

# FIREFIGHTING AND FIRE PREVENTION

A GUIDE FOR MONITORING THE IMPACTS
OF MILITARY FIRE BRIGADE PROJECTS



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### INTRODUCTION

Forest fires and unauthorized burning damage biodiversity and the hydrological cycle, and are also a source of greenhouse gas emissions. The Amazon Fund supports with non-refundable resources, actions for preventing, monitoring and combating deforestation as well as for promoting conservation and the sustainable use of forests in the Amazon biome and has been supporting Military Fire Brigades (CBMs – Portuguese abbreviation of Corpos de Bombeiros Militares) projects for the prevention, monitoring and combat of forest fires and unauthorized burning in several of the Legal Amazon states.

This guide was produced as part of the technical cooperation project between the Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) GmbH and the Amazon Fund/BNDES, to provide guidelines on how to: [i] monitor and evaluate the impacts of Amazon Fund supported projects, which prevent, monitor and fight forest fires and unauthorized burning, [ii] qualify the annual and final reporting of those projects, using in addition, the tool of impact evaluation, [iii] verify that the adopted strategies are indeed leading to a reduction in the number of forest fires and unauthorized burnings and therefore contributing to reducing deforestation and promoting sustainable development in the Amazon.



# IMPACT MONITORING OF PROJECTS: BASIC CONCEPTS

### WHAT IS IMPACT MONITORING?

Projects emerge from the wish to change a reality. Within the capacities of the actors involved, the objectives and targets are defined and financial and human resources are invested.

The changes that occur due to these interventions are called impacts. Impacts can be desired or not, direct or indirect, positive or negative. To the extent to which it is possible to infer a causal relationship between given inputs and a consequent change that occurs, it is possible to attribute impacts to a project. Impacts may occur throughout the execution of a project, as well as after the end of the project<sup>1</sup>.

Impact monitoring is a process of observing the changes that occur with the implementation of a project, in which the progress achieved with the application of the available resources and the execution of planned activities is verified by analyzing the direct and indirect impacts of the project.

Thus, impact monitoring is carried out with the purpose of:

- Evaluating the extent to which the objectives and targets are being achieved:
- Implementing measures to rectify the progress of the project, as necessary;
- Following up on how the resources (financial, human, etc.) should be distributed or redistributed throughout the project, in order to achieve the desired results;

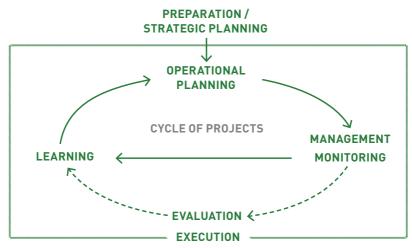
<sup>1.</sup> Impacts that arise after the end of a project are analyzed by **ex-post evaluations**. In the case of the Amazon Fund, the ex-post evaluations of supported projects are scheduled for up to two years after a project's end.

- Obtaining the necessary information to be able to report on the project results and impacts in the annual and final reports;
- Gathering data that could be used in the evaluation process.

This guide aims to contribute to the observation of impacts produced by projects that support Fire Brigades, in a systematic way and based on comparatives, in order to promote:

- a) The quality of project execution
- b) The quality of the annual and final reporting, to the Amazon Fund and the general public, on the impacts of the project.

Impact monitoring identifies and analyses the direct and indirect impacts of the execution of a project during its entire life cycle, as shown in the image below:



The project cycle (Source: GIZ)

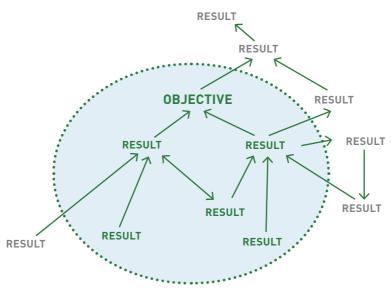
The phases of a project cycle are: **STRATEGIC PLANNING**, that conceptualizes the project; **OPERATIONAL PLANNING**, that occurs periodically; **MANAGEMENT** and **MONITORING** that verify that the targets are being achieved and provide a reflection on whether the desired impacts (changes) are occurring or not.

Monitoring data is collected and analyzed continually. The **EVALUATION** of this data leads to decisions at the managerial level, such as the need to adapt activities or to take strategic decisions. The monitoring results foster the **LEARNING** process and allow for an evidence-based **EVALUATION** of the impacts produced by the project.

