ICMBio
INSTITUTO CHICO MENDES
MMA

PEP-ICMBio

STRATEGIC PLAN OF RESEARCH AND KNOWLEDGE MANAGEMENT

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Vision

To be among major Science and Technology Organizations devoted to biodiversity conservation, especially to the management of protected areas and endangered species protection.

Scope

The ICMBio Strategic Plan of Research and Knowledge Management encompasses all the Brazilian territory, and the exclusive economic zone (EEZ). The plan is intended to foster integration between Instituto Chico Mendes, other branches of power and society.

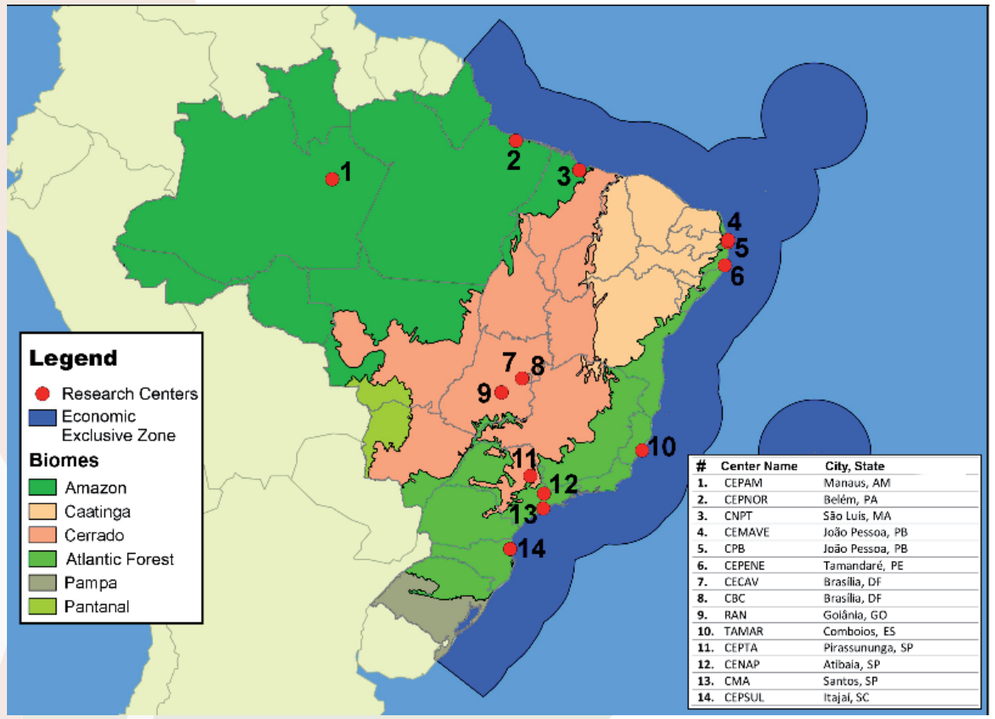


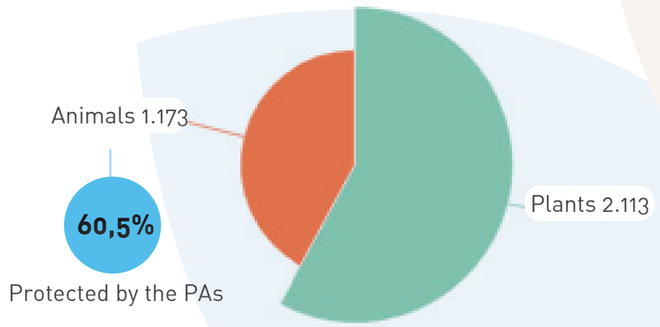
Image 1: National Centers of Research and Protection distribution

ICMBio in Numbers

Federal Protected Areas[1]	Federal Continental Land	Protected Areas Management Plans	National Research and Biodiversity Centers gerared to biodiversity and traditional communities conservation (image 1)	Researchers who have taken part in Brazil's red list assessments
334	+9%	191	14	1.100

