EFFECTIVENESS EVALUATION OF

SCIENTIFIC AND TECHNOLOGICAL DEVELOPMENT PROJECTS WITHIN THE SCIENCE, INNOVATION AND ECONOMIC INSTRUMENTS COMPONENT

SUPPORTED BY THE AMAZON FUND/BNDES

Effectiveness Evaluation Report

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Effectiveness Evaluation Report for the projects of Biodiversity, Amazon Bioactive Compounds, Mangrove Forests, Belém Islands and Amazon Public Policy Incubator (UFPA / FADESP)

This report presents the results of the ex-post effectiveness evaluation of component 4 "Science, Innovation and Economic Instruments" projects sponsored by the Amazon Fund / BNDES. They include the "Biodiversity", "Amazon Bioactive Compounds", "Mangrove Forests", "Belém Islands" and "Amazon Public Policy Incubator" projects, which ended between 2015 and 2018. This evaluation was carried out by a team of independent consultants under the coordination of the technical cooperation between BNDES and the German Cooperation for Sustainable Development through the *Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) GmbH*. All opinions expressed herein are the sole responsibility of the authors and do not necessarily reflect the position of GIZ and BNDES. This document has not been submitted for editorial review.

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LIST OF ABBREVIATIONS AND ACRONYMS

BIOCAU	Integrated Network of Post Graduate Programmes in Biotechnology for Scientific, Technological, Innovation and Resource Development in the Cocoa Production Chain *(Rede Integrada de Programas de Pós-Graduação em Biotecnologia para o Desenvolvimento Científico, Tecnológico, de Inovação e Formação de Recursos na Cadeia Produtiva do Cacau)*
BNDES	National Bank of Economic and Social Development *(Banco Nacional de Desenvolvimento Econômico e Social)*
CAMTA	Tome-Açu Joint Agricultural Cooperative *(Cooperativa Agrícola Mista de Tome-Açu)*
CAPES	Coordination for the Improvement of Higher Education Personnel *(Centro de Biotecnologia da Amazônia Coordenação de Aperfeiçoamento de Pessoal de Nível Superior)*
CBA	Amazonian Biotechnology Centre *(Centro de Biotecnologia da Amazônia)*
CEABIO	Centre for Advanced Studies in Biodiversity *(Centro de Estudos Avançados da Biodiversidade)*
CI	Conservation International
CNPq	National Council for Scientific and Technological Development *(Conselho Nacional de Desenvolvimento Científico e Tecnológico)*
COFA	Amazon Fund Guidance Committee *(Comitê Orientador do Fundo Amazônia)*
CVACBA	Centre for Agro-Food Valorisation of Amazonian Bioactive Compounds *(Centro de Valorização de Compostos Bioativos da Amazônia)*
DAC	Development Assistance Committee
DINTER	Interinstitutional Doctorate *(Doutorado Interinstitucional)*
EMATER-UDB	Pará State Rural Extension Technical Assistance Company - Bragança Development Unit *(Empresa de Assistência Técnica de Extensão Rural do Estado do Pará – Unidade de Desenvolvimento de Bragança)*
EMBRAPII	Network of Brazilian Companies for Industrial Research and Innovation *(Rede Empresa Brasileira de Pesquisa e Inovação Industrial)*
FA	Amazon Fund *(Fundo Amazônia)*
FADESP	Research Support and Development Foundation *(Fundação de Amparo e Desenvolvimento da Pesquisa)*
Finep	Funding Authority for Studies and Projects *(Financiadora de Estudos e Projetos)*
GAT	Technical Advisory Group *(Grupo de Assessoramento Técnico)*
GIZ	The German Cooperation for Sustainable Development *(Deutsche Gesellschaft für Internationale Zusammenarbeit GmbH)*
ICB	Biological Sciences Institute *(Instituto de Ciências Biológicas)*
ICEN	Institute of Exact and Natural Sciences *(Instituto de Ciências Exatas e Naturais)*

ICMBio	The Chico Mandes Institute for the Conservation of Biodiversity *(Instituto Chico Mendes de Conservação da Biodiversidade)*
Ideflor-Bio	Pará State Forestry and Biodiversity Institute *(Instituto de Desenvolvimento Florestal e da Biodiversidade do Estado do Pará)*
IF	Impact Factor
INCT/RENAABIO	National Institutes of Science and Technology / National Network for Innovation in Agroindustrial and Agrifood Biotechnology *(Institutos Nacionais de Ciência e Tecnologias/Rede Nacional de Inovação em Biotecnologia Agroindustrial e Agroalimentar)*
IOC/UNESCO	Intergovernmental Oceanographic Commission associated with the United Nations Educational, Scientific and Cultural Organization
IPCC	Intergovernmental Panel on Climate Change
ISMA	Sustainability Indicator of the Amazonian Municipalities *(Indicador de Sustentabilidade dos Municípios da Amazônia)*
IUCN	International Union for Conservation of Nature
LabCroL	Liquid Chromatography Laboratory *(Laboratório de Cromatografia Líquida)*
LAMA	Mangrove Ecology Laboratory *(Laboratório de Ecologia de Manguezal)*
LASA	Santo Antônio Laboratory *(Laboratório Santo Antônio)*
LBE	Structural Biology Laboratory *(Laboratório de Biologia Estrutural)*
LISQF	Laboratory of Systematic Research and Fine Chemicals *(Laboratório de Investigação Sistemática e Química Fina)*
LNMC	Laboratory of Molecular and Cellular Neurochemistry *(Laboratórios de Neuroquímica Molecular e Celular)*
LPDF	Laboratory of Pharmaceutical Planning and Development *(Laboratório de Planejamento e Desenvolvimento de Fármacos)*
MAPA	Ministry of Agriculture, Livestock and Food Supply *(Ministério da Agricultura, Pecuária e Abastecimento)*
MCTIC	Ministry of Science, Technology, Innovation and Communication *(Ministério da Ciência, Tecnologia, Inovações e Comunicações)*
MINTER	Interinstitutional Master's Degree *(Mestrado Interinstitucional)*
MMIB	Belém Islands Women's Movement *(Movimento de Mulheres das Ilhas de Belém)*
NAEA	Centre for Advanced Studies on the Amazon *(Núcleo de Altos Estudos Amazônicos)*
OECD	Organisation for Economic Cooperation and Development
PAN	National Action Plan *(Plano de Ação Nacional)*
PCT Guamá	Guamá Science and Technology Park *(Parque de Ciência e Tecnologia do Guamá)*
PortalBio	Biodiversity Portal *(Portal da Biodiversidade)*
PPCDAm	Action Plan for the Prevention and Control of Deforestation in the Legal Amazon *(Plano de Ação para Prevenção e Controle do Desmatamento na Amazônia Legal)*

PROCAD-Amazônia	National Programme for Academic Cooperation in the Amazon *(Programa Nacional de Cooperação Acadêmica na Amazônia)*
PRÓ-ENEM	National High School Examination Preparatory Programme *(Programa de Preparação para o Exame Nacional do Ensino Médio)*
RD&I	Research, Development and Innovation
REDD+	Reducing Emissions from Deforestatión and Forest Degradation in Developing Countries, and the Role of Conservation, Sustainable Management of Forests, and Enhancement of Forest Carbon Stocks in Developing Countries
RESEX	Extractive Reserve *(Reserva Extrativista)*
SBB	Brazilian Society of Biotechnology *(Sociedade Brasileira de Biotecnologia)*
SBPC	Brazilian Society for the Progress of Science *(Sociedade Brasileira para o Progresso da Ciência)*
SDGs	UN Sustainable Development Goals
SEBRAE	Brazilian Micro and Small Business Support Service *(Serviço Brasileiro de Apoio às Micro e Pequenas Empresas)*
SEMAS/PA	Pará State Department of the Environment and Sustainability *(Secretaria de Estado de Meio Ambiente e Sustentabilidade do Pará)*
SESPA	Pará State Department of Public Health *(Secretaria de Estado de Saúde Pública do Pará)*
SiBBr	Brazilian Biodiversity Information System *(Sistema de Informação sobre a Biodiversidade Brasileira)*
SisGen	National System of Genetic Heritage Management and Associated Traditional Knowledge *(Sistema Nacional de Gestão do Patrimônio Genético e do Conhecimento Tradicional Associado)*
SNUC	National System of Conservation Units *(Sistema Nacional de Unidades de Conservação)*
ST&I	Science, Technology and Innovation
TCC	Course Completion Paper *(Trabalho de Conclusão de Curso)*
UFOPA	Federal University of Western Pará *(Universidade Federal do Oeste do Pará)*
UFPA	Federal University of Pará *(Universidade Federal do Pará)*
UFRA	Federal University of Rural Amazon *(Universidade Federal Rural da Amazônia)*
UN	The United Nations
UNFCCC	United Nations Framework Convention on Climate Change
USP	University of São Paulo
WBI	*Wallonie Bruxelles International*

EXECUTIVE SUMMARY

The following evaluation focuses on component 4 of the Amazon Fund logical framework[1], namelly “Science, Innovation and Economic Instruments”[2]. Five completed projects, which were among the first to be approved in the component: Biodiversity, Bioactive Compounds in the Amazon, Mangrove Forests, Amazon Public Policy Incubator and Belém Islands. They were initiated between 2012 and 2014, and completed between 2015 and 2018. The value of the support from the Amazon Fund varied between R$1.1 and R$4.6 million for each project, totalling R$12 million.

In addition to the individual effectiveness assessment of each project, this evaluation also analyses the Amazon Fund's strategy for supporting Science, Technology and Innovation (hereafter, ST&I) and provides recommendations for future support.

All of the projects were carried out by different departments from the Federal University of Pará (UFPA), with financially implemented the Amparo Research Support and Development Foundation (FADESP). Four of the five projects were based in departments at the UFPA campus in Belém, the state capital, while the remaining Mangrove Forests project having been based at the UFPA campus in northeastern Pará, in the city of Bragança.

The Mangrove Forests project also operated in the Caeté-Taperaçu Marine Extractive Reserve (RESEX), which is also located in the Bragança region. In addition to its bases at the UFPA campus in Belém, the Amazon Public Policy Incubator project comprised cities in all states of the Legal Amazon. The Belém Islands project, on the other hand, operated on four islands around the capital (for the location of the projects, see Figure 1, page 19).

In the light of the key objective of the Amazon Fund, in reducing deforestation with sustainable development in the Legal Amazon, the assessed projects contributed to the development of activities in science, technology and innovation - promoting the recovery, conservation and

1. The Amazon Fund 2017 Logical Framework, available at: http://www.fundoamazonia.gov.br/export/sites/default/pt/.galleries/documentos/monitoramento-avaliacao/FA_Quadro_Logico_2017.pdf

2. The focus of component 4 expanded in 2016, with the revision of the Amazon Deforestation Prevention and Control Plan (PPCDAm) when the promotion of economic instruments for the preservation of forests gained more prominence. Consequently, adjustments have been made to the Amazon Fund Logical Framework that deal with this expansion. However, the final assessed projects still remain loyal to the original focus of the component. For this reason, the report focuses on ST&I and does not include economic instruments.

sustainable use of biodiversity in the region - and also with the strengthening of knowledge, with the aim of preserving the forest. This has been due to the incorporation of knowledge gained by the Mangrove Forests project, regarding mangroves, into the Conservation Units' management plans, and input from the Amazon Bioactive Compounds project into açaí classifications established in the Normative Ruling N° 37 of October 1st, 2018, which establishes its quality criteria (Ministry of Agriculture, Livestock and Food Supply - MAPA). There is still potential to support the implementation of public policies (as is the case in Marajó), by systematizing knowledge disseminated in the series of publications "Regional Formation of the Amazon", by defining areas of priority based on the diagnosis of the most socially and environmentally vulnerable mesoregions and by defining their courses of action based on the Sustainability Indicators of the Amazonian Municipalities (ISMAs), all outlined by the Amazon Public Policy Incubator project.

In this evaluation, which is the first thematic evaluation undertaken by the Amazon Fund, the following methodology was applied: the logical frameworks of each project were analysed individually, and with this as a base, a theory of change was created showing the intervention logic that correlates with the results, direct effects, indirect effects and impacts on the five projects. Thus, the evaluation goes beyond a classic analysis based only on the logical framework by taking a broader look at the (possible) impacts of projects on the direct effects of component 4 "Science, Innovation and Economic Instruments", including identifying unforeseen outcomes and effects.

Highlighted below are the contributions made by the five projects, which have been identified for each of the direct effects, assessed according to the criteria of the Organisation for Economic Cooperation and Development (OECD):

IMPACT, SUSTAINABILITY AND RELEVANCE:

Regarding the direct effect "Knowledge about the Amazon biome, integrating both science and traditional knowledge, produced and disseminated", the research groups supported by the projects have produced at least 120 academic papers and teaching materials. The impact of publications was measured by the "impact factor" (IF) of the journals in which they were published. This factor is the key metric used to assess journals in terms of citations received. The average IF of the project publications was 3.11, which corresponds to periodical publications A2, the second highest extract of journal classification by the Coordination for the Improvement of Higher Education Personnel (CAPES) Qualis[3] index. In addition to the publications, registered patents were considered. Hereby, the Amazon Bioactive Compounds project stands out, having registered one patent for processing açaí light pulp and its derivatives and a second for devices to collect gas samples. In terms of the impact sustainability of the studies, the Bioactive Compounds, Mangrove Forests and Biodiversity projects have produced relevant knowledge that further aids research in bioeconomy and mangrove forests. In the case of the Belém Islands and Public Policy Incubator projects, the knowledge gained is likewise relevant, however, could have a greater impact if more efficiently disseminated.

Regarding the direct effect "researchers and technicians established in the region", the infrastructure provided by four of the five assessed projects has had a positive impact on strengthening research groups and on sustainably securing researchers and technicians in the

3. See details regarding Qualis / CAPES Journal Classification at: http://www.biblioteca.ics.ufpa.br/arquivos/QUALIS-rev_26_11.pdf.

region beyond the project's duration. In total, 126 researchers and technicians were kept in the region by the projects. Researchers and technicians established in the Amazon region play a relevant role in the production of knowledge that results in public policies and ventures for the recovery, conservation and sustainable use of the Amazon biome or themselves become public officials and decision-makers at governmental institutions.

In the direct effect "integration between scientists, government, the private sector, traditional communities and local residents", each project established ties with different types of players, which helped to achieve the desired effect. The Bioactive Compounds project, for example, was well established within the private sector, which contributed to the development of relevant research and the sustainability of the project results. The Mangrove Forests project had a greater integration with the Chico Mendes Institute for the Conservation of Biodiversity (ICMBio), responsible for the management of Conservation Units, including the Taperaçu community. This integration generated a positive social impact beyond the anticipated scientific effects, helping in improving the skills of local residents. The Belém Islands project involved a socio-economic improvement in four island communities; however, community participation in the project outcomes is still limited. The main impact observed was the securing of compensation for a local fishing colony to cover for the period in which fishing is forbidden by law. Finally, the Public Policy Incubator project sought to establish interaction with public agencies of the priority municipalities, with partial social impact.

In the direct effect "fundraising capacity and local research groups strengthened", the Amazon Bioactive Compounds and Mangrove Forests laboratories equipped during the projects and the international visibility of the Amazon Fund contributed to the acquisition of funds from other sources and, therefore, to the sustainability of project results. These new resources and the strengthening of research groups are relevant to the Amazon Fund's objective as it has the ability to enhance the effects of ST&I production.

In terms of the direct effect "initiatives of recovery, conservation and sustainable use of the Amazon biome", the projects focused on strengthening the infrastructure of scientific and technological development as well as promoting awareness of biodiversity in the Amazon, indirectly affecting the recovery, conservation and sustainable use of the biome by promoting its sustainable use. Only the Mangrove Forests project had a direct effect on implementing reforestation activity.

In the direct effect "business involving new products or sustainable technological processes", only the Amazon Bioactive Compounds project aimed to develop products and technology. This was achieved in partnership with a private company and a cooperative, and culminated in significant results as the project responded to real market demands. The results had great impact because they were widely publicized and are sustainable because the project was able to shift from using the private company's infrastructure to using its own adequate infrastructure developed during the project.

Finally, regarding the direct effect "improved public policies for the recovery, conservation and sustainable use of the Amazon biome at the federal, state and municipal levels", the Mangrove Forests project impacted positively on Conservation Unit Management Plans in areas of mangrove vegetation; the Amazon Bioactive Compounds project contributed to public policies related to the quality of açaí by providing input for the consolidation of three classifications (açaí, clarified açaí and dehydrated açaí, according to Normative Ruling N° 37 of October 1st, 2018); the Belém Islands project supported the argument for financial security and protection for a local Fishing Colony. In the case of the Public Policy Incubator project, the impact on public policies at the municipal level was a challenge, despite the project's involvement.

EFFECTIVENESS

The research carried out by the projects was effective in producing and disseminating knowledge and technology for the sustainable use of the biodiversity, as it generated new processes and patents, as illustrated by reforestation techniques developed by the Mangrove Forests project and biodiversity patents created by the Amazon Bioactive Compounds project. The creation and equipping of the laboratories were important for the generation and diffusion of knowledge and for the strengthening of research groups in the four projects in which implementation of infrastructure was planned. However, the delay in their completion partly compromised their effectiveness within the projects. In addition, the granting of 91[4] scholarships, totalling R$2,963,237.00, was effective in generating technologies and products as well as for producing theses and articles in four of the five projects. The research grants were crucial for researchers and technicians to develop new technologies, research and content focused on science itself but also on society, in addition to benefiting biodiversity.

EFFICIENCY

The financial arrangement with FADESP worked well, with difficulties reported only regarding the presentation of documentation due to a lack of formality in the region. The relationship of the projects with the Department of Environment and Management of the Amazon Fund / BNDES was considered positive and reliable, which was reflected in BNDES's relative flexible stance on execution schedule. This was well received by the projects' teams due to the delays in infrastructure implementation. This infrastructure was important for strengthening research groups and for project sustainability, but monitoring the execution of infrastructure works was costly for the project coordinators in terms of the time needed to dedicate to it. The work took much longer than expected and the infrastructure has become significantly degraded after a short time of use, which cannot be solely attributed to the region's climate. In some projects, the acquisition of equipment was done efficiently, while others suffered bureaucratic delays. After implementation, the coordinators faced the difficulty of bearing the maintenance costs of the equipment. In general, the projects have sought external solutions for conducting research in the face of these challenges (e.g. partnership with other laboratories, companies, etc.).

CROSSCUTTING CRITERIA

Crosscutting criteria for poverty reduction and gender equality were not required for projects at the time of their submission to the Amazon Fund, therefore, projects did not develop specific strategies to address them directly. With this taken into consideration, the criteria were used here as they allowed for a more long-term impact assessment.

Poverty reduction: the contribution of projects to poverty reduction has been limited due to their nature. Unlike, for example, projects that work with governance or social inequality, the assessed projects focus on science, technology and innovation activities. Even so, one of the projects, namely the Mangrove Forests project, went beyond the scope of its planned objectives and had positive economic, social and environmental impacts on a community within a marine Extractive Reserve (RESEX). These impacts were achieved through mangrove replanting

4. Mangrove Forest – 22, Incubator – 50, Belém Islands – 2, Bioative Compounds – 17, Biodiversity – none.

activities developed by the project, which contributed to the maintenance of the crab and fish population (the main source of income and protein in the population's diet). In addition to this, training workshops were provided for the population on the use of banana leaves, which contributed to the strengthening of the handicraft production chain.

Gender equality: regarding gender equality, the projects did not envision a specific strategy for the empowerment of women. However, in some specific cases, advancement of women was observed, mainly in the execution of research, both as research leaders and as beneficiaries. All of the projects included women in their research teams. In two cases, women participated in leadership roles: women held coordinating positions in the Belém Islands and Biodiversity projects. With regard to beneficiaries, the Mangrove Forests project had a positive impact by involving women in both the project's main activities (reforestation) and in training activities, including handicrafts, which fostered a new source of income generation. It is worth noting that this project has also empowered youth by offering a college entrance exam preparatory course.

1. BACKGROUND INFORMATION

In the Amazon, within the areas of science, technology and innovation (ST&I) there is a markedly low number of research institutions and postgraduate programmes and volume of investments in the area, especially when compared to other regions in Brazil. Only 10 of the 122 National Institutes of Science, Technology and Innovation (INCTs) are based in the Amazon[5]. In the nine states of legal Amazon, there are 344 postgraduate programmes in various disciplines and different fields of knowledge, all concentrated in metropolitan regions. This number represents almost 18% of all existing programmes in Southeast Brazil[6]. University lecturers represent a similar percentage (16% in relation to the Southeast). In terms of the distribution of public investment, the Southeast received, in 2016, 70% of federal public spending on ST&I, compared to 5.1% in the legal Amazon[7].

This unequal distribution of resources may partly explain the relative scarcity of intellectual capital in the region, as residents seek opportunities for higher education and professional practice in the academic sector outside the Amazon and often do not return. On average, the states that make up the Legal Amazon had about 1.5 new doctors per 100,000 inhabitants in 2014, below the national average of approximately eight new doctors per 100,000 inhabitants, and well below the southeastern average of about 12.5 new doctors per 100 thousand inhabitants[8]. The majority of them are employed in educational and research institutions (91.6%), while the industry sector absorbs only 0.89% of these doctors, demonstrating the enormous fragility in the relationships between the science, technology, innovation and entrepreneurial sectors[9].

Historically, there has been no shortage of initiatives seeking to streamline ST&I efforts in the Amazon. These included the Amazon Humid Tropics Programme (PTU)[10]; the Northern Research and Graduate Programme (PNOPG)[11]; the Northern Internalization Programme

5. Source: CGEE (2013) - Plano de Ciência, Tecnologia e Inovação para o Desenvolvimento da Amazônia Legal

6. Source: GEOCAPES (2019) Sistemas de Informações Georeferenciadas. Available at: https://geocapes.capes.gov.br/geocapes/

7. Source: MCTIC (2016) – Applied Resources *(Recursos Aplicados)* – State Governments

8. Source: Mestres e doutores 2015 - Estudos da demografia da base técnico científica brasileira. – Brasília, DF: Centro de Gestão e Estudos Estratégicos, 2016. 348 p.

9. Source: CGEE (2013) - Plano de Ciência, Tecnologia e Inovação para o Desenvolvimento da Amazônia Legal

10. For more information on the PTU: http://www.scielo.br/pdf/aa/v2n2/1809-4392-aa-2-2-0003.pdf

11. For more information on the PNOPG: http://www.pppg.ufma.br/cadernosdepesquisa/uploads/files/programa.pdf

(PNI)[12]; the Integration of the Universities of the Legal Amazon Protocol (PIUAL); the Universities of the Amazon Forum (UNAMAZ); CAPES Interinstitutional Master and Doctorate (Interinstitutional Master - MINTER / Interinstitutional Doctorate - DINTER)[13]; and, more recently, *Acelera Amazônia* (Amazon Advancement) / CAPES[14]. However, these initiatives have not yet met the goal of establishing a strong and diversified ST&I base and reducing regional differences in this sector.

At the time of approval and analysis of the projects evaluated, the public policy, which guided the Amazon Fund, was the second phase of the Operative Plan for the Prevention and Control of Deforestation in the Legal Amazon (PPCDAm)[15], effective from 2009 to 2011. Among the guidelines for sustainable, innovative and competitive production is the promotion of "research aimed at valuing Amazonian biodiversity with social inclusion and focusing on the generation of innovative production and beneficiation technologies" and ensuring "high productivity based on technological innovations, facilitating competitiveness in national and international markets". Hence, the projects analyzed here have activities considered complementary or consistent with the objectives of PPCDAm, as defined in this second version.