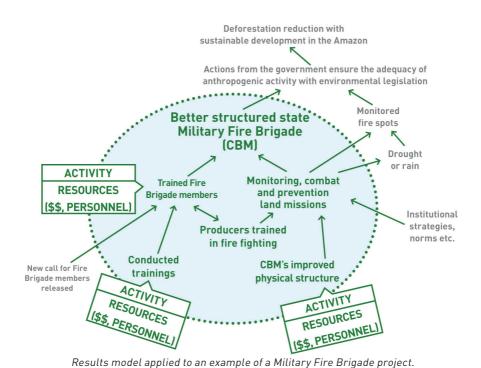
### RESULTS-BASED MANAGEMENT

Due to the focus on the changes achieved by a project, impact monitoring is linked to results-based management, a term that has increasingly been used to elevate organizational performance. Results-based management consists of strategic planning, the adjustment of objectives and targets as necessary and the conversion of strategic intentions into tangible results.

The results may be better understood by using a "results model". This model shows the impacts linked in a network of causal relations, in complex and non-linear ways, forming a large model:

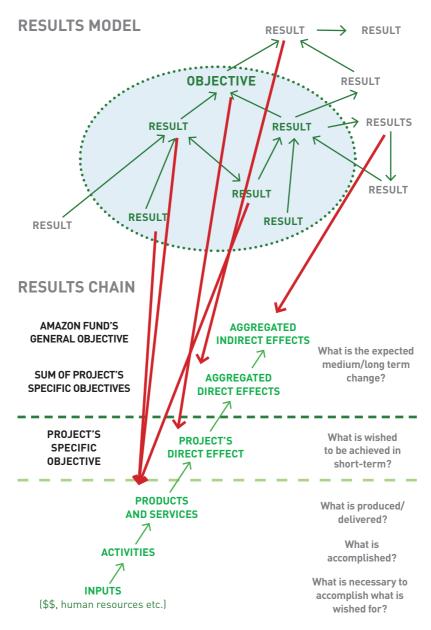


A results model (the blue highlighted area is where the project may intervene directly, while everything outside the circle is only indirectly attributed to the project). Source: GIZ



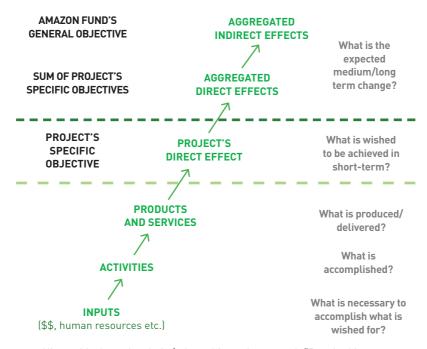
In results-based management, changes are also ranked. This is represented in a "results chain", created from the elaborated results model, as shown below:

Source: GIZ



Transposition of a results model into a hierarchical results chain (Own elaboration. "Results chain" Adapted from the manual "Results Management in Norwegian Development Cooperation")

### **RESULTS CHAIN**



Hierarchical results chain (adapted from the manual, "Results Management in Norwegian Development Cooperation")

In the results chain, the **DIRECT AND INDIRECT AGGREGATED EFFECTS (IMPACTS)** are those that last in the long-term. In the case of many projects, it is important to consider the aggregated impact indicators. They enable analysis of the integrated effect of a number of related projects (a "program"). In the context of the projects that support Fire Brigades, the expected effect is "the reduction of the annual deforestation rate in that state", through the reduction of forest fires and unauthorized burning. Measuring these results as aggregated indicators is the best way of demonstrating impacts. The direct and indirect aggregated effects contribute to the achievement of the Amazon Fund's general objective: "reduction of deforestation with sustainable development in the Amazon region".

**EFFECTS (EFFECTIVENESS):** when it comes to the specific objective of a project, the effects are the results achieved in the short or medium term. In the context of projects that support the work of the Fire Brigades, the specific objective is:

Fire Brigade of the state [XY] is better structured for monitoring and combating deforestation caused by forest fires and unauthorized burning.