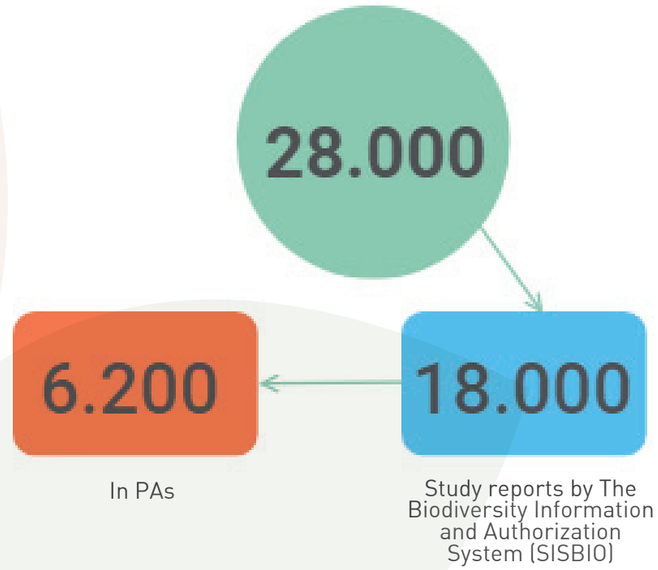
Officially declared Endangered Species or taxa

3.286



ICMBio's Partnerships

Research authorizations since March 2007



Tools to strengthen the relationship between research and biodiversity management

- Institutional Scientific Initiation Scholarship Program (PIBIC/ ICMBio- Scientific and Thechnological Development National Council - CNPq),
- Research project calls (own funding or environmental compensation funding);
- National, regional, and local scientific meetings;
- Scientific journals
- Data and information systems - Sisbio, Biodiversity Portal, business intelligence tools

Research Plan

The effective conservation of Brazilian megabiodiversity requires the union of scientific, local and traditional knowledge.

It is essential to plan action strategies for the conservation of biodiversity and endangered species. These strategies are accompanied by knowledge needs. Can scientific research help to generate this knowledge? How?

This plan was developed to integrate research and biodiversity conservation management.

[1]In this document, Protected Areas are the categories of federal protected areas administered by ICMBio defined by the Law as "conservation units": Ecological Stations, Biological Reserves, National Parks, Natural Monuments, Wildlife Refuges (corresponding to IUCN I – III categories), Environmental Protection Areas, National Forests, Extractive Reserves, Fauna Reserves, Sustainable Development Reserves, and Natural Heritage Private Reserves (IUCN IV-VI). Therefore, other areas protected by the Brazilian Legal System, such as Indian Lands, River Margins, Quilombos etc are not subjected to PEP-ICMBio

Strategic Plan of Research and Knowledge Management of ICMBio Objectives

- Guide research and knowledge management in ICMBio
- Associate research strategies to conservation strategies
- Prioritize key knowledge for the conservation strategies conducted by ICMBio on a national basis

Planning Methodology

Plan Elaboration

- Methodology: Open Standards for the Practice of Conservation
- Contributors: 54 people all over Brazil
- Number of workshops: 3 (1 - preparation of conceptual model, 2 - planning and 3 - action plan agreement)

Adapted from the Open Standards for the Practice of Conservation (a strategic planning method for conservation programs and projects) (CMP 2013), in this plan we added the identification of knowledge generation and management demands to improve the quality of actions and ICMBio strategies for biodiversity conservation. As a result, key issues, data management needs, and monitoring actions were proposed to integrate the set of knowledge demands that should guide ICMBio strategies to accomplish expected results.

Research Plan conceptual model

The purpose of this plan is to generate knowledge to leverage conservation strategies conducted by ICMBio and so reduce the impact of major threats to biomes and endangered species (which are considered as conservation targets in this plan). A conceptual model was the starting point to explain the main conservation challenges in Brazil and the most appropriate strategies to address them, starting with the identification of conservation targets.

The conservation of identified targets aims to ensure their roles as providers of ecosystem services. In the preparation of the conceptual model, some ecosystem services and social benefits associated with biomes and endangered species were therefore identified.

Direct threats are human activities that degrade the conservation targets. Factors were identified in this plan as social, economic or cultural aspects that contribute positively or negatively to the incidence of the direct threat.