Already in its third phase, in effect from 2012 to 2015, the action "Generate ST&I in the Amazon to subsidize sustainable development" is included with activities such as, "investing in research from the Amazon Biotechnology Centre (CBA) for the development of products and processes" and "fostering projects within the scope of the BIONORTE network - the Biodiversity and Biotechnology Network of the Legal Amazon". However, the balance sheet report of the third phase does not provide a progress assessment of ST&I themes. In addition, although this version includes ST&I-focused activities, the five ST&I projects reviewed here do not fit into any of the specific themes listed within this version.

In order to understand how support from the Amazon Fund positively impacted the ST&I scenario in the region, contributing to the recovery, conservation and sustainable use of the Amazon biome, the following projects supported by the Fund were evaluated:

- Biodiversity
- Amazon Bioactive Compounds
- Mangrove Forests
- Belém Islands
- Amazon Public Policy Incubator

The five projects covered distinct geographical areas (Figure 1). Four of the five were based in the state capital of Pará, in departments at the Belém campus of the Federal University of Pará (UFPA), while one, the Mangrove Forests project, was based at UFPA's Bragança campus in the northeast of the state. In addition to their bases, the Amazon Public Policy Incubator project encompassed

12. For more information on the PNI: http://repositorio.ufpa.br/jspui/bitstream/2011/6708/1/Tese_RepercussoesInteriorizacaoUFPA.pdf (from pg. 225 onwards)

13. For more information on MINTER e/ou DINTER: https://www.capes.gov.br/avaliacao/projeto-minter-e-ou-dinter

14. For more information on the Acelera Amazônia: http://www.gruporedeamazonica.com.br/marca/acelera-amazonia

15. Activities supported by the Amazon Fund, in addition to the PPCDAm guidelines, must also observe the (a) provisions of Decree No. 6.527 / 2008; (b) the guidelines of the Sustainable Amazon Plan; and (c) the Amazon Fund Application Guidelines and Criteria, as well as BNDES operational policies (see 2010 Logical Framework).

cities in all states of the Legal Amazon; the Belém Islands project was active on four islands around the capital, and the Mangrove Forests project operated in one community and one mangrove area in the Caeté-Taperaçu Marine Extractive Reserve (RESEX).

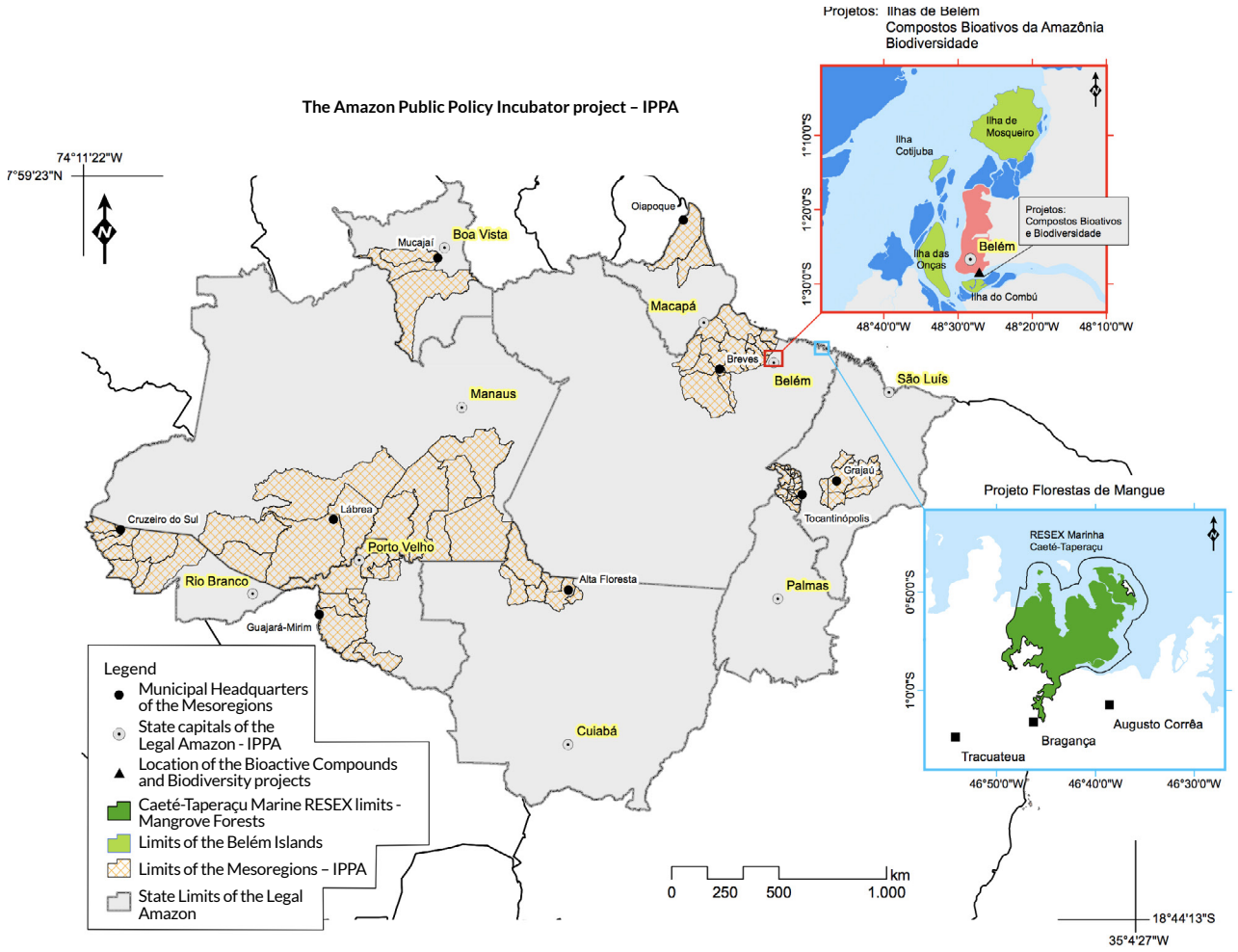

Figure 1 Location of the assessed projects[16]

All projects were proposed and carried out by UFPA, with financial implementation by the Research Support and Development Foundation (FADESP). The projects supported the implementation of research infrastructure, the development of studies (including methodology, collection and analysis of data, and publication production), community participation, the training, placement and exchange of researchers, the involvement of local and external academic institutions and product development and patent registration.

The total value of the five projects was R$12.7 million, of which R$11.8 million came from the Amazon Fund (Table 1). The project with the lowest value was R$1.4 million (Amazon Bioactive Compounds) and the one with the highest value was R$4.6 million (Biodiversity). The projects started between 2012 and 2014 and ended between 2015 and 2018. Therefore, this is considered an ex-post evaluation, as it was conducted sometime after the activities ceased when the impacts and the sustainability of the investments made could be verified.

16. Base map sourced from: Embrapa, 2015; IBGE, 2015; CPRM, 2019; ESRI, 2019; MMA, 2019.

Project	Value provided by the FA (R$)	Project Value	Start	End
Biodiversity	4,639,706.98	4,639,706.98	2013	2018
Amazon Bioactive Compounds	1,352,368.48	1,413,357.00	2014	2018
Mangrove Forests	1,982,143.00	1,982,143.00	2013	2017
Belém Islands	1,138,083.93	1,982,143.00	2012	2015
Amazon Public Policy Incubator	2,660,567.23	2,704,084.90	2012	2016
Total	11,816,387.29	12,721,434.88		

Table 1 Value attributed and time frame of the assessed projects

2. INTRODUCTION

The main purpose of carrying out the ex-post effectiveness evaluation of projects is to measure the results achieved, their effects and the sustainability of the changes generated due to their implementation. This evaluation is particularly innovative, as it takes advantage of the thematic proximity of the five projects to in order to drawtake broad considerationsreflections on the strategy of support provided by the Amazon Fund's strategy, for Science, Technology and Innovation in the period in question (2012 - 2018). Therefore, it contributes to the recovery, conservation and sustainable use of the Amazon biome.

The projects included in this evaluation are among the first projects approved in component 4 of the Amazon Fund. They, therefore, do not represent the whole of the component, but their joint analysis allows for valuable conclusions to be made to guide future support for scientific and technological development projects. In the main part of this report, we will present a synthesis of the analysis of the five projects. Project-specific assessments can be found in Annexes 7.1.1 to 7.1.5.

The main objectives of this evaluation are:

- Strategic:
  - Enabling institutional learning of the Fund itself, contributing to improving project quality and prioritizing investments (providing decision-making subsidies), as well as providing knowledge of the executing institution of the projects;
  - Look for possible opportunities for strengthening the ST&I theme, with a view to continuing Fund support for scientific and technological development projects;
  - Verify project alignment with PPCDAm and with the state deforestation prevention and control plans;
- Impacts and safeguards:
  - Assist the Amazon Fund report to its donors the type of projects supported and their effects;
  - Verify compliance by the Amazon Fund supported projects with the Cancun Safeguards agreed under the United Nations Framework Convention on Climate Change (UNFCCC) for REDD+ (Reduction of Greenhouse Gas Emissions from Deforestation and Forest degradation, considering the role of forest carbon stock

conservation, sustainable forest management and increased forest carbon stocks)[17];

- Verify compliance by supported projects with crosscutting criteria for poverty reduction and gender equity;
- Determine the extent to which projects are relevant, efficient, effective, sustainable and impact-generating (Organisation for Economic Cooperation and Development, OECD criteria);

- Project specifics:
  - Analyse the strengths and weaknesses of project intervention; and
  - Identify challenges and lessons learned as well as recommendations.

The following general key questions guide the evaluation:

- Were the projects able to mobilize the necessary inputs?
- Were the projects efficient in the use of the inputs?
- Were the actions effective? Were the expected outputs realised?
- Did the realised outputs achieve the expected impacts?
- How do these impacts contribute to the goal of recovery, conservation and sustainable use of the Amazon biome?
- Have there been unintended impacts (positive and negative)?
- How sustainable are the investments and impacts generated?

For each project, specific guiding questions were developed, which reflect their particular objectives and effects.

17. Although UNFCCC REDD+ Safeguards were agreed upon in 2010 during COP16 in Cancun, Mexico, they were only proposed as evaluation criteria for Amazon Fund projects in 2016, with the publication of the Conceptual Framework. It is understood that the projects were already underway or had been completed in 2016, so they may not have developed specific strategies to respond directly to each safeguard, but it is also understood that the safeguards are useful tools for gauging the impact of the projects. Brazil submitted the 2nd Safeguards Summary to the UNFCCC in 2018 the, which includes information on how Cancun Safeguards were addressed and respected by Brazil during the implementation of emission reduction actions resulting from deforestation in the Amazon biome from 2011 and on how the Amazon Fund addresses and respects this theme (see summary in English here www.fundoamazonia.gov.br/export/sites/default/pt/.galleries/documentos/monitoramento-avaliacao/salvaguardas_eng_2sumario.pdf).

3. METHODOLOGY

Ex-post effectiveness evaluations of projects supported by the Amazon Fund are guided by the five criteria defined by the Organization for Economic Co-operation and Development (OECD) in 1991, through its Development Assistance Committee (DAC). They are: Relevance, Effectiveness, Efficiency, Impact and Sustainability.

In addition to the OECD criteria, it is also assessed is how funded projects promote gender equality and contribute to poverty reduction (cross-cutting criteria). Due to the inclusion of the Amazon Fund in the context of international efforts to financially reward developing countries for their REDD+ results, projects are also evaluated against REDD+ safeguards (see Annex 7.2).

In order to operationalize the impact evaluation based on these five criteria, the evaluation team chose a mixed-method research model, which includes secondary data collection, interviews and observations during the two field missions, the application of a qualitative and quantitative online questionnaire, in addition to a round of consultation to verify preliminary results.

3.1 EVALUATION PHASES

The evaluation went through several phases, namely, the preparation and creation of the design report, the field mission, and the preparation of the preliminary report. Based on the preliminary report, a consultation round was held, in which the results of the evaluation were validated, and, finally, the final evaluation report was created.

3.1.1 PREPARATION AND DEVELOPMENT OF THE DESIGN REPORT

In the preparatory phase, secondary data was collected, such as studies, performance reports, result assessments and project end, as well as other documents that formed a reference and levelling base for understanding the project execution *(memorandum)*. This material directly supported the preparation of the evaluation design report. The first phase also included finding appropriate participants to be interviewed during field missions.

3.1.2 FIELD MISSION

The assessors decided to limit the field mission to the state of Pará, because all of the projects are based in Pará, and four of the five projects' activities were limited to this state. Together with the coordinators of the respective projects at UFPA, it was suggested to carry out the field mission in two blocks. These being between May 2nd and 3rd and then May 20th and 24th of 2019, with trips to the cities of Belém, including Onças Island in the municipality of Barcarena, located on the outskirts of Belém, and Bragança, including the Taperaçu community in RESEX Caeté-Taperaçu.

Through semi-structured interviews, dialogue was held with different publics. Specifically, businesspersons, public managers of the Pará State Secretary of Environment and Sustainability and the Pará State Secretary of Science, Technology, Professional and Technological Education. Also included were other relevant institutions, such as the Pará State Forestry and Biodiversity Institute (Ideflor-Bio), which is responsible for the management of state public forests, as well as with teachers, university and community members from the RESEX mentioned above.

An online questionnaire was created to reach and include participants in the Amazon Public Policy Incubator project based in the other eight states of the Legal Amazon in which the project operated. The questionnaire was sent through an online tool called SurveyMonkey to 62 people. In the period in which it was available, between 27/05/2019 and 04/06/2019, 24% people had responded to the survey. All participants belonged to universities and only the Federal University of Maranhão had no one respond.

3.1.3 REPORT ELLABORATION

This Effectiveness Evaluation Report has been prepared in order to consolidate the data and information collected, and includes specific annexes that give details of each of the five projects (see annexes 7.1.1 to 7.1.5). The results are presented according to the scope identified in the indirect and direct effects of each project, while also considering their management.

This report was presented in a consultation round to validate its results. This was attended by the Evaluation Reference Group. This group was composed of members from the Amazon Fund's Department of Environment and Management and also the BNDES Assessment and Promotion of Effectiveness Department, the executors of the five projects being evaluated, representatives of the German Cooperation through the *Gesellschaft für Internationale Zusammenarbeit (GIZ) GmbH*, as well as representatives of the Ministry of Environment (MMA) and the Amazon Fund itself. Based on these discussions, the team of assessors consolidated the analyses of the preliminary report, as well as prepared this Effectiveness Evaluation Report.

As this is the first evaluation that attempts a joint analysis of projects covering an identical theme, below, the specifics of this analysis are presented in relation to these base documents.

3.2 LOGICAL FRAMEWORK FOR COMPONENT 4 "SCIENCE, INNOVATION AND ECONOMIC INSTRUMENTS"

3.2.1 2010 LOGICAL FRAMEWORK

The five assessed projects were submitted to the Amazon Fund before 2017. The Amazon Fund was at that time using the 2010 logical framework. According to this framework, the objective of the component was:

- Science, technology and innovation activities contribute to the recovery, conservation and sustainable use of the Amazon biome.

To achieve this the flowing results were sought:

- 4.1. Produce and disseminate knowledge and technologies for the recovery, conservation and sustainable use of the Amazon biome
- 4.2. Research, Development and Innovation (RD&I) infrastructure for the recovery, conservation and sustainable use of the expanded and modernized Amazon biome.
- 4.3. Human Resources from RD&I activities related to the recovery, conservation and sustainable use of the Amazon biome.
- 4.4. Strengthen information, communication and conservation networks related to the recovery, conservation and sustainable use of the Amazon biome.

3.2.2 2017 LOGICAL FRAMEWORK

With the commencement of the fourth phase of PPCDAm, starting in 2016, the Amazon Fund logical framework was revised, resulting in the current version – 2017 Logical Framework[18]. It contains the general objective: "Reduction of deforestation with sustainable development in the Legal Amazon", achieved through the indirect effect of the projects. As the five projects analysed in this evaluation include knowledge and technology, but not economic instruments, due to the period in which they started, only the direct effect 4.1. is discussed in this report.

The evaluation is based on the respective logical frameworks of the five projects analysed as well as the logical framework of the component into which these projects fit: component 4 "Science, Innovation and Economic Instruments". The following is the component's logical framework and its history. The logical frameworks for individual projects will be discussed in the annexes 7.1.1 to 7.1.5.

18. The Amazon Fund 2017 Logical Framework, available at: http://www.fundoamazonia.gov.br/export/sites/default/pt/.galleries/documentos/monitoramento-avaliacao/FA_Quadro_Logico_2017.pdf

The following indirect effect of the projects is anticipated:

- Economic instruments, science, technology and innovation activities contribute to the recovery, conservation and sustainable use of biodiversity.

These instruments and activities are expected to result from two main direct effects of the projects:

- 4.1 Produce, disseminate and use knowledge and technologies for the conservation and sustainable use of biodiversity, the monitoring and control of deforestation and territorial planning.
- 4.2 Develop, disseminate and use economic instruments aimed at the conservation and sustainable use of biodiversity, the monitoring and control of deforestation and territorial planning.[19]

3.2.3 COMPARISON OF LOGICAL FRAMEWORKS FROM 2010 AND 2017

Between 2010[20] and 2017, there was a simplification of the logical framework in component 4, including indicators, while the component theme was expanded also to cover economic instruments (Table 2). Table 2 shows that the frameworks use different terminology for similar hierarchical levels.[21]

2017 Logical Framework		2010 Logical Framework	
Level 2017	**Text**	**Level 2010**	**Text**
General objective	Science, technology and innovation activities contribute to the recovery, conservation and sustainable use of the Amazon biome	*Strategic target*	Reducing deforestation with sustainable development in the Amazon Region
Indirect effect	Economic instruments, science, technology and innovation activities contribute to the recovery, conservation and sustainable use of biodiversity.	*Component objective*	Science, technology and innovation activities contribute to the recovery, conservation and sustainable use of the Amazon biome.

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19. As the five projects analyzed in this evaluation encompass knowledge and technologies, but not economic instruments, only the direct effect 4.1. is discussed in this report.

20. The Amazon 2010 Logical Framework, available at: http://www.fundoamazonia.gov.br/export/sites/default/pt/.galleries/documentos/biblioteca/FA_Quadro_Logico_2010.pdf

21. The direct effects in 2010 Logical Framework were called results, the indirect effects were called objectives, and the overall objective was called the strategic target. That is, the results (direct effects) from 4.1 to 4.4 were consolidated into direct effect 4.1 in 2017.

2017 Logical Framework		2010 Logical Framework	
Level 2017	**Text**	**Level 2010**	**Text**
Direct effects	4.1. Produce, disseminate and use knowledge and technologies for the conservation and sustainable use of biodiversity, the monitoring and control of deforestation and territorial planning.	*Results*	4.1. "Produce and disseminate knowledge and technologies for the recovery, conservation and sustainable use of the Amazon biome". 4.2. "Expand and modernize the RD&I infrastructure focused on the recovery, conservation and sustainable use of the Amazon biome". 4.3. "Train and establish human resources from RD&I activities related to the recovery, conservation and sustainable use of the Amazon biome". 4.4. "Strengthen information, communication and research networks related to the recovery, conservation and sustainable use of the Amazon biome".
Indicators	• Number of scientific, pedagogical or informative publications produced • Number of researchers and technicians involved in ST&I activities residing in the Amazon region (specified by gender)	*Indicators*	Result 4.1. • Number of patents sought or filed - Source: supported projects • Number of theses and scientific articles published - Source: supported projects • Number of educational or informative publications - Source: supported projects Result 4.2. • Value invested in RD&I infrastructure Result 4.3. • Number of researchers and technicians involved in established RD&I activities in the region • Number of trained individuals from trained communities Result 4.4. • Number of integrative events (seminars and forums) • Number of supported networks

Table 2 Projects generated and supported after financing by the Amazon Fund

The 2010 Logical Framework is applied to the assessed projects, both because of its validity during the project implementation period and because of the alignment between the results of the framework and project results, as demonstrated in the Results Evaluation section.

In this evaluation, the link between the intermediate level of direct effects and the objective of the Amazon Fund, which is at the same time the indirect effect of component 4, was established by reconstructing a theory of change that encompassed all assessed projects, as is discussed below.

3.3 THEORY OF CHANGE

The assessment done in the field was guided by a series of questions, generated from individual theories of change and the general theory of change. Specific theories were developed from the analysis of the logical frameworks and their respective indicators, agreed upon at the beginning of each project, and from the performance reports of each project. They were later adjusted based on inputs collected during the field missions. The overall theory of change (Figure 2, below) was constructed by the evaluation team from individual theories and also revised after field missions and interviews. It outlines the focus and the results of this evaluation.[22]

22. The visual representation of the theories of change in the format of networks of results was based on the methodology proposed by GIZ. The network of results facilitates the visualization of causes and effects in an almost non-linear format, allowing the representation of non-linear interconnections which allows for the complex reality in which a project usually operates. At its core, are the actions and inputs used to generate products. These products generate direct and indirect effects, which contribute to the indirect effect of component 4 and the objective of the Amazon Fund.

4. ASSESSMENT OF RESULTS

The effectiveness evaluation of the five Science, Technology and Innovation projects was based on the logical framework of each of the projects (see Annexes 7.1.1 to 7.1.5), which was agreed on by the Amazon Fund and the Federal University of Pará, as well as the logical framework of component 4 "Science, Innovation and Economic Instruments" (see item 3, Methodology).

Based on these inputs, it was possible to recreate a hierarchy of desired impacts, from which the assessment of direct, desired and undesired, intended and unintended effects of projects was done.

From the following theory of change, the team's preliminary understanding was that projects act to achieve the specific objective of the Amazon Fund ("ST&I activities contribute to the recovery, conservation and sustainable use of the Amazon biome"). This is at the same time the indirect effect of component 4, generating positive impacts on public policies at the municipal, state and federal levels, and on changing the mind-set around economic and sustainable development.