The effects are direct consequences of the products or services **ELABORATED** in the scope of the project. This includes the **USE** of products and services by a project's target group creating foreseen effects, according to the defined specific objective. In the case of projects that support the Fire Brigades, one of the foreseen effects is, for instance:

Number of Fire Brigade members of the state [XY] effectively using acquired knowledge for verification, control and prevention of fires.

**PRODUCTS AND SERVICES** created within the project's scope are on a lower level called performance, and describe the changes that were directly achieved by the activities of a project. They may be goods, services, specific acquired knowledge, norms, and elaborated regulations, among others. Within the scope of the projects in support of the Fire Brigades, examples could include:

Number of trained Fire Brigade members or inventory of acquired equipment for combating fire.

**ACTIVITIES** are actions developed for the delivery of a determined product or service and **INPUTS** are financial and human resources and/or other resources necessary for the execution of project activities.

#### **INDICATORS**

An indicator is a tool that is used to show if the desired changes are occurring or not. Monitoring indicators should be an instigating process that leads to reflection on the issues that motivate the actors involved. Using guiding questions that express the concerns and needs of the actors is fundamental for analyzing and evaluating achieved results and impacts. The indicators help in answering the guiding questions.

Examples of guiding questions:

- When and how do we perceive that the desired change is occurring or not?
- What are the key aspects regarding the desired impact? What are secondary aspects?
- What concrete information is necessary to verify if there was progress/evolution? Who has this kind of data and information?
- What methods do we need to apply in order to acquire data to verify that the change occurred as desired?
- What is the cost-benefit relation between the effort to acquire the necessary data and the quality (content) of the data?

The guiding questions help define the indicators as well as the instruments necessary for generating the data to answer the questions.

In the formulation of indicators, the **SMART** method should be considered, whereby indicators should be:

S	SPECIFIC	Clear, concise, tangible		
M	MEASURABLE	Capable of being measured (time, money, volume, etc.)		
A	ATTAINABLE	Viable in terms of resources, time and technical domain		
R	REALISTIC	Express a realistic, desired final condition		
Т	TIME BOUND	Have initial, execution and conclusion dates defined		

### Furthermore, it is advisable to:

- Define one or more sources, for verifying if an indicator was achieved.
- Identify changes that may be demonstrated quantitatively and/or qualitatively
  - *Quantitative:* measurable variables (area, volume, quantity, etc.), of which changes can be measured over time.
  - *Qualitative*: information from evaluations, opinions and measurable "facts", such as satisfaction and reliability.

Finally, it is recommended that several quantitative and qualitative indicators are combined, aiming for the same desired change.

### BASELINE AND TARGETS

The indicators measure the changes brought about by the project. For each indicator, a baseline should be defined, which can be understood as the initial condition of a specific indicator or project, that is, the situation previous to the beginning of the project's execution, providing a basis for:

- Determining and verifying realistic and challenging targets.
- Comprehending the progress achieved.
- Measuring the changes in comparison to the situation prior to the project.
- Supporting future evaluations.

Once the baseline is established, the targets should be defined. All targets should be clearly aligned with their indicators, using the same measuring units. The targets are measured during the execution of the project and after its completion.

### ELEMENTS OF A MONITORING PLAN

Monitoring is a process that involves several stages and actors. Creating a monitoring plan means defining these stages, the frequency of measurement and the actors involved. All Amazon Fund models come with the following recommendations:

- **Project elaboration phase:** a more general proposal is presented to the Amazon Fund/BNDES, with a clear focus on the indicators to be used and the impacts to be monitored.
- **Project analysis phase:** the project proponents and Amazon Fund team agree on the project's logical framework and monitoring plan.
- **Project implementation phase:** the filled out monitoring plan is sent to the Amazon Fund/BNDES, along with the periodic performance reports or the results evaluation report at the end of the project, by the person responsible for the project's execution.

Planning and monitoring during the analysis stage enables opening up space for dialogue and negotiation between the project proponents and the Amazon Fund. Normally, the following steps are included in a monitoring plan form:

- **Objective (general/specific):** definition of what is expected to be changed and achieved with the project in general and which thematic components (specific objectives) help achieve the general objective.
- Indicator: instrument used for measuring achievement of targets or objectives. The definition of the indicators is negotiated between the financier and the project proponent.
- **Definition of the indicator:** levelling of the signification of the indicator, observation focus, objective of the indicator and what is expected to be perceived through the indicator.

