governments (GAM)

With its local teams in 5 modules, PASF worked with 54 GAMs. This means 14% of the GAMs of the country and 90% of the GAMs in the Bolivian Amazon region. Despite being one of its main target groups, the PASF did not have or develop a precise characterisation of GAMs, their territorial heterogeneities, population (main criterion for the budget allocation), administrative and technical capacities to adjust the activities and actions to be implemented. The result was an identical accompaniment programme for all: training for municipal technicians, training and equipment for BRIF, PTDI awareness-raising on risk management, budget requirement for UGR and to implement AFU in demonstration plots (DUs).

There is a tendency for GAMs to devote more resources to the UGR and production development. The PASF has thus influenced the sector by requiring that GAMs, in turn, allocate resources to fire prevention (See Annex 5.8). However, most GAMs, especially the smaller ones, allocate few resources, and some do not have UGRs or are just planning their creation. The case of Riberalta stands out because, along with other institutions, the PASF contributed to the development of municipal standards relating to risk management and the assumption of a "culture of prevention."

However, not all municipal production programmes are implemented with a natural resource conservation approach. Although this is the case in Villa Tunari and Riberalta, it is not the case in the others, where, on the contrary, deforestation, and therefore burning, are usually encouraged through the provision of machinery and inputs for monocultures on clean land (rice, sugar cane, cultivated pastures, etc.). This can be seen in particular with the compensation they provide for accessing the Indigenous Fund, a notable case being that of the Apolo GAM that is apparently encouraging deforestation in Madidi NP (See Annex 7).

15 2005-2012: Forest Fire Prevention and Control Programme. 2014-2019: Forest Fire Mitigation Programme. It had a budget of ca. 20 MBs. 2020-2024: The Departmental Fire Management Programme is approved with 4 components i) Prevention, ii) Early warning of forest fires, iii) Control of forest fires, iv) Fire Use and Management. Each component contains strategic lines, and in turn, a matrix of operations planning was defined by setting measurable and quantifiable activities and indicators. Requested budget of 32 MBs. See some of its lessons learned in chap.8.2.

4.4.2.3 Little support for PA directorates

During the PASF execution in the municipalities of Reyes, Santa Rosa, San Ignacio and Concepción, Municipal Protected Areas (MPAs) have been approved and established, with the subsequent development of a management plan that defines the permitted uses. These MPAs were supported by NGOs such as *Wildlife Conservation Society (WCS)*. There is no evidence of PASF involvement in this process. It was surprising to note that, in Santa Rosa, the Livestock Association supported the establishment of the MPA and promoted good livestock practices, while the opposite happened in Reyes.

The PASF also did not affect the relationship between the GAMs and the directorates of the national PAs, which is usually conflicting due to boundary problems with urban expansion areas (see Tunari NP sheets, Pilón Lajas BR sheets), expansion of the agricultural borders (see Madidi NP sheet), and non-regulation of predators, among others. The PASF also failed to strengthen PA Management Committees. These committees do not function fully and, in any case, do not secure the strong support of the GAMs concerned. In case of fires within PA, GAM support is limited. On the other hand, in the event of fires outside PAs, GPs are mobilised first, because most are trained as forest firefighters and to prevent propagation to the PA.

4.4.2.4 Use of rural communities

Evidence shows that the PASF might have focused its action with communities only to have access to people and then focus on plots where to install DUs. It missed or failed to integrate into its strategy this key social, economic and territorial link in Bolivia, the community. It is clear that doing so would have involved a different strategy and a greater permanent presence in the territory; that is, a wider reach or closer alliances with such community organisations or NGOs.

There was no diagnosis of community organisational standards and practices for fire management or land management. It did not gather information on what people knew how to do or their specific needs (see chap.5.1.3). Therefore, the PASF also did not provide support aimed at strengthening or developing such practices. Basically, the PASF involved community organisations as bodies to convene assemblies, carry out training, and disseminate the experience of DUs and their awareness-raising messages. Under this mode, it reached about 440 communities (!) distributed in a balanced way among the 5 modules and departments.

Only in a few cases was the PASF included in processes developed by indigenous and/or farmers' organisations and with CIPCA, CARITAS and other NGOs such as ECOTOP and IPHAE that applied a territorial approach at the communal level to increase rootedness, through rules of access to forest reserves, agroforestry systems (AFS), communal fire containment alleys, etc.

4.4.3 EQ 9. To what extent has the training provided by the programme contributed to fire control and reduction?

The response to EQ9 is neither positive nor negative. There is recognised impact on the target groups of awareness-raising campaigns and training launched by the PASF. The message of avoiding burning was placed on local and national agendas. However, we find no evidence of a cause-effect relationship between these campaigns and fire reduction.

It is difficult to establish a direct cause-effect relationship between the training provided and fire reduction. The large number of training events, aimed at a large number of technicians and farmers, has contributed to some awareness and, to a certain extent, to a change of attitude. Measuring these

two effects required more sophisticated instruments, which the PASF did not develop. Political decision-makers (councillors, mayors, governors, (deputy)ministers, directors, political parties, etc.) have not been part of the target group; there was no training dedicated to them, although they are the ones that guide public investment.

Several interviewees have given very positive ratings of the training of trainers given by the PrevFogo experts brought by ABC. A good class of trainers has been trained, but the actual number is not known. There is no database of them; therefore, this human talent is dispersed in the country. There were two training courses at university level with a Diploma involving 26 technicians (see annex 5.7) and the support of a platform comprising the *Istituto per la Cooperazione Universitaria* (Italy), the Universidad Mayor de San Simón (Cochabamba), the Universidad Autónoma Gabriel René Moreno (Santa Cruz), the Universidad Amazónica de Pando and the *Università di Firenze* (Italy). However, these technicians' graduation was pending due to difficulties in the UMSS to recognise the postgraduate degree in the university system. Also noteworthy is the holding of 99 workshops for the creation of BRIFs; several of the participants still work in municipal UGRs. Likewise, 1565 AFU training workshops were held with 48,522 participants.

While most of the technicians of some GAMs, NGOs and livestock associations maintain a discourse against burning, we have also heard reverse arguments, as opposed to not burning, because it is an unrealistic instruction, not adapted to the reality of the PSs.

The campaigns and events focused on the transfer of technical knowledge; they did not start from the know-how and local experience of rural communities. The contents were standardised for all areas, without including particular elements of the local culture or languages. Nor did the training focus on the logic of the country's current regulations for deforestation and controlled burning, considering the existing contradictions (see EQ1a) and how to address or manage the opinions found among those who are in favour and against the use of fire in production practices.

The biggest achievement of these campaigns has been to put the fire issues on the table and raise awareness about it. However, there are indications that the messages and practices promoted for prevention, firefighting, and AFU did not match the participants' possibilities; that is, their institutional and individual capacities.

4.4.4 EQ 10. To what extent are the proposed techniques (AFU) and better management of the PSs functional and effective in controlling / reducing fires?

The response to EQ10 is potentially positive and promising. The immediate impact is recognised of abandoning the use of fire on the plot where an AFU was installed. Although we confirm the existence of duplications, there is not enough information to allow a general conclusion valid to the rest of the property, to neighbouring properties or to the community. This requires a more in-depth study, not only of technical and economic aspects, but also of social standards and agreements to promote citizen environmental responsibility.

To address this question, we sorted and collated secondary and field visit information. According to reports from the 3 phases, the PASF implemented a total of 179 DUs, 150 of which during phases I and II, and 29 during phase III. According to the phase III report, of the 150 DUs, 112 were active, so it is estimated that a total of 141 DUs (112 + 29) remained active at the end of the PASF.

Table 3: Status of Demonstration Units (DUs) visited in 2020

	Total registered DUs	DUs registered in the 13 municipalities in the sample	DU visited in the evaluation	Successful DUs	noted duplications
grassland management	53	22	17	5	9
agroforestry system	41	9	2	2	1
integral ownership	16	6	1		
nurseries	9	2	1	1	
soil recovery	8	3	1	1	
beekeeping	5	3	1	1	2
integrated fallow management	3	2			
organic production	2				
vegetables	2	2	1	1	
carpentry	1	1	1	1	
land clearing without fire	1				
T O T A L	141	50	25	12	12

For the description of each unit visited, refer to the sheets in Annex 6. Table 3 summarises what was observed in the 13 municipalities in the sample. Of the 25 DUs visited[16], we found that 12 are successful under the criterion of being functioning on the day of the visit. It can then be said that, in these cases, DUs constitute a space where owners no longer use fire and make efforts to prevent fire from entering from neighbouring properties[17].

Table 3 also shows the "menu" of the PASF AFU offer, inspired by the PASF Brazil. It has been the same during the 3 phases and in all the modules. As its name suggests, each AFU is designed to prevent burning. There is no hierarchy according to potential impact or its installation cost. All involve an investment in materials, inputs and above all labour for their installation and then for their maintenance: this aspect is fundamental because the use of fire corresponds to an extensive PS, while the use of AFU implies an intensification of the PS.

The AFUs are designed for small-scale agricultural units that can use family labour for such investments. The Voisin system is the AFU that has the most potential and can be applied to larger surfaces (a basic electrifier can cover a radius of 700 m, almost 200 ha). As the rotation of pastures is sought, the highest cost is the installation of poles that the PASF did not cover (see Annex 8).

In Annex 5.9, the PASF duplicated replicated classical aspects of agricultural extension programmes, in terms of beneficiary selection criteria (tension between individual and group logic, conditions for ownership and duplication, etc.). The PASF, being dependent on a ministry with a different competence, failed to fully develop or transfer such aspects at the time of its closure.