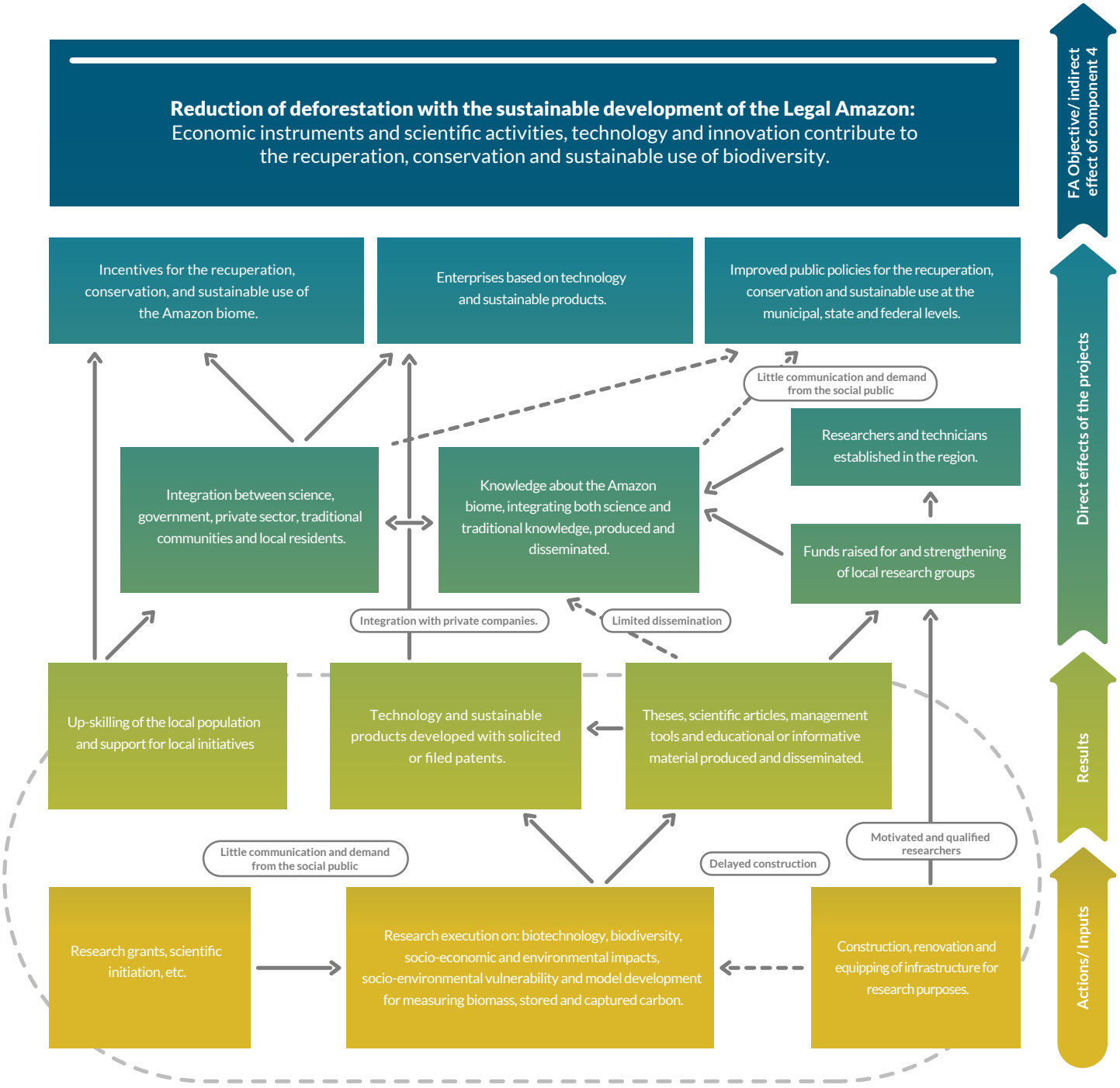


Figure 2 General theory of change for the five Scientific and Technological Development projects[23]

Following the diagram, the intervention logic proposes that, on the one hand, the projects strengthen scientific knowledge about the biome and influence the integration between scientists, government, the private sector, traditional communities and the local population. On the other hand, developed products and patents applied for or filed underpin sustainable ventures that strengthen the local economy and generate economic incentives for conservation and sustainable use.

23. The dotted lines indicate what did not happen or happened poorly. The red boxes explain why the dotted element did not work, and in the black boxes, principle success factors are summarized.

4.1 IMPACTS, SUSTAINABILITY AND RELEVANCE

Table 3 shows the impact, sustainability and relevance of project actions in achieving direct effects. It has been noted that projects have common direct effects, but also some particularities (for example, not all aim to promote business involving new products or sustainable technological processes).

The indicator targets agreed in the logical frameworks at the start of projects have been achieved and in some cases exceeded (see Annexes 7.1.1 to 7.1.5). On the other hand, a broader look using the theory of change generated throughout the evaluation reveals that the Biodiversity, Belém Islands and Amazon Public Policy Incubator projects have not achieved some of the direct effects that were expected, as there has been little articulation and little demand outside academia for the research developed and, consequently, for the results generated.

Project/ Direct effect	Criteria	Biodiversity	Amazon Bioactive Compounds	Mangrove Forests	Belém Islands	Amazon Public Policy Incubator
Knowledge about the Amazon biome, integrating both science and traditional knowledge, produced and disseminated.	*Impact (I) **					
Researchers and technicians established in the region	*Sustainability (S) ***					
Integration between scientists, government, the private sector, traditional communities and local residents	*Relevancy (R) ****					
Fundraising capacity and local research groups strengthened						
Amazon biome Recovery, Conservation and Sustainable Use Initiatives						
Business involving new sustainable technological products or processes						
Improved public policies for the recovery, conservation, and sustainable use of the Amazon biome at federal, state, and municipal levels.						

Table 3 Impact, sustainability and relevance of actions taken in achieving the overall direct effects of assessed projects (based on the theory of change)

*Definition: The impacts of project actions consist in the positive and negative changes caused by the project while aiming at achieving its direct effects.

** Definition: The sustainability of project actions consist in the maintenance of benefits after the end of the project.

*** Definition: The relevance of project actions consist in the coherence between project objectives and beneficiary's demands, as well as priorities by the target audience, donors and executors.

Legend:

There has been impact/sustainability/relevancy;

There was no impact/sustainability/relevancy;

Not relevant.

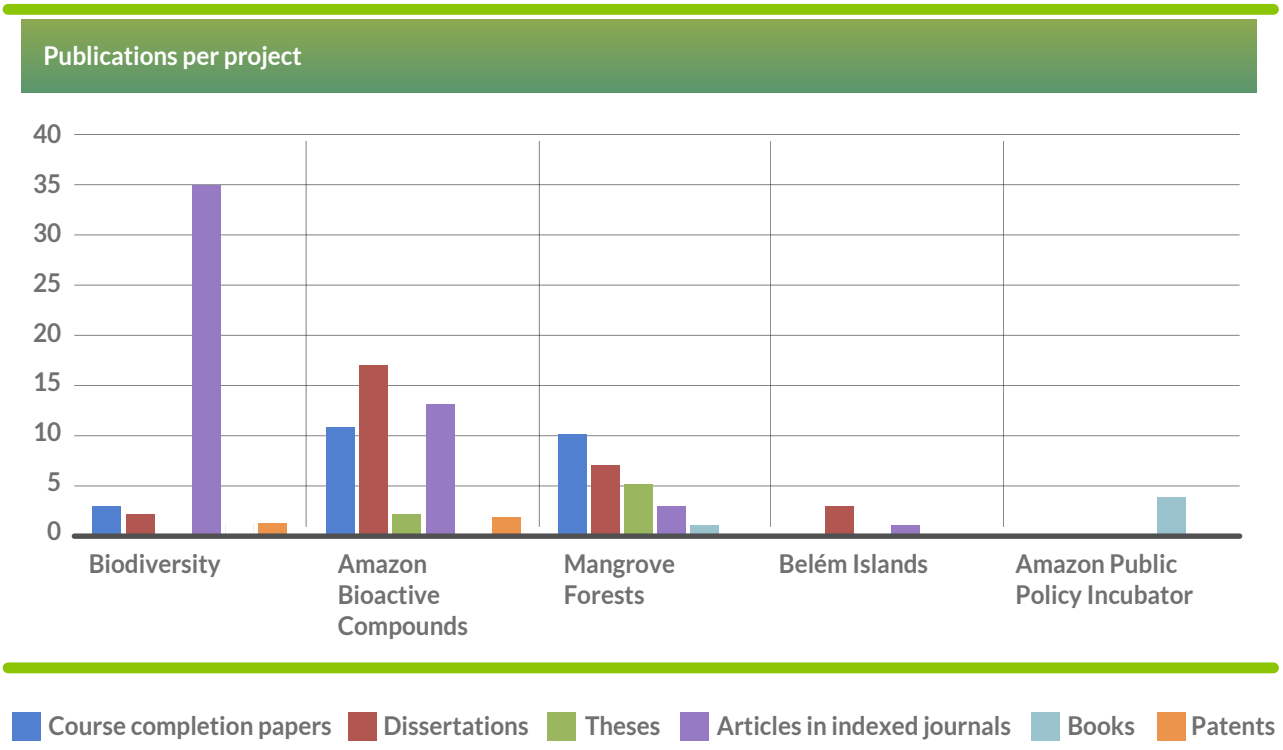
In the following, the results of the evaluation will be presented based on the direct effects identified in the theory of change (Figure 2), in order to understand the contribution of projects in achieving the objectives of the Amazon Fund.

4.1.1 KNOWLEDGE ABOUT THE AMAZON BIOME, INTEGRATING BOTH SCIENCE AND TRADITIONAL KNOWLEDGE, PRODUCED AND DISSEMINATED

In projects involving scientific and technological development, parts of the results are not immediately apparent. In the case of Amazonian Biodiversity and Bioactive Compounds projects, which seek the development of new products, this is more evident since, for example, a drug may take more than a decade from the beginning of the research and to its release on the market. Although research may begin to appear rapidly in scientific articles (which is not always the case considering the need for industrial confidentiality), some time is needed between initial research, identification of active ingredients, testing, product development in itself, its patenting, the elaboration of the commercial strategy and the placing of the products on the market.

Considering this, it has been noted that the research groups supported by the projects produced reports, booklets, books, course completion papers, dissertations and theses, as well as some scientific articles in journals, even before the completion of the project's infrastructure (Graph 1 and Table 4). Amazonian Biodiversity and Bioactive Compounds projects generated the most publications, with a clear focus on articles in indexed journals, which have the greatest academic impact. In line with its focus on product development, only the Bioactive Compounds project had registered patents. Together, the five projects have produced at least 120 publications[24].

24. This number may be higher, as the Amazon Public Policy Incubator project did not report publications generated other than books funded by the Amazon Fund.



Graph 1 Publications per project

Number of Publications	Biodiversity	Amazon Bioactive Compounds	Mangrove Forests	Belém Islands	Amazon Public Policy Incubator	Total
CCPs	3	11	10	0	-	24
Dissertations	2	17	7	3	-	29
Theses	0	2	5	0	-	7
Articles in indexed journals	35	13	3	1	-	52
Books	0	0	1	0	4	5
Patents	0	2	0	0	0	2
Total	**41**	**45**	**26**	**4**	**4**	**120**

Not informed: -

Table 4 Number of project publications

Most of the impact on academic development has been generated by the Amazon Bioactive Compound and Biodiversity projects. However, the impact of these publications was not proportional to their number. Considering only articles in indexed journals, the 13 publications from the Amazon Bioactive Compounds project generated 10 times more citations than the 35 publications from the Biodiversity project (Table 5).

In terms of the relevance of the research, it can be argued that all publications have been made in reputable journals, with an average impact factor (IF) of 3.11[25], which measures the importance of the academic journals in which the articles were published. The articles produced in the Amazon Bioactive Compounds project stand out in this context, having been published in scientific journals with an average IF of 3.57.

	Biodiversity	Amazon Bioactive Compounds	Mangrove Forests	Belém Islands	Amazon Public Policy Incubator
Articles in indexed journals[1]	35 (*International: 29, National: 6)*	13 (*IInternational:7, National: 3)*[2]	3 (*International: 3*)	1 (*National: 1)*	-[3]
Citations (Google Scholar)	174	595	7	5	4[4]
Average impact factor[5]	2.528	3.577	3.221	-[6]	-[6]

Table 5 Academic impact of project publications

[1] A journal is called an "indexed journal" if it is indexed in one of the major scientific indexes, such as SCOPUS or EBSCO Publishing's electronic database. The indexing of a journal is considered a reflection of its quality. Indexed journals are considered of higher scientific quality than non-indexed journals.

[2] Articles still in the process of submission; [3] Not informed; [4] Refers to published books;

[5] Calculated by summing all the impact factors of the journals (Impact factor) that published the articles and dividing this value by the number of articles; [6] Indicator unable to be calculated.

It can also be stated that scientific and technological knowledge is legitimated in the process of dissemination of information and methods produced in the academic environment, in consultation with the existing knowledge among other scientists, decision makers and professionals from the public and private sectors.

Regarding the dissemination of the results, there was no explicit and efficient strategy for communication of the generated products, although the results have achieved good dissemination in the case of the Amazon Bioactive Compounds, Mangrove Forests and Biodiversity projects,

25. Qualis A2, second best impact level according to CAPES. More details, see: http://www.biblioteca.ics.ufpa.br/arquivos/QUALIS-rev_26_11.pdf.

which are precisely those with the highest demand from communities or companies for the development of their research. Regardless, research results could be more easily available and accessible for all projects, making it easier for users to use and produce new knowledge.

The most significant contribution of the projects in strengthening the associated postgraduate programmes was the building of infrastructure necessary to conduct quality and efficient research (as provided in the logical framework of four of the five assessed projects). Therefore, it is interesting to highlight the contribution of the Bioactive Compounds project in strengthening the graduate programme in biotechnology, resulting in the improvement of its standing in the Coordination for the Improvement of Higher Education Personnel (CAPES), passing from grade 4 (GOOD) to grade 5 (VERY GOOD). The project's main impact was on improving the criteria of "infrastructure" (carrying 18% weight in CAPES overall assessment) and "scientific output" (carrying 16% weight in CAPES overall assessment).

Additionally, another significant positive impact occurred in the Amazon Public Policy Incubator project, which supported the creation of a postgraduate programme in public management in the city of Breves, Marajó Island, where almost all 21 first-year graduates are currently working in municipality development. Table 6 below provides information on the positive impacts (column 4) caused by project interventions on related graduate programmes.

Project	Course	University	Relationship with the programme
Biodiversity	Specialization Course in "Applicability of New Technologies as Pedagogical Tools for Science Teaching	Laboratory of Pharmaceutical Planning and Development (LPDF) - UFPA	Laboratory Reform
Mangrove Forests	Master's in environmental biology	Mangrove Ecology Laboratory (LAMA) - UFPA	Construction and equipping of a mangrove ecology research laboratory
	Postgraduate Programme in Environmental Biology (PPGBA)	Mangrove Ecology Laboratory (LAMA) - UFPA	
Belém Islands	Postgraduate Programme in Aquatic Ecology and Fishing	UFPA	Construction and equipping of the Ecology and Fishery Laboratory - UFPA
	Master's in environmental biology		
	Master's in environmental sciences		

→

Project	Course	University	Relationship with the programme
Biotechnology **Bioactive Compounds of the Amazon**	Masters and Doctorate of the Postgraduate Programme in Biotechnology	Biological Sciences Institute (ICB); Institute of Exact and Natural Sciences (ICEN) - UFPA	Strengthening of graduate programme with improved CAPES rating from grade 4 (GOOD) to grade 5 (VERY GOOD)
Amazon Bioactive Compounds	Masters and Doctorate of the Postgraduate Programme in Biotechnology	Centre for Agro-Food Valorisation of Amazonian Bioactive Compounds (CVACBA) - UFPA	Installed a pilot plant at PST Guamá focused on the development of extracts rich in bioactive compounds from the Amazon and new products
Amazon Public Policy Incubator	Professional master's in public management	Centre for Advanced Studies on the Amazon (NAEA) - UFPA	A special class was held in Breves-PA, sponsored by the project

Table 6 Relationship between project / postgraduate programmes

When it comes to the knowledge gained, it remains sustainable as long as it remains relevant, provided the knowledge remains useful. Except for the research generated by the Belém Islands and Public Policy Incubator projects, whose results gradually lose relevance over time (due to changes in the reality of the studied areas), the other projects have produced knowledge that will remain relevant, since it is independent of context.

Since the evaluation presented here is ex-post, it is possible to determine whether the research groups are currently still able to generate knowledge relevant to the objective of the Fund (reducing deforestation with sustainable development in the Amazon biome). In this case, all project-supported groups maintain this capacity, as will be discussed below, except for the Amazon Public Policy Incubator project, whose research group has disbanded since the end of the project. Research projects, by their nature, often have an indirect contribution to reducing deforestation, as is evident in the Biodiversity and Bioactive Compounds projects. On the other hand, "field" projects such as Mangrove Forests and Belém Islands have a greater capacity to contribute directly to this reduction.

The research theme is also an important aspect in assessing its relevance. The Amazon Biodiversity and Bioactive Compounds projects have generated knowledge for the economic use of biodiversity through the development of products and enterprises. Hence, its contribution to the Amazon Fund objective depends on establishing a positive relationship between the use of biodiversity and its conservation, which is not always a given premise. Research from the other three projects points to territorial management having a more direct effect on the Amazon Fund's objective, but is also sensitive to the socio-economic and environmental context, which, because it is more dynamic, can make the results of this research less sustainable.

4.1.2 RESEARCHERS AND TECHNICIANS ESTABLISHED IN THE REGION

The northern region has only 2,382 research groups[26], corresponding to 6.3% of the national total, a very small number given the enormous challenge of expanding scientific knowledge in the region. Attracting and keeping qualified skilled personnel has previously been sought through different research funding programmes, but still with reduced impact. An example is the expansion of the Interinstitutional Masters (MINTER) and Interinstitutional Doctorate (DINTER) as means to support the process of strengthening research groups in the Amazon. As the research activity presupposes interaction and sharing with peers, one of the major challenges is to increase the number of doctors in strategic areas of scientific and technological knowledge, this is in addition to strengthening the local research infrastructure, and creating an ecosystem conducive to scientific and technological development activities.

When compared to southeastern Brazil, the Amazon region has only 16% of the teaching staff working in undergraduate, graduate and research programmes and in developmental research in companies and industries. This leads to a vicious cycle in ST&I - fundraising for projects and graduate expansion depends on qualified intellectual capital, which in turn depends on these graduate programmes – therefore this lack has contributed to maintaining the existing asymmetry in this segment. Some promising initiatives that point to the mitigation of this reality include *Acelera Amazônia* / CAPES, the National Programme for Academic Cooperation in the Amazon (PROCAD / Amazonia) and the Biodiversity Research Programme.

The Fund has a flexible definition for professionals who considered established: according to the logical framework, "researchers and technicians are considered established when they maintain a residence in the states of the Legal Amazon during the execution of research projects." Considering this broad concept of an established professional, Table 7 presents the number of "established" researchers per project:

	Biodiversity	Amazon Bioactive Compounds	Mangrove Forests	Belém Islands	Amazon Public Policy Incubator
Established Researchers	1	17	22	2	84[27]

Table 7 Established researchers per project

In all the five projects, 126 researchers were established, with the largest number concentrated in the Public Policy Incubator project, followed by the Mangrove Forests and Amazon Bioactive Compounds projects. The Belém Islands and Biodiversity projects had less staff involved, for which they did not have significant numbers.

It is worth noting that the participation of professionals in a project for any given time is insufficient to determine them as actually truly established, which would correspond more to the establishment of permanent bonds between these professionals and institutions in

26. Available at: http://lattes.cnpq.br/web/dgp/por-regiao.

27. There were 84 researchers established throughout the project, as there were alternating recipients of the 50 established scholarships available from the beginning to the end of the project.

the region. This establishment in the medium and long term depends on factors outside the support of the Amazon Fund, such as the existence of public courses, the availability of budget resources, etc.

The challenges of setting up researchers and technicians in the region have numerous aspects[28], but one of the main reasons is that skilled personnel tend to look for workplaces with better infrastructure. The main impact achieved with the infrastructure created by four of the assessed projects was the strengthening of research groups to carry out subsequent research and the relative "anchoring" of researchers and technicians in the region in a sustainable way, beyond their participation in the project.

In addition, all projects have contributed to the training and capacity building of researchers and technicians by pooling better-qualified personnel, not only for research institutions, but also for companies, governments and non-governmental organizations.

Researchers and technicians established in the region can play a relevant role in achieving the Amazon Fund's goal of reducing biome deforestation. They do this over the long term as they produce knowledge that can result in public policy and enterprises for the recovery, conservation and sustainable use of the Amazon biome, or even to the extent that they occupy positions in public policy-making bodies[29]. Even though, in some cases studied here, there has been an insufficient connection between research and its social demand, as often happens in other universities and regions, the establishment of researchers and technicians is a necessary even if not sufficient, for the generation of relevant knowledge in a sustainable way.

Research grants policy is still the main instrument for attracting and keeping qualified personnel in the ST&I area, both in the Amazon and in other regions of Brazil. Although it is a fragile mechanism when taken from a medium and long-term perspective, it proves to be effective in the sense that it contributes to the viability and implementation of scientific projects, and even more effective when combined with a permanent qualification and training process. Local institutions and businesses can then harness these qualified people, thereby, consolidating the process of sustainably securing personnel outside academia.

4.1.3 INTEGRATION OF SCIENTISTS, GOVERNMENT, THE PRIVATE SECTOR, TRADITIONAL COMMUNITIES AND LOCAL RESIDENTS

The validation of the process of advancing scientific and technological knowledge implies the establishment of cooperation networks at different levels and formal and informal spaces for scientific dissemination. Traditionally, this has been achieved through technical and scientific events, which make it possible to create an integrative environment for the exchange of knowledge and ideas. Moreover, the integration between scientists, government, the private sector, traditional communities and local residents is important to maximize the return on investments made in ST&I.

28. For professionals coming from other regions, there are cultural and affective aspects. For all, there are opportunities for professional development in other regions, particularly linked to postgraduate courses and positions in public administration. There is also the question of family, such as when looking for opportunities for spouses and children.

29. For example, the current Secretary of Science and Technology and Assistant Secretary of Environment of Pará State are, respectively, a former dean and a former professor of UFPA.

Each project established close ties with actors in different areas, ties that were relevant to the achievement of their respective goals. The Amazon Bioactive Compounds project had the most interaction with the private sector. The partnership with the company Amazon Dreams and the Joint Cooperative Tomé-Açu, was a partnership in terms of personnel and shared knowledge (having a direct impact on research development) and it also shared the use of equipment for the production and analysis of bioactive compounds. This contributed to circumvent the delay in the acquisition of some equipment (resulting from bureaucratic problems) and, therefore, contributed to the development of relevant research. Since the installation of infrastructure for the pilot line, including equipment for analyses, other university projects following the Amazon Fund-supported project have benefited from them, thus contributing to the sustainability of the project's results. This university-business arrangement opens up possibilities for the formation of new consortia and new partnerships in other fields of scientific knowledge in the Amazon.

The Mangrove Forests project was well integrated with the Chico Mendes Institute for Biodiversity Conservation (ICMBio), in the management of marine extractive reserves, and with the Taperaçu community, which generated a positive social impact beyond the project, as it fostered the development of the residents' skills. The Belém Islands project involved a socio-economic survey in four of the island communities. However, the participation of the communities in the project results and its impact on them was limited; the greatest impact observed was the influence on a policy to provide financial security for the Z-9 Fishing Colony, while in the other communities the project could have fostered greater community participation, which could have ensured greater sustainability of the project results. The Public Policy Incubator project sought to establish integration with municipalities in the priority mesoregions, but this occurred only in part.

In many cases of integration, was seen to have already occurred prior to the involvement of the Fund supported project; therefore, one could say that it was strengthened but not created by the project. Where this integration previously existed, and where it was based on mutually beneficial partnerships between research groups and other sectors, it was sustainable; Proof of this is the continuity of the partnership and the development of research. This integration has much relevancy for outlining and conducting research, the results of which have practical use for other actors outside academia. In addition, the integration between different sectors optimizes the sharing and consolidation of knowledge from scientists, government, the private sector, traditional communities and local residents. This allows for more complete and relevant approaches to real problems.

In many cases of integration, it had already occurred prior to the involvement of the Fund-supported project; therefore, one could say that it was strengthened but not created by the projects. Where this integration previously existed and where it was based on mutually beneficial partnerships between research groups and other sectors, it was sustainable; Proof of this is the continuity of the partnership and the development of research. This integration has much relevance for outlining and conducting research, the results of which have practical use for other actors outside academia. Moreover, the integration between different sectors optimizes the sharing and consolidation of knowledge from scientists, government, the private sector, traditional communities and local residents. This allows for more complete and relevant approaches to real problems.