- **Baseline:** initial situation, immediately prior to the execution of the project.
- Target: situation expected to be achieved with the project execution.
- Form of collection/source: where, how and with whom the information will be obtained.
- Frequency: periodicity of data collection and organization.
- **Responsability:** those responsible for collecting and organizing the data.

The Amazon Fund's monitoring plan currently required from the projects it supports may be visualized in table format, as follows:



General objective: The state government ensures the suitability of anthropic activities in accordance with environmental legislation					
Proposed Indicator	Definition	Collection Form	Frequency	Responsibility	
Annual deforestation in the XY Amazon state					

Specific objective:
Military Fire Brigade of the state is better structured for monitoring and combating deforestation caused by forest fires and unauthorized burning

deforestation caused by forest fires and unauthorized burning					
Indicator	Definition	Baseline	Target	Collection form (source)	

Corresponds to component N° 2 in the Amazon Fund's logical framework, which is equal in all projects.

Corresponds to the indicator of the Amazon Fund's general objective, "reduction of deforestation", which is equal in all projects.

This is equal in all projects which support the Fire Brigades. The indicators proposed in this guide are referred to at this level.

		Data collected:		
Frequency	Responsibility	In:	In:	ln:



# IMPACT MONITORING PLAN FOR FIRE BRIGADE PROJECTS

The Amazon Fund's general objective is to reduce deforestation through sustainable development in the Amazon region. According to its logical framework, four components direct its non-refundable support to projects:

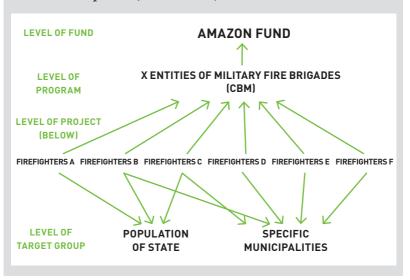
- 1) Sustainable Production Activities
- 2) Monitoring and Control of Deforestation
- 3) Land-use planning
- 4) Scientific and Technological Development

Support to Military Fire Brigades in the Amazon states is inserted into the "Monitoring and Control of Deforestation" component. The set of projects supported by the Amazon Fund for prevention, monitoring and fighting forest fires and unauthorized burning are organized into a thematic group or "program", as follows:

- "Program" level: set of Fire Brigade projects supported by the Amazon Fund.
- Project level: each supported Fire Brigade project.
- **Final beneficiaries' level:** population of the states and municipalities that will be benefitted by the actions of the Fire Brigades.

### GOVERNANCE LEVELS OF AMAZON FUND SUPPORTED PROJECTS

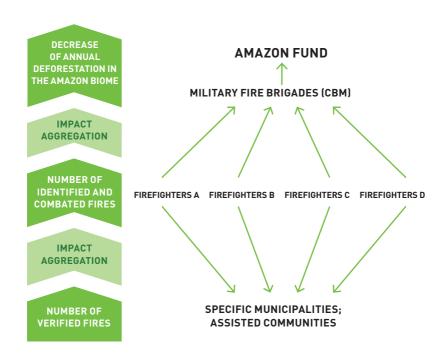
The following illustration demonstrates the different governance levels of Fire Brigade projects supported by the Amazon Fund, as well as the different implementation levels and related public (stakeholders):



The intervention logic of the Amazon Fund supported Fire Brigade projects allows for monitoring of the aspects which are similar or equal in all the projects in the program. Consequently, it is possible to know not only what the support to a Fire Brigade has achieved in state "A", but also what the Amazon Fund's support to the Fire Brigades of the various states of the region has contributed to, in terms of improving prevention, identification and combating of fires. Thus, the Amazon Fund's overall role in reducing deforestation in the region – and the role of its project implementers – becomes clearer. However, this analysis and reflections on a regional level will only be possible if all the Amazon Fund supported Fire Brigade projects adhere to the same set of indicators.

