





PLANNING AND MANAGEMENT OF NATIONAL ACTION PLANS FOR THREATENED SPECIES CONSERVATION

THE BRAZILIAN APPROACH

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1. CURRENT CONTEXT

Brazil is globally recognized as a megadiverse country, with its immense biodiversity reflected in its biomes, ecosystems, and the countless species of flora and fauna, as well as in the culture and identity of its people (BRAZIL, 2017). However, the intense pressure on natural resources has severely endangered this biodiversity, with 1,253 species now classified as threatened, calling for urgent and effective conservation actions. Reducing biodiversity loss is one of the world's greatest challenges, requiring responses at multiple levels and greater political, academic, and social mobilization.

In this context, the Brazilian Federal Government, through the Chico Mendes Institute for Biodiversity Conservation (ICMBio), has played a central role in implementing the biodiversity conservation agenda in the country, engaging with all major national issues.

ICMBio, an agency under the Ministry of the Environment (MMA), is tasked with "formulating and implementing environmental public policies to protect the environment and promote sustainable socioeconomic development." It is responsible for managing, implementing, and protecting 340 protected areas, fostering sustainable development in collaboration with traditional populations within these regions, and developing and executing conservation strategies for threatened species.

In order to implement strategies aimed at threatened species, ICMBio employs an integrated set of tools to assess and improve the conservation status of Brazil's fauna, including:

1. Extinction Risk Assessment of Brazilian Fauna Species

is a process that evaluates the extinction risk of species across the national territory. The results of this work contribute to updating the Official National List of Threatened Brazilian Fauna Species and support the implementation of several public policies.

2. National Action Plans for Threatened Species Conservation (PANs)

are participatory plans focused on reducing or mitigating threats to endangered fauna species. The guiding framework for this planning is the Official National List of Threatened Brazilian Fauna Species. Since the introduction of this planning tool, more than 100 PANs have been developed and evaluated.

3. Plans for Reducing Impacts on Biodiversity (PRIMs)

are tools based on the Hierarchical Impact Mitigation Process, aimed at supporting environmental management to prevent net loss of species. These plans create scenarios that reconcile biodiversity conservation with the development of socioeconomic activities.



This document presents the National Action Plans for Threatened Species Conservation, also known as PANs. These plans are legally established instruments by the Brazilian government for the management and formulation of public policies aimed at threatened species, and they are part of the National Program for Threatened Species Conservation – Pro Species.

Based on a planning methodology developed by the Chico Mendes Institute for Biodiversity Conservation (ICMBio), the PANs define a set of priority actions to address the threats to species and their habitats, with the goal of protecting and recovering threatened species. The execution of these plans is periodically monitored and evaluated, enabling the tracking and assessment of the results achieved. The management of these stages involves the use of planning and evaluation matrices, which are interrelated documents that allow for monitoring the implementation of actions, reprogramming the plans, and assessing the impact of the PANs. Throughout this document, we will present these matrices, their concepts, and their applications.

The plans set out a comprehensive range of actions across multiple topics, including land-use planning and management, applied conservation research, environmental monitoring, habitat restoration, in situ and ex situ population management, and the promotion of environmental education. Additionally, the plans address crucial issues such as combating wildlife trafficking and controlling invasive alien species.

Furthermore, a fundamental principle of the PANs is their participatory development, which involves the integration of diverse partners, sectors, and perspectives for biodiversity conservation, thus promoting extensive societal involvement. This structure ensures legitimacy and facilitates the engagement of all stakeholders in the implementation process. For each plan, a Technical Advisory Group (GAT - *Grupo de Assessoramento Técnico*, in Portuguese) is established, comprising representatives from various sectors of society. The GAT is responsible for monitoring and evaluating the plans throughout their management cycle.

The implementation of the PANs is conducted through a consortium of partners in collaboration with ICMBio, mobilizing financial and human resources to expand the reach of conservation actions across different biomes. Some of the actions outlined in the PANs are implemented within protected areas, thereby contributing to the strengthening of these areas' management.

Currently, ICMBio coordinates 40 PANs covering 82% of the 1,253 threatened fauna species, making these plans strategic tools for their conservation (*updated data is accessible via QR codes in the "Learn More" section*). The implementation of over 2,500 actions across these plans is being carried out by an extensive network of partners, involving approximately 400 representatives from over 300 partner institutions. Consequently, it is evident that the PANs provide substantial coverage for threatened fauna species.

2. WHAT IS A PAN?

The National Action Plan for Threatened Species Conservation (PAN) is a management and public policy tool designed to address the conservation needs of endangered species. The PAN is developed and implemented in a participatory approach, based on a defined objective within a set timeframe. Its purpose is to serve as a tool to identify, organize, and prioritize conservation actions designed to address the threats endangering species and their habitats.

This tool was developed by ICMBio based on the Strategic Planning for Species Conservation methodology, adopted by the International Union for Conservation of Nature (IUCN/SSC, 2008), which provides guidelines and methods for the development of action plans. Elements of other participatory planning methods were incorporated into this species-specific planning model, including goal-oriented project planning (ZOPP), the strategic planning method (PDCA), and project management techniques (ANSOFF et al., 1981; PMI, 2008).





- Focus on species or groups of species;
 - Emphasis on partnerships;
- Based on the review of species biology and ecology;
- May directly involve population and habitat viability
- Typically occurs concurrently with the extinction risk assessment process;
 - Prioritizes threats and actions;
- Provides guidelines and necessary actions for various aspects of species conservation in the form of recom-



Strategic Planning

- Strategic planning;
- Plans structured as projects;
- Clear definition of deliverables, deadlines, and stages;
 - Covers different levels of operational, tactical, and
 - strategic planning;
- Focus on feasible and tangible results;
- Management based on the PDCA cycle;
- Establishment of indicators to measure performance during implementation;
- Regular monitoring and tracking of the Plan's execution.

Focuses on threats (synergistic and systemic nature of the conservation process):

- Can encompass taxonomic or spatial scopes;
- Based on the extinction risk assessment process;
- Anticipates the inclusion of new information gathered during
 - the PAN development process;
- Considers a consensus among different sectors in defining both threats and conservation actions;
 - Plans are structured as projects with clear definitions of responsibilities;
- Covers three levels of planning but focuses efforts on tactical and strategic levels;
- Focus on feasible and tangible results within a five-year timeframe;



Based on the PDCA cycle, with the flexibility to make adjustments during plan execution;

Clear definition of deliverables, deadlines, and stages;

Actions are implemented based on deliverables; Establishment of indicators to track results;

All actions are considered priorities;

Annual monitoring to track action execution;

Two evaluations are planned to assess goal achievement;

A Technical Advisory Group is established for oversight; Efforts are made to maximize the execution of actions;

Officially recognized as a public policy of the State.

Figure 1. Diagram of the development of ICMBio's PAN Approach, based on and evolved from the IUCN and Strategic Planning methods.



The PAN follows the logical structure of a project, which is defined as "a temporary effort undertaken to create a unique product, service, or result" (PMI, 2008). As with any project, the focus of the PANs is on achieving results, and in this sense, an appropriate management system is essential. It allows not only the monitoring of implementation but also, more importantly, the identification of challenges, both positive and negative impacts, and any potential or emerging issues. This system guides decision—making in time to implement the necessary improvements or adjustments to the plan.

PANs are complex planning instruments, as they involve a wide range of drivers and stake-holders, encompassing numerous scales from conception to implementation. This multiplicity of elements represents a significant challenge for the tool, particularly in terms of evaluating results, but it is also what makes it a consistent and robust instrument.