4.4.5 EQ 11. Has the programme contributed to promoting public policies at national and local levels aimed at preventing and controlling forest fires?

The response to EQ11 is positive. The PASF has clearly contributed to the development of EPMIF and to strengthening the SIMB, to which GAMs will assign human and budgetary resources to fire

16 With a clear bias of respondents and informants to point out the DUs of management of grasslands with electric fences, as they are the most striking and durable, compared to the DUs that failed or that lasted little (one or two campaigns) such as vegetable cultivation, soil recovery or the preparation of organic fertilizers.

17 Several owners – see Rurrenabaque and Guayaramerin sheets – indicated the impossibility of maintaining surveillance and care during the quarantine of 2020; their DUs suffered damage due to the entry of other people's livestock or by the spread of fires towards their plot.

prevention and control. However, the achievements did not translate into the budgetary allocations required to achieve the planned targets. On the other hand, the PASF has had very little impact on policies and programmes for the expansion of the agricultural borders, which had strong political support and resources to consolidate illegally deforested areas even in forested lands, without internalizing a fire reduction strategy through the MDRyT.

The PASF is the first programme in Bolivia to have introduced the concepts of IFM and AFU in public management and to achieve their inclusion in a national public policy and several municipal actions. The concepts were already handled by technicians, NGOs, environmentalists, but until then, except in the IFM Programme of the Santa Cruz GAD, they were not registered as public policy.

The MMAyA made important strategic and policy decisions, some of which noted the decisive influence of the PASF:

1) Supreme Decree 2914 establishes the NUESTROS BOSQUES Programme

SD 2914 was promulgated on 27 September 2016. It creates the Programme for Monitoring and Control of Deforestation and Forest Degradation, "Nuestros Bosques" and establishes its components and implementation mechanisms. Its regulation should formalise the creation of the URF/UGR within the DGGDF, as planned at p.26-28 of the EPMIF.

2) 2016-2020 MMAyA Comprehensive Development Sector Plan (PSDI)

The PASF's influence on the formulation of MMAyA's PSDI could not be ascertained. The PSDI does not mention the PASF. However, the PSDI makes a detailed national diagnosis of deforestation and forest fires, highlights regulatory advances, and places IFM as one of the MMAyA lines of action.

3) Integrated Fire Management Multinational Strategy, April 2018 (EPMIF)

On 11 April 2018, the EPMIF was approved by Ministerial Resolution No. 170. It is the greatest achievement of the PASF in public institutions! Its role has been fundamental in the conception of this strategy, since the draft was prepared by a consultant hired by the PASF. The EPMIF, as its name suggests, is based on "comprehensive fire management;" that is, the set of ordered actions for the prevention, mitigation and control of forest fires. It has 4 components:

a) Institutionalisation of Integrated Fire Management.
b) Risk reduction through the prevention and control of forest fires.
c) Disaster and/or emergency response through preparedness, alert, response and rehabilitation.
d) Promotion of AFUs in agricultural practices on demonstration plots.

Alongside these successful guidelines, the same issues and gaps are detected as those mentioned for the PASF. It is based on a monolithic vision of fire when reality shows different kinds of fires and different attitudes of rural communities (see chap.5.1.3). It omits the analysis of rules favouring deforestation, burning and hence forest fires (see Annex 5.1.2). It does not propose actions to counteract their negative effects, nor does it establish bridges with the MDRyT, which promotes land-use change, and omits the ecological function of fire in certain ecosystems. EPMIF notes the development of EDMIF at the departmental level; but these have not yet been drafted (except for Santa Cruz), and progresses in identifying institutional strengths and weaknesses and building IFM departmental platforms.

The EPMIF is right to mention the other actors involved but does not establish their integration into an inter-sectoral public policy led by the MMAyA/VMA/DGGDF that involves and seeks to coordinate and strengthen relations with ABT**, SERNAP, MDRyT, VIDECI, Firefighters,** Bolivian Police, FFAA**,** among others. Also the PASF failed to achieve this goal. Other weaknesses observed are that the EPMIF leaves the coordination body undefined and does not diagnose in sufficient detail the deficiencies in the articulation with the departmental, municipal, TIOC/TCO levels and with the communities in all their diversity. Nor does it establish or propose what to do if current capacities are insufficient, as we have seen at municipal and PA level.

4) DGGDF AOP

There is no evidence that all or some of the PASF activities have been integrated into the 2018 and 2019 DGGDF AOPs, nor that the EPMIF has guided the planning of said AOPs. Good regulatory work has been carried out at the DGGDF level, up to obtaining a SD and an MR to formalise the EPMIF, but it has not been possible to capture the TGN's budgetary resources to be able to operate the fire control policy from the State.

5) Insufficient coordination between ministries and autonomous territorial entities

The PASF has contributed to strengthening municipal public policies; see the response to the EQ8 and its measurement with some indicators (see Annex 5.8).

MMAyA is a ministry with little capacity to call upon other ministries. On the other hand, the MDRyT has much more budget and is in charge of expanding the agricultural borders. INRA has provided land to many families, sometimes on permanent forest production lands without coordination with GAD/GAM or ABT, which ensures greater land use capacity and the authorisation of agricultural and forest management instruments. However, following the fires of 2019, and 2020, questions have arisen about the selection criteria and the beneficiaries' real dedication to agriculture.

There have been cases of coordination between MMAyA and MDRyT, and[18] they are commendable because they show that a better balance between production and conservation is possible. Obviously, they are not sufficient to correct the divergence between the two approaches within the State.

The fire issue cannot be separated from that of deforestation. The policy promoted by MMAyA through the PASF did not influence the agricultural border expansion policy promoted by the MDRyT and considered as a priority by the last few governments. The MDRyT and its programmes seek and achieve immediate benefits for farmers and agricultural producers, while

18 Examples of specific coordination detected in our survey.

1) The Ministry of Productive Development and Plural Economy convened directors of the MMAyA and MDRyT to promote the Amazon fruit production complex (registered in the PDES). At that meeting, MMAyA noted the need to conserve forests, within which palm trees and trees with fruits of economic interest are developed or to recover land degraded with SAF; while the MDRyT proposed deforestation and installing monocultures of such plants as the only way to obtain large volumes and thus justify the investment.
2) UDESTRO has supplemented the electric fencing DU in Villa Tunari.
3) The National Coffee Programme has promoted coffee under shade and in SAF (Caranavi, Chimoré, Villa Tunari, San Ignacio).
4) PASF module coordinators have contributed to the development of projects for submission to the calls for PAR, PICAR, and other MDRyT programmes. We are not aware of the outcome of these efforts.
5) The GISBA project has provided continuity to at least 2 PASF DUs in Pando and 2 DUs in Beni. And it has coordinated with the Indigenous Fund the financing of SAF.

the MMAyA comes with a message and demanding standards that aim to achieve sustainable, but long-term benefits.

4.5 Sustainability

4.5.1 EQ 12. To what extent have national institutions ensured that the results of the programme continue?

The response to EQ12 is that the continuity of results, overall, is insufficient at the central level and more positive in decentralised institutions.

The guardianship entity, DGGDF, has generated the necessary strategy and budgetary programme to continue the PASF activities, especially regarding IFM and AFUs. In the end, however, it was not granted the sufficient economic resources required to implement them in the same size. Furthermore, it weakened in the 2017-2019 period.

On the other hand, the continuity of IFM training by the GADs of Santa Cruz and Cochabamba, and VIDECI is notable. In Santa Cruz, the GAD has refined its IFM programme that includes a community BRIF shaping component in the most fire-prone locations. Something similar happens with some GAMs.

4.5.1.1 DGGDF has weakened

In March 2020, the DGGDF had a General Manager, two unit heads (Management & Conservation and Forest Development & Management) and a SIMB manager. Despite the knowledge and the regulatory and programmatic instruments, the DGGDF has suffered a contraction. Since 2017, the budget available for the DGGDF staff and operation has decreased. There is no monitoring unit, and the SIMB manager was left alone[19] without time for satellite image analysis. Their main job is to edit a bulletin of heat sources and forest fires and disseminate it to an IFM Platform that is basically reduced to a WhatsApp group.

The UGR, result No. 1 of Phase III of the PASF was not implemented; the MMAyA did not obtain either the items or resources from the State Budget[20]. The DGGDF has managed some continuity with the PASF and an emerging implementation of EPMIF, with external cooperation funds. Most of the DGGDF technicians trained by PASF do not currently work in this directorate. The DGGDF does not have a database of the instructors trained by the PASF and PrevFogo; therefore, it is difficult to know where to locate and hire them to duplicate training actions.

In 2017, all the elements and information existed to proceed with a gradual process of PASF institutionalisation and its integration into the 2018 AOP. This did not finally happen, with the sole exception of follow-up to DUs by consultants funded by the CAF and UNDP.

Annex 5.10 provides details on additional consultancies covered by the CAF and UNDP, on the proposal of the Transitional Government Forest Director, on the weakness of PA management committees, and training limits for FFAA staff.

19 Previously, the SOB-OCTA had up to 14 professionals, but all financed by international cooperation.
20 Between October 2017 and January 2018, the VMA and MMAyA Minister sent three requests to AICS / Embassy of Italy for resources to rent an office for the UGR throughout 2018 (USD 2,200/month). Said requests have been denied, the final term of the PASF being on 31 January 2018.

4.5.1.2 The weakness of the SERNAP

A permanent concern in the Direction of SERNAP is to recover and restore the PAs that have been endorsed in recent years. It also proposed the creation of a scientific platform to provide technical support to its management, with the participation of universities and environmental NGOs. The dynamics of PA management present an interest in its convergence with the objectives of the PASF and the spaces of continuity that represent, however, the weakness of SERNAP, which faced a budget gap of 22 MBs in 2020, did not allow a greater appropriation and valuation of PASF contributions.