### IMPACT AGGREGATION AND AGGREGATABLE INDICATORS

A common set of indicators, used by a set of projects with similar objectives, potentiates the monitoring of achieved impacts. The "vertical feeding" of an aggregated indicator can be illustrated as follows:



The following table presents the advantages that impact aggregation brings to the supported projects and to the Amazon Fund itself:

#### **ADVANTAGES OF IMPACT AGGREGATION**

Allows for measuring the contribution of Fire Brigades to the reduction of deforestation in the Amazon

Allows for drawing conclusions on what worked out well in the supported projects, supporting the formulation of new strategies and showing the possible merits of their prioritization

Facilitates reflection regarding results and impacts, achieved through a comparative vision

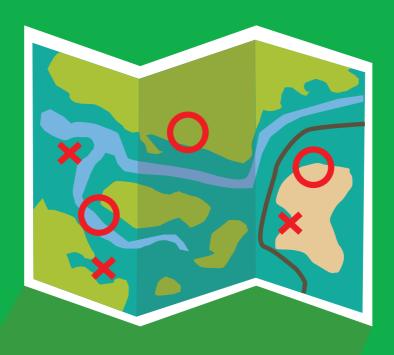
Better communicates what was achieved, to the financers and the general public

Provides reference data and facilitates institutional partnerships

### An aggregatable indicator is understood as:

- Formulated so that numerous projects in a strategic area can supply it with data.
- Representing aspects that are easily measured (usually quantitative).
- Allows for all projects of a program to use the same methods for gathering data in the same period of time.

A set of eight standard indicators was elaborated for all Fire Brigade projects, as presented below.





# STEPS FOR MEASURING INDICATORS

#### INDICATORS AND THEIR CONCEPTS

A set of indicators is presented below in three blocks. The first block is aimed at measuring monitoring capacities, verification of hotspots<sup>2</sup> and identification of forest fires and unauthorized burning. The second block concerns firefighting, performed by both the Fire Brigades and the other actors involved in fighting fires in that state. The third block refers to the prevention of forest or rural fires.

It is worth mentioning that only the indicators regarding a project's foreseen executed actions should be adopted by that project. For instance, if the project only foresees monitoring, verification, identification and firefighting actions by the Military Fire Brigades, indicators related to the development of actions by other actors or the prevention of forest fires and unauthorized burning should not be adopted.

Finally, other indicators, besides these presented in the set below, can also be aggregated, for example, the measurement of the area (ha) affected by forest fires and unauthorized burning in a state. When the corresponding information sources are available, these additional indicators complement and enrich the understanding of the impacts of a particular project.

<sup>2.</sup> Points of high temperature identified by the satellite of reference that are not necessarily fire or burning.



	INDICATOR	DEFINITION	BASELINE (DATA FROM THE YEAR PREVIOUS TO THE IMPLEMENTATION OF THE PROJECT, EXCEPT IN THE CASE OF INDICATOR 1)	TARGET (DATA MEASURED ANNUALLY SINCE THE BEGINNING OF THE PROJECT)	
1	1. Number of hotspots	Hotspots count in the state (or project coverage region), based on the points identified by the satellite of reference (AQUA), made available on the INPE/CPTEC Fire Database.	Average number of annually identified hotspots in the 10 years previous to the implementation of the project	Decrease in the number of annually identified hotspots (number and percentage evolution)	
CAPACITY	2. Number of hotspots verified by the Fire Brigade	Number of hotspots, registered in the fire Database, which were verified <b>in loco</b> by the Fire Brigade of the state (or project coverage region). This measures the verification capacity of the Fire Brigade.	Number of hotspots verified by firefighters in (20XX)	Increase in the capacity of the firefighters to verify hotspots (number per annum and percentage evolution)	
	3. Number of forest fires or unauthorized burnings identified by the Fire Brigade	Count of hotspots that were identified as forest fires or unauthorized burnings in the region (or project coverage region). This indicator demonstrates which hotspots were identified by the Fire Brigade as forest fires or unauthorized burnings.	Number of forest fires or unauthorized burnings identified by the Fire Brigade in (20XX)	Increase the identification capacity of the number of forest fires or unauthorized burnings by the firefighters (number per annum and percentage evolution)	
BLOCK 1: MONITORING AND VERIFICATION	4. Number of hotspots verified by the other actors	Hotspots count verified in loco in the state (or project coverage region) by other actors benefited in the scope of the project, dealing with the monitoring and control of forest fires or unauthorized burning, for example, members of other public organs that also work with monitoring of fires using the data geo-processing methodology from the Fire Database/INPE, civil population, etc This indicator is considered complementary for understanding the action of these actors in this theme.	Number of hotspots verified in (20XX) by other actors	Increase the verification capacity of hotspots by other actors (number per annum and percentage evolution)	
CK 1: MONIT	5. Number of forest fires or un- authorized burnings identified by the other actors	Count of hotspots that were identified as forest fires or unauthorized burning in the state (or project coverage region) by other actors benefitted by the project. Through this indicator, we hope to understand the evolution of these actors' capacity of identifying forest fires and unauthorized burning.	Number of forest fires or unauthorized burnings identified in (20XX) by other actors	Increase the capacity of other actors benefitted by the project to identify the number of forest fires or unauthorized burnings (number per annum and per- centage evolution)	
BLO	MEANS OF COLLECTION FOR BASELINE AND FOLLOWING YEARS	Step 1: Register, by using the Fire Database/INPE (http://www.dpi.inpe.br/proarco/bdqueimadas/) the average number of hotspots in the 10 years prior to the implementation of the project actions in the state (or project coverage region) and then count the annual number of hotspots since the beginning of the project.  Step 2: Count the number of hotspots verified in loco by the Fire Brigade or other actors in the state (or project coverage region) in the year 20XX (baseline) and annually in the following years.  Step 3: Count the number of forest fires or unauthorized burnings identified in loco by the Fire Brigade or by other actors in the state (or project coverage region) in the year 20XX (baseline) and annually in the following years.			
	HOW TO CONSOLIDATE	Include in the performance report and results evaluation report the topic to analyze if there was an	increase in the capacity of verifying forest f	ires and unauthorized burning.	