4.1.4 FUNDRAISING CAPACITY AND LOCAL RESEARCH GROUPS STRENGTHENED

All the states of the Legal Amazon have their Research Supporting Foundations (FAPs), which contribute to broaden the base for the promotion of scientific and technological development projects in the region. This support enhances the resources made available by agencies at a national level, such as CAPES and National Council for Scientific and Technological Development (CNPq), via various strategic programmes and relevant public grants. Considering the various sources of funding, the Fund's contribution is significant. For example, from all the project-funding institutions coordinated by the Centre for Agro-Food Valorisation of Amazonian Bioactive Compounds (CVACBA), the Fund has contributed to 17%.

A positive impact has been that the projects have allowed local research groups to acquire new resources for research from other sources, which is important for both the sustainability of investments and their expansion. This occurs because the structuring of laboratories strengthens research groups and guarantees robustness and security for other sources, both public (CNPq and Funding Authority for Studies and Projects – Finep) and private companies, in turn, providing new resources. Additionally, the international visibility of the Amazon Fund expands the potential for new funding by groups supported by the five projects, which may ensure the continuity of research.

Finep is responsible for the largest investment in the Amazon Bioactive Compounds project (R$1,563,817.28), followed by CNPq (R$1,274,947.61), Foundation for Supporting Research in the State of Pará - FAPESPA (R$780,163.73), CAPES (R$511,952.50) and companies (R$425,255.11), respectively. In addition to these, Petrobras also contributed additional funds thanks to investments from the Amazon Fund, investing R$5,898,441.00 in projects related to the Mangrove Forests project.

The potential for acquiring other resources signals a relatively high degree of sustainability, except in the case of the Amazon Public Policy Incubator project, as this project is no longer operating. Acquiring new resources and strengthening research groups is highly relevant to the Amazon Fund's objective as it can multiply the effects of ST&I production.

4.1.5 INITIATIVES FOR THE RECOVERY, CONSERVATION AND SUSTAINABLE USE OF THE AMAZON BIOME

The clearing of the Amazon Forest in order to give way to other uses for the land, i.e. agriculture and livestock, is still a threat to the conservation of the biodiversity of Amazon biome.

The assessed projects focused in general, on strengthening ST&I infrastructure and on generating knowledge on the Amazon's biodiversity. Due to these characteristics, all had an indirect impact on recovery, conservation and sustainable use of the Amazon biome, except the Mangrove Forests project, which had a direct effect on implementing reforestation actions in mangrove areas.

The Mangrove Forests project effectively contributed to the reforestation and restoration of degraded areas in this ecosystem, but the recovered areas were relatively small when considering the damage caused by a local highway to ecosystem drainage (in this case, upgrading the highway, based on the scientific knowledge generated by local institutions, would improve

the situation greatly). More than just this direct effect, the development of recovery actions has had an important didactic impact, with the potential to change the community's attitude towards mangrove conservation, in addition to generating knowledge that can be utilized by other initiatives that also deal directly with this area. Thus, regarding ST&I, the size of the area recovered (9 ha) is relevant but even more so is the knowledge generated and its educational effect. This is because, although the objective of the Amazon Fund is the recovery, conservation and sustainable use of the Amazon biome, in component 4 this effect is not, by definition, directly achieved.

Other projects, such as the Amazon Bioactive Compounds, had an indirect impact by contributing to the enhancement of biodiversity in production chains and to the promotion of their sustainable use. These impacts result from the development of new products, such as light açaí and cosmetics containing plant extracts, and the creation of research networks in partnership with the private sector. Therefore, the contribution made by the initiatives for the recovery, conservation and sustainable use of the biome and therefore to the objective of the Amazon Fund, has great relevancy to all projects in which it occurred.

The sustainability of these initiatives was high in the Amazon Bioactive Compounds project (where products have gained economic value) and moderate in the Biodiversity and Mangrove Forests projects (as local groups have remained interested and new funding is available). In the case of the Belém Islands and the Amazon Public Policy Incubator projects, there is no sustainability or relevance because there were no impacts in this regard.

4.1.6 BUSINESS INVOLVING NEW SUSTAINABLE TECHNOLOGY PRODUCTS OR PROCESSES

Two projects supported business development involving new products or sustainable technological processes: Amazon Bioactive Compounds and Mangrove Forests projects. However, only in the case of the Amazon Bioactive Compounds were these ventures based on the results from the supported research.

The Amazon Bioactive Compounds project collaborated with the company *Amazon Dreams* and the CAMTA cooperative in conducting research and in the development of new technologies, in addition to provide services to various companies in the analysis of their products. Pilot bioactive compound products were produced, also research on purity, antioxidant capabilities, functionality and chemical stability, in addition to optimizing and developing new processes obtained from these Amazonian biodiversity products. Together with CAMTA added-value cocoa nuts were produced and capsules of açaí compounds extracted from açaí were developed with Amazon Dreams. This strategy proved successful in terms of scientific dissemination in different media and technological applications, such as the development of partially fat-reduced açaí (light) and its dissemination. Therefore, the research results were relevant because they respond to real market demands, and they had impact as they were widely publicized, and sustainable because the partnership started with the use of the company's facilities but now has its own and adequate infrastructure, acquired through the implementation of the project.

In the Mangrove Forests project, the supported enterprises were based on pre-existing knowledge, and were part of the community involvement strategy and were not included in the objectives of the Amazon Fund supported project. Thus, these ventures do not align with the theory of change.

4.1.7 IMPROVED PUBLIC POLICIES FOR THE RECOVERY, CONSERVATION, AND SUSTAINABLE USE OF THE AMAZON BIOME AT THE FEDERAL, STATE, AND MUNICIPAL LEVELS

The impact of the projects on public policies has been limited, which is related to the fact that none of the projects evaluated have objectives specifically related to public policy and the fact that research projects generally have a more indirect contribution to them, in terms of public policy recommendations and inputs. Even so, there were unexpected positive developments, as in the case of the Mangrove Forests project, which positively affected Conservation Unit Management Plans in areas of mangrove vegetation, and the Amazon Bioactive Compounds project. The latter impacted public policies related to the quality of açaí by developing studies that provided inputs for the consolidation of three classifications (açaí, clarified açaí and dehydrated açaí, according to Normative Ruling N° 37 of October 1st, 2018) and by contributing to the mobilization for the adoption of these classifications in the normative ruling. This classification aims to give more transparency to the value chain and improve health safety for the açaí berry consumer market considering the risk of product contamination (for example, by the microorganism that causes Chagas disease). Açaí berry classified as "clarified" or "dehydrated" is free of this contaminant.

In the case of the Belém Islands project, it supported discussions for securing compensation for the Z-9 Fishing Colony on Mosqueiro Island, where fishing is a significant source of income, with opinions drawn for the possible granting of income security, which would give small-scale fishers additional income during the critical period when fishing is prohibited. The Public Policy Incubator project has only partially affected this outcome, due to the majority of the development projects in the mesoregion, which have higher priority, not having been implemented, and also, because of a lack of continuity in the project's actions and of a communication strategy of its results.

These effects, when they occurred, proved to have a certain degree of sustainability, as formulated public policies tend to be sustained over time. The relevancy of approved public policies for the Amazon Fund objective varies from project to project. Açaí quality standards, for example, may be considered moderately relevant as they contribute to the maintenance of the activity and, indirectly, to the conservation of native açaí plantations. On the other hand, the implementation of protected area management plans has a direct influence on forest recovery, conservation and sustainable use.

4.2 EFFECTIVENESS

Effectiveness reflects the contribution actions have on generating project results. Four main types of results were recognised through the theory of change:

- Up-skilling of the local population and supporting community initiatives;
- Sustainable technologies and products developed with patents solicited or filed;
- Theses, scientific articles, management tools and educational or informative material produced and disseminated;
- Construction, updating and equipping of infrastructure for research.

There are also three main actions:

- Conducting research on biotechnology, biodiversity, socio-economic and environmental impacts, social and environmental vulnerability and development of models for measuring biomass and carbon captured and stored;
- Awarding of research grants, scientific initiation scholarships, etc.;
- Construction, updating and equipping research infrastructure (both being considered an action and result).

These actions can be compared to the project results with regard to their effectiveness (Table 8).

Action / Result	Research conducted	Payment of grants	Construction, updating and equipping research infrastructure
Up-skilling of the local population and supporting community initiatives	○	●	×
Sustainable technologies and products developed with patents solicited or filed	●	●	○
Theses, scientific articles, management tools and educational or informative material produced and disseminated	●	●	○
Research Infrastructure	×	×	●

Project effectiveness: × = Ineffective; ○ = not very effective; ● = very effective

Table 8 Relationship between actions and project results

Constructing and equipping laboratories, while important for strengthening local research groups, sustaining progress and generating future positive impacts, is not a prerequisite for generating research results, patents or training during the operation of the projects, that often rely on previously existing infrastructure. As the infrastructure was completed only at the end of the projects, it was not an effective means of considering the results achieved within the project period. It has been important, however, for conducting post-project research.

The research has strongly contributed to the generation of scientific publications and in two projects, namely Amazon Bioactive Compounds and Biodiversity, they have also contributed to the generation of technology and products. In terms of the up-skilling of the population, the contribution was limited, as this was only partially realised in the Mangrove Forests project, as a result of the knowledge generated by the project research (some training was based on knowledge not related to the ongoing research, as with banana fibre handicrafts). It is important to emphasize that community involvement was not anticipated within the logical framework of the project.

Grant payments were effective in three of the four main outcomes, given the number of theses and articles published by the recipients, their participation in the development of sustainable technologies and products, their participation in the up-skilling of the local population, and support for community initiatives.

4.3 EFFICIENCY

Efficiency seeks to measure the quality of products and services in relation to the resources invested in the projects, thus proving whether the financial resource was invested in the most economical way and if the results were satisfactorily achieved.

Expenditure Categories	Biodiversity	Amazon Bioactive Compounds	Mangrove Forests	Belém Islands	Amazon Public Policy Incubator
Research grants	N/A	R$ 85,817.18	R$ 713,420.00	R$ 52,800.00	R$ 2,111,200.00
Recruitment costs	R$ 10,457.20	R$ 10,451.70	R$ 10,452.70	R$ 10,452.70	R$ 10,457.80
Administrative costs	R$ 171,690.58	R$ 56,534.00	R$ 93,890.00	R$ 53,696.73	R$ 128,268.20
Daily costs	N/A	R$ 6,690.00	R$ 7,049.06	R$ 65,364.63	R$ 100,878.34
Equipment and permanent material	R$ 1,279,888.98	R$ 965,448.00	R$ 361,191.61	R$ 137,401.59	N/A
Consumable supplies	N/A	R$ 166,756.13	R$ 63,604.13	R$ 49,772.59	R$ 15,359.26
Construction work and installations	R$ 3,370,430.98	R$ 77,360.00	R$ 690,370.28	R$ 487,889.98	N/A
Travel	N/A	R$ 2,253.61	R$ 10,316.07	R$ 1,272.94	R$ 142,590.74
Third party services (individuals)	N/A	N/A	R$ 148,000.00	R$ 248,723.27	R$ 44,665.30
Third party services (legal entity)	R$ 413,530.73	R$ 122,149.62	R$ 39,281.70	R$ 35,762.00	R$ 107,147.59
Total Expenditure	**R$ 5,245,998.47**	**R$ 1,493,460.24**	**R$ 2,137,575.55**	**R$ 1,143,136.43**	**R$ 2,660,567.23**

Table 9 Expenditure per project per item

Total expenditure was greater than the amount provided by the Amazon Fund, as proceeds gained were also applied and spent, as well as resources from other sources, as in the case of the Bioactive Compounds project (resources from Amazon Dreams and CAMTA, project partners). Unused resources were returned. This is summarized in the table below:

Value	Biodiversity	Amazon Bioactive Compounds	Mangrove Forests	Belém Islands	Amazon Public Policy Incubator
Value supplied by the Amazon Fund	R$ 4,639,706.98	R$ 1,352,368.48	R$ 1,982,143.00	R$ 1,138,083.93	R$ 2,660,567.23
Resources from other sources	N/A	R$ 61,021.00	N/A	N/A	N/A
Proceeds	R$ 607,693.55	R$192,847.23	R$227,742.94	R$82,891.24	R$ 111,894.42
Amount returned	(-) R$ 1,402.07	(-) R$ 112,776.47	(-) R$ 72,310.39	(-) R$77,838.74	(-) R$ 155,412.09
Total Expenditures	**R$ 5,245,998.47**	**R$ 1,493,460.24**	**R$ 2,137,575.55**	**R$ 1,143,136.43**	**R$ 2,660,567.23**

Table 10 Total expenditure in relation to the value of the Amazon Fund's support

Table 11 summarizes the efficiency ratings of the execution processes, as discussed in the next section:

Project / Process	Biodiversity	Amazon Bioactive Compounds	Mangrove Forests	Belém Islands	Amazon Public Policy Incubator
Reporting Procedures	○	●	●	○	○
Management arrangement with FADESP	●	●	●	●	●
Project management, monitoring and accountability	●	●	●	●	●
Construction work	○	○	○	●	—
Equipment Acquisition	●	●	●	●	—

× = Not efficient ○ = Moderately efficient ● = Efficient — = Not applicable

Table 11 Efficiency of implementation processes

4.3.1 PROJECT ARRANGEMENT, EXECUTION AND MANAGEMENT

The management and financial execution arrangement with FADESP worked well, with difficulties reported only regarding the presentation of documentation due to the informality in the region. The Foundation was remunerated within a category of costs called "operating expenses", which covers the administrative costs of project implementation.

The execution of the projects demonstrated a good rapport between the technical and financial executors and the Amazon Fund. In addition, disbursement rules were considered appropriate for the actions and timeframe of projects, including flexibility in their adaptation.

Project resource management and acquisitions was generally efficient. This was guaranteed by the management model, which includes regulations for recruitment and transparency. The exception was for construction work (see section below).

Project monitoring was done through annual reports and regular contact with BNDES teams. This contact was considered very positive, both with the guidance provided by BNDES and with the relationship of trust established between the parties, resulting in greater flexibility, especially in terms of implementation, which was well received by the projects due to the difficulties in meeting the timeframe requirements for the installation of infrastructure.

The reporting process, its format and importance were not always well understood by project representatives, who sometimes considered them mere bureaucracy for access to resources rather than efficient management tools.

The form of reporting, completed by the project coordinator, is cost-efficient, but creates a work overload for that individual, who in addition to coordinating the project also coordinates the research conducted. This accumulation of responsibilities may have contributed to the poor understanding of terminology, which impairs the quality of the reporting, such as the difficulty of separating the research results from the project results, and the low execution rate of the corrections and clarifications as requested by BNDES.

One of the most important points for the structuring of research groups and the sustainability of research beyond the period of the project was the installation of the infrastructure. In all projects where the installation was planned, it was delayed, which led to the extension of the project completion date (Table 12).

Indirect Effect	Biodiversity	Amazon Bioactive Compounds	Mangrove Forests	Belém Islands	Amazon Public Policy Incubator
Completion year of the infrastructure	2018	2018	2018	2015	Without infrastructure
Completion year of the project	2018	2018	2018	2015	2016

Table 12 Completion year of the projects

The construction process was also quite laborious for the project coordinators, with many bureaucratic steps[30], which divided the researchers' attention between research and carrying out these procedures.

In some cases, a prior architectural plan was used, resulting in the acceleration of its execution. However, the buildings were not designed to attend the needs of the specific research group. There was a concession made for speed of execution versus adequacy. This resulted in some tight spaces for activities, with crowded laboratories and lack of space for users to circulate, as in the case of the Biodiversity project.

The equipment was generally purchased efficiently, but in some cases, such as the Amazon Bioactive Compounds project, there was a delay in purchasing and delivery due to bureaucratic problems. There are some cases of equipment not having been installed, such as a generator for the Biodiversity project, necessary to keep computers operating even in the face of frequent power outages and thus not interrupt the progress of research. Another noteworthy case relates to the Mangrove Forests project, where a purchased vehicle is available, but cannot be used by the project because there is no authorized (university) driver available.

Although purchases were made efficiently, low sustainability is observed, since the maintenance costs (often very high, as much of the equipment is cutting-edge and / or from abroad) were not anticipated by the project and many times paid by the researchers themselves who use them.

To overcome problems related to the delay in the acquisition of equipment and the completion of construction work, the projects had to be creative. For example, the Amazon Bioactive Compounds project used the *Amazon Dreams*[31] pilot line to process extracts and perform dermis permeability tests with açaí, annatto, muruci leaf, and cecropia extracts to assess their antioxidant capacity. Similarly, research done by the Belém Islands project was conducted alternative spaces rather than the project's laboratory, which was still in construction, and the researchers from the Biodiversity project used equipment and facilities from partner laboratories in some phases of the experiments.

30. For example, the two-year delay in starting the work of the UFPA Mangrove Ecology Laboratory (LAMA) was caused by technical and bureaucratic problems, as the Belem-based UFPA Campus Council had a disagreement with the technical and architectural project that then underwent reforms. The construction was located in a flooded área which compromised the budget, requiring input from the University. This resulted in management problems on behalf of the council (environmental license, bidding and completion of the work).

31. With the final delivery of the equipment the whole process of fractionation of extracts of bioactive compounds began to be performed in the pilot line of the centre.

5. CONCLUSIONS

In general, the assessed projects were effective in meeting the established goals, resulting in increased infrastructure, equipment and technical capacity for high-impact scientific research in the Amazon; training, capacity building and establishment of human resources; scientific publications; patents; and strengthening and expanding new research networks. With regard to establishing human resources, in five projects in total, 91 grants were awarded and 126 researchers were established, the largest number being concentrated in the Public Policy Incubator project (84), followed by the Mangrove Forests and Amazon Bioactive Compounds projects.

Although not directly an objective of component 4 of the Amazon Fund, the evaluation has shown that carrying out extension activities in scientific and technological development projects contributes to a more fluid insertion of researchers alongside their target demographic.

The potential for collaboration among the five assessed projects was greater than the interaction they actually managed to have, even if the same Federal University of Pará developed them all, and especially considering that they all addressed the issue of sociobiodiversity in the Amazon biome.

The time allotted for the execution of the projects, proved to be insufficient for the development of research with the amount of support the infrastructure and equipment could have potentially provided for the projects. Due to the long construction time, the impact of infrastructure and equipment was greater for strengthening research groups and conducting research after the end of the project. In future projects, it is recommended to extend the execution time or adjust the expectations that the structuring of laboratories will have on the project's research targets.

In support of similar future projects, the Amazon Fund could request evidence of the social and / or economic demand for research, the need for structuring laboratories to support the proposed research, the presence of motivated groups of researchers with lines of research relevant to the conservation and sustainable use of the biome. In addition to this, looking at the networking of these researchers, and the ability of these groups to capture new resources.

Finally, the successful actions developed through the projects have revealed the strategic importance of component 4 of the Amazon Fund, especially in a biome where research still faces enormous difficulties in terms of infrastructure, availability of equipment and qualified personnel.

6. RECOMMENDATIONS AND LESSONS LEARNED

RECOMMENDATIONS

FOR PROJECT COORDINATORS

- Involve recipients of benefits in project design and define strategies for their participation during project implementation;
- Create an interinstitutional arrangement that will streamline bureaucratic processes so as not to overcommit the project's physical implementation schedule;
- Encourage the conducting of research that responds to community and private sector demands through targeted notices;
- Expand and strengthen partnerships between universities and private sector through the development of more actionable partnership models to consolidate cooperation between the academic and business world, and facilitate raising funds from private sources;
- Take advantage of current technical-scientific cooperation networks to ensure the sustainability of research agendas and technological innovations;
- Develop a strategy for communication and availability of results that reaches the different potential audiences for information, other than academia. Thus, allowing for its use and stimulating the production of new knowledge;
- In the case of projects involving infrastructure work and the acquisition of equipment, demonstrate the existence of infrastructure and equipment that enable the research to be carried out during the execution of this construction work and the actual acquisition of them. In addition to demonstrating the demand for their use and financial feasibility of maintenance beyond the duration of the project.

FOR THE DEPARTMENT OF ENVIRONMENT AND MANAGEMENT OF THE AMAZON FUND / BNDES

- Provide training in project management, results monitoring and report completion for the executors of scientific and technological development projects;
- Allocate more time for implementation of projects involving the construction of infrastructure and the acquisition of equipment to carry out the proposed research;

- Demand a financial sustainability strategy in the project proposal, especially in cases of projects involving the construction of infrastructure and medium / long term maintenance services;
- Demand evidence be presented of an integration between scientists, government, the private sector, traditional communities and local residents in submitting proposals, unless fostering such integration is one of the objectives of the project;
- Support component 4 orientated projects that are conceived and implemented in research networks;
- Stimulate in public calls the creation of arrangements that value the integration of project executors with the private sector;
- Stimulate in public calls the creation of projects that prioritize production chains that have an impact on the population;
- Continue to support positively assessed projects under component 4, therefore valuing those that internalize the socio-environmental dimension and contribute to the knowledge and management of Amazonian ecosystems;
- Establish an ongoing dialogue with the Ministry of Science, Technology, Innovation and Communication (MCTIC) regarding research demands in the Amazon, in order to strategically guide project selection;
- Demand that research projects supply official databases, including:
    - Brazilian Biodiversity Information System (SiBBr), from the Ministry of Science, Technology, Innovation and Communication (MCTIC): an online platform that aims to gather the largest amount of existing biodiversity data and information in Brazil. Its objective is to support scientific production and public policy-making and decision-making processes associated with environmental conservation and sustainable use of natural resources by stimulating and facilitating digitization, publication on the Internet, integration of freely accessible data and use of information on Brazilian biodiversity;
    - Biodiversity Portal (PortalBio): A partnership between the Chico Mendes Institute for Biodiversity Conservation (ICMBio) and the Ministry of Environment (MMA), with support from *Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) GmbH*, as part of the Biodiversity Monitoring with Relevancy to the Climate project;
    - National System for the Management of Genetic Heritage and Associated Traditional Knowledge (SisGen): an electronic system created by Decree No. 8,772 of May 11, 2016, which regulates Law No. 13,123 of May 20, 2015, as an instrument for assisting the Genetic Heritage Management Council (CGen) in the management of genetic heritage and associated traditional knowledge.
- Regarding the current phase of the PPCDAm, in force until 2020, the Amazon Fund should promote the development of the bioeconomy through food and pharmaceuticals, themes that can strengthen the PPCDAm operational plan.

LESSONS LEARNED

- Implemented infrastructure and purchased equipment have their sustainability impaired when there is no strategy to guarantee resources for maintenance;
- Time allotted for the execution of the project should be longer so that implemented infrastructure and purchased equipment have an impact on the research carried out during the project and not just on post-completion research;
- The elaboration and implementation of scientific and technological development projects need to strengthen lines of communication and connect with potential users of the information produced so that research results do not run the risk of being forgotten;
- The extension of activities in scientific and technological development projects contributes to a more fluid insertion of the researchers alongside their target demographic and for the research to have a positive social impact beyond academia;
- Taking into account the social and / or economic demands of research in project design is essential for applied research to produce results that are not restricted to academia alone;
- Greater promotion of gender equality in the recruitment process for scientific and technological development projects has the potential to strengthen research by promoting the diversification of the perspectives involved.