4.5.2 EQ 13. To what extent are the techniques promoted by the programme genuinely sustainable for producers?

No clear response can be given to EQ13. In the evaluated sample, sustainable DUs represent only half of the total, and are run by producers who have economic capacities other than the DU. In the other cases, the lack of follow-up, supplemental resources to complete or repair equipment, and the passive and paternalistic attitude of waiting for further support, negatively influence the work.

The response to EQ13 has much to do with the selection criteria mentioned in Annex 5.9. Our sample was large but not statistically representative and its biases were indicated in chap.5.3.4. The data in Table 3 would indicate that roughly half of the DUs were maintained 5 to 6 years after installation.

Technical sustainability depends more on the producer than on the technique. If the producer already had some previous experience or had made investments of their own effort, it is very likely that they will continue to do so to maintain a new technique (see Guarayos sheet). Most success cases involve a medium or large producer with the ability to mobilise economic resources outside the plot with AFU (professionals, sale of livestock, etc.). In Annex 5.9.4, we argue that paternalism also affected the PASF and its technicians, which explains the unsustainability of a good number of demonstration plots and their AFUs.

The DUs that are still operating confirm the interest in several of the practices promoted by the PASF. 1) Beekeeping is attractive for producers with this interest because it is profitable (even more so with Melipona) and it is an additional activity on the property, without displacing the others, rather promoting the enrichment of the flora with honey plants. 2) the rotation of pastures is facilitated by the electric fences and translates into a lower pressure to enable new pastures.

The directors of productive development of Riberalta, Villa Tunari and Rurrenabaque have stated that they have formulated new agricultural projects inspired by the experiences of the PASF; that is, incorporating AFUs, promoting diversification on the land and curbing specialisation, monoculture and therefore deforestation. Unfortunately, the reverse trend prevails in the other GAMs' productive projects.

4.6 Impact

According to the PASF Results Book,[21] between 1999 and 2009, the PASF-Brazil achieved a positive impact: in the states of Acre, Mato Grosso and Pará, the incidence of forest fires decreased

21 PASF, 2018. Amazonia Sin Fuego Results Book 2011 – 2018. Reduction of forest fires through the adoption of alternatives to fire use in agricultural activities. "Programa Amazonía Sin Fuego", financed by the governments of Bolivia, Italy, Brazil, and the Development Bank of Latin America – CAF. (Prepared by Roberto Bianchi, Estefanía Miranda Vega, Romina Aguilar Makaren, Wesly Méndez Cobarruvias).

between 70% and 94%. The most important achievement was the appropriation of the initiative by the Brazilian State, which, through IBAMA, converted several experiences into public policies at the federal level, including the PASF in the 'Arco Verde' programme. The PASF-Bolivia's impact is smaller; this chapter details both positive and negative aspects.

The final phase III report reviews the logical framework in terms of its 4 results, without addressing either the SO or the GO, and therefore does not provide quantified indicators in terms of incidence for fire reduction or revenue increase. The data produced during this evaluation refer to the sample of 13 municipalities (25% of the total supported by the PASF), 5 PAs (55% of the total), and 25 DUs (50% of those registered in the 13 municipalities visited). Considering that the choice of municipalities was made with qualitative criteria, the sample is significant in terms of indicating the main trends. Also, in view of what happened in 2019 and 2020, we consulted some national sources (SIMB, ABT, FCBC, scientific articles) regarding the incidence of fires.

4.6.1 EQ 14. What was the impact on environmental variables?

The response to EQ14 is negative overall because in 2014, 2015 and 2019, and 2020 according to the SIMB, the burnt area increased, instead of decreasing as per the PASF target; therefore, the GO of forest fire reduction has not been reached.

So, the PASF, on one hand, did not have the expected global impact on this environmental variable mentioned in the logical framework. On the other hand, it contributed to reducing burnings in and around DUs (PASF reports) and forest fires in at least two protected areas (directors' communication).

4.6.1.1 The year-on-year variations of burnt surfaces

The 2019 megafires and their repetition to a lesser extent in 2020 have had an unprecedented media impact in Bolivia; they were used as an electoral argument in September 2019 by politicians in the race for national elections. Then in 2020, several campaigns were carried out by indigenous and environmental movements for the repeal of the so-called "ecocidal" decrees that were considered favouring the occurrence of forest fires (see Annex 5.1.2) and encouraging the development of transgenic crops.

This reminder seeks to contextualise the response to the EQ 14. If evaluated until 2018, no major fires occurred in the country. This would give the impression that the PASF has had a good impact. Taking into account the fires that occurred in 2019 and 2020, it would be hastily concluded that the PASF had no impact. The creation of BRIFs and the training of volunteers, firefighters and community members point to the management of small and localised fires, but they were not prepared for fires like those experienced in Chiquitanía in 2019 (6^{th} generation fires?) that require above all a professional intervention with heavy and sophisticated equipment.

This discussion requires comparing data as we do in Annex 5.11. Several sources indicate a likely increase in fires in the coming years due to climate change. An isolated programme such as the PASF cannot be expected to change historical and continental trends. The PASF was right to take the incidence of fires as an indicator of impact, based on the Brazilian federal policy's success in combatting deforestation, but its influence was low in this regard, especially considering the year-on-year climate variations. Indicators of institutional changes in the State and in society were not sufficiently refined.

4.6.1.2 Surfaces affected by burnings did not decrease

The goal of the 1st GO indicator was a 40% reduction compared to the 2,348,323 ha burnt in the PASF municipalities in 2010, that is, not to exceed 940,000 ha burnt. This indicator is inaccurate for the following reasons:

- The 2013 baseline used INPE images from Brazil, but the SOB-OCTA and then the SIMB use the Modis sensor. There are differences between the two systems, and they do not allow a systematic comparison.
- It did not specify the target year. If the year 2019 is considered, with frosts, heavy droughts, and intensification of settlements of new communities in fragile ecosystems, then the goal was far from being reached (the area burnt was not reduced but tripled or more compared to the goal).
- The indicator does not give the exact reference of the number of intervention municipalities: the phase III project document indicates 50 municipalities; the report of the 420 communities where training was carried out covers 40 municipalities; the report of the 141 DUs covers 44 municipalities.

4.6.1.3 The local impact on PAs and around DUs

The Phase II PASF report presents municipal maps and states a reduction in burnings around DUs (see Annex 5.11.2 on the proposed change of indicator).

Two PA directors mentioned a positive impact in reducing burnt areas in their PAs and related it to the PASF (see Annex 7). In the case of the Tunari NP, the Director referred to the training and equipment received by the GPs that allowed for earlier and more effective interventions. In the case of the Carrasco NP, the director referred to a lower spread of fires in the northern area (Entre Ríos and Puerto Villarroel) thanks to the fact that the adjacent farmers adopted the rotation of pastures (with electric fences) and the planting of live fences (silvopastures), and therefore reduced the burning of their pastures.

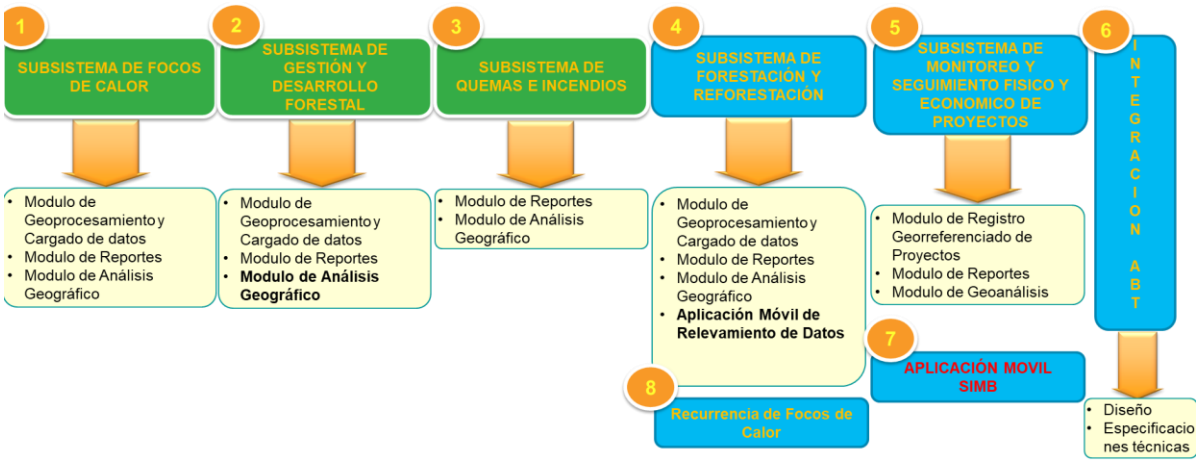
4.6.2 EQ 15. Has the programme contributed to improving forest fire monitoring systems?

The response to EQ15 is positive. The PASF has contributed directly to improving the SIMB established in the DGGDF, with an algorithm for interpreting satellite information. Unfortunately, these contributions have not been used since 2018 due to a reduction in DGDF staff.

The SIMB was born in the Bolivian observation room of the ACTO that operated between 2013 and 2017 with 14 people (hired with international cooperation). The SIMB to date has only one operator. Its 6 modules are shown in Figure 3.

The PASF strengthened the SIMB, supporting the refinement of modules 1 and 3 (figure 3) through an algorithm for interpreting satellite images to quantify, locate and calculate the recurrence of heat sources and burnings. Module 1 can be interpreted as an early warning system for competent authorities to identify areas with fires and implement prevention measures.