Despite the inherent complexity associated with its scale and diversity of elements, the PAN approach has been proven to be a practical and effective tool for biodiversity conservation. It can be applied across a range of taxonomic levels, from a single species to groups of species, and can also encompass different territorial scales.

One of the central premises of the tool is participatory development, which emphasizes the commitment of all stakeholders involved. Collaborative engagement with society is a fundamental and necessary condition for the viability of its implementation. Therefore, the involvement of various sectors whether governmental, non-governmental, organized civil society, or the economic sector - is essential for the success of the PAN.

Each PAN is designed with the aim of reducing or mitigating threats to biodiversity and has the following main objectives: (i) to establish priority actions for species and habitats targeted for conservation, (ii) to streamline the allocation and management of resources, and (iii) to organize, direct, and enhance conservation efforts. However, while planning is crucial, it is important to emphasize that without execution, it becomes nothing more than a list of intentions. The key to achieving results lies in turning these plans into concrete actions.

Thus, the ability to effectively execute the strategy is one of the most critical elements of the process. Therefore, the establishment of mechanisms to monitor and evaluate the implementation of the PANs marked an important methodological advancement, as it enabled continuous tracking of the plans and allowed for adjustments as needed.







The first PAN was developed in 2004, primarily using the methodology established by the IUCN. These initial PANs focused on a single species, and their creation mainly involved specialists in the target species.

As the plans were implemented, it became evident that, while the strategy for developing the plans was functional, the traditional single-species approach would not allow for the inclusion of all threatened fauna species listed in the official lists (MMA, 2003; 2004; 2008) within the short or medium term. This made the goals agreed upon under the Convention on Biological Diversity (CBD) unattainable for Brazil. Additionally, the lack of mechanisms to adequately track the implementation of the plans made it impossible to accurately assess whether the planning was contributing to reducing the threats affecting the species.

In practice, it became evident that the method often led to the definition of actions that, while necessary, were frequently unrealistic, unfeasible, or beyond the responsibility of those involved in the planning. As a result, the document turned into an idealized vision - a set of aspirations unable to bring about real change.

Given the significant and growing number of threatened species, it became clear that this conservation planning methodology was not suited to the Brazilian context. As a result, the PAN methodology evolved considerably, incorporating elements and concepts from other planning methods, eventually developing a model tailored to the conservation of Brazil's threatened fauna species. In 2012, the methodology and guidelines for the development, management, monitoring, and evaluation of PANs were formalized by the federal government through a normative instrument. The publication of the National Program for the Conservation of Threatened Species (Pro Species) in 2014 by the Ministry of the Environment reinforced the importance of PANs as a conservation tool in Brazil, focused on adhering to the following premises:

- Plans capable of promoting improvements in the conservation of species and their habitats.
- Plans that are effectively executed and incorporated into environmental policies at various levels of government.
- Plans that consider the synergistic and systemic nature of biodiversity conservation.
- Development of realistic plans with necessary actions that are pragmatic, tangible, feasible, and achievable within a defined timeframe.
- Broader scopes, either spatially or taxonomically, with the capacity to directly benefit a larger number of species.
- Focus on reducing threats while accounting for the specific needs of each species.
- Broad representation and participation of society in the development, monitoring, and implementation of the plans.
- Shared responsibility and the establishment of a collaborative network to address the identified threats.
- Clear linkage between conservation actions and the expected outcomes.
- Flexibility to adapt to changing circumstances over time.

In this context, the tool undergoes a continuous process of refinement, with periodic strategic analyses and evaluations conducted to improve both the procedures and the application of the method. Over the past 12 years, the PAN tool has gained increasing legitimacy and trust among its network of partners. Simultaneously, significant efforts were made to train ICMBio staff and collaborators in applying the method, while establishing a routine of regular training sessions for its use (Figure 2).

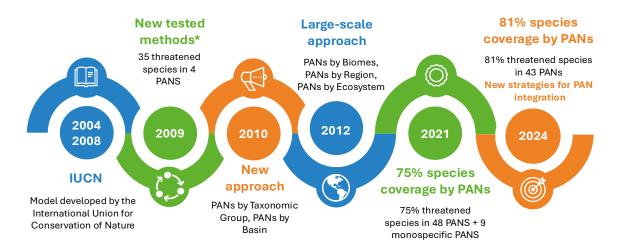


Figure 2. Timeline of the methodological evolution of PANs in Brazil

Another innovation brought by the methodology was the establishment of systematic monitoring and periodic evaluation of the PANs, assigning this role to a group - the Technical Advisory Group (GAT - *Grupo de Assessoramento Técnico*, in Portuguese), composed of both ICMBio and other partners involved in the plan.

The structure of the PANs requires a clear establishment of a causal relationship between the General Objective, which defines the desired transformation in reality; the Specific Objectives, focused on threats; and the actions, which are the concrete activities to be carried out in order to achieve the Specific Objectives, with the aim of reducing or mitigating the main identified threats (Figure 3).



Figure 3. Methodological Framework of the PANs.

3. PAN: FROM PLANNING TO MANAGEMENT

The management of a PAN refers to the activities inherent to the process, meaning those carried out by ICMBio itself, ensuring that all are fulfilled. In simplified terms, there are three main phases: 1) Planning; 2) Implementation; and 3) Monitoring and Evaluation.

According to ICMBio Normative Regulation 21/2018, PAN management must consider:

- The principles of strategic and tactical planning, with a clear definition of the improvements sought in the conservation of species and habitats targeted by the PAN.
- The involvement of stakeholders who are relevant to the reduction of threats to endangered biodiversity.
- The establishment of a causal relationship between the Vision for the Future, General Objective, Specific Objectives, and actions, focusing on the main threats to be reduced or eliminated.
- The identification of strategic actions that can be implemented within the established timeframe and fall within the governance of the PANs.
- The establishment of indicators and targets to verify the achievement of the PAN objectives.
- Transparency and public disclosure in the development, implementation, monitoring, evaluation, review, and dissemination of the PAN.
- The establishment of a continuous process of monitoring, evaluation, and review.
- High engagement and integration among GAT members; and
- A shared effort with partner institutions to pool human and financial resources for the implementation of PAN actions, effectively operationalizing a networked structure.



The management logic of a PAN aligns with the PDCA cycle (Figure 4), which also guides ICMBio's organizational management. The PDCA acronym identifies the phases of a cycle: P – Planning; D – Doing (execution); C – Checking; and A – Acting (taking corrective measures). In project management, the PDCA cycle should be systematically followed: plan, execute the plan, verify if the planned results have been achieved, and, if not, take corrective action; if successful, standardize the method of execution and propose improvements for the next cycle. Thus, PAN management is conducted adaptively, allowing for course corrections and adjustments throughout its execution.

PAN MANAGEMENT CYCLE

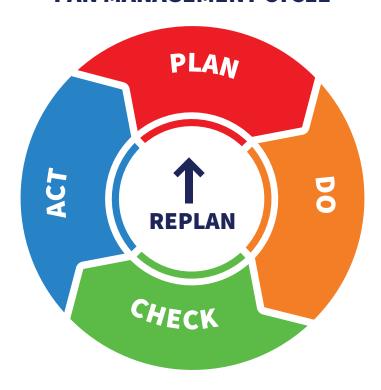


Figure 4. PAN management cycle adapted from the PDCA cycle.