The conceptual model built for Brazil emphasizes the relationship between targets, ecosystem services and direct and indirect threats and biodiversity conservation strategies conducted by ICMBio. The knowledge demands (key issues) and actions needed to strengthen the implementation of such strategies have been identified

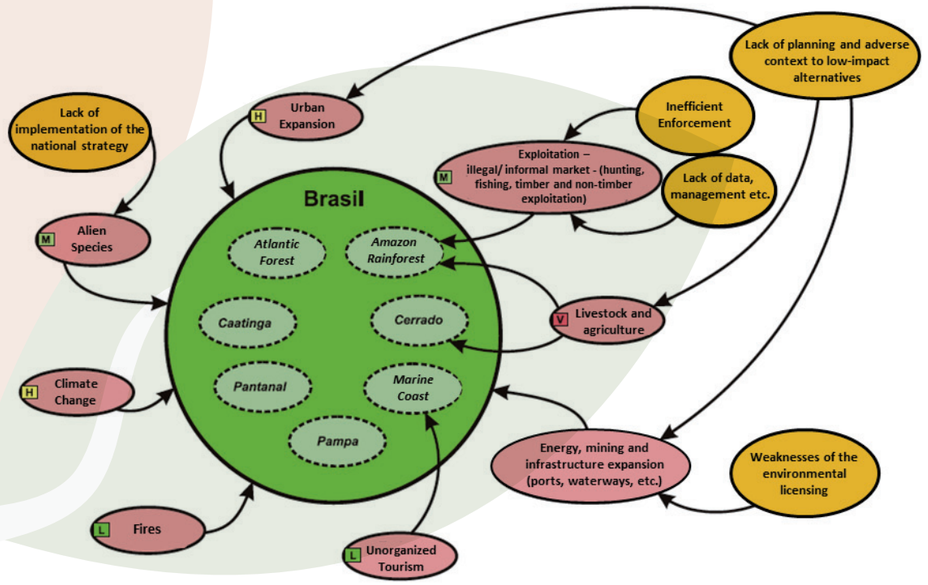


Image 2 – Simplified conceptual model of the Strategic Plan of Research and Knowledge Management of ICMBio, identifying the conservation targets (green), direct (pink), and indirect (orange) threats. The strategies adopted by ICMBio (not shown on the image) aim at reducing or eliminating threats.

[2]CMP. **Conservation Measures Partnership**. 2013. Open Standards for the Practice of Conservation (version 3.0). Available at http://cmp-openstandards.org/

Foto: Eduardo Sozo

Main direct threats to Brazilian biomes

Biodiversity conservation strategies selected, and knowledge required to implement them

After the definition of conservation targets and identification of the threats, different conservation strategies were identified.

Strategy 1: Valorization of biodiversity, ecosystem services and speleological heritage

The valorization of biodiversity, ecosystem services and speleological heritage not only concerns the economic situation, but also non-monetary forms that strengthen recognition and respect

Key Issues

1- Identify provision, regulation, support, and cultural ecosystem services provided by PAs

2- Identify economic values of ecosystem services in PAs

3- Disseminate ecosystem services and cultural, social and economic values of biogeodiversity to society

4- Characterize the economic importance of PAs

5- Identify positive impacts on biodiversity of policies to encourage economic practices / sustainable management

6- Identify sustainable practices in agriculture / extractivism and ways of disseminating them in critical areas

7- Evaluate the perception of society on biogeodiversity and ecosystem services in PAs

8- Evaluate social support for conservation actions

9- Identify if interpretative tools/resources available in PAs promote behavior change of visitors

10- Evaluate if there is contribution of volunteering in ICMBIo for the valorization and conservation of biogeodiversity

11- Evaluate the expectations of visitors in PAs

Strategic Actions

1- Economically enable sustainable practices in different dimensions and contexts

2- Identify mechanisms to ensure the continuity of sustainable practices, after the end of incentive projects

3- Promote the recognition of biogeodiversity values in the visitation in PAs

4- Promote strategies to increase visitation and improve methods of counting visitors in PAs

5- Improve concession of services offered to visitors in PAs

Macro-strategy of spatial planning for biodiversity conservation (Strategies 2 to 5)

ICMBio rarely takes part in Brazil macro-planning actions, which debilitates the approach of environmental issues, ranging from the origin of impacts to possible alternatives to State-induced development axes. PEP-ICMBio suggests lines to increase the knowledge applied to strategies 2, 3, 4 and 5, all related to spatial planning for biodiversity conservation

In this set of strategies, issues and actions aim at providing a basis to an integrated, conservation-compatible territorial planning.