Figure3: Conceptual and logical design of the SIMB (source DGGDF)



Indeed, an information network operates at three levels: national, departmental and municipal level. Through WhatsApp groups, the SIMB manager sends his daily newsletters to IFM departmental platforms (created in 2003) and forwards them to municipal UGRs, SARs, FFAA and COEs. We have seen that 4 of the 5 PAs, and only 3 of the 13 GAMs (those in Cochabamba) declare having received the SIMB bulletin. The UGRs of Beni and Santa Cruz declare to receive information from SATIF or SATRIFO.

In fact, in the country, several systems co-exist (see Annex 5.11.3) that present the incidence of fire, detected by different earth observation satellites. In 2014, an attempt was made to centralise the information at the level of the entities dependent on the MMAyA (DGGDF, ABT, APMT); today there is only integration between DGGDF and ABT. The UMAIB, envisaged by EPMIF p.26, has not been established. The PASF had supported the development of a SIMB module in anticipation of this creation.

4.6.3 EQ 16. To what extent have the permanent capacities for local territorial management improved?

The response to EQ16 completes the response to EQ8, which makes an analysis of territorial governance for 4 categories of actors, with the following conclusions: 1) the PASF did not bring any improvement to the GADs, communities, and PA directorates to manage their territories; 2) instead, the accompaniment to about 48 GAMs served to incorporate fire risk management in their PTDI, for the development of their UGRs with early warning systems and relationship with trained BRIFs, co-participation in the implementation of DUs and planning of production projects with forest conservation considerations.

The inclusion of the PASF components (prevention, fight, training, AFU) in the PTDI has facilitated the incorporation of fire-related activities and the allocation of funds within the AOPs of the following management (phase II report p. 26). However, as in most GAMs in Bolivia, an ability to evaluate the 2016-2020 PTDI and capitalise on learning for better planning for the period 2021-2025 has not been appreciated.

4.6.4 EQ 17. What was the level of adoption of alternative practices to burning and their contribution to producers' income?

The response to EQ17 completes the response to EQ10. The level of adoption of AFUs has been 48% in the evaluation sample; that is: almost one in two beneficiary partners of DU continues to

implement one or more AFU techniques 4 to 6 years after their introduction by the PASF, which is very promising and deserves further analysis.

Assuming that the adoption of the AFUs is very likely to have contributed to income generation, only 48% of the beneficiaries would have perceived an increase in income, falling below the target of 80% as envisaged in the logical framework.

On the level of adoption and duplication, see the response to EQ 10 (chap.5.3.4).

The goal of the 2nd GO indicator on revenue growth was "At least 80% of beneficiary partners have increased their economic income on their plots without the use of fire."[22] In our sample of 25 DUs, the goal would be 20. We have only found 12 successful DUs[23] (see Table 3). At the level of our sample, the value found is below the target (60%); but it still represents 48% of the DUs of the 13 municipalities visited.

PASF reports mention 134 spontaneous duplications. In our journey, we have been referred to about 12 spontaneous duplications, some of which had subsequently ceased to function. In any case, if there is a duplication, this means that some producers are interested and have risked their capital to install an AFU (most with an electric fence). Therefore, this behaviour indicates an income expectation. As lessons learned and recommendations, we include in Annex 8 a proposal for intervention inspired by the AFU management of grasslands with electric fences.

4.6.5 EQ 18. What contribution does PASF make to improving sectoral policies?

The response to EQ18 is positive. The PASF has succeeded in providing inputs to provide a policy and strategic framework for a sectoral policy on forests and comprehensive fire management. Unfortunately, this policy is not yet funded and has not been implemented.

4.6.5.1 Little progress in the APMT Joint Mechanism

In its phases I and II, the PASF had not contributed to improving the Joint Mitigation and Adaptation Mechanism for the Integral Management of Forests and Mother Earth (see Annex 5.1.1). The initial design did not require the PASF to engage with national authorities on industry regulations. Despite the announcement of favourable objectives (CPE, *Ley de la Madre Tierra*), the political-institutional context was not conducive. This explains why, to date, the APMT has not managed to establish the Joint Mechanism either.

In 2016, there is no evidence of an influence of AICS, ABC or the CAF on the drafting of DSs No. 2912 to No. 2916 that establish several measures and immediate actions in favour of the forest sector. Nor was the coordination between MMAyA and MDRyT clear to make this programme viable. However, these decrees opened a favourable framework for phase III of the PASF, which includes activities promoting regulatory and institutional changes.

4.6.5.2 One achievement: the Plurinational Strategy for Integrated Fire Management (EPMIF)

The regulatory measures in favour of the forest sector and the actions of the PASF that have allowed the preparation of EPMIF have been developed in EQ7 (see chap.5.3.1.1). Its main impact

22 This indicator is inaccurate because it does not specify: 1) How to count the partners-beneficiaries. We will assume that there is 1 family per DU, as we do not know how many DUs were group-based or how many families they grouped. 2) what amount of income increase you are referring to... could be 1 Bolivian [peso]! 3) which AFUs are generating household income (for example, municipal nurseries are not).

23 We simplify by assuming that a successful DU increases revenue. In some cases, the producer stated otherwise, but we consider that if they continue in the practice, they are getting some advantage.

was the approval of the EPMIF in April 2018 by MR Nº170 and of a specific unit for its implementation (URF/UGR in the DGGDF), the establishment of which is still underway.

During the last CDM (2017), the DGGDF presented: 1) the strategy for transferring the PASF to the Government; 2) the "Nuestros Bosques" programme; 3) the sustainable integrated forest management; 4) the comprehensive fire management strategy with the Forest Risk Unit. Its minutes mention that the URF will be able to count on CAF funding, at least during 2018 (which actually happened, but only through TA consultancies).

The former PASF staff, the ABC and CAF advisors, as well as several other interviewees, pointed out the contradictions between conservation policies and standards and the production promotion policies implemented by the MDRyT. But this analysis does not show in PASF reports. Apparently, there was no room for reflection on this before 2016, and an impact result on public policy was only raised in 2017. This makes a big difference with the PASF experience in Brazil (see chap.8.1) where PASF Brazil was clearly part, from the beginning, of a public policy to control deforestation led by the highest levels of federal power.

It is clear that the GdB priorities were health, education, infrastructure or industrialisation, and that the environment was not part of them. In this context, the MMAyA could only seek external financing and achieved it with:

1) ACTO for the Bolivian Observation Room, which financed 14 consultants with Danish and other cooperation, computer equipment, furniture, etc.
2) The CAF, which funded 3 consultants to implement the EPMIF in 2018.
3) The GEF that funded, with UNDP funds, 1 consultant to implement the EPMIF in 2019.

The latter two translate the impact of PASF's regulatory and programmatic contribution.

The transfer of the PASF to the DGGDF during Phase III (year 2017) was not optimal. The PASF Steering Committee ceased to function. Despite the effort to create the standards that supported the restructuring of the DGyDF, neither the UGR nor the UMAIB were set up; the personnel with items in the DGDF was already reduced to 9 technicians. Legally and institutionally, there was an improvement of the sectoral policy on forests, but it did not translate into budgetary resources of the TGN. Intentions did not turn into action.

Several reasons explain the low appropriation: 1) in general, the PASF functioned as an autonomous project; 2) there was no continuity in the national guardianship that occurred among: i) PNCC, ii) UMATI, iii) APMT, iv) DGGDF; 3) the units that had the guardianship did not have sufficient resources to meet the challenges of the PASF; 4) short-term solutions with temporary consultants financed by CAF resources in 2018 and GEF-UNDP in 2019; consultants were hired and made available to the DGGDF; however, they were ex-PASF technicians who already knew the PASF, but did not stay as permanent DGGDF staff.

We find the classic contradiction between a long-term approach and the vision of public policy. In the case of the PASF, the objective for a public policy was only explained in phase III; that is, only for one year (February 2017 to January 2018) has the emphasis been placed on the improvement of Bolivian public policy on IFM. It achieved interesting accomplishments (regulations, strategy, programmatic approach, training of officials and technicians, improvement of the instruments, etc.), but the budget was not finalised with resources of the TGN for the year 2018, nor the following, leaving the continuity of the progress subject to the support of external financing.

4.6.5.3 Penalties

Penalties for environmental crime do not seem dissuasive in Bolivia. However, only in 2020, after 30 years of Law 1333, the State (via the ABT) criminally indicted 47 offenders (arsonists caught in flagrante delicto), 17 were tried and 7 were convicted and imprisoned; 748 administrative penalty proceedings were also initiated (source ABT). It could well reveal a change of attitude by the authorities: combating and preventing forest fires can be politically mobilizing and capitalizable. That is due to the media-political impact that the fires had in 2019 and 2020. In some ways, awareness-raising campaigns and training of the PASF contributed to this change of attitude.

4.7 Cross-cutting issues, equity, gender, indigenous communities

4.7.1 EQ 19. To what extent have measures been taken to strengthen women's participation and ownership?

The response to EQ19 is partially positive. As already mentioned in EQ2, the PASF did not have a gender strategy. It is true that it encouraged the participation of women in the events it organised; 32% of participants in training and DU are women.

The PASF diagnosis and baseline were superficial in the perception of the productive gender roles, and no specific study has been carried out in this regard, as it would be necessary to perceive the differences among social groups and regions. There is a gender distribution in agricultural and livestock labour. Schematically, it is known that men are the ones who clear, deforest and burn both grasslands and shacks, while women are more involved in sowing, planting, harvesting, collecting, processing and housework and yard breeding. They are more concerned about not burning their plantations and/or houses. While CIPCA, IPHAE and FAN relied on women's organisations, the PASF overlooked a potential ally, which would have been easy to find since women's organisations are active in many Amazonian municipalities.