The following sections will provide a detailed explanation of each phase of the Action Plan cycle, how they are developed, and the key products expected at the end of the process.

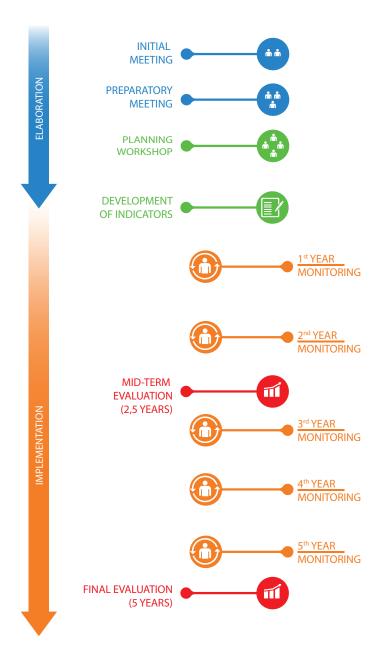


Figure 5. Phases and events of a National Action Plan for the Conservation of Threatened Species (PAN).

3.1. Planning

Planning is essential for any process aimed at achieving specific objectives and driving change. It is not just about making decisions for the future, but also about considering the future impact of our decisions, characterizing it as a systematic and ongoing decision-making process. The goal is to define needs and priorities, set objectives to be reached, and allocate both human and financial resources. It is at this phase that the PAN is truly developed.

The conception of each PAN can be driven by specific demands or opportunities. A PAN can be proposed either internally by ICMBio or by external partners. In either case, an ICMBio Research Center is associated with the focus of the proposed plan.

The development of a new PAN proposal involves the following information:

- Preliminary list of target species.
- Contextualization of the threats to the conservation targets and existing opportunities.
- Justification for the development of the PAN.
- Designation of a representative from the ICMBio Research Center, who will serve as the PAN coordinator.
- Timeline for the activities related to the development of the PAN.

Considering that this is only an initial proposal and that the PAN follows the concept of continuous improvement, the information may be modified during the planning process, as well as throughout its implementation.

Once the proposal is approved by the Technical and Management Divisions of ICMBio, the development of the PAN follows three sequential stages, detailed below:

A. Initial Meeting

The Initial Meeting is considered the milestone in the PAN Planning phase, where strategies for the conservation of threatened species are discussed and may result in the development of a new PAN. It is an important internal meeting in which ICMBio legitimizes the mobilization of efforts and aligns the objectives for building a new PAN. Representatives from the technical and management divisions of ICMBio, along with the Research Center responsible for the PAN, participate in this meeting. Occasionally, if necessary, an external partner may also participate.

Based on the approved PAN Proposal, the taxonomic and spatial scope of the PAN (Figure 6) is initially discussed, which is usually a proposal presented by the Research Center. Additionally, based on these defined scopes, efforts are made to identify individuals, both internal and external to ICMBio, considered to be experts in the conservation targets, who have the potential to participate in the Preparatory Meeting.

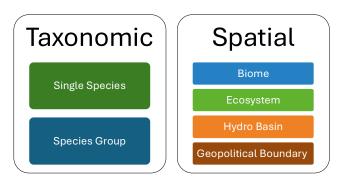


Figure 6. Types of scope for PANs

SUMMARY BOX PRODUCTS OF THE INITIAL MEETING

- 1. Taxonomic scope of the PAN.
- 2. Spatial scope of the PAN.
- 3. List of stakeholders (participants and institutions) for the Preparatory Meeting.

B. Preparatory Meeting

The Preparatory Meeting is a time to validate the information consolidated during the Initial Meeting, as well as to identify new relevant data for the development of the PAN. This meeting is led by the PAN Coordinator, with the participation of representatives from the Research Center responsible for the plan, as well as individuals internal or external to ICMBio, who are considered experts in the conservation of the target species and/or environments, and other key collaborators, depending on the specifics of the PAN.

At this stage, participants evaluate and validate the information gathered during the Initial

Meeting, such as the target species and environments, the geographical area of coverage of the PAN, and the main threats affecting these species and their environments. It is important to emphasize that the step of identifying threats to conservation targets forms the foundation for developing the PAN. Based on this, the objectives and actions will be developed during the Planning Workshop. Considering the information provided, the group participating in the Preparatory Meeting drafts a list of key participants and institutions that will take part in the Planning Workshop. Additionally, if relevant, participants may contribute supplementary information they deem crucial for the advancement of the PAN development process.

Area of Coverage: this is the geographical space for which the PAN's conservation actions will be developed and potentially implemented.

The threats to the conservation targets of the PAN (species and environments) are identified with the aid of the information available in the species' Risk of Extinction Assessment forms. In addition to threats, these forms contain records of species distribution and information on ecology, taxonomy, and natural history, among others. The list of threats will be brought to the Planning Workshop, where it may be further supplemented.



The identification of threats to conservation targets serves as the foundation for developing the PAN. Based on this. objectives and actions will be formulated during the **Planning Workshop**

In the context of PANs, threats are factors resulting from human activities that negatively impact species or environments. The IUCN provides a classification scheme for threats to biodiversity. The Species Extinction Risk Assessment System -SALVE presents the same classification scheme but adapted to the Brazilian context.

Once the target species and environments have been defined, the area of coverage established, the principal threats identified, and the list of key participants compiled, the next step is to carry out the PAN planning workshop.

SUMMARY BOX PRODUCTS OF THE PREPARATORY MEETING

- 1. Preliminary list of target species;
- PAN Coverage Area;
 Initial list of threats to selected species and their environments;
- 4. List of invitees (stakeholders and institutions) for the Planning Workshop;
- 5. Probable date and location of the Planning Workshop.

C. Planning Workshop

The Planning Workshop is the main stage in the process of developing a PAN, where participants from several institutions gather to build the conservation objectives and actions. The diversity of people involved, including specialists, managers, decision-makers, civil society representatives, and the private sector, is essential to ensure the legitimacy and success of PAN implementation.

The goal of this Workshop is to define the PAN strategy, which is expressed through a Planning Matrix. The key components required for its construction are:

- Threats to conservation targets (species and environments)
- **Future Vision**

- **General Objective**
- **Specific Objectives**
- Actions

It is crucial to emphasize that the concept of threat, introduced in the previous stage, is fundamental, as the threats form the foundation for the development of the PAN. Objectives and actions are derived directly from these identified threats.

Strategic Areas: the most relevant areas for the PAN's objective within its Area of Coverage. The criteria for defining these areas are collectively discussed, generally involving the distribution of the target species and their extinction risk category, as well as the intensity, urgency, and extent of the threats. Additionally, the selection of areas where partners are active is considered an opportunity in defining the PAN's Strategic Areas and has proven increasingly important for implementing actions locally. The federal government has guided the production and availability of PAN spatial data on the Brazilian National Spatial Data Infrastructure platform – INDE (Figure 7). For more information, visit: (www.inde.gov.br).

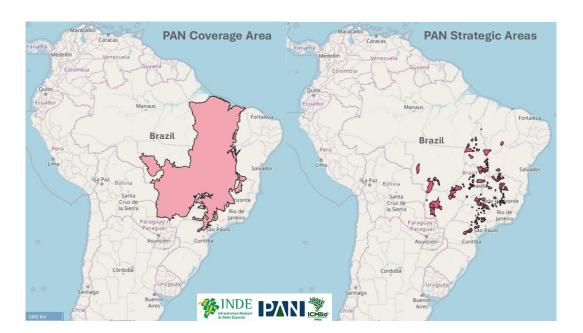


Figure 7. Area of Coverage and Strategic Areas of the National Action Plan for the Conservation of Threatened Species of Ichthyofauna, Herpetofauna, and Primates in the Cerrado and Pantanal - CERPAN.