Strategy 2: Work with the Environment Ministry and other sectors to promote the compatibility of different national interests in the same planning

Key Issues

1- Improve the survey and spatialization of existing and potential anthropogenic impacting activities

2- Identify biomes vulnerabilities to the most impacting human activities

3- Identify specific species and environments that will be impacted by anthropic activities

4 - Identify areas, by biome, most vulnerable to climate change, and where the potential refuges will be located

5- Project effects of climate change on biomes and their biodiversity

6 - Identify the joint effect of licensed ventures separately

Strategic Actions

1- Identify and prioritize non-licensable activities planning that should incorporate elements of biodiversity conservation

2- Match different interests for integrated territorial planning on the national level

Strategy 3: Participation of ICMBio in the different levels of territorial planning (national, regional and local)

Key Issues

2- Study the effective contribution of Endangered Species Action Plans, Management Plans, Agreements and other planning instruments of ICMBio for conservation

3- Develop Instruments and products so that ICMBio can influence territorial planning

Strategic Actions

1- Analyze different kinds of land cover mapping

2- Evaluate annual series of deforestation/land use change on biomas

Strategy 4: Improve planning and implementation of protected areas

Key Issues

1 Identify and disseminate good management practices in PAs

2 Evaluate the effectiveness of PAs in accomplishing the objectives for which they were created

Strategic actions

1- Develop tools to provide and analyze information for management plans and PAs administration

2- Identify and systematize good production practices (agriculture, livestock, fishing etc.)

3- Use, in an integrated form, information from management plans and other PAs tools to help decision-making

4- Prioritize PAs for the allocation of resources (financial, human, etc.) based on ecological criteria

5- Prioritize PAs for the operation of ICMBio Research Centers

6- Prioritize PAs for land regularization

7- Map the barriers to the use of environmental compensation funds for land regularization

Strategy 5: Promoting expansion and connectivity of protected areas

Key Issues

1. Identify the minimum area to be conserved of each biome

2. Identify and map biological and speleological attributes in protected areas

3. Evaluate the representativeness of the federal PAs and identify protected attributes

4. Map permanent protected areas, legal reserves, Protected Areas (counties, states, federal), and Indian and quilombo reserves in the country

5. Map traditional communities included or not in PAs

Strategic Actions

1. Identify the most suitable connectivity methods for each class of protected area (permanent preservation area, legal reserve, private natural heritage reserve, buffer zone, etc.)

2. Select or develop efficient methodologies for planning connectivity according to dimension and environment

Foto: Alessandro Carbone

Strategy 6: Enhancement of ICMBio's contribution to environmental licensing

Environmental licensing is important to enable the mitigation of environmental and social damages related to large enterprises. ICMBio must be heard in cases where they affect protected areas or endangered species and should also analyze the respective impacts, based on the information generated by biodiversity monitoring. In addition, it is necessary to evaluate the compliance and effectiveness of the constraints required by ICMBio and the licensing body.

Thus, the proposed issues for this strategy aim to allow ICMBio to position itself with quality technical data in the decision-making process

Key Issues

1. Identify information and gaps to make monitoring protocols of licensing, as well as mitigating and compensatory measures

2. Evaluate the effectiveness of the mitigating measures in use

3. Define attributes to be monitored according to the type of enterprises or environments

4. Identify environmental licensing critical nodes to reduce environmental impacts

Strategic Actions

1. Spatialize ICMBio planning tools

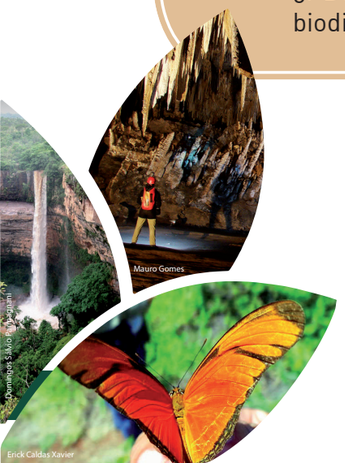
2. Continually improve species distribution maps