	INDICATOR	DEFINITION	BASELINE (DATA FROM THE YEAR PREVIOUS TO THE IMPLEMENTATION OF THE PROJECT, EXCEPT IN THE CASE OF INDICATOR 1)	TARGET (DATA MEASURED ANNUALLY SINCE THE BEGINNING OF THE PROJECT)	
BLOCK 2: FIREFIGHTING	6. Number of forest fires or unauthorized burnings identified and fought by the Fire Brigade	Count of the number of forest fires or unauthorized burnings that were identified (indicator 3) and now combated by the Fire Brigade. There is expected to be more success in the capacity to respond to and combat these fires with a reduction in the response time to mobilize teams for verification/identification of forest fires or unauthorized burning in loco, as well as with increased success with combating actions, counting only those combats that resulted in effective fire suppression.	Number of forest fires or unauthorized burnings identified and fought in 20XX were by XX (firefighters)	Annual increase in the response capacity for combating forest fires and unauthorized burning in relation to the total in 20XX (number and percentage evolution)	
	7. Number of forest fires or unauthorized burnings identified and fought by the partners without the presence of the Fire Brigade	Count of the number of forest fires or unauthorized burnings that were identified (indicator 4) and then combated by these firefighters, for example, as a result of being trained and/or equipped by the Fire Brigade as a result of the project.	Number of forest fires or unauthorized burnings identified and fought in 20XX were by XX (other actors)	Annual increase in the response capacity for combating forest fires and unauthorized burning in relation to the total in 20XX (number and percentage evolution)	
	MEANS OF COLLEC- TION FOR BASE- LINE AND FOLLOW- ING YEARS	Step 1: Gather data to count the number of forest fires or unauthorized burnings that were combated by firefighters and other actors in the years following 20XX (baseline).  Step 2: Compare the number of forest fires or unauthorized burnings that were identified and combated in the year of analysis in relation to the number of forest fires or unauthorized burnings that were identified and combated in 20XX (baseline) as a percentage.			
	HOW TO CONSOLIDATE	Include in the performance report and in the results evaluation report the annual number of fire combats, evaluating in comparison to the number of combats of forest fires or unauthorized burning in the baseline.			