7. ANNEXES

7.1 INDIVIDUAL ASSESSMENTS OF THE PROJECTS

7.1.1 BIODIVERSITY PROJECT

INTRODUCTION

Project title:	Biodiversity
Responsible body (project management):	Federal University of Pará (UFPA)
Responsible body (financial management):	Research Support and Development Foundation (FADESP)
Project timeframe:	1st semester 2013 to the 1st semester of 2018
Territorial scope:	Pará State
Beneficiaries:	UFPA, the scientific community, potential suppliers and companies from the Amazon region that work with biodiversity products and their potential consumers.
Objective:	Expand UFPA's research infrastructure focusing on the study of biodiversity, including: (i) construction and structuring of the Centre for Advanced Studies in Biodiversity (CEABIO); and (ii) reform of the Pharmaceutical Planning Laboratory and the Molecular and Cellular Neurochemistry Laboratory, and the acquisition and installation of equipment for biotechnology research.
Total value of the project:	R$4,639,706.98
Value of support provided by the Amazon Fund:	R$4,639,706.98

Table 13 Biodiversity project fact sheet

PROJECT SUMMARY

The Biodiversity project aimed to build and strengthen UFPA's science, technology and innovation infrastructure, focusing on biodiversity studies of the Amazon biome. With financial support from the Amazon Fund, the project enabled the construction and equipping of the first Centre for Advanced Biodiversity Studies (CEABIO) in the northern region of the country, as well as the renovation of the Pharmaceutical Planning Laboratory and the Molecular and Cellular Neurochemistry Laboratory (LNMC) of the Institute of Biological Sciences (ICB).

The CEABIO building, with an area of 1,300 m^2, is located in module 11 of the Guamá Science and Technology Park (STP-Guamá), on the campus of the Federal University of Pará. The research planned in the two structured laboratories, prioritized the development of drugs based on Amazonian biodiversity products, the isolation of peptides from Amazonian seeds with biological activities of biomedical interest, and the development of bioherbicides based on the characterization of biocompounds from Amazonian plants.

Most of the project resources (75%) went to laboratory construction and renovation. Because the project has a strong emphasis on infrastructure, it mobilized few people and had little effect on establishing permanent personnel.

INTERVENTION LOGIC

Figure 3 presents the intervention logic agreed on between the project executors and the Amazon Fund:

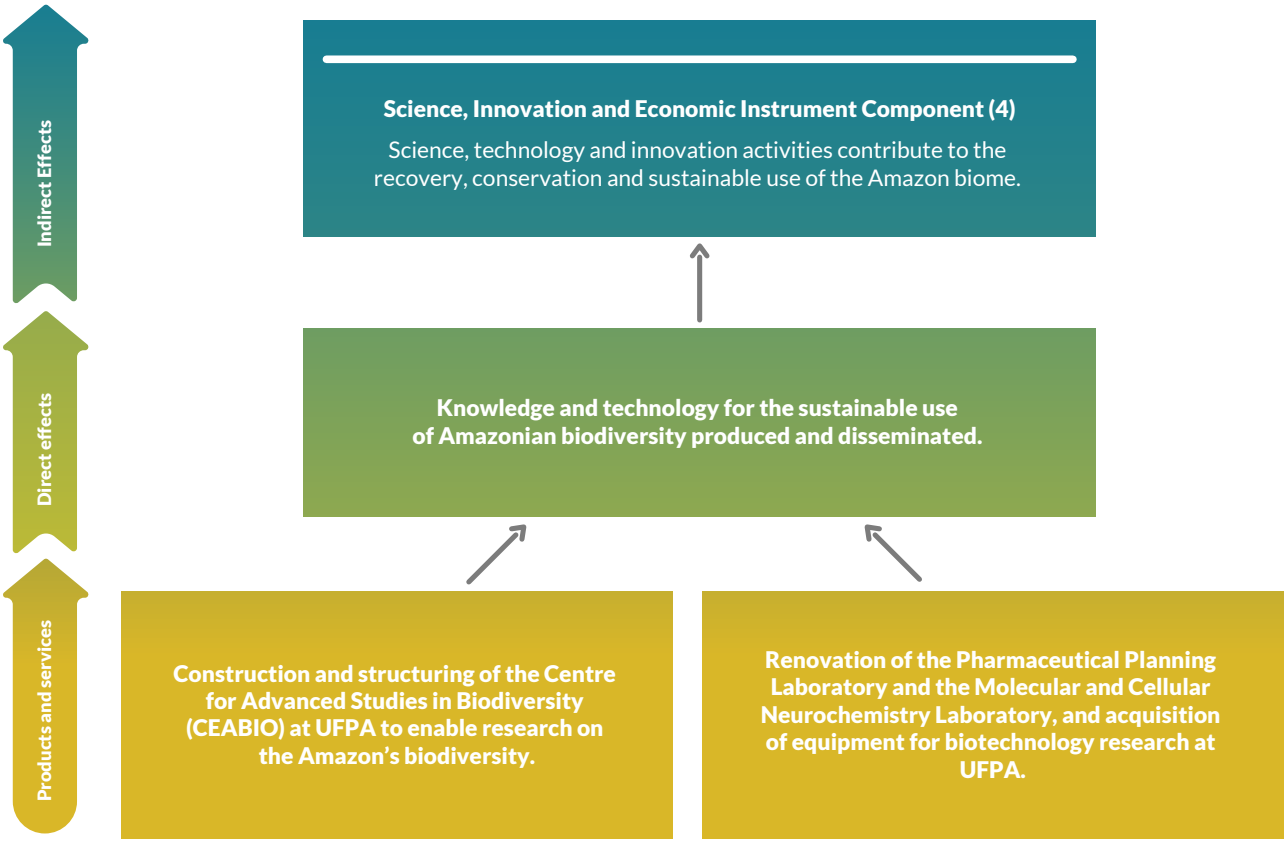


Figure 3 Intervention logic according to the Biodiversity project logical

METHODOLOGY SPECIFICS

The evaluation followed the evaluation criteria and methodology described in section 3 of the report.

In the primary data collection, consultations and semi-structured interviews were prioritised involving the project coordination team and coordinators of the Pharmaceutical Planning and Molecular and Cellular Neurochemistry laboratories, as well as key members of the research group. The managers of the Research Support and Development Foundation (FADESP) were also consulted.

GUIDING QUESTIONS

For each individual assessment, specific guiding questions were designed to guide the field mission. The guiding questions directed at measuring the impact of this project were:

1. Was the implementation of the CEABIO and laboratories executed as planned, supporting diagnostic and research activities on biodiversity and bioactives of Amazonian plants?

2. Has the strengthening of the support infrastructure for biodiversity research had any impact on the formation of new scientific networks in the Amazon and the promotion of biodiversity research groups at the UFPA Institute of Biological Sciences and Exact and Natural Sciences?

3. Was the construction work and equipment / inputs actually available for research activities? How much did the apparent delay in the bidding processes of civil works and equipment acquisition (majority imported) compromise the development schedule of biodiversity research?

4. How often, and in what context, did communication occur between the Biodiversity project and the administration of the institutions FADESP and UFPA?

5. What new technological products or processes (patents) applied for in the food, pharmaceutical, chemical, biotechnological and cosmetic industries were generated from investments in ST&I?

6. How does CEABIO communicate with other sectors and research groups of UFPA such as: NUMA; ICB; ICEN and NAEA?

ASSESSMENT OF RESULTS

ASSESSMENT OF INDICATORS

The initial step of the individual assessment was to assess the result and impact indicators, which were agreed on with BNDES at the beginning of the project. Table 14 presents the key indicators.

Key indicators	Target	Status at the end of the project
Direct Effect (former Specific Objective): Knowledge and technologies produced and disseminated for sustainable use of Amazonian biodiversity.		
• Number of solicited or filed patents	2	Not observed
• Number of theses and scientific articles published on territorial management o Dissertations o Specialisation o Course Completion Papers o Articles	10	40 2 3 35
• Number of researchers and technicians established in the region involved in RD&I activities	9	1
Products and Services:		
• Laboratory area constructed	Not defined	1.300 m²
• Amount invested in infrastructure (R$)	R$ 3.333.287,80	R$ 3,370,430.98
• Laboratory area remodelled	Not defined	129.30 m²
• Amount invested in RD&I infrastructure	R$ 1.306.419,18	R$ 1.466.589,79

Table 14 Key indicators of the Amazon Bioactive Compounds project

By enabling an adequate infrastructure for the execution of research projects, the project achieved targets related to scientific publications, but regarding the number of researchers and technicians involved in RD&I activities, the indicator was below the stipulated target (only the project manager was established permanently).

There were publications in indexed journals, as well as defended dissertations with results obtained from the use of equipment acquired with financial support from the project. The acceptance of scientific papers in high quality journals requires more sophisticated analyses, which involves high technology equipment with high purchasing costs.

Such research projects encompass several areas within biotechnology. They range from the identification and isolation of compounds and substances from various sources of Amazonian biodiversity, to biological testing of these compounds and substances to create products (new therapeutic and / or cosmetic drugs, for example).

Some of the project impact indicators refer to results that will be obtained ex-post, once CEABIO is actually in operation. After its inauguration on February 21, 2018, researchers, who were then able to commence their activities, occupied the building. Therefore, the indicators of "number of patents solicited or filed" and "number of new products or technological processes developed" have not yet been measured and are expected to meet their respective targets two years after project completion.

THEORY OF CHANGE

Based on the analysis of project performance indicators and reports, and following the methodology presented in item 3 of the report, a theory of change was developed for the project, which was then reviewed before and after the field mission and interviews (Figure 4):

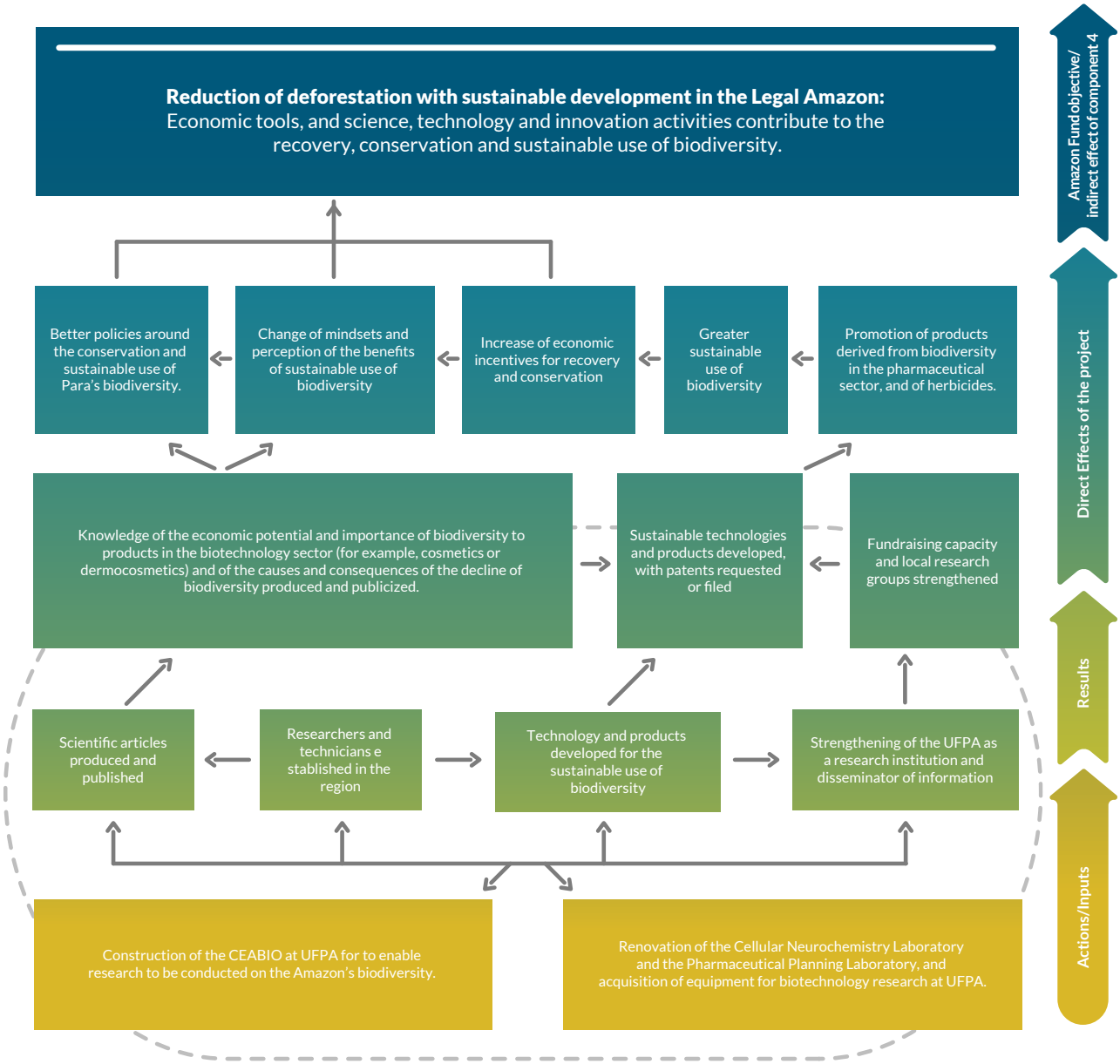


Figure 4 Theory of change of the Biodiversity project revised after field mission
(The arrows represent the hypotheses, that is, the assumptions regarding the interaction among results; the boxes contain the objective that was negotiated and agreed upon with the Amazon Fund; the space enclosed by the dotted line shows the area of responsibility of the project)

The theory of change of the Biodiversity project is based on two infrastructure actions, including the construction and renovation of research laboratories. These actions would result in the mobilization of more researchers and technicians, which would boost the generation of knowledge and technology development in the biotechnology sector, with emphasis on cosmetics. In turn, resulting in the promotion of sustainable markets and enhancement of biodiversity products, which would contribute to the Amazon Fund's objective.

Therefore, it was hoped that this infrastructure could then contribute to improving the quality of biodiversity research, where researchers, in their respective specialisations, could enjoy a functional and adequate space to carry out their biodiversity research.

In the analysis of the revised theory of change (Figure 4), it is observed that:

1. The actions included academic and scientific infrastructure implementation, as well as the acquisition and installation of biodiversity research equipment from three other UFPA laboratories, which in itself contributed very little to involving and establishing technicians and researchers.

- The installed infrastructure has also contributed little to the promotion of biodiversity products, thus having little impact on the generation of knowledge of pharmaceuticals and bioherbicides.

2. The occupation of the new structures has been gradual. This has compromised the progress of carrying out a series of proposed research projects and fundraising for new projects.

- Despite the technical and bureaucratic problems faced, the renovation and acquisition of equipment contributed to strengthening UFPA's infrastructure.
- The expected effects have only been partially achieved. This equally applies to the valorisation of biodiversity products, the changing of mind-sets and perceptions regarding the benefits of sustainably using biodiversity, and the influence on public policy in this area.
- The renovation and equipping of the Molecular and Cellular Neurochemistry (LNMC) laboratories of the Institute of Biological Sciences (ICB) consisted of restructuring the space and construction of cabinets and workbenches, and the acquisition and installation of equipment. In UFPA's department for the Planning and Development of Pharmaceuticals (LPDF) of the Institute of Exact and Natural Sciences (ICEN), the electrical system was restructured for the installation of a power generator.

At the initial stages of the project, the relatively long period of analysis and approval of the project by the Amazon Fund contributed to the delay in construction work. This was also affected by bureaucratic problems involving environmental licensing processes, the public bidding process, and relationship difficulties with the UFPA campus council, amongst others.

The delay can be attributed to several factors. The difficult relationship with the UFPA campus council and bureaucratic delays with the architectural project for example. Only after the chancellor had hired a private company to complete the architectural project, was it possible to expedite and complete this phase of the project and commence bidding.

Another factor that caused delay was the difficulty on behalf of the UFPA council in designating an area on the University Campus for the construction of the building. The problem was resolved after deciding that the building would be built in the Park of Science Technology (PST Guamá), which is situated on the actual (UFPA) campus itself, even if it is far from where the original departments are found. The decision was found to be best, due to the CEABIO being closer to other sectors present in the park, fostering partnerships and allowing for more communication between other entities outside the realm of academia.

The existence of an ample physical space that bears the name “Biodiversity” was pointed out by the interviewees as a differential, enabling integrated research and drawing the attention of potential partners. However, the relocation to the PST Guamá was another factor in the delay in commencing construction work, as it had to submit to the regulations and bureaucracy specific to this sector.

As a result, the original forecast amount in Reals (R$) was not sufficient for the construction of the CEABIO and the project coordination team was authorized by BNDES to reallocate equipment resources under construction. There also existed the UFPA’s contribution of (R$829,355) corresponding to about 15% of the total project value, for construction and services such as cleaning and urbanization of the land, installation of benches and cabinets, complementary electrical installation, installation of grids and an alarm system, demonstrating the institution’s commitment to this project.

Upon completion of the architectural project, the Research Support and Development Foundation (FADESP) conducted bidding. The timeframe for carrying out the construction work was two years and nine months (01/07/2014 to 30/04/2017). Occupation of the premises only began in June 2018, after the project had ended, so the space had no impact on research carried out during the project, but has since contributed to the strengthening of research groups and the sustainability of previously gained research results.

The procedures adopted by the Research Support and Development Foundation (FADESP) for purchasing equipment led to the purchase of some low-quality products, compromising their durability and functionality.

The process of physical construction, quality of service and purchasing of equipment were not always linear and predictable. In this regard, according to the project coordination team, the Amazon Fund team was very flexible in meeting the specific demands, especially in the matter of reallocating budget and financial resources, which made it possible to optimize the acquisition and replacement of equipment not originally foreseen in the project.

Even being new, the CEABIO building presented problems with water infiltration within the structure. The architectural plan did not favour large spaces in terms of room size nor enabling the circulation of people. This could indirectly inhibit the process of occupation of these spaces and subsequently threaten the sustainability of the desired outcomes of the project.

IMPACT, SUSTAINABILITY AND RELEVANCE

The assessment of the impacts achieved, their relevance and sustainability after the project's completion focuses on three identified key impacts: (i) knowledge produced and disseminated, (ii) fundraising and research group strengthening, and (iii) promoting products derived from biodiversity.

KNOWLEDGE ABOUT THE ECONOMIC POTENTIAL AND IMPORTANCE OF BIODIVERSITY FOR BIOTECHNOLOGY PRODUCTS

Despite the challenges in building the planned infrastructure, the project and its research groups were able to generate considerable amount of knowledge.

Over the course of the project, three course completion papers, two master dissertations, and thirty-five papers published in indexed journals were carried out. Through the knowledge generated, including the process of training personnel (researchers), the project also contributed to the strengthening of postgraduate programmes (Masters and Doctorates) linked to the Institute of Biological Sciences (ICB) and the Institute of Exact and Natural Sciences (ICEN).

With the infrastructure installed and completed at the end of the project, it is expected that new scientific and technological development projects will be carried out more effectively, which may result in the improvement of the quality of scientific production. In this sense, three projects were submitted to the Amazon Fund: "Forest Recovery of PAE Lago Grande PAs", "Metagenomics and metabarcoding as a tool for ecosystem health assessment in Hydro mining areas, Paragominas - PA" and "Measuring biodiversity, dynamics using environmental DNA and metabarcoding: establishing baselines and monitoring recovery in affected ecosystems". While the first is under review, the last two have been approved and are due to begin in 2019.

The equipping of three other laboratories of the UFPA (ICB Structural Biology Laboratory (LBE), Liquid Chromatography Laboratory (LabCroL) and Laboratory of Systematic Research and Fine Chemicals (LISQF)), which work together with LNMC and LPDF / ICB in conducting integrated research and shared use of equipment has made it possible to strengthen research networks, including researchers from other states, such as Amapá. The benefits extended to the three laboratories have had an unplanned positive effect as they have contributed to the strengthening of ST&I infrastructure in biodiversity.

FUNDRAISING CAPACITY AND LOCAL RESEARCH GROUPS STRENGTHENED

Strengthening the scientific research infrastructure is thought to encourage the potential for new funding.

The core group of researchers involved in the Biodiversity project since the beginning now have the potential to secure new developmental projects in science and technology. For instance, four projects were submitted to the Amazon Fund, under the coordination of a group of researchers from UFPA and the Federal Rural University of Amazonia (UFRA) that are currently under analysis. Infrastructure built with support from the Amazon Fund has certainly contributed to this initiative as these new projects look to focus on equipment resources and expenditure.

In addition, CEABIO researchers have had two new projects approved: one in conjunction with the Norwegian government and one with the Norwegian company Hydro. The latter, budgeted at 1.2 million Brazilian reals, focuses on the study of vertebrates (carnivores) and DNA analysis of mosquitoes.

The project supported by the Amazon Fund contributed to the strengthening of the biodiversity cooperation network, whose researchers work in the benefited laboratories. There are currently networks of cooperation in research and development with the Federal University of Rio de Janeiro, the State University of North Fluminense and the Emílio Goeldi Museum. Similarly, there are research agreements with international institutions such as the University of Cambridge, the University of Buenos Aires and a university in Norway, which have the potential to contribute to the sustainability of CEABIO's scientific and technological development activities.

Two other chains strengthened by the project were family farming, which resulted in the submission of a project to the Amazon Fund, with the participation of FADESP, the UFPA Centre for Higher Amazon Studies (NAEA) and the UFRA; and the chain of studies on active ingredients of Amazonian plants, which involved researchers from the Pharmacy and Food Engineering departments at the UFPA. These have some interface with CEABIO's agenda on research and technology development, and may generate new synergies to enhance the bioeconomy segment in the Amazon. The maintenance of these networks of scientific cooperation depends greatly on the dynamism of the research groups involved and the resources to support their acquired projects.

PROMOTION OF PRODUCTS DERIVED FROM BIODIVERSITY IN THE PHARMACEUTICAL, COSMETIC AND BIOHERBICIDE SECTORS

It was evident that there is little relationship with the business sector, especially the pharmaceutical sector, probably due to the emphasis researchers gave to basic research, of which the results aroused little interest from the private sector.

Knowledge gained on biocompounds with the potential for use in the pharmaceutical, dermo-cosmetic and bioherbicide sectors did not result in relevant contributions.

EFFECTIVENESS

The focus on basic research in biodiversity under the new research infrastructure has produced little interest from the bioeconomy business sector. This is concerning, as it compromises the creation of new channels of dialogue within this sector.

On the other hand, all products and services which the project had proposed were fully realised, as it was a project essentially based on the implementation of construction work, renovations, services and equipment.

The construction of the CEABIO made it possible to bring together researchers from similar areas of study within a single building, which were previously dispersed in different academic departments. This facilitated integration and broadened perspectives while conducting multidisciplinary research, creating a productive environment for coexistence and exchange of ideas and experiences, as well as enabling new partnerships.

The visibility of the CEABIO, with regards to what it can offer the biodiversity research agenda, has the potential to leverage the formation of new scientific cooperation networks. In this way, the reputation of the CEABIO has enabled the establishment of two networks funded by CAPES. A network involving researchers from the chemistry department at the UFPA, the State University of Maranhão and the University of Brasilia, will study the effects of the active ingredients of andiroba extracts. The second network under the coordination of a CEABIO researcher, involves the Federal University of Western Amazon (Santarém), the National Institute for Amazonian Research (Manaus, AM) and the Julio de Mesquita Filho State University (Botucatu, SP), and will focus on the study of biodiversity of Amazonian vertebrates.

EFFICIENCY

The quality of project management was satisfactory, even in the face of a dual coordination arrangement (two subprojects for scientific and technological development, one coordinated by Prof. Barbarella and one by Prof. Julio, in addition to the administrative coordination of the project together with the Amazon Fund by Prof. Barbarella).

The purchasing of equipment was highly efficient and unproblematic. Some equipment purchases were cancelled due to inconsistency from suppliers, who did not honour delivery schedules.

When considering the physical execution of the construction work and laboratory reforms, FADESP efficiently carried out the financial management and monitoring of the bidding process. However, bureaucratic hurdles on behalf of the campus council prevented its completion on time due its bureaucratic requirements. This subsequently jeopardized the implementation of certain stages of the project.