3. Periodically map and update the enterprises and affected areas

3. Define which biodiversity data collected in environmental licensing will be systematized and made available

4. Define indicators for evaluating the impact of enterprises

5. Develop new geospatial instruments for planning and analyzing biodiversity data



Macrostrategy of Good Practices in the Use of Resources (Strategies 7 to 9)

To promote the sustainable use of PAs, and seek answers to several issues related to the economic exploitation of these territories are among the competences of ICMBio.

Strategy 7: Strengthening fisheries management and productive chains in sustainable use PAs

Fisheries management is marked by disarticulation and lack of monitoring. ICMBio is committed to ordering the fishery management in PAs, considering that fishing occurs in great volume in them.

The knowledge to be generated or organized will contribute to reduce impact, define support capacity and the establish effective fisheries agreements.

Key Issues

1. To carry out a diagnosis of fishing activity and socioeconomic situation in PAs

2. To consolidate experiences and to write good practices manuals for fishing in PAs

3. Analyze the production potential of different fish species and different types of fishing

4. Identify more sustainable technological mechanisms and innovations for fisheries

5. Identify income alternatives to reduce the pressure over fish stocks

6. Analyze the effectiveness of PAs as repositories of natural fish stocks

Strategic Actions

1. Structure surveillance and monitoring of bioecological information about fishing in PAs

2. Structure the socioeconomic surveillance and monitoring on fishing in PAs

Strategy 8: Promotion of good practices and regulation of fauna use in sustainable use PAs

Harvesting and hunting are, on many occasions, a way of subsistence. Current laws impair the development of fauna management methods as a conservation tool and, therefore, this activity is usually carried out illegally, with no sustainability criteria.

Research on wildlife use should contribute to a legal debate and an adequate understanding of its purposes and capabilities, underpinning agreements and guiding users and inspectors.

Key Issues

1. Diagnose fauna usage in sustainable use PAs by traditional populations
2. Diagnose populations of hunted species in sustainable use PAs
3. Define support capacity and population growth rate of populations of species used
4. Assess sustainability in the use of wildlife resources
5. Define sustainable harvest rates for game species
6. Evaluate the pressure on hunted species after managing the use of wild animals

Strategic Action

1. Monitor the demographic evolution of traditional population in PAs of sustainable use

Strategy 9: Strengthening the management of timber and non-timber products effectively or potentially extracted in PAs

Some of the indirect threats of timber and non-timber products are informal markets and inefficient enforcement, mainly on Cerrado and on Amazon.

Research in this area will contribute to strengthening and generating two chains of results oriented to fight the threat of unsustainable exploitation of timber and non-timber products: (i) The development and implementation of benefits and recognition of sustainable practices; (ii) the aggregation of value to products. The actions should lead to a better knowledge about the market and the potential of use of such consumer goods.

Key Issues

1. Identify exploitation impacts of non-timber resources
2. Identify and map species with sustainable exploitation/harvest potential
3. Identify non-sustainable practices on current exploitation models and suggest improvements
4. Diagnose impacts on the exploitation of timber and non-timber products on the fauna

Strategic action

1. Compile good practice data on the exploitation of non-timber products

Strategy 10: Participation strengthening on monitoring and management

The participative monitoring strategy and participative management of resource use requires lines of investigation on themes such as education, mobilization and community organization.

Key Issues

1. Evaluate the local perception of results of the participative monitoring and identify adequate practices

2. Evaluate the effectiveness and costs of the participative monitoring in various levels and shapes

3. Diagnose how the ones involved on the monitoring are perceived by their community

Strategy 11: Promotion of intelligence in enforcement and protection actions

The promotion of intelligence aims to improve the effectiveness of monitoring and protection actions. Promotion of intelligence is understood as, for example, the integration of authorization documents, improvement of trackability of illegally exploited resources and the strengthening of the interaction between ICMBio research centers and other inspection actors.