FOREST	INDICATOR	DEFINITION	BASELINE (DATA FROM THE YEAR PRE- VIOUS TO THE IMPLEMEN- TATION OF THE PROJECT, EXCEPT IN THE CASE OF INDICATOR 1)	TARGET (DATA MEASURED ANNU- ALLY SINCE THE BEGIN- NING OF THE PROJECT)	
3: PREVENTION OF FO AND RURAL FIRES	8. Dissemination of techniques for the prevention of rural or forest fires.	Detailing the degree of dissemination of techniques for the prevention of forest or rural fires. These techniques include the use of firebreaks and educational signs for the prevention of forest or rural fires, natural protection, etc. When the project aims to disseminate alternative methods for fire usage such as direct planting, agro-forestry systems and agro-ecological management, it is possible, to measure, for example, the number of farmers qualified in techniques of controlled burning and prevention of forest fires, the number of people who were trained in alternative use of fire techniques, number of training events, amount of educational booklets efficiently distributed, etc.	Degree of dissemination of techniques for the prevention of forest or rural fires and alter- native methods to fire usage in 20XX	Annually increase the dissemination of techniques for the prevention of forest or rural fires and, when appropriate, of alternative methods to fire usage.	
BLOCK 3: P	MEANS OF COLLEC- TION FOR BASE- LINE AND FOLLOW- ING YEARS	n any form (documents, posters, flie: emination of alternative methods to a ars that followed, verifying if dissemi	fire usage.		
	HOW TO CONSOLIDATE	Include in the performance report and in the results evaluation report the themes regarding fire prevention, with emphasis on data collection concerning the degree of dissemination of techniques for forest or rural fire prevention and, when appropriate, alternative methods to fire usage.			





# HOW TO REPORT PERFORMANCE AND IMPACTS

During the implementation of the project supported by the Amazon Fund, performance reports on the situation of the project should be sent to the BNDES and, in the end, a report on the evaluation of the project results.

For these reports, some key elements are used:

- **Performance reports** deal with the physical and financial evolution of the project, the relevant occurrences regarding the beneficiary, contractual obligations and the monitoring of the indicators from the logical framework, etc. It is desirable that interrelations between the products/services, and obtained effects and impacts, are also clarified.
- **Results evaluation reports** demonstrate how the objective was achieved, consolidating information on the execution of the supported project. In all reports, but especially in this one, it is necessary to identify in what ways the project contributed to the Amazon Fund's general objective: "reducing deforestation with sustainable development in the Amazon region".

In short, it is important to report on the change produced due to the project's interventions and to what extent this change correspond to what was expected, and also, if it was positive/negative.

In order to elaborate a performance or results evaluation report, answering the following questions may facilitate the task:

- What was accomplished (in terms of products/services)?
- What changed with the interventions of the project for the individual/ organization/community etc.?

- What kind of evidence exists to demonstrate the relationship between the project's intervention and change produced? (not only thinking of formal evidence, but also of events that occurred)
- Is the collected data for documenting the change solid and reliable?

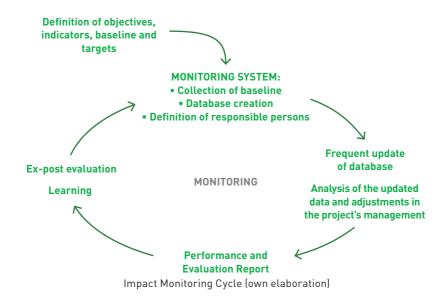
Changes, or impacts, are not usually verified in an immediate way and due to the duration of a project (two to three years), sometimes it is not possible to document all its impacts.

One example of a well-documented impact is shown as follows:

"With the equipment bought and the training done with 700 people, the participants were capacitated to fight fires. One year later, the data collection showed that 80% of those capacitated applied their knowledge and the percentage of identified and efficiently fought fires increased from 20% to 40%."

In order to have a well-documented impact, the elements described above are crucial (indicator, baseline and target), as well as a methodology of gathering the necessary data at the beginning and during the implementation of a project. The monitoring cycle of a project is shown in the following image:

### MONITORING CYCLE





### CONCLUSION

The present guide for monitoring the impacts of Military Fire Brigade projects supported by the Amazon Fund aims to qualify the annual and final reporting of the projects. The objective is thus to obtain standardized inputs so as to enable comparison of the gathered data and analysis of the initiatives in the area of preventing and fighting forest fires and unauthorized burning.

Based on this information, the Amazon Fund and its project executor partners will be able to clearly and convincingly communicate the results and impacts achieved by the projects to third parties and the general public.

This information will also be used for reflection, on a regional level, on best practice in the fight against forest fires and unauthorized burning, being able to identify the extent to which the adopted strategies are actually contributing to the reduction of deforestation and the promotion of sustainable development.

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