Considering the defined threats, the development of the PAN should begin with discussions on the Future Vision, the General Objective, and the Specific Objectives. The Future Vision represents the long-term conservation scenario that is desired and encompasses several ma-

nagement cycles of the PAN. A well-defined Future Vision also helps in setting clearer objectives and goals, which serve as a guide for the actions to be planned. It ensures that individuals and organizations remain focused on key priorities, minimizing distractions and avoiding resource misallocation.

Future Vision: An ideal scenario developed to address the conservation needs of target species or environments. The Future Vision represents the desired long-term conservation scenario, potentially spanning several cycles of the PAN. Creating a Future Vision is optional, and its time frame is specific to each PAN.

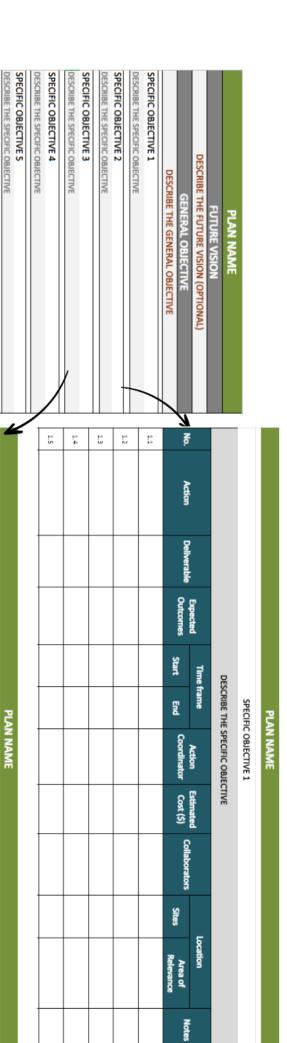
General Objective: A positive change in the conservation of the target species or environments that the PAN aims to achieve. This is a shared perspective among PAN participants, reflecting a necessary and achievable state or condition within five years. The PAN's General Objective contributes to reaching the Future Vision.

Specific Objectives: These are intermediate outcomes aimed at reducing or eliminating threats to the conservation targets. They must be feasible and measurable within the PAN's timeframe, playing a crucial role in achieving the General Objective.

The PAN's General Objective reflects the desired transformation in the conservation status of the target species and their environments, to be achieved within the five-year term of the PAN. It is translated into Specific Objectives, which aim to mitigate or reverse the threats to conservation targets.

Once the objectives have been defined, the next step is to develop the actions that will form the Planning Matrix (Figure 8). This step is extremely important and represents the primary outcome of the Planning Workshop.

The **Planning Matrix** is a framework that organizes the actions planned by workshop participants, aimed at achieving the PAN's objectives. The matrix (Figure Y) incorporates elements of project management, establishing a clear and structured link between the **action statement**, the intended outcome within a specific **time frame**, the person responsible for monitoring execution (**action coordinator**), **collaborators**, associated **resource** requirements, and the spatial **location**. This structure ensures that each action is clearly linked to the production of concrete **deliverables**, which must be completed within the established timeframe of the PAN. Additionally, it allocates product delivery responsibilities among partners and strengthens the group's sense of ownership.



					DES	CRIBE THE	DESCRIBE THE SPECIFIC OBJECTIVE	TIVE			
Planning Matrix				Expected	Time frame		Action	Estimated		.	Location
	No.	Action	Deliverable	Outcomes	Start	End	Coordinator	Cost (\$)	Coordinator Cost (\$)	Sites	Area of Relevance
	1.1										
	1.2										
nal Action Plan for Threatened INSTITUTO CHICAGON MANA	1.3										

Notes

SPECIFIC OBJECTIVE 2

Figure 8. Example of a Planning Matrix

15 4

Species Conservation

National Action Plan for Threatened

At the end of the Workshop, the Technical Advisory Group (in Portuguese *Grupo de Assessoramento Técnico* - GAT) is established through a consensus among the participants during a plenary discussion. This group is composed of members from various institutions and is coordinated by the Research Center, which serves as the PAN coordinator. The GAT represents the participants of the planning workshop and is autonomous regarding decision—making throughout the implementation of the PAN, particularly during the Monitoring and Evaluation Workshops. This encompasses the addition, removal, or adjustment of actions, the redefinition of action coordinators, timeline adjustments, and other decisions necessary to improve the PAN's execution, thus putting adaptive management of the plan into practice. Participation in the GAT is voluntary. The GAT's main responsibilities include:

- **I.** Facilitating dialogue between the various PAN stakeholders in collaboration with the PAN Coordinator.
- **II.** Monitoring the execution of actions with the action coordinators and annually consolidating the information in the PAN Monitoring Matrix, with the authority to propose adjustments throughout its implementation.
- III. Developing indicators and targets.
- **IV.** Systematizing the information on indicators, evaluating the achievement of specific objectives at the mid-term and end of the PAN cycle through evaluations.

The GAT plays a critical role in the successful implementation of the PAN. It's essential that the GAT be composed of a diverse group of representatives from several sectors involved in the PAN, including universities, government agencies, environmental agencies, civil society organizations, and the productive sector. This diversity should also reflect the geographical scope of the partner's work, expertise, and other relevant factors.

At this point, it is essential that the PAN be endorsed by an appropriate governmental institution, to become a public policy and begin to be implemented. At ICMBio, the plan is approved by the technical and legal divisions and officially recognized through a regulation, published by the Brazilian government. Subsequently, these documents are made available on the official ICMBio website.

SUMMARY BOX PRODUCTS OF THE PLANNING WORKSHOP

- 1. Final list of target species;
- 2. List of threats to target species and their environments;
- 3. Planning Matrix;
- 4. Technical Advisory Group (GAT)

3.2. Information Management

The monitoring and management of PANs are the responsibility of ICMBio. In this process, a solid information management strategy is a key asset. The institute provides dedicated pages for each PAN, along with an analytical dashboard featuring categorized data on PANs (Power BI). Moreover, all matrices, publications, and key results are made available to the public on the PAN's page on the ICMBio website.

In addition to these information management tools, an innovative strategy of categorizing PAN actions into Key Themes has been introduced. This approach allows for greater integration between PANs and other national environmental public policies, increasing the likelihood of implementing actions within the same thematic area. Below are the 16 Key Themes of PANs:

- **1.** Collaboration
- **2.** Training and Environmental Education
- **3.** Communication and dissemination
- **4.** Invasive alien species
- **5.** Financing
- **6.** Enforcement
- **7.** Information management
- **8.** Licensing

- **9.** Habitat management
- **10.** Ex situ management
- 11. In situ management
- **12.** Regulation
- **13.** Spatial Planning and Management
- 14. Research
- **15.** Protected areas
- **16.** Sustainable use of biodiversity



4. IMPLEMENTATION



The plans are implemented collaboratively, involving an extensive network of partners from different institutions. Government agencies at all levels work together with universities, research institutions, and non-governmental organizations (NGOs), sharing their expertise, fieldwork experience, and social mobilization networks. Local communities are also key participants, as they possess traditional knowledge about the species and their environments, in addition to being directly impacted by conservation efforts.