Strategic Actions

1. Identify factors (key-actors, activities, etc.) with negative impact on biodiversity resources

2. Promote the use of technological innovation to support environmental enforcement (for example: apps)

3.Promote the integration of inter and intra institutional databases to support the environmental enforcement

Strategy 12: Promotion of invasive exotic species management

Management and control of invasive exotic species in Brazil is still emerging, but high costs pose a difficulty. However, it is important to seek incorporation into ICMBio's actions as well as alternatives that promote management. The key investigation issues suggested aim at reducing the damage caused by invasive exotic species in PAs.

Key Issues

1. Evaluate if incentive to exotic species extraction leads to its dissemination in specific situations

2. Identify incentive mechanisms for extraction to control or eradicate invasive exotic species

3. Identify ecological cost-benefit of invasive exotic species

4. Identify social, cultural and economic costs associated to the presence and control of invasive exotic species

5. Identify the occupation load per exotic species that a native ecosystem can support

6. Evaluate the susceptibility of environments to the invasion of exotic species

7. Map dissemination vectors of invasive exotic species

Macrostrategy of biodiversity recovery, (Strategies 13 and 14)

The set of threats on PAs and biodiversity implies damage and changes that, to be reversed, need restoration measures and population management.

Information management strategies should promote the definition of protocols, which would allow environment agencies and licensing authorities in the states to guide species conservation restoration. It is expected that improvements in data management and products arising from preparation and monitoring of Action Plans to Endangered Species should have positive effects in fulfilling actions against extinction trends.

Foto: Fernanda Azevedo

Strategy 13: Restoration of terrestrial and aquatic habitats

Key Issues

1. Map priority areas for habitat recovery
2. Identify the reasons for intervention in the process of ecological restoration of ecosystems
3. Define appropriate methodologies to restore each environment
4. Assess habitat quality efficiently and on a large scale

Strategic Action

1. Restore aquatic environments considering the consequences of climate changes

Strategy 14: Promoting the improvement on the conservation status of endangered species

Key Issues

1. Promote effective use of information gathered in the species conservation assessments for decision making
2. Integrate actions from different Action Plans into other conservation planning tools
3. Improve previous information gathering and the identification of actors and competent institutions for the Action Plans
4. Improve protocols with information that must be observed prior to the beginning of environment-impact actions
5. Improve the conservation assessment from knowledge gaps
6. Promote the generation of information to improve species conservation assessments

Strategy 15: Integrated and adaptive management of fire

In the integrated and adaptive fire management, we consider the cultural, socio-economic, and environmental situations in which protected areas are enclosed. In this sense, the strategy requires knowledge on the most suitable fire regimes. Researches on the different perspectives of fire use will allow its regulation for agriculture and conservation.

Key Issues

1. Identify cultural, social and economic perspectives of fire use
2. Identify the best fire regime for each conservation objective on a local scale
3. Identify social benefits of integrated and adaptive management to local population
4. Identify the economic and environmental feasibility of using fire as an agricultural tool
5. Identify mechanisms to remotely measure fire severity
6. Identify the impact of fire on fauna and flora
7. Evaluate the effectiveness of natural landscapes heterogeneity as an indicator of biological diversity

Strategic action

1. Identify where conservation fire management is needed

Articulation of the Strategic Plan for Research and Knowledge Management of ICMBio with other programs, actions and instruments of planning and management

National Biodiversity Monitoring Program - Monitora Program

The National Biodiversity Monitoring Program aims to evaluate the effectiveness of Brazilian Protected Areas, to subsidize biodiversity management actions and strengthen social participation in management. It is structured in the following subprograms: terrestrial, continental aquatic, and coastal marine; therefore, comprises all the biomes.

Regarding PEP-ICMBio, the Monitora Program will provide data to evaluate the impact of implementing the strategies in the biomes.

Biodiversity data management and others

Research, monitoring and, in general, a broad part of ICMBio activities produce data and information that requires knowledge management. In this sense, the availability and accessibility of information for different audiences and contexts are fundamental.