Nowadays, in San Ignacio de Velasco, 15 of the 100 trained community brigadiers are women. This means that the traditionally male firefighter trade is becoming feminised and that women are also in the front lines when fighting fire. It reveals women’s involvement, although limited, in the fire issue.

4.7.2 EQ 20. To what extent have the cultural and productive practices of indigenous peoples been respected?

The response to EQ20 is partially positive. The PASF respected the cultural and productive practices of indigenous peoples in the sense that there was no imposition. Participation in the activities was voluntary. Fires are not mainly caused by indigenous people; PASF messages regarding avoiding burning were not addressed to them.

Although the PASF signed agreements with some indigenous organisations, there was no clear support for their alternative approaches and proposals. In fact, as has already been demonstrated in the EQ 2, the PASF had difficulties in recognizing and adapting its technical proposal to indigenous production systems and practices.

Regarding the inadequacy of the diagnosis (EQ2) in its social, cultural, migration, enhancement of ancestral knowledge and the subsequent failure to program specific activities of intercultural dialogue, the PASF has applied a monolithic, monolingual approach, little adapted to the indigenous realities of the Bolivian Amazon.

Experiences that achieve a life in harmony with the environment and forests deserve recognition by the State and the international community. It is one of the Joint Mechanism's ambitions that was not developed by either the PASF or the APMT.

4.7.3 EQ 21. What impact has the programme had on communal fire control mechanisms and small rural producers?

The response to EQ21 is negative because the PASF used communities more than it supported their own dynamics, knowledge and standards to control fire. It did not develop an offer adapted to rural communities.

In particular, it did not take advantage of the agroecological and food security approach that prevails in most indigenous communities.

The answers have already been provided in:

- chap.5.1.3.2 and annex 5.3.2 (EQ2), explaining that the PASF did not study or rely on communal fire control mechanisms.
- chap.5.3.2.4 (EQ8), that explains how the PASF did not have a territorial approach and although it relied on communities, this was mainly to ensure a call for its training events and awareness campaigns; but not to develop the communities' capacity of managing their territory. In our journey, we have received strong testimonies from communities that impose rules of prevention when using fire (Trópico de Cochabamba) and rules that prohibit fire in chestnut forests (Pando, Norte de Beni and La Paz).
- The Chimoré sheet mentions a resolution of the farmers' federation prohibiting the burning of more than one hectare.

However, in many communities, standards do not exist or are not complied with; some report that fire comes from neighbouring properties. In turn, several ranchers mention that the fire comes from communities or is caused by communal entities. It is unlikely and in any case, there is no evidence that the training events have been sufficient to create or tighten the social norms and attitudes of the majority of the population.

5 General conclusions

5.1 A significant programme, but with insufficient diagnosis

According to the MMAyA Comprehensive Development Sector Plan - PSDI (2016), Bolivia loses 239,000 ha/year of forests. There is a close relationship between deforestation and fire: approximately 1/3 of the fires are forest fires and 2/3 are grassland burns. It is estimated that 69% of greenhouse gas emissions come from agriculture and land-use change, from forestry to agriculture. The enormous damage that fires cause in Bolivia to biodiversity, the climate, the economy, and to people's lives, fully justifies the PASF.

The PASF baseline and design did not characterise the Bolivian Amazon's great geographical and social diversity, gender differences, nor contradictions among public policies and the actors' interests. Being a programme that aimed to reduce symptoms, it did not identify the root causes of burns and fires. While the PASF is significant at the global, national, and soil and forest preservation levels, most actors' interests and needs, on the contrary, point to the continued use of burning. As a result of limited diagnoses, the PASF training and technical proposal has been uniform. It does not respond to the needs of the diversity of life systems and types of producers.

5.2 A continental dynamic supported by Italian, Brazilian and CAF cooperation through the South-South triangular cooperation approach.

Undoubtedly, Trilateral Cooperation has allowed the PASF experience in Brazil (2000-2009) to serve to decide on a duplication in Bolivia (2013-2018) and both experiences to be duplicated in Ecuador (2018-2021). The approval of the "Regional Project for the Strengthening of Capacities in the Integral Management of Fire in the ACTO Member Countries" reflects a continental will.

The intervention logic of the three PASFs is similar and was adapted to the issues and institutional environment of each country. Unfortunately, there was no formal process of independent evaluation or capitalisation of useful lessons to improve the focus.

Given the importance of institutionalisation to be able to implement the national strategies and regulations of IFM, it is not clear why the PASFs of Bolivia and Ecuador have not provided in their cooperation agreements, preconditions, or commitments related to this essential aspect for impact and sustainability.

Fortunately, the design of the Ecuador PASF integrates important improvements with respect to its predecessor in Bolivia, especially regarding an implementation modality much more rooted in the sectoral governing institution, a territorial planning based on the development of specific and inter-institutional local plans for the prevention and control of fire, the use of a more suitable approach (field schools) to identify AUs in a more participatory way and with the aim of consolidating the quality of the technical package to be proposed to producers and agricultural extension agencies.

5.3 The PASF notoriously boosted the paradigm shift

Prior to the PASF, the seasonal response to the occurrence of forest fires, which consisted of fighting fire, predominated in the State. Thanks to the PASF, awareness of prevention, controlled use and the possibility of avoiding fire in productive practices has increased. With other local and non-governmental actors, the PASF succeeded in making the fire issue in Bolivia visible and addressed it in a comprehensive manner, requiring a structural response.

The great success of the PASF was 1) thanks to a massive campaign of local alliances, training and communication, involving producers and their organisations in fire management, 2) introducing fire management into the institutional structure of the State, its regulations and its planning instruments (PSDI; EPMIF; PTDI and GAM AOP).

The PASF could not measure the effect of intense information and prevention campaigns; but influencing imaginations in the sense of visibility of a problematic practice such as fire is likely to have an effect in the medium and long term, especially on young actors who will be confronted in the future with the reduction of biodiversity and climate change and destruction caused by fires.

The field trip has identified a series of initiatives that go in the same direction as the PASF: it is possible to produce and live in the Amazon without the use of fire, protecting natural resources (MPAs of Reyes, Sta Rosa, San Ignacio, etc., protection of territories with chestnuts or açai and SAF promoted by AOPEB, CIPCA, IPHAE, ACEAA, ECOPTOP, CARITAS, group livestock modules in San Ignacio, good livestock practices of private individuals and FEGACRUZ, etc.). After all, what is most important is to disseminate the knowledge and above all the practices promoted by the PASF.

5.4 Good coherence in terms of strategic and design framework, but limited by a policy environment not conducive to forest conservation.

The PASF rightly relied on its sponsors' experiences in Brazil and Bolivia, as well as those of FAO. Clear cooperation and synergy have been established regarding strengthening of the SIMB and other sectoral initiatives also financed by Italian Cooperation.

The PASF was conceived within the principles of the Framework Law on Mother Earth and Integral Development for Living Well (2012) (*Ley Marco de la Madre Tierra y Desarrollo Integral para Vivir Bien*) and the Joint Mitigation and Adaptation Mechanism for the Integral and Sustainable Management of Forests and Mother Earth. However, starting in 2015, the Ministry of Rural Development and Land (MDRyT) promoted plans and standards that facilitated deforestation and burning.

Neither the PASF nor the MMAyA, its guardian ministry, succeeded in influencing these policies. Similarly, the necessary synergies and cooperation with other MDRyT programmes related to technical outreach and food production did not exist.

5.5 A contradictory political environment

On the one hand, the CPE and the Ley de la Madre Tierra provide a favourable framework for policies that reconcile conservation with production; as was the PASF objective. But MMAyA has neither the weight nor the resources of the MDRyT. Little can be done if the INRA grants rights to entrepreneurs or settlers on forest lands vulnerable to fires or if it relaxes the existing protection regulations to achieve the expansion goals of the agricultural borders included in the Patriotic Agenda.

The MMAyA is not responsible for agricultural extension: making demonstration plots as recommended by component 4 of the EPMIF, and as the PASF did, has no greater impact if these are not aligned with what is promoted by the MDRyT and GAD/GAM programmes.

Several state (GAD, GAM) and non-state (ONG) actors call for the MMAyA to assert its leadership and make a conjunction of institutions so that forest fires are considered a structural problem that requires strategic vision, sustained actions, and sufficient resources.

5.6 A programme that did not attack the cause of the fires

Comprehensive Fire Management, training, awareness, and BRIF creation are operational and palliative objectives and activities in reaction to a disaster or anticipation of a disaster. They are laudable targets, but they attack symptoms, not causes. Climate change and forest fires are two sides of the same coin. In 2019, policies and operations to extinguish fires have proven ineffective (Chile, Portugal, Australia, California, Bolivia (Chiquitanía)...). The current trend is more frequent drought, deforestation, and hence more severe and frequent fires.

Training in the PASF has been conceived as a way to change mindsets. However, since there is not a differentiated diagnosis of the actors' interests and their mentalities, it became a unique package. There was and is evidence that there is an ancestral knowledge about fire and a need to resort to fire, given the current conditions of life and production. It turns out that PASF activities and proposals were more oriented towards farmers / indigenous people who are not necessarily the ones who burn the most. In addition, they tend to be poorer and therefore more likely to seek aid than make efforts; however, they are the ones who manage the smallest areas. Farmers who manage large areas where more burnings occur have not been addressed by the PASF, while their responsiveness or interest in new techniques would have been greater, as would have been the surface impact.