The involvement of the productive sector in the PANs has become increasingly important for their development and management. While its representation is still smaller compared to other sectors, efforts are growing to expand and strengthen the sector's participation. Engaging the productive sector adds legitimacy to the process and can contribute to biodiversity conservation. Throughout this effort, dialogues have been fostered to align different interests, aiming to increase the sector's role in implementing conservation actions, direct more effective mitigation measures, and promote the adoption of sustainable practices.

4.1. Challenges and Opportunities

Although the development, monitoring, and evaluation of PANs are the responsibility of ICMBio, their effective implementation depends on the engagement of the extensive network of partners. The execution of the plan's actions relies on strong interinstitutional mobilization and collaboration, as well as overcoming several challenges, such as those discussed below:

- Engagement and collaboration: The success of PANs relies heavily on the active involvement of collaborators. However, maintaining this engagement can be challenging, particularly when financial limitations and a lack of inclusion in the planning process arise. To overcome these obstacles and keep the group mobilized, the PAN Coordinator can adopt various strategies. These may include utilizing diverse communication tools to ensure transparent, ongoing dialogue and organizing virtual events that foster experience-sharing. Such approaches help cultivate a collaborative atmosphere where participants feel valued and invested in the PAN's goals, strengthening their commitment to its success.
- **Financial Resources:** The availability and allocation of financial resources pose significant challenges for the implementation of PANs. Dependence on public funding, which is often vulnerable to budget cuts and changing government priorities, contributes to financial instability. To address this issue, it is crucial that the entire network of partners commit to seeking alternative funding sources, such as NGOs, private foundations, and public-private partnerships, while also participating in and promoting conservation-focused grants and calls for proposals. Additionally, capitalizing on opportunities related to tax incentives and specific subsidies for environmental preservation is crucial. PANs were designed to reduce reliance on government resources by operating within a collaborative framework that engages a diverse range of partners.
- Integration with Public Policies: Another goal, and also a challenge, for PANs is their integration with other public policies focused on biodiversity conservation. PANs generate a large volume of information that needs to be incorporated into other environmental regulations and sectoral policies. As mentioned earlier; by involving participants from several sectors, it is possible to increase the PANs' cross-sectoral reach within other policies. A lack of alignment can lead to conflicts of interest and hinder the implementation of conservation measures. One example of how information produced within the framework of PANs is used in Brazil is the transformation of this knowledge into regulations for fisheries management, which establish mitigation measures to reduce by-catch and mortality of sea turtles in longline fishing, among other initiatives.
- Integration with tax incentive policies: Many PANs face a lack of funding, hindering the implementation of actions, species research, monitoring, and restoration activities.

A still underutilized opportunity is the creation of tax incentives for companies that adopt sustainable practices and contribute to biodiversity conservation. Environmental sustainability certifications, known as green seals within the ESG framework, certify companies that follow governance and socioenvironmental responsibility principles. There is great potential to integrate tax incentive policies with conservation actions, attracting companies to support PANs. Public-private partnerships, aligned with ESG criteria, can fund and execute research projects, restore degraded areas, and promote environmental education. This strategy not only strengthens the financial sustainability of PANs but also benefits companies by reducing tax burdens and contributing to biodiversity conservation.

In this context, the monitoring of the achievement of results in PANs takes place through two distinct yet complementary processes: Monitoring Workshops and Evaluation Workshops.



4.2. Monitoring

The Monitoring Workshop, held annually in person or virtually, is the opportunity to assess the progress of actions and deliverables outlined in the PAN, as well as to make any necessary adjustments that ensure the smooth implementation of the plan. The Monitoring Matrix (Figure 9), an essential tool for this process, allows for comparison between what was planned and what is being executed, enabling continuous adjustments and improvements. These workshops also promote knowledge sharing and the exchange of experiences among participants, strengthening the network of collaborators.

The Monitoring Matrix contains two types of tabs: 1) a spreadsheet for entering information; and 2) a Management Panel. On the first tab of the Annual Monitoring Matrix, there are three sections of information related to the PAN (Figure 9):

- PAN Planning (green columns). This section is for entering information from the PAN's Planning Matrix, which is updated after each monitoring cycle;
- Current Status of actions (blue columns). This section indicates the status of the actions
 during the monitoring period, noting whether the action is in progress, completed on
 time, or facing implementation issues; and
- Reprogramming of Actions (orange columns). This section is used to report on any necessary adjustments or re-planning of actions.



Monitoring Matrix

ICAMINITATION CHICO MENDES National Action Plan for Threatened Species Conservation

NATIONAL ACTION PLAN FOR THREATENED SPECIES CONSERVATION - PAN National Action Plan for Conservation... [name of the PAN]

eneral Objective of the PAN Add text of General Objective

(virtual)
0/04/2024
01/2024 - 1
10/
Date

				PAN PLANNING	INING							
	1			Expected	Time frame	rame	Action	Estimated		Location	uc	
SPECIFIC OBSCIIVES	2	ACDON	Deliverable	Outcomes	Start	End	Coordinator	Cost (\$)	Collaborators	Sites	Area of Relevance	Notes
	1.1	1.1 text of the action 1.1										
	1.2	1.2 text of the action 1.2										
_											l	f

				CURRENT STATU	CURRENT STATUS OF ACTION IMPLEMENTATION	MENTATION				
Action with a planned start after the monitored period	Action not started or Action in progress not completed with execution issues	Action in progress with execution issues	Action in progress within the expected period	Action completed	Action excluded or grouped	Description of the action's progress	Deliverable ju	Challenges encountered that justify the non-completion, partial completion, exclusion, or grouping of the action.	Responsible for providing information on the progress of the action	Responsible for providing information Recommendations or on the progress of Observations the action
					Excluded					
					Grouped					
		•							-	
				ACTIC	ACTION REPROGRAMMING	9				
Action Text revision	Action Text revision Deliverables revision	Expected Outcome revision	Revision of the Start Date		Revision of the End Action Coordinator Date revision	Revision of the Estimated Costs	Revision of the Collaborators	the Revision of the Sites	Area of Relevant revision	Revision of the Notes

Figure 9. Illustrative image of the PAN Annual Monitoring Matrix.

The current status of action implementation can be classified, using a color-coded like a traffic light system, into the following categories:

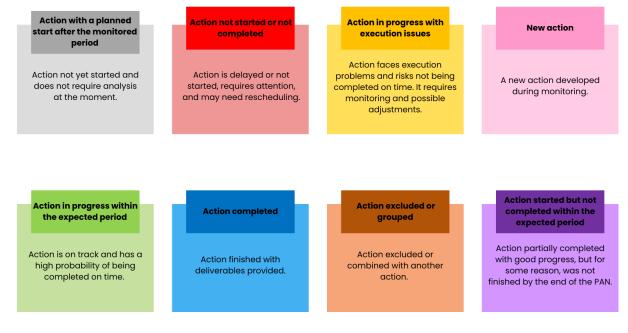


Figure 10. PANs Management Panel Colors

The Management Panel tab summarizes the performance of the actions through a set of consolidated and traffic-light-style graphs, providing a systemic view of the progress of the PAN.