MANAGEMENT ARRANGEMENT WITH FADESP

The relationship with the Amazon Fund / BNDES team went smoothly throughout the entire project implementation process, which had the competent intermediation of FADESP. According to the project coordinators, whenever adjustments or changes were required, regardless of their magnitude, the Amazon Fund team acted quickly, without losing commitment to complying with the legislation and the scope of the project.

CANCUN SAFEGUARDS (REDD+)

This project focused on infrastructure within the physical environment of the UFPA, without any interaction with local populations. Cancun's safeguards aim to protect local populations, i.e. their cultural and usage rights. The project's logic was interesting, but it did not show much link with the Cancun safeguards agreed on by the United Nations Framework Convention on Climate Change for actions to reduce greenhouse gas emissions resulting from deforestation and forest degradation.

Safeguard/issue	Compliance[32]	Observations
1. Actions complementary to or consistent with the objectives of national forest programs and other relevant international conventions and agreements.	**To some extent**	By contributing knowledge on biodiversity, the project showed indirect relativeness and adherence to REDD+ actions.
Has the project proved to be in line with PPCDAm and state deforestation prevention and control plans?	To some extent	Has shown to be indirectly in line with the Action Plan for the Prevention and Control of Deforestation in the Legal Amazon (PPCDAm).

→

32. These safeguards were not required of projects at the time of submission, so the project may not have developed specific strategies to address them.

Safeguard/issue	Compliance[32]	Observations
With which other federal public policies or international agreements has the project demonstrated alignment? In what respects?	No	
Has the project contributed or could it contribute directly or indirectly to reducing emissions from deforestation or forest degradation? In what way?	To some extent	By its contribution to raising the quality of biodiversity research in the Amazon biome.
2. Transparent and effective structures of national forest governance for national sovereignty and national legislation	**N/A**	
To what extent has the project promoted the articulation between different actors (public, private, third sector or local communities)?	N/A	
To what extent has the project contributed to strengthening public instruments and forest and territorial management processes?	N/A	
3. Respect for the knowledge and rights of indigenous peoples and members of local communities, taking into account relevant international obligations, circumstances and national laws, and noting that the UN General Assembly has adopted the United Nations Declaration on the Rights of Indigenous Peoples.	**N/A**	
To what extent has the project influenced the constitutional rights associated with formal land tenure and destination in your area of operation?	N/A	
To what extent has the project influenced the sustainable use of natural resources in your area of operation?	N/A	
If the project had as its direct beneficiaries, indigenous peoples, traditional communities or family farmers, were their socio-cultural systems and traditional knowledge considered and respected throughout the project?	N/A	
Have there been any effects on the traditional way of life of these groups? What kind of effects: on social, economic organization or the use of available spaces and resources? How do they interfere: positively, negatively, or both?	N/A	
4. Full and effective participation of stakeholders, in particular indigenous peoples and local communities, in the actions referred to in paragraphs 70 and 72 of Decision 1 / CP 16	**N/A**	
How has the project secured prior consent and local or traditional election of representatives for its beneficiaries (especially indigenous peoples and traditional communities)?	N/A	
What participatory planning and management tools did the project apply during planning and decision-making?	N/A	
In the case of projects with economic purposes: were any benefits arising from the project accessed in a fair, transparent and equitable manner by the beneficiaries, avoiding a concentration of resources?	N/A	
To what extent has the project provided the general public and its beneficiaries with free access and simple communication of information related to project actions?	No	

Safeguard/issue	Compliance[32]	Observations
Has the project been able to implement a good result and impact monitoring system? Have the achieved results and their effects been systematically monitored and disseminated?	N/A	
5. Actions have been consistent with conservation of natural forests and biological diversity, ensuring that the actions referred to in paragraph 70 Decision 1 / CP 1611 are not used for the conversion of natural forests, but rather to encourage the protection and conservation of natural forests and their ecosystem services and to improve other social and environmental benefits.	**To some extent**	**Investments in ST&I infrastructure to study the biodiversity of the Amazon biome contribute to its conservation *in situ*.**
How did the project contribute to the expansion or consolidation of protected areas?	N/A	
How did the project contribute to the recovery of deforested or degraded areas?	N/A	
In the case of activities relating to restoration and reforestation, did the methodologies employed prioritize native species?	N/A	
To what extent has the project contributed to establishing recovery models with an emphasis on economic use?	N/A	
6. Actions to address risks of reversals in REDD+ results	**N/A**	
What factors pose risks to the permanence of REDD+ results? How has the project addressed them?	N/A	
7. Actions to reduce carbon emissions displacement to other areas	**N/A**	
Have emissions reduced by project actions shifted to other areas?	N/A	

Table 15 Cancun Safeguards (REDD+) applied to the Biodiversity project

CROSSCUTTING CRITERIA

POVERTY REDUCTION

The project did not directly contribute to poverty reduction. It can be inferred that by enabling studies on biodiversity, regardless of which category it is referring to, the project contributes to *in situ* conservation of biodiversity, with the knowledge generated from the strengthening of academic infrastructure.

Crosscutting criteria/issue	Compliance[33]	Observations
Poverty reduction	**To some extent**	
To what extent has the project effectively contributed to economic alternatives that value the forest standing and sustainable use of natural resources?	N/A	
To what extent has the project positively influenced poverty reduction, social inclusion and improved living conditions of the beneficiaries (mainly: traditional communities, settlers and family farmers) living in your area of operation?	N/A	
Has the project been able to promote and increase production in value chains of timber and non-timber forest products sourced from sustainable management?	N/A	
In the case of a project that contains the scientific and technological development component, has this contributed to the construction of a development model suitable for the region?	To some extent	With the infrastructure installed, the project made it possible to create concrete foundations to boost the bioeconomy in the Amazon.

Table 16 Crosscutting criteria "poverty reduction" applied to the Amazon Bioactive Compounds Project

GENDER EQUALITY

The project did not have an explicitly defined and implemented gender strategy. The involvement of undergraduate and graduate researchers and students was random and spontaneous.

Crosscutting criteria/issue	Compliance[34]	Observations
Gender equality	**No**	
Has the project been able to integrate gender issues into its strategies and interventions or address the issue in isolation? How?	No	The project did not have a clear gender strategy.
Was there gender separation in data collection for project planning and monitoring?	No	
How did the project contribute to gender equality?	N/A	

Table 17 Crosscutting criteria "gender equality" applied to the biodiversity project

33. Crosscutting criteria were not required of projects at the time of submission, so the project may not have developed specific strategies to meet them.

34. See previous footnote.

CONCLUSIONS

It can be concluded that the goals were met for the construction and equipping of CEABIO, as well as the renovation of five laboratories, where most of the biodiversity researchers work.

The institutional commitment of UFPA was well evident in the construction process of the CEABIO and in the renovation of the laboratories of the two academic units - ICB and ICEN.

As it was eminently a project about infrastructure, the project's research results are not evident. However, with the infrastructure installed, there is promising potential to leverage new projects, strengthen and expand new research networks focusing on knowledge generation on Amazonian biodiversity.

Overall, it is concluded that the project, based on the two proposed objectives, fully achieved its goals.

There was little interaction with the other projects of component 4 of the Amazon Fund considering that all of them, in a way, addressed the biodiversity theme in the Amazon biome. There could be more interaction with the Amazon Bioactive Compounds project, which conceptually had a greater interface with this project.

The successful actions under the project have revealed the strategic importance of component 4 of the Amazon Fund in supporting science, technology and innovation initiatives in a biome whose research effort still faces enormous difficulties in terms of infrastructure and qualified human resources.

RECOMMENDATIONS

FOR PROJECT COORDINATORS

- Create an intra-institutional arrangement that implies streamlining of bureaucratic processes so as not to overwhelm the project's physical implementation schedule;
- In order to ensure the necessary financial and managerial sustainability of the physical facilities (building) and equipment purchased, it is necessary to expand and strengthen the University / Company / Development Institution partnerships, thus avoiding that research professors have to use their own resources;
- Seeking private sector demands for biodiversity conservation and the possible products or services it may generate.

FOR THE DEPARTMENT OF ENVIRONMENT AND MANAGEMENT OF THE AMAZON FUND / BNDES

- Maintain and improve the institutional and professional stance of the Amazon Fund / BNDES team to provide flexibility in monitoring the various stages of the project, which implies adaptions and adjustments in the face of unforeseeable situations;
- The Amazon Fund should continue to finance projects that require infrastructure work, equipping and services, but should adopt as one of the criteria for the purpose of project selection, that they present and prove the existence of consolidated research groups organized in networks to ensure project sustainability.

- In the case of projects which involve construction work, the Amazon Fund should require that a strategy be presented, up until the beginning of the final year of the project, guaranteeing the necessary resources to maintain these constructions;
- In case of several scientific projects operating in the same geographical territory, as was the case here, the Amazon Fund could verify and demand that there be structured interaction among them, in order to exchange advances and avoid duplication at the research level.

7.1.2 AMAZON BIOACTIVE COMPOUNDS PROJECT

INTRODUCTION

Project title:	Amazon Bioactive Compounds project
Responsible body (project management):	The Federal University of Pará (UFPA)
Responsible body (financial management):	Research Support and Development Foundation (FADESP)
Project timeframe:	2nd semester 2014 to 1st semester 2018
Territorial scope:	Pará State
Beneficiaries:	UFPA, suppliers of raw materials for the production of bioactive compounds and companies from the Amazon region that work with products derived from bioactive compounds.
Objective:	(i) Install a pilot plant in UFPA's food laboratory to produce and characterize extracts rich in bioactive compounds; and (ii) develop new products and technological applications from bioactive compounds extracted from typical Amazonian plants and fruits.
Total value of the project:	R$1,413,357.00
Value of support provided by the Amazon Fund:	R$1,352,368.48

Tabela 18 Amazon Bioactive Compounds project fact sheet

PROJECT SUMMARY

Its great biological diversity and its rich flora characterize the Amazon rainforest. It is unique in presenting high potential for the production of biocompounds. These substances play a secondary role in plant physiology when compared to macro and micronutrients. However, they are increasingly attracting the interest of cosmetic, pharmaceutical, food and bioinsecticide industries. This is due to their insecticidal, fungicidal and preservative actions; properties known empirically by indigenous and traditional populations.

Research efforts are increasing in order to discover not only the historical and ethno-botanical uses of these compounds, but in particular the aspects of their chemical and biochemical composition. However, this knowledge in the context of Amazon research institutions is still limited. In addition, there is a shortage of academic and scientific infrastructure, and of researchers in the region.

In contrast to this general trend, UFPA's research group in botanical biocompound studies has a long history in this field of scientific research.

The project aimed to implement a pilot plant to boost research on biocompounds. It also focused on the development of botanical extracts obtained from the Amazonian flora, rich in bioactive compounds, and new products that utilize these to add value to the raw materials of the Amazon biome. It also sought to develop a study on 31 Amazonian plant species, among which four were prioritized.

The project's pilot plant was installed at the Centre for Agro-Food Valorisation of Amazonian Bioactive Compounds (CVACBA), corresponding to an area of 200 m² in the Innovation Space, located at the Guamá Science and Technology Park (PST Guamá), on the UFPA campus. The centre is a reference for the bioprospecting of species of the Amazonian flora with potential to provide biocompounds. It works to develop new processes and products. It also provides quality control of botanical products in different sectors, especially food, pharmaceutical, biotechnological and cosmetic, such as in the açaí and cocoa production chains.

The research was developed along two lines: one that involved a partnership with a private company (Amazon Dreams / the Santo Antônio Laboratory - LASA) and a cooperative (Mixed Agricultural Cooperative of Tomé-Açu - CAMTA). In the other, research was conducted only by UFPA, without the participation of private partners, but communicated with research institutions and groups for the development of products and applications.

INTERVENTION LOGIC

Figure 5 shows the intervention logic agreed on by the project executors and the Amazon Fund:

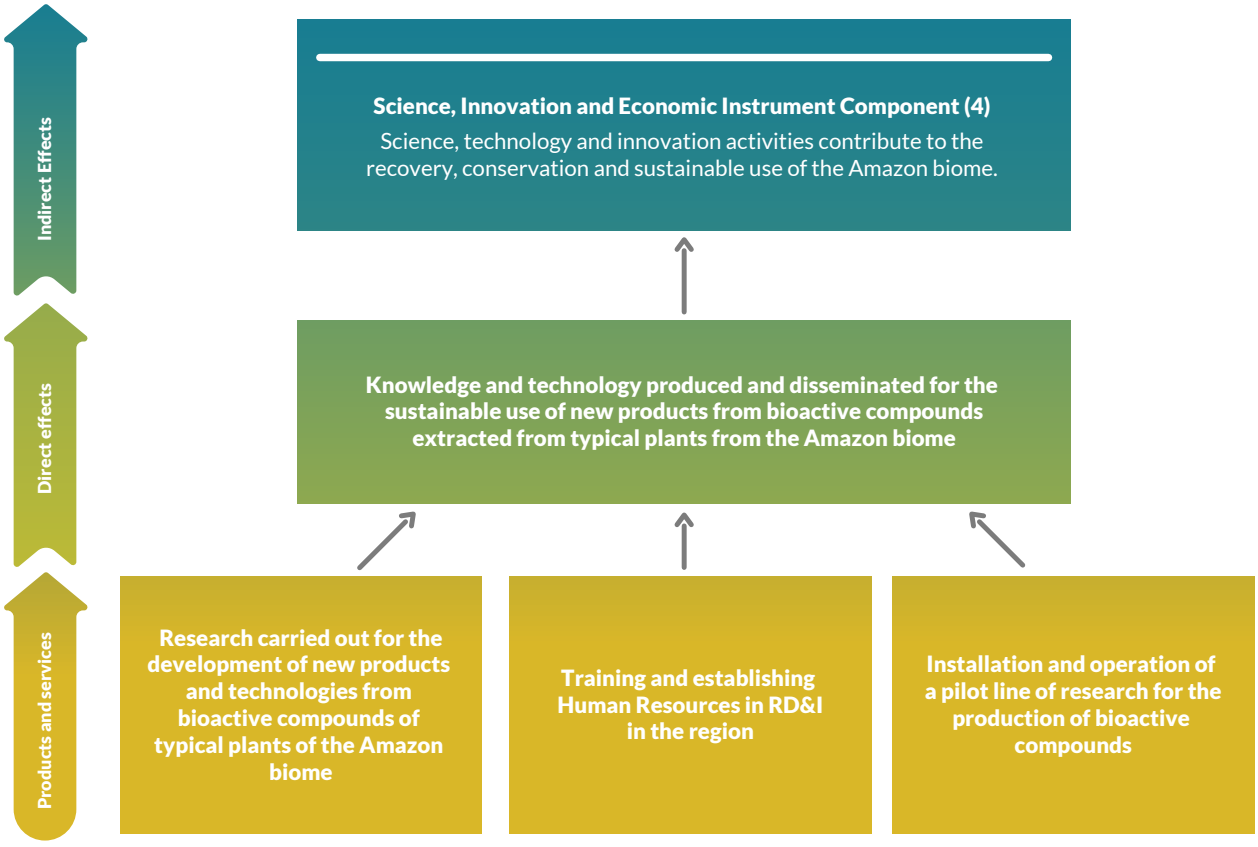


Figure 5 Intervention logic according to the Amazon Bioactive Compounds project logical framework

METHODOLOGY SPECIFICS

GUIDING QUESTIONS

The assessment followed the methodology and criteria described in section 3 of the report. For each individual assessment, specific questions were prepared based on the project's intervention logic (see Figure 5) and the overall objective of the Amazon Fund for this component. With regard to this project, the following questions were asked:

- Installation of the pilot plant, the Agro-Food Laboratory, in the "Innovation Space" / STP-Guamá
  - Questions addressed the contribution of the laboratory construction to the research conducted (usage) and the application of available resources to the actual construction (process).
- Independent research (with no partnerships)
  - Questions addressed the type of scientific output, the dissemination of results, and the degree of collaboration with other research groups.
- Research done in collaboration with *Amazon Dreams* & CAMTA
  - Questions addressed the differences in impact between the University-only research and the research in partnership with outside actors, the degree of innovation and the use of the results by the industry.
- Quantitative Questions
  - Questions addressed the quantitative results in terms of publications, patents, people trained, etc.
- General Questions
  - Questions addressed how research findings influenced public policies and science itself, and how they had aggregate impacts (socio-economic and preservation of the Amazon biome aspects).

ASSESSMENT OF RESULTS

ASSESSMENT OF INDICATORS

The initial step of the individual assessment was to assess the result and impact indicators, which were agreed on with BNDES at the beginning of the project. Table 19 presents the key indicators.

Key indicators	Target	Status at the end of the project
Direct Effect (formerly Specific Objective): Technology and knowledge produced and disseminated for the development of new products from bioactive compounds of typical Amazon biome plants		
• Number of scientific publications o Dissertations o Doctorate theses o Course completion papers o Articles o Scientific initiation reports	Not defined	51 17 2 11 13 8

→

Key indicators	Target	Status at the end of the project
• Number of educational or informative publications	Not defined	35
• Number of new products or technological processes developed being effectively applied	Not defined	6
• Number of new products or technology processes developed	2	10
• Number of researchers and technicians established in the region involved in RD&I activities	9	17
Products and services:		
• Amount invested in RD&I	R$455,771	R$ 85,817.18
• Number of plant species surveyed	30	31
• Laboratory area modernized	160 m²	200 m²
• Amount received for laboratory testing services provided to third parties (effectiveness indicator)	Not defined	R$ 165,248.85

Table 19 Amazon Bioactive Compounds project key indicators

The project investments and study grants financed by the Amazon Fund contributed to the Centre for Valorisation of Amazonian Bioactive Compounds (CVACBA), so that it could provide quality control services for plant products used in the food, pharmaceutical, biotechnology and cosmetics industries. New products were developed, such as reduced fat açaí (light) and a cosmetic formulation containing plant extract.

In addition to the new products, new processing methods were developed for the Tomé-Açu Mixed Agricultural Cooperative (CAMTA) involved in the project. It also passed over technology to the cooperative, improving monitoring and quality of production, notably of açaí and cocoa. A noteworthy example is the optimization of degreasing passion fruit seeds and the extraction of piceatannol, which is a compound with high added-value due to its high antioxidant capacity.

By providing complete infrastructure and research support, as well as the direct involvement of CAMTA with the innovation-driven company Amazon Dreams, the project directly contributed to higher value-added by-products prepared from common fruits, which naturally occur in the region.

THEORY OF CHANGE

Based on the analysis of project performance indicators and reports, and following the methodology presented in item 3 of the report, a theory of change was developed for the project, which was then reviewed before and after the field mission and interviews (Figure 6):

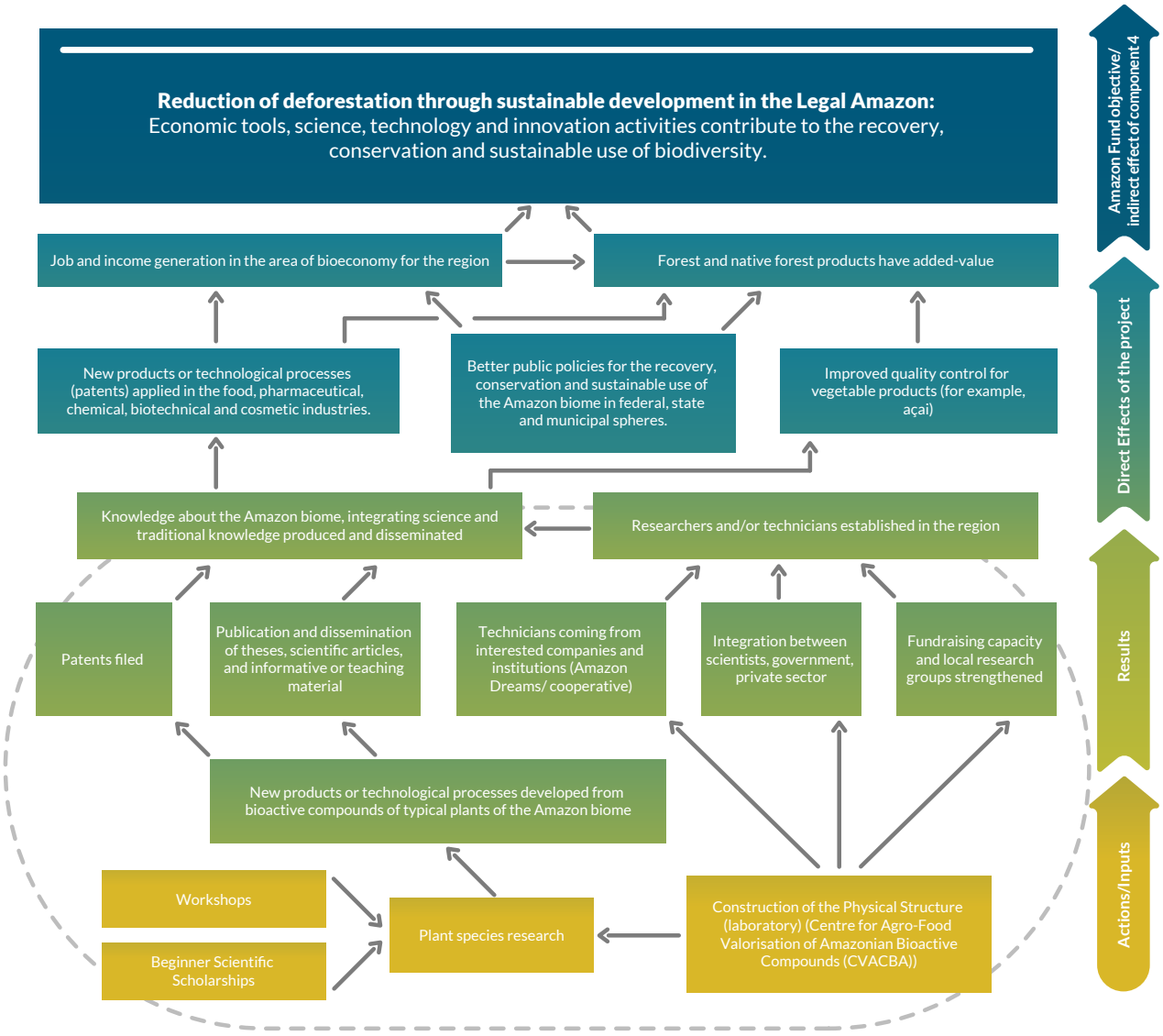


Figure 6 Theory of change of the Amazon Bioactive Compounds project revised after field mission

(The arrows represent the hypotheses, that is, the assumptions regarding the interaction among results; the boxes contain the objective that was negotiated and agreed upon with the Amazon Fund; the space enclosed by the dotted line shows the area of responsibility of the project)

The theory of change of the Amazon Bioactive Compounds project assumed that the three proposed actions (infrastructure; investment in research, development and innovation; and bioprospecting of new plant species) would imply changes in the different phases of the project. These would drive the generation of knowledge about new products and technological processes from biocompounds. In turn resulting in the production of patents and scientific dissemination, resulting in the strengthening of science, technology and innovation and the sustainable use of the Amazon biome.

These grants would contribute to training and retention of researchers, as well as adding value to forest products. These effects would be expected to remain after the end of the project and that their direct effects would indirectly contribute to the objective of the Amazon Fund.