ICMBio has some tools for this matter as:

• Biodiversity Portal (https://portaldabiodiversidade.icmbio.gov.br/portal/): provides occurrence records of species from two databases of ICMBio and one of the Botanical Garden of Rio de Janeiro

• SALVE, Biodiversity Conservation Status Assessment System: information on Brazilian species to subsidize the assessment of their extinction risk

• Other tools are being debated to receive, store and make available data from the Monitora Program and Environmental Licensing processes

ICMBio's Political Pedagogical Project

Research, education and extension underlie the process of knowledge generation and their approximation to society is part of this political pedagogical project.

In this fashion, it is crucial to ensure participation, questioning, improvement, and comprehension of attained results, so that knowledge produced by PEP contributes to biomes and endangered species conservation.

Implementation of PEP

To implement PEP, ICMBio relies on a series of tools, described below.

Strengthening of ICMBio as a Scientific, Technological and Innovation Institute (STI)

The strengthening as STI will contribute with the access of ICMBio to the policies of the education, science, technology and information sectors. Thus, a series of incen-

tives can take place to the development of teaching, research, extension and institutional development projects.

New Roles to ICMBio Research Centers

The Centers used to focus their action on endangered species, especially on the conservation assessments and the preparation of action plans. Currently, there is a need for the Research Centers to expand their range of action, taking responsibility on priority subjects such as guidance for the implementation of enterprises, environmental impact mitigation, environmental emergencies, broader action on PAs management, among others.

Promotion and Support Tools

Journals on subjects related to species conservation and PAs management.

ICMBio Journals

- Biodiversidade Brasileira - BioBrasil (Brazilian Biodiversity): PAs management and fauna conservation
- Ornithologia: research on birds
- Revista Brasileira de Espeleologia (Brazilian Journal of Speleology): speleological studies
- Revista CEPSUL (Journal of the Brazilian Center for Research and Conservation of Southern Sea Marine Biodiversity): research on marine biodiversity in Southern Brazilian sea
- Boletim Técnico-Científico do CEPENE (Technical - Scientific Bulletin of the Brazilian Center for Research and Conservation of Northeastern Sea Marine Biodiversity): researches with water biodiversity at the northeastern region

Investment of environmental compensation funds in research for the management of federal PAs or for studies related to the decree of new PAs of proposals of creation of federal

Environmental Licensing. Studies related to licensing, such as EIAs, constraints and monitoring can strengthen the research needed to conservation and also compose the implementation efforts of this Plan.

Major projects and new opportunities for fundraisings. The funds raised by ICMBio and its partners allow the development of large-scale projects and innovative actions.

Internal Calls for Research applied to Conservation Projects. Between 2010 and 2015, the research in the federal Protected Areas and ICMBio research centers was institutionally strengthened through annual launch of Internal Calls for Projects, a tool to be retaken.

Academy envolvement on themes related to the Research Plan. The incentive to academy enrollment can come from the identification of studies that walk side by side with strategic matters registered in SISBIO or by offering themes connected to the Research Plans in future project calls.

The **Institutional Program of Scientific Initiation Scholarships (PIBIC-ICMBio/CNPq)** contributes to: undergraduate student education on the arena of research applied to conservation; fosters research policy and scientific development in ICMBio; and contributes to the growth, and renewal of staff acting at knowledge production.

Research Plan Management

General Coordination of Biodiversity Research and Monitoring (CGPEQ/DIBIO)	Strategy articulation, fundraising, articulation with other initiatives
Coordination of Research and Information Management on Biodiversity (COPEG)	Coordination and monitoring of the Plan implementation. Management of tools of research support Articulation of management strategies of data and information
Brazilian Center of Species Conservation Assessments, and Research and Conservation of Cerrado (CBC)	Species and biomes conservation assessments
Coordination of Biodiversity Monitoring (COMOB)	Articulation between the Monitora Program and PEP-ICMBio (identification of indicators and evaluation of conservation targets)
General Coordination of Conservation Strategies (CGCON)	Coordination of research actions to reduce impacts and to conserve threatened species, observing the priorities set in PEP-ICMBio
ICMBio Research and Conservation Centers (all)	Scientific research and monitoring for the management and conservation of species and ecosystems Articulation of PEP-ICMBio with their own planning tools
Protected Areas	Integration of this Plan in their range of action and planning. Promotion of development actions, dissemination and sharing of knowledge Strengthening local research arrangements

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