■ Planned start is later tahn monitored period Management Panel In progress within the New Actions - Post Not started or not expected period execution issues In progress with 22 Completed monitoring completed Threatened Species Conservation 2 National Action Plan for 13 16 PAN Status Post Monitoring 77 12 9 60) Planned start is later tahn NATIONAL ACTION PLAN FOR THREATENED SPECIES CONSERVATION - PAN In progress within the Not started or not monitored period execution issues expected period In progress with National Action Plan for Conservation... [name of the PAN] Completed completed OBJECTIVE 2 OBJECTIVE 3 OBJECTIVE 4 OBJECTIVE 5 OBJECTIVE 1 MANAGEMENT PANEL OF THE PAN Current Monitoring PAN Current Status 2 12 1% 26% 19% 9 25% 27% 100% 9 3% 10/01/2024 - 10/04/2024 (virtual) POST MONITORING Add text of General Objective 4 53 38 CURRENT STATUS OF THE ACTIONS - 1st MONITORING (2024) 1% 100% 19% 25% 27% 0 0 150 15 12 15 15 15 2 4 6 2 88 41 SUMMARY OF ACTIONS STATUS PAN SPECIFIC OBJECTIVES PANEL General Objective of the PAN Monitoring Workshop Date anned start is later tahn monitored period OBJECTIVE 3 OBJECTIVE 5 Number of Specific Obje OBJECTIVE 2 OBJECTIVE 4 **ACTION STATUS** OBJECTIVE 1

Figure 11. Example of a Management Panel of the Monitoring Matrix of the PANs.

SUMMARY BOX ANNUAL MONITORING WORKSHOP PRODUCTS

- 1. Properly completed Monitoring Matrix.
- Updated Planning Matrix (containing the Reprogramming of actions that were modified).

4.3. Evaluation

The Evaluation Workshops take place midway and at the end of a PAN cycle, focusing on assessing the achievement of objectives. In other words, they evaluate whether the planning and execution were effective in promoting the expected changes in reality. To this purpose, it is essential to verify both the efficacy and effectiveness of the PAN. Unlike the Annual Monitoring Workshops, which analyze deliverables and deadlines, the Evaluation Workshops focus on parameters that measure whether the implemented actions were effective and successful in promoting the desired changes. For this, the use of indicators and targets is particularly relevant.

In order to reduce the subjectivity of evaluations and enable comparison between different PANs, the Evaluation Matrix was adopted. The matrix is composed of three parts: Indicators and Targets, Mid-term Evaluation, and Final Evaluation.

A. Workshop for developing indicators and targets

The objective of this workshop, conducted among the GAT members, is to develop the indicators and targets that will signal the achievement of the Specific Objectives established for the PAN. It can take place right after the Planning Workshop or alongside the 1st PAN Monitoring Workshop and may include the participation of other partners, when necessary.

The Indicators and Targets tab of the Evaluation Matrix is a table that contains the Specific Objectives, comprising their respective indicators and targets, as well as the means and individuals responsible for monitoring these indicators. This matrix should help identify whether the actions were well or poorly planned and if the planning structure is appropriate for addressing the identified threats. Thus, if an action was not planned or if more actions than necessary were planned, the indicators are expected to reveal this. However, this is only possible if the indicators are designed independently of the actions.

Indicators are elements within the planning process that aim to translate a specific aspect of a given or constructed reality into a measurable form, thus facilitating its observation and

operational evaluation. The selection of indicators is guided by a set of desirable properties. It is essential that the indicators be: verifiable, with feasible means in terms of technical, financial, personnel, and time resources; specific to the achievement of a given objective; sensitive to changes brought about by the set of planned actions; objective and explicit, using units of measurement; reliable and replicable, meaning they can be periodically measured using the same means of verification and criteria.

For each Specific Objective, indicators and targets are established for both the midpoint and the end of the PAN's period of validity, as well as a baseline that considers the state of the indicator before the implementation of PAN actions. To ensure the accurate monitoring of these targets, the verification methods and frequency of checks are clearly defined. Following the same guidelines used in the development of the Planning Matrix, a person responsible for monitoring each indicator is also designated.

All this information is duly entered into the Evaluation Matrix (Figure 10), with the fields defined as follows:

- **Specific Objective:** Specific objectives from the Planning Matrix.
- **Indicator:** Tool for measuring the achievement of the objectives. It must be objective, specific, and feasible in terms of resources and time.
- **Baseline:** Measurement of the indicator at the beginning of the work. The date of the baseline measurement should be indicated.
- **Target:** The desired point to be reached within a certain timeframe in relation to an objective. PAN targets should indicate the achievement of specific objectives at two points: mid-term and at the end of its extent.
- **Means of Verification:** Measurement tool for the indicator (e.g., forms, field observation, publications, mapping, assessments, among others).
- Measurement Frequency: Periodicity and dates for indicator monitoring.
- **Responsible:** The individual responsible for monitoring the indicator must be identified, along with their name and the institution they represent. It is essential that this individual is a member of the GAT.
- **Observations:** Field to add target calculation notes and other useful information.

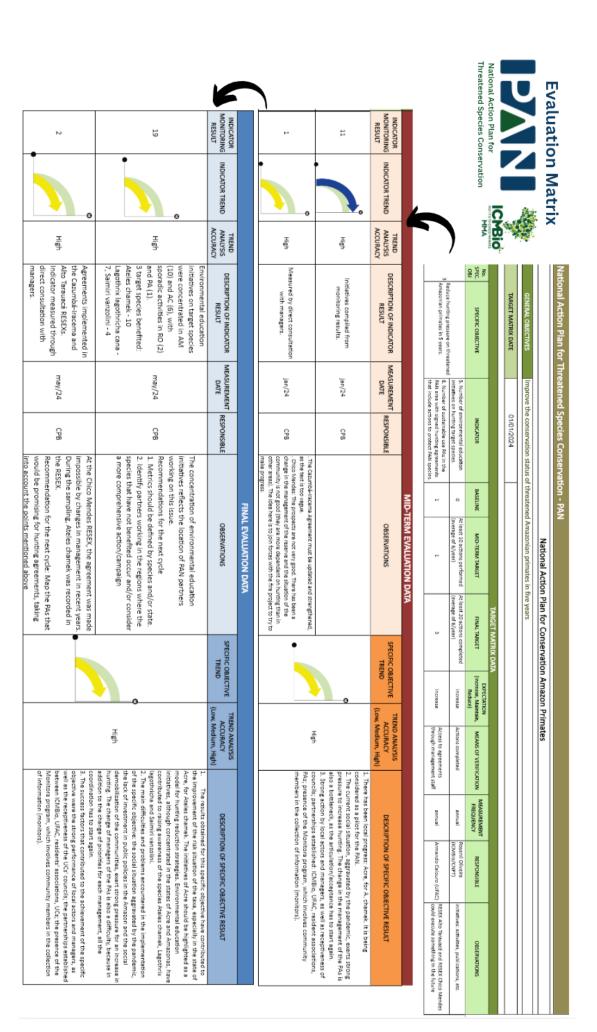


Figure 12. Layout of the Evaluation Matrix with all tabs: Indicators and Targets, Mid-term Evaluation, and Final Evaluation.

SUMMARY BOX PRODUCT OF THE INDICATORS AND TARGETS DEVELOPMENT WORKSHOP

1. Evaluation Matrix developed.

B. Mid-term and final evaluation workshops

These two workshops, conducted among the GAT members, take place midway through the PAN's duration and at the end of the management cycle. They aim to evaluate the achievement of intermediate and final targets, analyze factors contributing to the success or challenges in implementing actions, propose solutions to problems, and guide decisions about the future of the PAN. The Evaluation Workshops may include the participation of other partners, when necessary.