In analysing this project's theory of change (Figure 6), after the field mission being completed, it is observed that:

- the construction of the pilot plant has contributed to the expansion of studies on biocompounds, strengthened training processes and the establishment of new researchers

promoted trainings of technicians from partner companies, as well as the dynamization of multi-institutional cooperation networks, including associations and private companies;

- the bioprospecting of botanical species has led to the development and dissemination of new product technologies of bioactive compounds sourced from Amazonian flora;
- by contributing to the enhancement of the value chains of products derived from the flora of the Amazon biome, the project indirectly contributed to the achievement of the objective of the Amazon Fund, which seeks to reduce deforestation and promote sustainable development in the Amazon;
- Construction of the pilot plant was delayed for four years, not conforming to the project schedule, causing the need for reallocation of financial resources, as part of the planned equipment had been required by other CVACBA projects, at the same time as the laboratory would have been equipped. This was also due to the changing demands on innovations during this period. Part of the redeployed resources were used to implement intelligent fire prevention systems, considered a priority, due to a fire that destroyed part of CVACBA's facilities and equipment in 2012;
- CVACBA's compliance process with ISO 17025[35] and accreditation by the National Institute of Metrology, Quality and Technology (Inmetro) allowed it to become the first national reference centre for bioactive and food product validation. It is one extremely important factor in the internationalization of Amazonian research. This was not a planned action, so it was not included in the original theory of change, but has brought positive effects for the project.
- The strengthening of the Agro-Food Laboratory allowed açaí tests to be performed to check for the presence of the protist *Trypanosoma cruzi* (Chagas disease).

In its implementation, the project adopted two strategies: (i) conducting pilot research on bioactive compounds for bioprospecting, physicochemical characterization, stability assessment and quality control, without the participation of partner institutions, and (ii) research along the same lines, in which products were characterized by purity, antioxidant capacity, functionality and chemical stability, involving two external organizations, namely, Amazon Dreams and CAMTA. This strategy proved successful for two reasons: firstly, the long trajectory of the research group, which was focused on bioactive compounds of Amazonian plants, made it possible, at first, to conduct studies without partners. Secondly, it improved the scientific dissemination strategy in different technological facilities and applications, such as was the case with the development of reduced fat (light) açaí.

No results were observed from the conducting of socio-economic and environmental impact studies, which resulted from leaf and fruit collection activities in the field mission, as foreseen in the original project.

IMPACT, SUSTAINABILITY AND RELEVANCE

The assessment of impacts achieved (including an unexpected positive impact, the strengthening of funding and resources), their relevance and sustainability after the conclusion of the project can be seen below:

35. This an exclusive standard for testing and calibration laboratories. It has the function of internationally standardizing testing processes. No matter where in the world they are, if two seperate laboratories are certified by this standard, the results obtained by them will be the same.

RESEARCHERS AND TECHNICIANS ESTABLISHED IN THE REGION

One of the most relevant impacts of the Amazon Bioactive Compounds project was that it contributed to the strengthening of the research group and CVACBA. The Centre is expected to become, after full compliance with ISO 17025 and accreditation by Inmetro, the first national reference centre for bioactive and food product validation, such as açaí and other antioxidant-rich products. This is in addition to playing an important role in the production of scientific and technological knowledge applied to the conservation and sustainable use of Amazonian flora resources. Thus, the innovation services provided by CVACBA to small producers, associations, cooperatives, public and private companies will follow the requirements of this standard.

The project has contributed significantly to the establishment of 17 researchers in the region, five in 2016, six in 2017 and another six in 2018. Likewise, it provided training to 28 people in plant collection and processing techniques of the Amazonian flora.

In addition to 35 pedagogical publications, 51 scientific publications were produced through the project, including scientific initiation reports (8), course completion papers (11), master's dissertations (17), doctoral theses (2), articles in indexed journals (13) and two patents. These publications focused on different aspects of knowledge about bioactive compounds of plants with potential economic interest, especially açaí *(Euterpe oleracea)*, cocoa *(Theobroma cacao var. foarteiro)*, muruci *(Byrsonima crassifolia)*, embaúba *(Cecropia obtusa)*, ingá-lipo *(Inga edulis)* and passion fruit *(Passiflora edulis)*. Research continues on these species, such as the use of biomarkers in humans and their functionalities.

Of the total articles published, three deserve attention for the number of citations they have generated, according to Google Scholar (accessed June 2019), demonstrating the relevance and impact of these pieces of research:

1. SILVA, E.M.; SOUZA, J.N.S.; ROGEZ, H.; REES, J-F.; LARONDELLE, Y. Antioxidant activities and polyphenolic contents of fifteen selected plant species from the Amazonian Region. *Food chemistry*, [s.l.], v. 101, [s.n.], p. 1012-1018, 2007. (415 citations)
2. ROGEZ, H.; BUXANT, R.; MIGNOLET, E.; SOUZA, J.N.S.; SILVA, E.M.; LARONDELLE, Y. Chemical composition of the pulp of three typical Amazonian fruits: araça-boi (*Eugenia stipitata*), bacuri (*Platonia insignis*) and cupuaçu (*Theobroma grandiflorum*). *European Food Research and Technology*, [s.l.], v. 218, [s.n.], p. 380-384, 2004. (75 citations)
3. SOUZA, J.N.S.; SILVA, E.M.; LOIR, A.; ROGEZ, H.; REES, J-F.; LARONDELLE, Y. Antioxidant capacity of four polyphenol-rich Amazonian plant extracts: a correlation study using chemical and biological in vitro assays. *Food chemistry*, [s.l.], v. 106, p. 331-339, 2008. (105 citations)

The project enabled the creation and filing of two patents in the invention and utility categories:

1. Invention Patent. Registration number: BR1020180037722, title: “PROCESSING FRUIT PULP OF THE GENUS EUTERPE AND THEIR DERIVATIVES PRESERVING AUTOCHTHONOUS OR ALLOCHTHONOUS MICROBIAL AGENTS WITH FUNCTIONAL PROPERTIES”. Registration Institution: INPI - National Institute of Industrial Property. Solicited: 26/02/2018.

2. Utility Model Patent. Registration number: BR2020170123419, title: "DEVICES FOR COLLECTION OF GAS SAMPLES PRODUCED IN OPEN SYSTEM FERMENTATIVE PROCESSES". Registration Institution: INPI - National Institute of Industrial Property. Solicited: 09/06/2017;

NEW TECHNOLOGICAL PRODUCTS (PATENTS) APPLIED IN THE BIOTECHNOLOGY INDUSTRY IN THE AMAZON

Scientific research undertaken by science institutions in Brazil and in particular the Amazon, have not always resulted in the generation of patents or practical applications by potential stakeholders. For this reason, relevance of the project is noteworthy, as over the course of the project two patents have been registered.

The first patent, in the "Utility Model" category, refers to the development of "Devices for collecting gas samples produced in open system fermentation processes". The second patent, in the category "Invention", is entitled "Processing of fruit pulp of the genus Euterpe and their derivatives preserving autochthonous or allochthonous microbial agents with functional properties".

IMPROVED PUBLIC POLICIES FOR THE RECOVERY, CONSERVATION AND SUSTAINABLE USE OF THE AMAZON BIOME AT FEDERAL, STATE AND MUNICIPAL LEVELS

The project has contributed to three public policies: (i) Normative Instruction No. 37 of 01/10/18, from the Ministry of Agriculture, Livestock and Food Supply (MAPA) / State Secretary of Public Health (SESPA); (ii) Letter from Macapá, result of the 17th Forum of Governors of the Legal Amazon (28-29/03/2019); and (iii) National System of Genetic Heritage Management and Associated Traditional Knowledge (SisGen), of the Ministry of Environment (MMA).

The Normative Instruction was created through the combined efforts of the CVACBA, private companies, documented açaí preparers and producers, the Ministry of Agriculture, Livestock and Supply (MAPA) and the Pará State Department of Health (SESPA), to change the quality and identity standards for the açaí drink, and drew on the results of studies carried out by the project to define such quality and identity standards.

Thus, the Normative Instruction defines for the first time what is "clarified açaí" and "dehydrated açaí" ("light"), which are products of higher added-value, differentiating them from the simple "açaí" pulp. It also establishes a minimum antioxidant content for all three types of açaí. By establishing a profile of phenolic compounds to be found in any açaí sample, IN contributes to preventing the misuse of artificial colours, ensuring the authenticity of açaí products. Therefore, it contributes to the strengthening of value chains and the sustainability of the açaí market.

A second contribution to public policy was the inclusion of the bioeconomy theme in the document "Carta de Macapá (Letter from Macapá)", which was attended by the governors of the states of the Legal Amazon. Point 4.4 of this document stipulates "The states of the Legal Amazon will work together to promote an innovative ecosystem among the member states in the Legal Amazon with an emphasis on the region's bioeconomy".

A third public policy that the project has influenced concerns changes in legislation of the National Genetic Heritage Management System and Associated Traditional Knowledge (SisGen), in an action integrated with the Brazilian Society for the Progress of Science (SBPC), the Brazilian Biotechnology Society (SBB), the Amazon Biotechnology Centre (CBA), among others. The action sought to simplify processes so not to unduly harm the private sector, recognizing its role in investing in innovation with Brazilian living material.

One of the aspects to be considered in the sustainability assessment of a project based on scientific research is the analysis of its degree of capillarity in relation to partner institutions and its potential to attract new funding.

CVACBA's research team has a long history of developing integrated research, involving partnerships with institutions and companies and, therefore, raising funding.

INTEGRATION BETWEEN SCIENTISTS, GOVERNMENT, THE PRIVATE SECTOR, TRADITIONAL COMMUNITIES AND LOCAL RESIDENTS

In conjunction with the company *Amazon Dreams*[36] and the cooperative CAMTA, bioactive compounds were produced in pilot scale, in addition to the optimization and development of new processes. The new technological applications were conceived from the development of products obtained from Amazonian fruit residues such as açaí, cocoa (seeds), passion fruit, muruci and ingá-cipo (leaves). Thus, the main compounds present in these fruits were identified and characterized. Topical creams have been developed, and tested as natural antioxidants to prevent the degradation of food oils. Along with CAMTA, cocoa beans with added-value were obtained, and together with *Amazon Dreams*, capsules of compounds extracted from açaí were developed.

Prior to the project, these partnerships, during their execution, were fundamental for the production and analysis of bioactive compounds, which contributed to circumvent the delay in the acquisition and delivery of some equipment, resulting from bureaucratic problems.

Some of the equipment (hydraulic press, pulping machine, etc.) was only purchased and delivered in the last semester of the project (2018). This caused the coordination to use the pilot plant provided by *Amazon Dreams* to perform some of the analyses, such as extraction, purification, concentration and fractionation of bioactive compounds. Thus, when evaluating the antioxidant capacity in the dermis permeability tests with açaí, annatto, muruci leaf and embaúba extracts, these extracts needed to be processed in the *Amazon Dreams* pilot plant.

In order to integrate scientists, government, and the private sector, the Amazon Bioactive Compounds project contributed to the formation of three networks of cooperation:

(i) Integrated Network of Biotechnology Graduate Programs for the Scientific, Technological, Innovation and Resource-Building of the Cocoa Supply Chain (BIOCAU Network), involving three institutions and 14 researchers;

(ii) Network for optimization and use of analytical methods for cocoa and chocolate traceability and authentication (WBI / CAPES Network), involving four institutions, two in Belgium and two in Brazil, and nine researchers;

36. Later: LASA.

(iii) Brazilian Company Research and Industrial Innovation Network (EMBRAPII), involving six institutions, most notably the Centre for Advanced Amazonian Studies (NAEA / UFPA), and 33 researchers.

Specifically with EMBRAPII, the formation of this network enabled the creation of an Industrial Innovation unit in Belém, in the Amazon Bioeconomy.

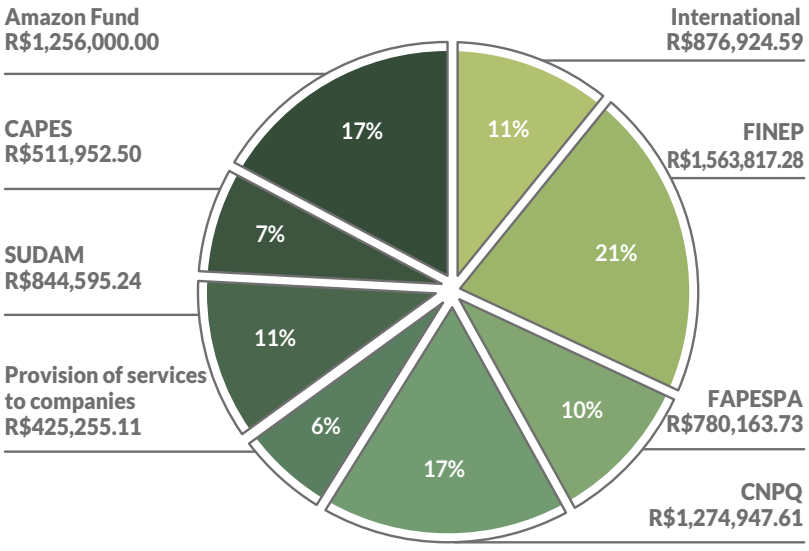
Of the technical-scientific cooperation networks initially foreseen in the project, only one was not effective: National Innovation Network on Agroindustrial and Agri-Food Biotechnology of the National Institute of Science and Technology (RENAABIO / INCT).

Integration into these networks and interaction with the private sector is likely to contribute in the future to the continued advancement of research and the development of new competitive processes and products for the market.

Another relevant aspect in the context of project sustainability concerns the development of new products resulting from this research effort in technological innovation. In 2018, after project closure, other products were developed, including new mix juices, sorbets and a new açaí powder.

FUNDRAISING FOR NEW PROJECTS IN THE BIOACTIVE SECTOR

The Amazon Fund contributed 17% of the budget of all projects coordinated by CVACBA, which also have other sources of funding (Graph 2). This demonstrates a major role in fundraising, with reduced reliance on a single source of funding. The international visibility of the Amazon Fund has also helped to expand the potential for new funding, which aids in the continuity of research.



Graph 2 The participation of the Amazon Fund in the percentage allocation of funds raised by CVACBA / UFPA (excluding civil construction, scholarships and salaries). Source: Academic Memorial – Prof. Hervé Louis Ghislain Rogez.

Assessing the sustainability and replicability potential of scientific and technological development efforts in biodiversity and bioactive compounds, CVACBA adopted a strategy for complementing infrastructure and knowledge transfer by collaborating to create a cocoa innovation hub in Altamira (PA), and a project with the Federal University of Western Pará (UFOPA), in Santarém, leading to the integration of a new group of actors.

By prioritizing the enhancement of biodiversity products, such as the açaí and cocoa value chains, the project contributed to the Amazon Fund's strategic objectives.

In turn, by contributing to the valorisation of species in the production chains, the project, even indirectly, helped to reduce deforestation and forest degradation (REDD+) emissions and the implementation of the Action Plan for Prevention and Control of Legal Deforestation in the Legal Amazon (PPCDAm).

EFFECTIVENESS

In terms of effectiveness, all the project's proposed products and services were fully realized, especially in the generation of patents, a differential when compared to other scientific and technological development projects supported by the Amazon Fund.

By enabling two patents in the categories "Invention Patent" and "Utility Model" as a practical result of the scientific research process, the project showed it is possible to strike a balance between basic and applied science. This is because it did not compromise other levels of construction of knowledge, as is appropriate when conducting science.

It is noteworthy that the infrastructure adequacy was because the production equipment (organic waste generators that require washing with a lot of water) are incompatible with the analytical equipment. Thus, it was necessary to separate the washing and drying processes from those of monitoring, which led to the physical separation of the respective equipment. With this arrangement, the project gained effectiveness in its procedures.

The CVACBA integration process with *Amazon Dreams* and CAMTA contributed to meeting the targets, despite the bureaucratic obstacles that resulted in the late delivery of some equipment.

EFFICIENCY

The late delivery of some equipment caused by the University's bureaucratic delays did not compromise the implementation of the different stages of the project. In turn, the investments made in the installation of the pilot plant made the development of new processes possible, both for the private sector (rendering services through FADESP) and for the public sector.

The project coordination also sought to minimize the bureaucratic obstacles faced in the different stages of the innovation process and access to genetic heritage through the promotion of interinstitutional partnerships.

In turn, the flexibility of the Amazon Fund team that monitored the project, as witnessed by both the project and FADESP, contributed to a more efficient project management. Although project coordination has filled out reports for the Amazon Fund rigorously, there has been confusion about the records of research findings and project results themselves.

MANAGEMENT ARRANGEMENT WITH FADESP

The arrangement with FADESP worked well. Regarding the procedures, the transfers were performed according to schedule, but there was difficulty in the acquisition of some equipment due to problems with suppliers.

CANCUN SAFEGUARDS (REDD+)

The project's compliance with the Cancun Safeguards agreed by the United Nations Framework Convention on Climate Change for actions to reduce greenhouse gas emissions resulting from deforestation and forest degradation materialized in its two objectives (Table 20).

Safeguard/ issue	Compliance[37]	Observations
1. Actions complementary or consistent with the objectives of national forest programs and other relevant international conventions and agreements.	**To some extent**	
Has the project proved to be in line with PPCDAm and state deforestation prevention and control plans?	To some extent	By contributing to the valorisation of species in production chains, the project, even indirectly, helped to implement the Action Plan for the Prevention and Control of Deforestation in the Legal Amazon (PPCDAm).
With which other federal public policies or international agreements has the project demonstrated alignment? In what respects?	To some extent	The project influenced the adaptation of sectorial public policies focusing on bioeconomics. In this context, observing the United Nations (SDG) Sustainable Development Goals, the project assumes relevance in dialogue with the SDGs 1, 2 and 13, respectively, regarding the elimination of poverty in all its forms, such as ending food insecurity and the fight against climate change.
Has the project contributed or could it contribute directly or indirectly to reducing emissions from deforestation or forest degradation? In what way?	To some extent	By contributing to the enhancement of biodiversity products from the Amazon biome, the project, even indirectly, has helped to reduce emissions from deforestation and forest degradation (REDD+).
2. Transparent and effective national forest governance structures, taking into account national sovereignty and national legislation	**To some extent**	
To what extent has the project promoted the articulation between various actors (public, private, third sector or local communities)?	Yes	Establishing new partnerships between the university and the private sector *(Amazon Dreams)* and local communities through CAMTA.
To what extent has the project contributed to strengthening public instruments and forest and territorial management processes?	No	
3. Respect for the knowledge and rights of indigenous peoples and members of local communities, taking into account relevant international obligations, circumstances and national laws, and noting that the UN General Assembly has adopted the United Nations Declaration on the Rights of Indigenous Peoples.	**To some extent**	
To what extent has the project influenced the constitutional rights associated with formal land tenure and allocation in your area?	N/A	
To what extent has the project influenced the sustainable use of natural resources in your area?	Yes	Has contributed to the strengthening of the productive chains of the Amazonian flora.
If the project had indigenous peoples, traditional communities or family farmers as its direct beneficiaries, were their socio-cultural systems and traditional knowledge considered and respected throughout the project?	N/A	
Are there outcomes that interfere with the traditional way of life of these groups? What kind of effects: on social, economic organization or the use of available spaces and resources? How do they interfere: positively, negatively, or both?	N/A	

→

37. These safeguards were not required of projects at the time of submission, so the project may not have developed specific strategies to address them.

Safeguard/ issue	Compliance[37]	Observations
4. Full and effective participation of stakeholders, in particular indigenous peoples and local communities, in the actions referred to in paragraphs 70 and 72 of Decision 1 / CP 16	**N/A**	
How has the project secured prior consent and local or traditional election of representatives for its beneficiaries (especially indigenous peoples and traditional communities)?	N/A	
What participatory planning and management tools did the project apply during planning and decision-making?	N/A	
In the case of projects with economic purposes: were the benefits arising from the project accessed in a fair, transparent and equitable manner by the beneficiaries, avoiding a concentration of resources?	N/A	
To what extent has the project provided the general public and its beneficiaries with free access and easy understanding of information related to project actions?	Yes	Through dissemination in different media to various types of public.
Has the project been able to set up an efficient result and impact monitoring system? Have the achieved results and their effects been systematically monitored and disseminated?	Yes	The project fully met the requirements of the Amazon Fund.
5. Actions consistent with the conservation of natural forests and biological diversity, ensuring that the actions referred to in paragraph 70 Decision 1 / CP 1611 are not used for the conversion of natural forests, but rather to encourage the protection and conservation of natural forests and their ecosystem services and to improve other social and environmental benefits	**To some extent**	**Research efforts that have resulted in the economic valorisation of botanical species have contributed to the sustainable use and conservation of forest species.**
How did the project contribute to the expansion or consolidation of protected areas?	N/A	
How did the project contribute to the recovery of deforested or degraded areas?	N/A	
In the case of area restoration and reforestation activities, did the methodologies employed prioritize native species?	N/A	
To what extent has, the project contributed to establishing recovery models with an emphasis on economic use.	To some extent	By generating knowledge about the relevance of the bio compounds of the Amazonian flora.
6. Actions to address the risk of reversal in REDD+ results	**N/A**	**The project does not include direct impact actions that aim to assess the risks of REDD+ reversals.**
What factors pose risks to the permanence of REDD+ results? How did the project address them?	N/A	
7. Actions taken to reduce carbon displacement to other areas	**N/A**	
Have emissions reduced by project actions shifted to other areas?	No	

Table 20 Cancun Safeguards (REDD+) applied to the Amazon Bioactive Compounds project

CROSSCUTTING CRITERIA

POVERTY REDUCTION

By focusing studies on four botanical species with emphasis on açaí *(Euterpe oleraceae)*, which is an important source of food and income in the state - the Belém metropolitan region alone has about 7,000 registered açaí preparers - the project contributed to reducing the effects of rural poverty and hunger in all its variants.

In addition to direct studies with açaí, the project raised awareness and certified 130 preparers with the "açaí bom" seal, which guarantees the adoption of good practices in the açaí chain. The purpose of the project in certifying these 130 preparers is to have a multiplier effect through the formation of potential trainers - for example, some of the certified preparers work for courses offered by the Belém city administration in Casa do Açaí (Açaí House).

The project has contributed to this segment, even indirectly, to the valorisation of the productive chains in the cosmetics, pharmaceutical and food markets. This allows for an increase in financial resources in the states of the Amazon, through direct and indirect taxes, also reflecting the generation of employment and income for farmers and extractivists.

Crosscutting criteria/issue	Compliance[38]	Observations
Poverty reduction		
To what extent has the project effectively contributed to economic alternatives that value standing forest and sustainable use of natural resources?	To some extent	The project contributed to the economic valorisation of Amazonian biodiversity by-products.
To what extent has the project positively influenced poverty reduction, social inclusion and improved living conditions of the beneficiaries (mainly: traditional communities, settlers and family farmers) living in their area?	To some extent	The numerous partnerships (cooperation networks) generated by the project contributed to the generation of jobs in companies (mainly food companies) reflecting in the increase of family farmers income.
Has the project been able to promote and increase production in value chains of timber and non-timber forest products sourced from sustainable management?	To some extent	Studies with açaí, as an important source of food and income, contributed to the strengthening of the value chain.
In the case of projects that contain the scientific and technological development component, has this contributed to the construction of a development model suitable for the region?	To some extent	The project contributed to the consolidation of the Amazon Bioeconomy network.

Table 21 Crosscutting criteria "poverty reduction" applied to the Amazon Bioactive Compounds project

GENDER EQUALITY

The project did not have any specific gender equality strategy. It is evident that within the group of people involved in training actions and implementation of different stages of the project, woman and men participated indistinctly. There was no priority given to this issue in any of the segments.

38. Crosscutting criteria were not required of projects at the time of submission, so the project may not have developed specific strategies to meet them.