Fires occur because of burnings; burnings occur because humans set fire for good reasons, from their point of view. These are short-term reasons, and the State and international cooperation should fight for the defence of the common interest in the long term. To prevent fires, the PASF had to learn the reasons that push the actors to use fire and create the conditions that prevent them from doing so, or by burning only in controlled conditions.

The root cause must be sought in the agrarian conception that seeks to enable agricultural and pasture areas; this is carried by agronomists, agro-entrepreneurs, farmers, livestock farmers, colonisers, and their political supporters, who have promoted deforestation and its cheapest means, fire. In this context, the PASF attached to a ministry with little power and few resources became a disconnected programme. If policy priorities change, then PASF actions and lessons learned can be fully leveraged.

5.7 Fire in Amazonia, a simple fact to perceive, but difficult for the State to prevent

"Amazonia sin fuego" is a formulation that has the advantage of aiming at a simple objective, reducing the incidence of fires in Amazonia, which is easily understandable and becomes a mobilizing slogan for a number of actors. However, behind the apparent simplicity, lies a problem of great complexity. The FAN's slogan "Fire is in our hands" shows that there are other approaches.

A programme alone cannot cover all this problem, in which fire is a symptom of imbalance. The PASF has been conceived from the point of view of the State and international cooperation, not from that of farmers/livestock farmers living in the Amazon and using fire. The phenomena 1) Burnings / fires and 2) clearing/ deforestation are linked; it is illusory to treat the former without having understood and controlled the latter.

The most outstanding PASF achievements are: 1) having introduced the issue of forest fires on the political agenda in Bolivia; 2) having carried out a strong dissemination of the issue in a multitude of actors.

The problem of fires is recurrent in Bolivia; environmental organisations, but also the mass media, have put the problem on their agenda and on the political agenda. This situation is not transitory but structural. Until now, the authorities have been more or less reactive when fires occur. Thanks to the PASF, a national public policy consistent with regulations and institutions was approved. It still lacks its own resources and greater coordination with other ministries. In 2011-12, IFM and AFU issues could be considered relatively new in Bolivia, only one-time experiences existed. But institutionalisation through integration into the State and the development of a public policy was laborious and approached as the last step (phase III).

Another weakness of institutionalisation in the Bolivian State is the high turnover of personnel. There are no permanent civil servants. This problem is serious, as it invalidates the strategy based on awareness: it is unlikely to bring about a change of mentality and practice in producers, if there is first no change in public servants, with continuity.

The PASF, like many actors, saw in fire and its lack of control (fires) a harmful consequence of development and therefore a symptom that must be combated, the cause of which would be the lack of awareness of farmers and other *chaqueadores*. They basically view forests as a hindrance to agriculture and ignore the multifunctionality of forests. However, another interpretation is possible, which leads to a radical questioning of the PASF strategy: fire is only a symptom; the underlying problem is the development model promoted for decades in the Amazon and the agrarian and developmental vision that supports it. The alternatives have to do with a radical change of priorities in public policies, in the training of technicians and engineers, in advising entrepreneurs, livestock farmers and farmers.

5.8 A programme that did not dialogue sufficiently

The PASF effectiveness and impact were limited by two poorly corrected design flaws during execution: the PASF followed its implementation approach independently from the UGP and with poor dialogue 1) with the institutional structure of the State and 2) with the knowledge of the Amazonian communities.

The consequence is that the PASF focused more on the negative aspects of fire and marginalised the positive aspects (ecosystems adapted to fire, economic advantages of fire in the face of labour shortages, ancestral and community practices with a territorial vision that includes controlled fire management, prescribed burnings, etc.).

The PASF applied the same approach to the 5 departments, and, despite the fact that the technical teams of the 5 modules had some adaptability, their design and application has not been sensitive to the different socio-economic conditions.

The PASF was characterised by signing agreements with a large number of actors, especially at the local level; this has allowed it to publicise its objectives and therefore put the IFM issue on the agenda. However, it did not establish sufficient coordination with the GADS and in particular with GAD Santa Cruz, which boasts over 10 years of experience in IFM, and claims the need to have a national agency able to issue guidelines and relying on a regular intervention budget (outside the declaration of emergencies).

The PASF gender focus has been limited: it has not differentiated male and female roles or involved women and their organisations as a central actor in their intervention or communication.

While we reaffirm the criticism of the PASF and its political isolation, it has not been the responsibility of its technical team; neither can a "small" programme be required to solve environmental problems that are the consequence of idiosyncrasy and extractivist planning. In this sense, the comparison with the PASF in Brazil is sobering. There is an impact when there is convergence and coherence between several policies.

5.9 An efficient programme

The Programme showed a high level of efficiency and high budget execution, carried out many activities and training events, led intense awareness campaigns, implemented numerous demonstration units. All this in a vast territory with logistical difficulties. In the end, it achieved most of its results. This has been made possible by having a stable and committed team of professionals.

On the other hand, the project-centric approach, focused on executing activities, has made it difficult to optimise institutional articulation at all levels and integration into the government structure, provided for in the SO and the expected results of phase III.

5.10 An effective programme

The main PASF achievement was a paradigm shift in the State and in society, proving that the problem of forest fires was structural and establishing comprehensive fire management on national and local agendas. It has achieved almost all of the logical framework outcomes at the municipal and community levels. Institutional strengthening was capitalised on by 1) the Directorate-General for Forest Management and Development of MMAyA (DGGDF), which obtained regulatory and programmatic tools, and improved its information system with algorithms for interpreting satellite images; 2) most of the 48 Municipal Autonomous Governments (GAM), which have implemented and/or strengthened, with budget and personnel, their Risk Management Units (UGR) and their technical units for productive development, thus allowing a certain projection towards rural communities, but in general with a production-oriented approach without sufficient concern for the protection of forests and water sources.

On the other hand, with the Vice Ministry of Civil Defence (VIDECI), the Armed Forces (FFAA), the Bolivian Police (on which firefighters depend), the National Protected Areas Service, decentralised entity of MMAyA (SERNAP), 5 Departmental Autonomous Governments (GAD) and 3 Universities, the PASF basically contributed to training human talents, present in these years, and with equipment, but without evidence of transformation in the institutions responsible for fighting fires or responsible for university training.

While it is true that the PASF encouraged the participation of women, 32% of participants in training and DU are women, it did not have a gender strategy.

5.11 Poor sustainability of the actions promoted

The guardianship entity – DGGDF – generated the necessary strategy and budgetary programme to continue the PASF activities; then, during its management in 2018 and 2019, it carried out actions related to capacity building, DU monitoring, creation of forest brigades (CAF and UNDP

consultancy) and has registered TGN resources for the 2019-2020 management. However, it has not obtained sufficient resources to maintain the same scale of actions as the PASF.

On the other hand, the continuity of training in Integrated Fire Management (IFM) by the GADs of Santa Cruz and Cochabamba, VIDECI and several NGOs and projects is notable. In the case of the GADs of Santa Cruz and some municipalities, community brigades continued to be formed and supported in the most fire-prone locations.

5.12 A limited impact

In 2019, the burnt area increased noticeably in the Amazon, and in particular in Chiquitanía (3Mha). The same happened, to a lesser extent, in 2020. This means that the PASF did not have the expected global impact of reducing the incidence of fires in the Bolivian Amazon region, the environmental variable mentioned in the logical framework as GO. The indicator was ambitious but inaccurate. It is subject to year-on-year climate variations, but also to the policies favouring deforestation, which intensified in 2019, and to a continental upward trend due to climate change that translates into greater droughts.

Now, on a more local scale, the demonstration units that are still being maintained and their duplicates have been successful in eradicating fire. The directors of the Tunari and Carrasco National Parks (NP) mentioned a positive impact in reducing burnt areas in their Protected Areas (PA) and related it to the PASF.

Likewise, the PASF contributed directly to providing the DGGDF with important regulatory instruments, such as the Plurinational Strategy for Integrated Fire Management - MMAyA 2018 (EPMIF) approved in 2018, the creation of the UGR and the Forest Information Monitoring and Analysis Unit (UMAIB), and the improvement of the Forest Monitoring Information System (SIMB). Unfortunately, these contributions have not been used since 2018 due to a reduction in DGGDF staff.

Finally, with regard to the Alternative(s) to Fire Use (AFU) techniques promoted through the 141 PASF DUs and oriented towards 10 AFU techniques, about half of DUs visited during the evaluation process (a total of 25) are still active. This confirms that producers received some benefits, although no income increase could be demonstrated. Likewise, about 12 cases of extensions or duplications on other farms or stays have been reported in the 13 municipalities visited. Among the different AFU techniques, the management of grasslands through the use of electric fences was best-received and had a positive impact.

6 Lessons learned from the PASF and other experiences

6.1 About institutionalisation

1) Brazil: "Under the auspices of the Presidency of the Republic, the programme for the prevention and control of deforestation in the Amazon, launched in 2004, involves thirteen ministries. The fight against deforestation has become a national priority of the Presidency and is no longer exclusively under the competence of the Ministry of the Environment. The objective is to promote the sustainable development of the Amazon through three types of actions: monitoring, control, and repression of deforestation; regularisation of lands granted

during the colonisation of the region; promotion and establishment of sustainable production systems[24]."

2) In Brazil, the Municipal Protocol for the Prevention and Combating of Forest Fires is an agreement signed by the municipality, associations, unions, public bodies, etc. It contains a series of commitments: each sector is accountable to society, regarding the use, control, and limitation of fire, as well as related activities. Considering the importance of building consensus and generating citizen responsibility in search of solutions to socio-environmental problems, the Programme used this voluntary and public instrument.