The Mid-term Evaluation Workshop is dedicated to analyzing the indicators and intermediate targets. Typically conducted alongside the 3rd Annual PAN Monitoring Workshop, this stage allows for adjustments to the specific objectives based on indicator measurements and progress toward the targets. It provides an opportunity for more structural adaptations to ensure the PAN meets its expected outcomes.

The Final Evaluation Workshop focuses on analyzing the indicators and targets set for the end of the PAN management cycle. Often held alongside the 5th Annual PAN Monitoring Workshop, this is the time to analyze the outcomes of the plan and identify the trends toward achieving the objectives. Additionally, GAT members evaluate the factors influencing the success or challenges of the PAN's implementation and provide recommendations for its closure, revision, or the development of new PANs.

As mentioned earlier, the Evaluation Matrix is the tool used to assess the achievement of PAN objectives. It is divided into three parts: the first covers information on the Indicators and Targets, discussed in the previous section; the second contains the results of the Mid-term Evaluation; and the third, the Final Evaluation, includes the assessment results of the indicators, information, and analysis of the final target achievement. For both evaluation stages, the following fields in the Evaluation Matrices must be completed:

- **Indicator Measurement Result:** Enter the result of the Mid-term Evaluation. If the indicator is quantitative, enter only the number.
- Indicator Trend: The direction of the indicator in relation to the established target.
- Accuracy of Indicator Trend Analysis: The degree to which the indicator estimate aligns with its true value.

- **Measurement Date:** The period during which the indicator was monitored.
- **Responsible:** The individual designated to monitor the indicator or a representative who provided the information for the Evaluation meeting.
- **Observations:** Additional information.
- Specific Objective Trend: The probability of achieving the objective.
- Accuracy of Trend Analysis (low, medium, high): The degree of proximity of an estimate to its true parameter or value.
- **Description of Specific Objective Result:** Causes of indicator variation or success factors. Explain why the targets were not met or describe the factors that contributed to achieving the target and fulfilling the Specific Objective.

Qualitative Analyses

Establishing appropriate metrics is one of the biggest challenges in PANs, as the selection of good indicators must meet most of the desired criteria. However, in some cases, there are various limitations in monitoring them. To overcome these challenges, different methods were adopted to assess the achievement of objectives, such as qualitative indicators and perception analyses, complementing the Evaluation Matrix. A trend analysis (Figure 13) was also incorporated, though without standardized methods. Trend analysis has been used for monitoring CBD targets and, therefore, serves as an interesting methodology to complement PAN evaluations.

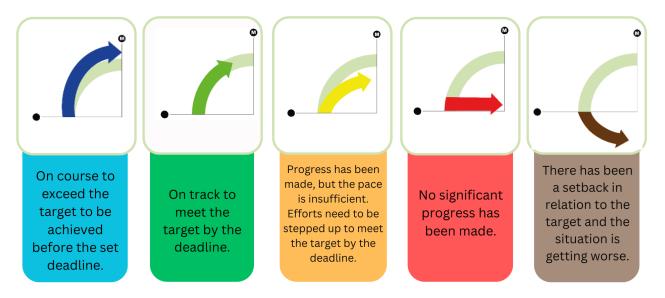


Figure 13. Charts used to categorize the trends of indicators and Specific Objectives.

It is important to note that merely quantifying indicator results is not sufficient to determine if the PAN is effectively conserving threatened species and their habitats. Therefore, analyzing the results and assessing trends is essential. This in-depth analysis is crucial for guiding decision-making in PAN management, particularly for making necessary adjustments. After completing the Evaluation Matrix, participants reflect on the outcomes achieved. During this stage of the workshops, three key aspects must be considered:

- Factors that contributed to success.
- Factors that hindered the achievement of the objective.
- The main results achieved through the actions.

For added robustness, this analysis is combined with quantitative indicators to show whether the PAN's actions resulted in a trend of increase, decrease, or stability, in accordance with the established objective.

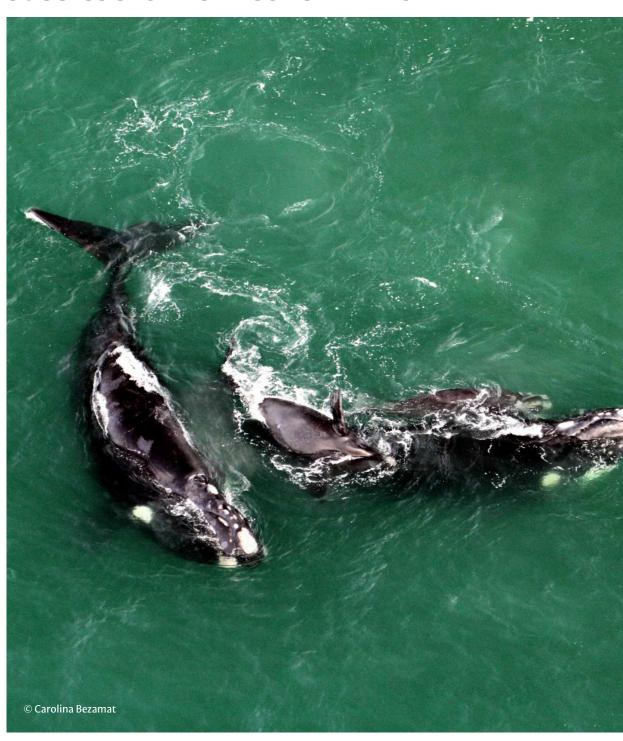
In conclusion, both Evaluation Workshops include this in-depth analysis, which is crucial to determining whether the PAN is effectively conserving species and habitats. At this stage of the workshop, it is essential to review the results and assess trends after completing the Evaluation Matrix, with participants reflecting on the outcomes achieved. This reflection considers factors that contributed to success, factors that hindered the achievement of objectives, and the key results achieved through actions. This thorough analysis guides decision-making in PAN management, determining whether it should enter a new cycle or be concluded.

SUMMARY BOX PRODUCT OF THE MID-TERM AND FINAL EVALUATION WORKSHOPS

- 1. Properly completed Evaluation Matrix
- 2. Updated Planning Matrix (if there are changes to the Specific Objectives)

5. FROM PLANNING TO ACTION: SUCCESS STORIES IN CONSERVATION

5. FROM PLANNING TO ACTION: SUCCESS STORIES IN CONSERVATION



Over the past 15 years, the PANs have achieved significant results for the conservation of native biodiversity threatened with extinction. The network of plan collaborators has been essential in reaching these outcomes.

Notable progress has been made in the conservation of the Lear's Macaw (Anodorhynchus leari), which saw its conservation status improve from Critically Endangered (CR) to Endangered (EN). This improvement can be attributed to a significant population increase resulting from actions under the Caatinga Birds PAN. Another key achievement of this PAN is the recovery of the grey-breasted parakeet (*Pyrrhura griseipectus*) population in the Baturité Mountains, Ceará, through reproductive management in nest boxes and the species' reintroduction into the Aratanha and Ibiapaba Mountains, Ceará.

Other noteworthy initiatives include the establishment of a Municipal Protected Area to safeguard rivulid fishes in Casimiro de Abreu, Rio de Janeiro, as a result of the Rivulid Fish PAN, and the creation of the Wildlife Refuge (RVS) for the Pied Tamarin (*Saguinus bicolor*), supported by the collaborators of the Pied Tamarin PAN.

The recent rediscovery of the lizard *Bachia psamophila*, after nearly two decades without records, marks a significant milestone for both the scientific community and the conservation of the species. Enabled by the National Action Plan for the Conservation of Threatened Species of Ichthyofauna, Herpetofauna, and Primates of the Cerrado and Pantanal, this finding opens new avenues for research on the lizard's ecology and conservation.

The Spix's Macaw PAN was instrumental in establishing the Environmental Protection Area (APA) and the Wildlife Refuge (RVS) dedicated to the species (*Cyanopsitta spixii*), both located in Curaçá, Bahia. This plan facilitated the reintroduction of twenty Spix's macaws into the wild, significantly contributing to the species' conservation. Additionally, the efforts of the Atlantic Forest Birds PAN partners also helped secure environmental compensation funds, which were essential for regularizing the status of the Murici Ecological Station (ESEC), a critical area for the conservation of various species covered by this plan.

The reversal of the primary threat to the microendemic and Critically Endangered (CR) Admirable Redbelly Toad (*Melanophryniscus admirabilis*), resulting from the cancellation of the construction of a small-scale hydroelectric power plant planned near the species' only breeding site, is one example of the success of the PAN Herpetofauna Sul in effectively addressing the major conservation demands for threatened herpetofauna (Fonte et al. 2014). Due to the region's hydroelectric potential for energy generation, actions under this PAN continue to monitor this threat to the Admirable Toad, as well as to focus efforts on reducing other threats.

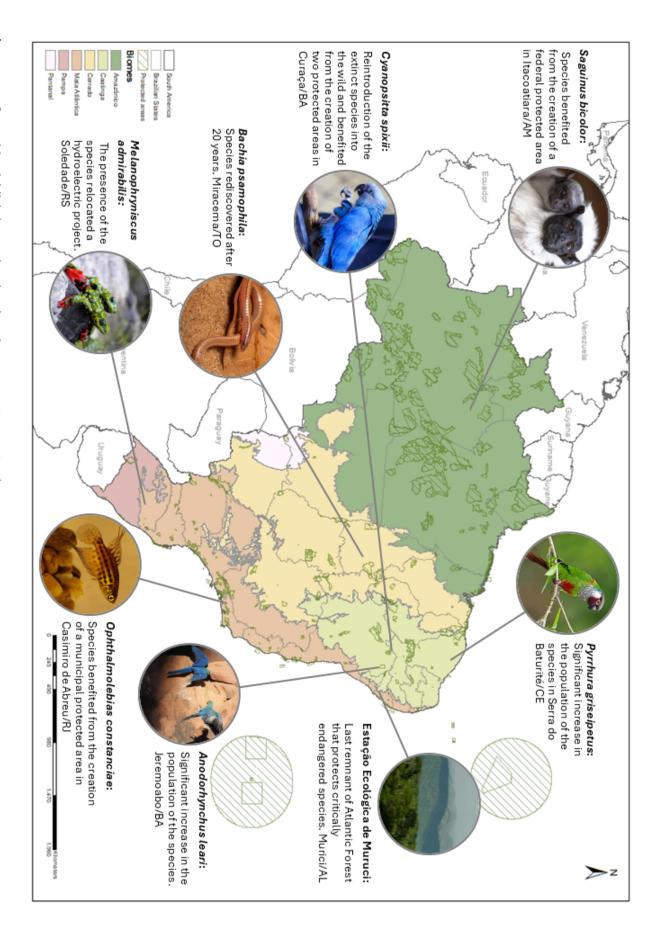
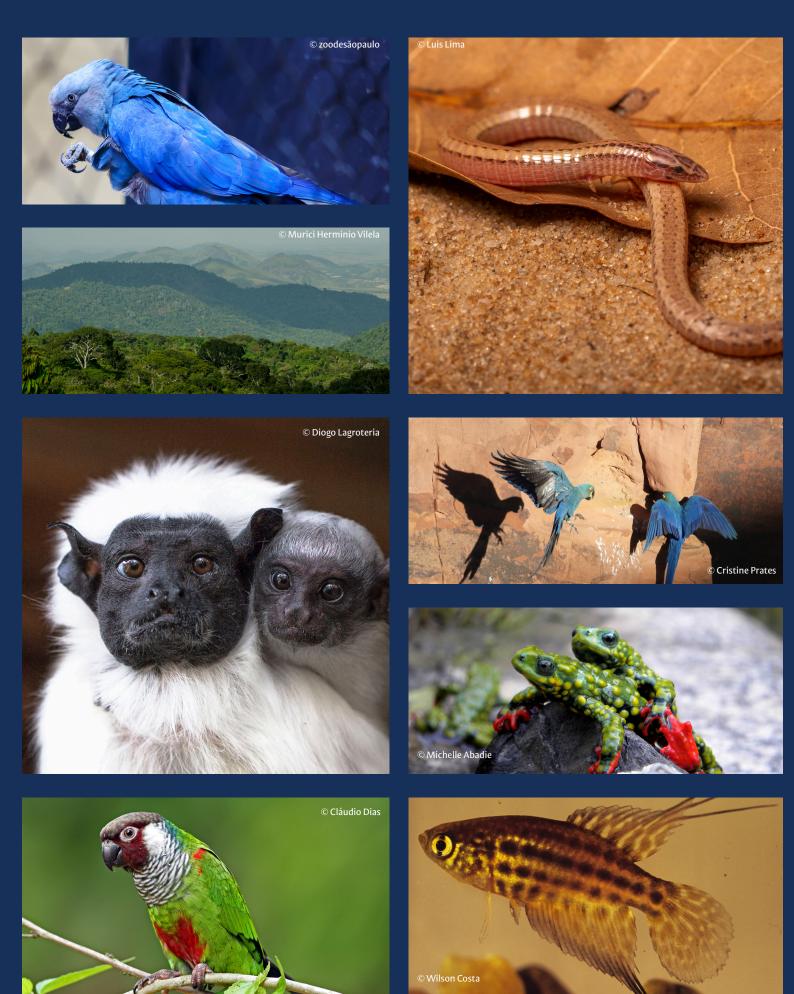


Figure 14. Infographic Highlighting National Action Plans (PANs) Success Stories.



By analysing successful cases, it is possible to identify strategies and practices that can be adapted and applied to different contexts, thus optimizing the effectiveness of conservation efforts.

6. FINAL CONSIDERATIONS

Brazil's experience with the National Action Plans for Threatened Species Conservation (PANs) highlights the effectiveness of a strategic and participatory approach to biodiversity management. The structuring action plans, engaging diverse societal stakeholders, and implementing concrete measures have proven crucial for mitigating threats and supporting the recovery of declining populations of threatened species.

In this context, Brazil shares this approach to encourage other countries interested in adopting similar models, adapted to their specific biogeographic and socioeconomic conditions. It is essential that these models prioritize the development of robust monitoring and evaluation systems, integrate PANs with public policies, and support scientific research as fundamental components for the long-term success of conservation initiatives for threatened species. It is important to emphasize that strengthening institutions responsible for biodiversity management and advancing environmental education are crucial for ensuring the sustainability of conservation efforts in each country.

By sharing these insights and strategies, Brazil is not only contributing to global biodiversity conservation efforts, but also helping to foster the international cooperation that is essential to address the complex challenges of biodiversity loss.





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PAN homepage





Programas de Manejo Populacional - PMP





PAN Matrices for download





Species Extinction Risk Assessment





Brazilian Government's Open Data Portal – PAN





Plans for Reducing Impacts on Biodiversity





Invasive Alien Species Management