3) To achieve the GO of reducing the incidence of fires, it is crucial to consider the environment of legal uncertainty, non-compliance with existing rules, and lack of clarity or conflicts in institutional competence, and to add a component thereof in the PASF.

4) It is possible to efficiently implement a programme with autonomy and a technical approach. This is proven by the PASF as well as by its good acceptance and recognition. However, for the State to have an impact and ownership, it must have a strong social base and/or allies at the highest level of the State and ensure that fire control is part of the high-level political agenda.

5) Institutionalisation is the first step, not the last.

6) If it is not in the AOP, it does not exist! It is not enough to show good intentions or to regulate, planning or action work with resources external to the TGN, unless an action or a policy does not have a budget duly allocated in the AOP of the competent institution, it has no power. Having the necessary, but not sufficient, regulatory framework and institutional framework. Having a significant budget is the full expression of a public policy.

7) A key lesson in this sense, not favourable to conservation, is the programme created by Law 337 to sanction illegal deforestation, which completely self-financed and generated surpluses for the TGN[25].

6.2 About fire

8) Fire is the herbicide of the poor!
Fire, a care ally (http://incendios.fan-bo.org/Satrifo/wp-content/uploads/2015/11/Reportaje.pdf) Controlling fire in small crops is not the same as in large areas.

9) The 30-30-30 rule, a mnemonic trick learned from the GAD Cochabamba UCR, works as follows: when the temperature is above 30ºC, when the wind blows at more than 30 km/h, when the relative humidity is less than 30%, it is impossible to put out a fire, at least by manual means.

10) Aspects to be treasured from the experience of GAD Sta Cruz IFM programme:

24 Sist et al. 2013, "Apoiar o manejo florestal familiar" in Perspective nº22, CIRAD. www.cirad.fr/actualites/toutes-les-actualites/articles/2013/ca-vient-de-sortir/baisse-de-la-deforestation-en-amazonie-bresilienne

25 The Food Production and Forest Restoration Programme, executed by the MDRyT and involving the VDRA, INRA, and ABT, in force since 2013, successively extended until December 2021, has sanctioned more than 1 Mha of illegally deforested land having collected more than 300 MBs. for the TGN (Source: CREBO report, 2020). In terms of area, the PASF managed to cover 630 ha with a total investment of 43 MBs. (source: p. 6 and 29 of the PASF results book, Word version).

- The synergy among planning, prevention, and direct intervention in the fight against fires generates an accumulation of learning, year after year. The current program is the result of a 10-year construction, with the advice of the U.S. Forestry Service.
- It is the country's only permanent departmental programme on a basis that mobilises regular resources and therefore, it does not depend on resources that are mobilised only with declarations of emergency.
- Recognition of the ecological benefits of fire on some ecosystems and the cultural dimension of fire; there was convergence with the community fire management approach applied by FAN in several municipalities of Sta Cruz and Beni. Both GADs and FAN have experience in conducting controlled burns (for agricultural purposes) and prescribed burns (for fuel reduction purposes).

6.3 About AFU/electric fences

11) *The cobbler should stick to his last*.

The MMAyA is not responsible for agricultural extension: making demonstration plots as recommended by component 4 of the EPMIF, and as the PASF did, since these will not achieve impact and sustainability if they are not incorporated into the MDRyT and GAD/GAM programmes.

12) See Annex 8, lessons learned from the DUs "management of grasslands using electric fences."

6.4 Indigenous Identity and Knowledge

13) The life of the indigenous peoples of Eastern Bolivia cannot be separated from forests. Where forests disappear, indigenous peoples disappear; where forests exist, indigenous peoples exist (TCO). "In the native understanding, the forest is the "big house" of the indigenous being. As Don Bienvenido Zacu would say, "what is the supermarket for non-indigenous people is the forest for indigenous people;" there they provide all the necessary goods and food, consolidating the different labour and sociocultural relationships (Martinez 2002).

14) Some examples of community knowledge and practices of non-burning or controlled burning:

- The Chiquitano Dry Forest is dry for about six months, but when the first rains arrive, everything is covered in green. Farmers and ranchers then wait for the first rains to set their crops on fire, because if they do it sooner, they know for sure that the forest will burn and be lost. They know that, after the rebound with the first rains, the fire will not be able to expand inside the mountain. FAN 2012
- Chiquitanía: Once, we used to eat tamales for Christmas; now we have to wait for Carnival. Until a few years ago, producers and livestock farmers had a relatively regular agricultural calendar; they knew that the feast of Santa Rosa, 30th August, was the best date to burn and prepare the land for the sowing of corn because it coincided with the arrival of the rainy season. Now, the weather has changed, and it is no longer possible to burn on the same dates as before. FAN 2012.
- Coffee plantations in agroforestry systems in Yungas and Villa Tunari.
- Forest management for wild cocoa, chestnut, açai in Moxos, Baures, Norte Amazónico.

15) The best way to fight fire is by investing in the plot. This is what many indigenous farmers and entrepreneurs already do. This means agricultural intensification; which consists of an investment in labour and/or capital in the plot; it can be through tree planting (plantations, agroforestry systems), beekeeping, irrigation, soil amendments, etc. In fact, farmers and livestock farmers are interested in taking care of their investment.

16) The chestnut and cocoa communities have developed communal land control standards, which make it possible, in particular, to prevent fires.

7 Recommendations

The recommendations are organised in two sets of Main and Specific Recommendations. Specific recommendations are covered by 4 sections: the regulatory framework, communication and agricultural promotion actions, and institutional articulations.

7.1 Main Recommendations

1) DGCS: Continue to promote a South-South regional approach that aims at a common strategy towards fighting fires in the Amazon within a clearly defined policy and institutional framework from the design phase of cooperation programmes. Also, ensure that alternative technical proposals to the use of fire are adequately evaluated and, if necessary, commonly disseminated through the appropriate institutional channels (ministries of agriculture and livestock, municipal governments).

2) DGCS: Ensure that there is a consistent, inter-ministerial and long-term strategy in Bolivia that seeks to eradicate the root causes of fires. Any new IFM strategy requires, as a precondition, that there is a broad agreement between the MDRyT and the MMAyA on forest conservation, which translates into a single and common strategy to support forest, agricultural and livestock production that preserves water, soil and biodiversity.

3) DGCS: Institutionalisation of initiatives should be the first step of any intervention on IFM in a framework where the MMAyA – DGGDF take the lead at the national level regarding IFM. In this framework, the Cooperation Programme Management structure and functions must integrate into the institutional framework and integrate the technical assistance of Italian Cooperation and sector's governing institutions in a balanced way.

4) DGCS, MMAyA: Balancing perceptions about fire: it is not always negative as the PASF used to approach it. Analysing risks and benefits (drawing inspiration from the FAN and Myers 2006 experience). In particular, importance should be given to "prescribed burnings" as a method to limit the expansion of fires. In this context, carrying out diagnostics of territorial and production patterns and complementary studies to specify cooperation axes: a cultural and socio-economic diagnosis of intervention communities, feasibility study of an incentive project for livestock production without deforestation, etc.

5) DGCS, MMAyA: Training is a powerful weapon; its use is recommended as long as it is based on a dialogue of knowledge and is customised according to the target groups' interests and knowledge.

6) DGCS, MMAyA: Modify the way of identifying, promoting and generating AFUs. Deepen and differentiate perceptions of the fire use according to area and type of producers and identify current fire control practices and standards.

7) MDPyEP, MDRyT, DGGDF, GAD, GAM Promote production that requires the maintenance and enrichment of the forest. Protect chestnut, açai, wild cocoa, honey, and other non-timber forest products producing forests, and strengthen their harvesting systems. Inspired by the Non-Carbon Benefits of the World's Forests (Denmark) in Chiquitanía.

8) MDRyT, DGGDF (MMAyA), GAD, GAM: Implement and institutionalise modes of financing AFUs through grants and loans; these modes cannot depend on external financing, nor on limited duration programs but should become a long-term public policy.

9) MMAyA as guardianship agency should take the initiative to coordinate with other ministries, through an institution or program specializing in IFM. It should also coordinate, exchange information and provide guidance to GADs, which in turn coordinate with GAMs. Sta Cruz's experience is suggested for the other GADs.

10) MMAyA MDRyT: Promote a combination of the legal framework among standards of protection and conservation, control of deforestation and burning and agricultural production promotion standards, prioritizing food sovereignty.

7.2 Specific Recommendations

7.2.1 Actions to improve the regulatory framework

11) MMAyA+MDRyT: Promote a combination of the legal framework among standards of protection and conservation, control of deforestation and burning and agricultural production promotion standards, prioritizing food sovereignty.

12) MMAyA+MDRyT: Co-ordination and enforcement of standards is essential, as forest land clearance for agricultural activity is the main cause of deforestation, burning, and fire. We propose below 1) a Forest Act 2) amendment to the INRA Act.

13) Plurinational Assembly + MMAyA: Avoid fires; forests must be valued; they are currently considered as a free and infinite resource, but from which only one function is exploited: accumulated fertility. However, forests, instead fulfil multiple ecosystem functions and still contain unknown resources.

To do this, Bolivia requires a Forest Law and ad-hoc institutions; establishing generic procedures, to then differentiate forest management, based on the rules of peoples and communities to manage and exploit timber and non-timber resources (Martínez 2008); that is, applying the *in dubio pro bosques + in dubio pro indigenous peoples'* principles and establishing tax, technical and financial mechanisms in favour of small forest producers. It is recommended to abandon the current ecosystem destruction strategy and bet on an ecosystem-based CC Adaptation strategy.

14) Plurinational Assembly + MMAyA + MDRyT:

- Apply and regulate the precautionary principle provided for by laws 71 (art.8-1) and 300 (art.4-4). Not to authorise or facilitate private or public investments if there are potential threats to human health, climate or biodiversity disturbance.
- Amend the INRA law (1715) and its Community Reconduction Law (3545), replacing the FES with the "Economic and Social Environmental Climate Function." This goes through the national and then regionalised definition of ecological easements and in particular the climate easements that every property must meet.

- The land endowment must set an integrated responsibility among ABT, APMT, and INRA.

15) MMAyA + MDRyT + INRA + ABT: In addition to providing updated and agreed planning tools, promote simple and easily understandable and verifiable measures that the standards must contemplate:

- The requirement for an Environmental Impact Study for land-use change for areas greater than 1 ha.
- Combating the common FES perception of the INRA law, according to which making "improvements" to a property consists of cutting down and/or burning trees.
- Introduce and disseminate the idea and while regulating (FCASE verification modality) that every property must have forests and trees, that any "improvement" implies a minimum of trees on the plots: conservation of trees and forest patches; planting of a diversity of trees (with a density and a diversity to be defined locally: at least at the national level: 100 trees of 10 different species per ha).
- Inspired by the environmental certificate per property applied in Brazil.
- + GAM: Increase the real cost of access to new land through ecological and climate easements, prohibiting deforestation and burning, regulating production systems (prohibiting monoculture, GMOs, the use of agro-toxics), charging a progressive tax on rural property (Morales 2011), charging patents, fines, and penalties that discourage deforestation and burning.
- Eliminate direct (granting of free land rights) and indirect (fuel, import of machinery, export support, etc.) deforestation subsidies. Encourage ecosystem protective and restorative practices (Johnson 2011, Pacheco 2011, Martinez 2011).
- Recognise the current failure (accelerated deforestation, illegal, fires, conflicts, extreme weather events, low productivity, soil erosion, loss of water sources) and apply a plot approach, based on the principle of balance between conservation and production, and the principle of resilience[26]. Promote rootedness and investment holding landowners accountable with a simple and easy to verify rule: more than half[27] of the property must be covered by the natural ecosystem. If the property has already been deforested by more than 50%, the owner must restore the natural ecosystem on the missing surface.

16) MMAyA + MDRyT + ABT + GAD/GAM: fire management must be based on territorial management and planning applied at each level (communal, municipal, departmental and national levels), in order to take into account and adapt to the diversity of local situations, both at the level of ecosystems, production systems, and type of actors (drawing inspiration from the community FAN fire management and the "integrated fire management" approach of Myers 2006). Fire management must be linked to territorial planning, that is, included into the PTDI.

This means burning only the planned areas and protecting the others. To this end, "prescribed burnings" should be planned in order to anticipate and prevent fires in areas of high biological, social or economic value.

26 The proximity of the natural ecosystem allows its regeneration in deforested plots.
27 The percentage may increase according to vulnerability criteria and ETA decision.

17) MMAyA + MDRyT + ABT + GAD/GAM: Create a **red list** of municipalities that do not comply with deforestation and burning standards and/or where fires occur. At their scale, GAMs will create a **red list** of their rural communities and properties. Municipalities and communities on the Red List shall have restricted access to public and private programmes.

18) MMAyA: obtain a multi-year budget of fiscal resources (TGN) to land the principles of Law 300, the EPMIF and other regulations.

- Allocate budget to the DGDFF URF to execute the EMIF (estimated at 4 MBs. yearly) and the UMIAB.
- Develop a financial sustainability strategy for EPMIF.

7.2.2 Communication actions

19) MMAyA: The new regulations (Recommendations 8, 9, 10) must be easy and massively understandable and accompanied by an adapted promotion campaign. It must guarantee the cooling ("air conditioning") and climate regulating role played by the Amazon forests; in particular, as generators of the rains in the Andean area, where the majority of the Bolivian population lives. This change must be based on a broad political alliance from the countryside to cities, from the East, the Valleys to the West.

20) MMAyA, GAD, GAM: Communication and training campaigns should be addressed to 1) local authorities, 2) technicians, 3) agricultural producer organisations, 4) farmers' and indigenous organisations, 5) women farmers and their organisations.

21) MMAyA, GAD, GAM: start by sensitizing, raising awareness, and training authorities on existing schemes according to fire and fire user types. Teach them that integrated sustainable forest management is more beneficial[28] than the change in use, which transforms forests into savannahs after a few years.

22) MMAyA, GAD, GAM: work with young people, because unlike their parents or grandparents, they have been born in the tropics and are more willing to change agricultural practices and in particular, they appreciate not burning and controlled burning. See also the experience of JUMA and APCOB in Chiquitanía.

7.2.3 Production promotion measures

23) GAD, GAM: budget a certain % for IFM and AFU actions and UGR as a condition to be able to access national and international support.

24) MDRyT, MMAyA: make direct and indirect grants conditional on compliance with ecological and climate easements.

25) GAD, GAM: organise competitions at different levels to i) prevent fires, 2) avoid burning and clearing, 3) promote biomass development systems instead of burning it. 4) award at each level with a budget and recognition that provides prestige according to local customs. Prizes will be awarded based on compliance with environmental indicators.

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28 forest benefits: fruits, bark, medicinal plants, handicrafts, wood, biodiversity emporium, ecotourism, landscapes, soil protection, shade and protection for livestock, seepage into groundwater and evapotranspiration (flying rivers), air conditioners, climate regulators from remote regions, O2 emitters, CO2 sequestrators, etc. And, not least, they are the habitat of indigenous peoples and communities.

a. municipality without fire or "green municipality" (not being on the red list, see REC nº12),

b. community without fire,

c. farm without fire (organise and promote a network of farms without fire in each municipality).

26) GAM: Create, train and equip community BRIFs in communities more vulnerable to fires and build infrastructure for fire prevention and control (drawing inspiration from the GAMs and NGOs of Riberalta, Concepción and San Ignacio):

- Alleys or strips at least 20 m wide, without dry fuel in dry season; eventually fire-resistant fruit trees (mangoes, Bixas, palms) can be planted. These strips can be widened by using heavy or agricultural machinery.
- Water ponds, near roads and rural roads in the most fire-prone locations where there are community forest brigades, that guarantee a water reserve for combat.
- Prioritise productive projects that maintain forests and have a risk prevention component.

27) MMAyA+MDRyT: include AFU in the planning (PSDI) of the MDRyT and all its entities/programmes (PAR, Fonadin, Indigenous Fund,...).

28) MDRyT, DGGDF, GAD, GAM: in the PASF/EPMIF AFU "menu," add:

- Direct sowing under vegetation cover (SCV),
- Investigate and experiment with farmers and indigenous people brush and knock-down systems based on the selection of species to be preserved and others to be cut, and maintaining a maximum of trees and a minimum of branches.
- Mechanisation of the control of over-matured weeds and pastures (brush cutters) and for the preparation of soils for sown pastures. This solution is adapted to flat terrain and large farms. It is advisable, as long as it provides for mitigation actions such as the use of organic matter cords, minimum tillage, amendments to decrease acidity and release nutrients, non-use of chemical or agrotoxic fertilisers...
- Branch choppers/crushers; prefer those that are easy to move and usable on slopes; some cost about 500 euros.
- The agrosilvopastoral models developed by EMBRAPA for large farms (transition grassland crops➔ with forestry trees➔).
- the production of biochar[29] and its use as an organic fertiliser.
- Crop-blocks in communities, which consist of grouping individual crops in one place in order to facilitate the mechanisation of certain phases of land allotment.

29) Promote the rootedness and protection of investments against fires, through fire prevention and through adapted insurance systems.

29 a technique that converts moist organic material into coal through low-temperature burns, emitting little soot and much less GHG than fires; it prevents and delays the washing of nutrients. This technique produces soils called terra preta (black soil) in Brazil.

30) DGDF, SIMB, VIDECI, GAD, GAM: identify (early warning system with SENAHMI) the dry years and strong winds that favour the start and spread of fires in a prevention logic.

31) DGGDF, SIMB: classify forests according to their level of degradation and/or recovery (400 t biomass per ha indicator in a primary Amazon forest) and their proximity to already deforested areas to focus control.

32) MDRyT, MMAyA: rescue and disseminate local knowledge and practices of fire control; promote knowledge dialogue; therefore, adjust the contents of training and coaching strategy to the need to exchange scientific and technical knowledge on the behaviour of soil chemistry, biochemistry, and biodiversity, or on the consequences of climate change on fire risks, etc.

33) DGGDF + Ministry of Education: a) Prepare the database of IFM trainers b) duplicate and mainstream the training of firefighters and trainers in IFM through certification of competence

34) VIDECI+COE+GAD+GAM+FFAA: in the event of 6th generation fires, heavy machinery is required (forest pump car, trucks, tractors to open gaps,...), planes and helicopters (but depending on the water available), 1st line firefighters and 2nd line firefighters. Training/professionalisation of firefighters in the light of new technologies (satellite, climate, winds, machinery,...).
+ coordination among those responsible for the 1st response.

35) SERNAP: develop and execute prevention plans + marked prevention areas + use of fire retardants.

7.2.4 Inter-agency coordination

36) MDRyT: the policy of expanding the agricultural border in the east must be accompanied by long-term profitability studies and risk analysis studies (droughts and fires in Chiquitanía, floods in Beni,...)

37) VIDECI for emergency interventions and ensure the sustainability of such interventions.

38) MMAyA + MDRyT + INRA + ABT: cross heat source and burn scar maps with land tenure maps (land registry);

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