Crosscutting criteria/issue	Compliance[39]	Observations
Gender equality		
Has the project been able to integrate gender issues into its strategies and interventions or address the issue in isolation? How?	N/A	
Was there gender separation in data collection for project planning and monitoring?	N/A	
How did the project contribute to gender equality?	N/A	

Table 22 Crosscutting criteria "gender equality" applied to the Amazon Bioactive Compounds project

CONCLUSIONS

Studies with bioactive compounds from the Amazon, based on botanical species of great importance for the bioeconomy in this region, contributed to improving knowledge of biocompounds of species that make up the main economic value chains.

With regard to the production and analysis of bioactive compounds of botanical species of the Amazonian flora, the conclusion is that the results generated contributed to the knowledge of the economic potential for the cosmetics sector (antioxidant and photoprotective action) and the food sector (*light* açaí), therefore resulting in the strengthening of its value chain.

It can be concluded that the installation of the pilot plant contributed to improving the quality of research and product development at different stages of the project. Arrangements and adaptations in physical facilities, whether to house new equipment or improve their layout, were fundamental for designing UFPA's food laboratory, providing a level of excellence in biocompound analysis in the Amazon.

The strengthening of the analytical infrastructure has enabled the development of new research such as bioprospecting and other projects that have benefited from the pilot plant.

Although not explicitly defined in the objectives, this project is one of academic research and development conducted in an institute of learning, university research and extension. By mobilizing the academic community, the project contributed to the formation, qualification and establishment of human resources at all academic levels, with the consequent production of knowledge published in different media.

In the context of academic intervention, the project contributed to the strengthening of postgraduate programmes, resulting in an improvement in the CAPES rating from grade 4 (GOOD) to grade 5 (VERY GOOD). The project positively affected the criterion of "infrastructure" (with 18% weight in CAPES overall assessment) and "scientific output" (with 16% weight in CAPES overall assessment) of the Biotechnology Graduate Programme.

39. See previous foootnote.

The generation of patents in the categories "Invention Patent" and "Utility Model" resulted from this concerted and robust production of knowledge from research done on Amazonian flora biocompounds.

It was also concluded that the governance arrangement minimized the effects of delivery delays and installation of equipment purchased for the pilot plant.

The project made a significant contribution to the strengthening of technical-scientific cooperation networks and in the elaboration of public policies. One of these initiatives, which resulted in changes in the quality and identity standards for the açaí drink, was fundamental in giving more security and transparency to the açaí's trade networks in its various aspects, especially for light açaí.

The influence of the project on changes made to the SisGen legislation is another factor that highlights improvements in public policies on biodiversity, given the large amount of bureaucracy involved in biodiversity research in the region, which may inhibit initiatives from both academia and the private sector.

Overall, it has been determined that the project, based on the two proposed objectives, fully achieved its targets and went even further in its cooperation and integration networks, by demonstrating promising working relationships regarding university / private company partnerships. Therefore, the project has contributed to the sustainable development and bioeconomy in the Amazon.

With regard to the Cancun Safeguards (REDD+), it can be concluded that the project partially met the criteria by contributing to the articulation and training of public and private sectors and segments of civil society in terms of the value given to traditional knowledge and conservation of biodiversity. Similarly, it partially met the criteria in relation to poverty reduction by contributing to the valorisation of the productive chains of botanical species of high economic interest.

The successful actions achieved by the project have revealed the strategic importance of the Amazon Fund component 4, in a biome where research efforts still face enormous difficulties in terms of infrastructure and qualified human resources.

The Amazon Fund, by providing funding resources for the broadening and strengthening of studies on the Amazon biome, plays an extremely important role in the ST&I agenda and, consequently, in the conservation of Amazonian biodiversity.

RECOMMENDATIONS

FOR PROJECT COORDINATORS

- Create an intra-institutional arrangement that implies the establishment of partnerships in order to minimize the bureaucratic obstacles inherent to the administration and operation of a public university;
- Expand and strengthen university / business partnerships to build on an institutional "culture" of mutually favourable cooperation, break resistance from the academic and business world and facilitate the raising of private funds such as with the Açaí Solidarity Fund[40];

40. Açaí Solidarity Fund is a social technology that has the strategic objective of guaranteeing the autonomy and financial sustainability of the açaí producing communities in the state of Pará.

- Strengthen current cooperation networks with emphasis on the EMBRAPII network to ensure the sustainability of research agendas and technological innovations;
- Improve the dissemination strategy of information produced and environmental legislation. This could be via a knowledge production platform, focusing on different segments with potential interest in the theme, such as the arrangement of açaí berry production and other biodiversity products. In addition, focusing on organizations that work with biodiversity resources and which depend on qualified personnel to fill out SisGEN forms,
- Insert postgraduate programmes into the formatting of research and development projects as part of the strategy of mobilization and involvement of academia (faculty and students) in the bioeconomy agenda.

FOR THE DEPARTMENT OF ENVIRONMENT AND MANAGEMENT OF THE AMAZON FUND / BNDES

- Promote events (business roundtables, workshops, etc.) that could bring together researchers working in different fields of study on bioactive compounds, different segments of the private sector and others interested in cooperatively building new arrangements and models for partnerships including grassroots organizations and cooperatives.
- To avoid misunderstanding research findings and records of project results, this matter should be evaluated by the Amazon Fund's team, as to whether or not adjustments need to be made to the component 4 form.

7.1.3 MANGROVE FOREST PROJECT

INTRODUCTION

Project title:	Mangrove Forest project
Responsible body (project management):	The Federal University of Pará (UFPA)
Responsible body (financial management):	Research Support and Development Foundation (FADESP)
Project timeframe:	1st semester 2013 to 3rd semester 2017
Territorial scope:	Municipality of Bragança, state of Pará
Beneficiaries:	UFPA, the scientific community, traditional communities of Tamatateua and Taperaçu of the Caeté-Taperaçu Marine Extractive Reserve and other communities in the region.
Objective:	(i) Construction and equipment of a mangrove ecology research laboratory at UFPA campus in Bragança (PA); (ii) research and development of knowledge and techniques related to the recovery of degraded mangrove areas in the northern region; and (iii) development of models for biomass estimation, carbon s equestration and mangrove forest carbon stock assessment.
Total value of the project:	R$1,982,143.00
Value of the support provided by the Amazon Fund:	R$1,982,143.00

Table 23 Mangrove Forest project fact sheet

PROJECT SUMMARY

The ecosystem, which was included in the Mangrove Forests project, is a continuous stretch of mangrove forest, comprising a coastline of 650 km in northeast Pará and northwest of Maranhão. It corresponds to 80% of all Brazil's mangroves. Therefore, it is an important coastal marine ecosystem. It requires preservation for its ecological functions and environmental services that it provides for organisms that depend on it and for the community in general. The complexity of these ecosystem services, expressed in carbon sequestration and storage and in providing breeding niches and shelter for various terrestrial and aquatic species, reveals the important potential of this ecosystem, especially in being an ecological fresh to saltwater transition region.

The project aimed to implement laboratory infrastructure on the campus of UFPA in the municipality of Bragança (PA) and to understand the extent of ecosystem services provided by

mangrove forest, and implement actions to recover degraded areas from human intervention, seeking to make traditional populations aware of the importance of conserving the forest for their own survival.

The project's area of study was the Caeté-Taperaçu Marine Extractive Reserve (RESEX), located in northeastern Pará, encompassing two traditional RESEX communities, Tamatateua and Taperaçu-Campo. Another area of study was around the PA-458 state highway in Bragança, Pará state, Brazil.

Bioecological and population dynamic studies of the uçá crab, an important source of income and food of the local population, proved to be extremely important for the conservation and management of this arthropod. Also noteworthy is the contribution of the project to the recovery of degraded areas and reforestation through innovative planting techniques. Several recovery activities took place involving the local population, which distinguishes it from the other projects evaluated in component 4.

From this socio-environmental standpoint, the project takes on relevance in the context of the United Nations (SDG) Sustainable Development Goals, in dialogue with SDGs 1, 2 and 13, respectively, to eliminate poverty in all its forms, to end food insecurity and combat climate change.

INTERVENTION LOGIC

Figure 7 presents the intervention logic agreed on between the project executors and the Amazon Fund:

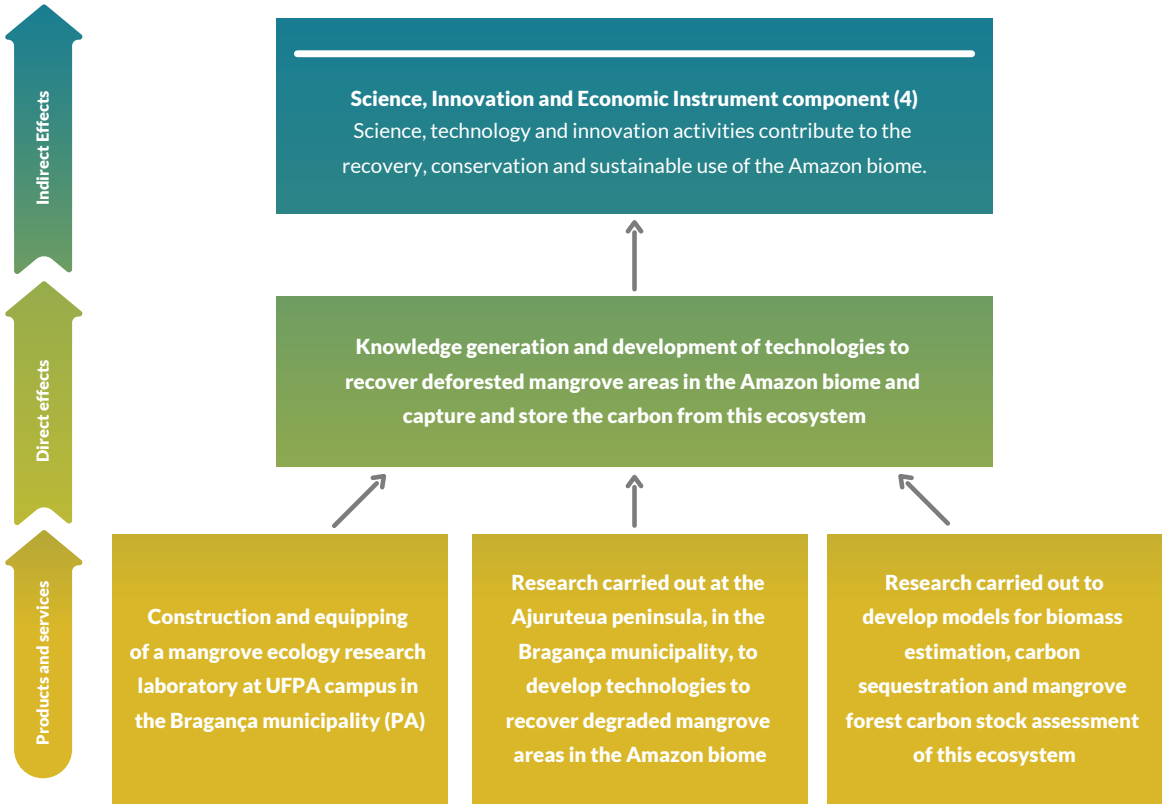


Figure 7 Intervention logic according to Mangrove Forests project logical framework

METHODOLOGY SPECIFICS

The assessment followed the methodology and evaluation criteria described in section 3 of the report. For each individual assessment, specific questions were created based on the project's intervention logic (see Figure 7) and the overall objective of the Amazon Fund in this component. In the case of this assessment, questions were prepared for the following topics:

- Production, dissemination and availability of the scientific knowledge produced;
- Interaction with the local population and dialogue with other audiences;
- Dialogue with environmental agencies and influence on local public policies;
- Research contribution to REDD+ policy.

In the initial data collection, semi-structured consultations and interviews were prioritized with the project coordination and members of the academia, the Taperaçu-Campo community leaders in the Caeté-Taperaçu Marine Extractive Reserve, managers of the Research Support and Development Foundation (FADESP) and of the Pará State Department of the Environment and Sustainability (SEMAS).

ASSESSMENTS OF RESULTS

ASSESSMENT OF INDICATORS

In the first step of the individual assessment, the results and impacts indicators were evaluated, which were agreed on with BNDES at the beginning of the project. Table 24 shows the key indicators.

Key indicators	Target	Status at the end of the project
Direct Effect (former Specific Objective): Knowledge generation and development of technologies for the recovery of mangrove deforested areas in the Amazon biome and carbon capture and storage in this ecosystem		
• Number of scientific publications o Dissertations o Doctoral theses o Course completion papers o Articles		19 7 5 4 3
• Number of educational or informative publications (books and book chapters)	Not defined	1
• Number of researchers and technicians established in the region involved in RD&I activities	15	22 (21 researchers and 1 technician)

→

Key indicators	Target	Status at the end of the project
Products and services		
• Replanted area (hectares)	5.7	9
• Measurement of number of seedlings produced	40,000	55,400 seedlings and 5,000 propagating materials planted
• Measurement of the amount of carbon captured and stored in mangrove areas effectively reforested by the technologies developed by the project.	Not defined	Allometric equations were generated for calculations of biomass containing mangrove and carbon stock sequestered and stored in the Amazon mangroves.
• Laboratory area constructed	325 m²	325 m²
• Equipment installed	N	15
• Amount invested in infrastructure (R$)	R$ 897,819	R$ 690,370.28

Table 24 Mangrove Forest project key indicators

The expansion of the laboratory infrastructure and the acquisition of equipment proved to be advantageous for the production of knowledge and technology development, with the publication of theses, scientific articles, pedagogical publications and the creation of new products or technological processes.

The vehicle purchased with project resources enabled field research that was not previously possible. The new auditorium offers a more suitable space for defences of monographs, dissertations and theses, and also lectures and courses. The physical structure of the laboratory made it possible to host researchers and develop research, promoting an increase in the potential for more human resources and an expansion in the research and extension horizon.

In addition to the construction of the laboratory, which is fundamental for the development of research lines in the areas of mangrove forest ecology and socio-environmental studies of the populations that inhabit them, it is worth highlighting the planting of 60,400 seedlings and propagation material in nine hectares of the Bragança region, the largest degraded area of mangrove swamps on the Brazilian Amazon coast. This replanting was a breakthrough not only in developing technologies for the recovery of degraded mangrove swamps, but also in restoring the ecological functions and services that this ecosystem provides to the community.

The information generated by the project had an impact both on improving knowledge about the mangrove system and on actions taken with the community through practices and courses.

Likewise, the results obtained served as a subsidy for the management plan of the Caeté-Taperaçu Marine Extractive Reserve, promoting sustainability in the use of mangrove resources and services available in this region.

THEORY OF CHANGE

Based on the analysis of project performance indicators and reports and following the methodology presented in item 3 of the Report, a project change theory was developed, reviewed before and after the field mission and interviews (Figure 8):

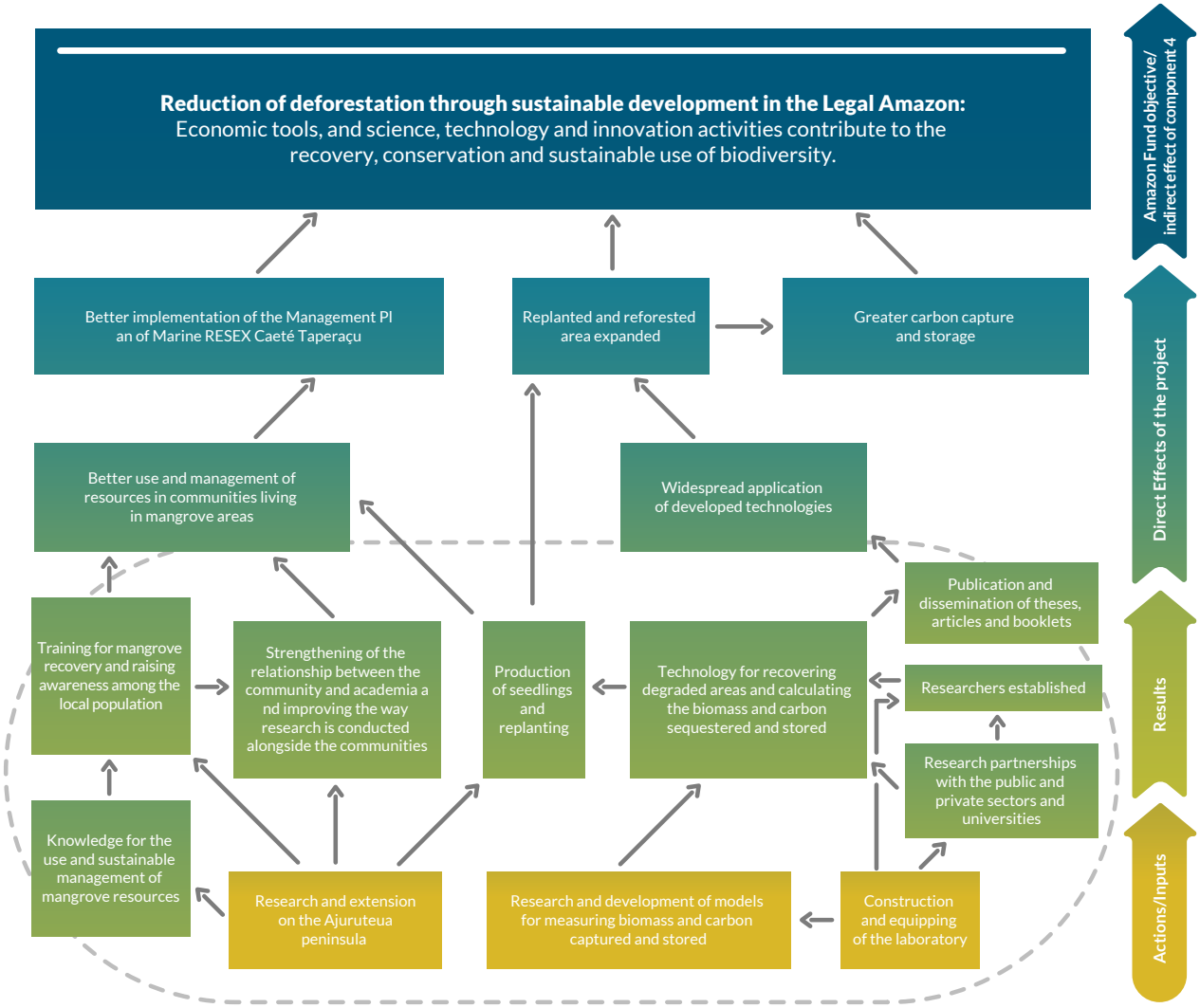


Figure 8 Theory of change of the Mangrove Forest project revised after field mission
(The arrows represent the hypotheses, that is, the assumptions regarding the interaction among results; the boxes contain the objective that was negotiated and agreed upon with the Amazon Fund; the space enclosed by the dotted line shows the area of responsibility of the project)

The Mangrove Forest project's theory of change focuses on three main assumed actions, including infrastructure construction, reclaiming of degraded areas, and development of biomass and carbon estimation models. As a result, it will improve the production of knowledge and develop mangrove degradation recovery technologies in the Coastal Marine biome. It will also capture and store carbon in this ecosystem, as well as training and retention of researchers.

These subsidies would contribute to the requalification of the RESEX Caeté-Taperaçu management plan. This would improve the conservation of mangrove resources by traditional communities, increase carbon stocks and strengthen relations between traditional communities and universities, and expand scientific production.

The expectation was that these effects would remain after the project's end and their direct effects would contribute to the Amazon Fund's objective.

Through an analysis of the revised theory of change for this project (Figure 8), after the field mission was conducted, it was observed that:

- Despite the delay in construction, the laboratory, and also the distribution of research grants from the project, contributed to the strengthening of inter-institutional partnerships, the training and establishment of researchers, and the strengthening of research groups. This is reflected in the production of knowledge about ecology and mangrove management, in addition to the expansion of scientific publications and academic production.
- The project's research effort on mangrove ecology resulted in the application of the developed technologies, which contributed to the recovery and conservation of mangroves of the Coastal Marine biome. This has resulted in an increase in the reforested area and consequently an increase in carbon capture and storage, and hence contributing to the Amazon Fund's objective.
- Data generated by the project, which included the definition of uçá crab management zones, contributed to subsidize the Caexé-Taperaçu Marine RESEX Management Plan. This has also resulted in closer proximity to the Chico Mandes Institute for the Conservation of Biodiversity (ICMBio), and the communities living in the mangrove areas. They have become more aware of the importance of conserving mangrove natural resources as an ecosystem.

IMPACT, SUSTAINABILITY AND RELEVANCE

The assessment of the achieved impacts, their relevance, and sustainability after the project's completion, focuses on four identified main impacts: (i) scientific knowledge produced and disseminated, (ii) establishment of researchers, (iii) integration between scientists and other sectors of society and (iv) fundraising.

RESEARCHERS AND TECHNICIANS ESTABLISHED IN THE REGION

In total, 21 researchers and one technician were established in the region during the implementation of the project due to the scholarships granted. Of these, 11 were of technological and industrial development (among doctoral students, masters and coordinators), one of extension, and nine of scientific initiation. An example of this was the hiring of researchers through the coordination scholarship of Prof. Hudson da Silva, PhD student at the time of the project, and today assistant professor at the same university.

In addition to the scholarship recipients, five doctoral students, seven master's students and four scientific initiation students were indirectly supported with project resources, totalling 37 people benefited.

The construction of the laboratory, which was completed only at the end of the project, played an important role in strengthening the research group and establishing it in the region after project completion, as well as the sustainability of previous research results and development of new research.

KNOWLEDGE ABOUT THE AMAZON BIOME, INTEGRATING BOTH SCIENCE AND TRADITIONAL KNOWLEDGE, PRODUCED AND DISSEMINATED

The construction and equipping of the Mangrove Ecology Laboratory (a two-storey building with a total area of 325 m^2) only partially contributed to the production of knowledge as it was completed only at the end of the implementation period.

The granting of scholarships, especially an Extension Grant in the Country (EXP in Portuguese *Bolsa de Extensão no País*), allowed for a non-academic to be employed. It had an important extension role by linking the university and the target communities. It was essential for the integration of traditional and scientific knowledge when conducting research developed by the project. Some students who passed through the lab even came from traditional communities, such as the daughter of an EXP scholarship recipient.

The good relationship between the university and the communities, and the integration of knowledge have contributed to research involving zoning and logging (wood extracted from the white mangrove is used in the construction of fish traps). This is in addition to mapping the exploration of uçá crab, also in the study of gall-inducing insect infestation (two new genera of galls were identified), and production of seedlings for mangrove replanting.

The scientific production created from the project was compatible with the period of its execution. Four undergraduate papers, seven master's dissertations, five doctoral theses, one book and three papers published in indexed journals were produced. The grants provided significantly helped, therefore, to increase knowledge generation on mangrove ecology.

One of the project's intervention axes was conducting studies on biomass estimates, sequestration and carbon storage in mangrove ecosystems. This research generated allometric equations for biomass and carbon stock calculations, which can be applied to the two types of mangrove forests prevalent along the Amazonian coast.

It is the first reference equation for the determination of biomass and carbon emissions of mangrove forests in the Amazon region. Existing equations had been developed in other countries and did not reflect the local reality.

By contributing to the reduction of deforestation in this fragile ecosystem, even indirectly, the project has contributed to the reduction of emissions from deforestation and forest degradation (REDD+) and to the implementation of the Action Plan for the Prevention and Control of Deforestation in the Legal Amazon (PPCDAm).

The study of ecological aspects sought to evaluate the size and complexity of ecosystem services (estimates of the amount of biomass and carbon sequestered and stored in mangrove; breeding and shelter niche of various terrestrial species and marine aqua fauna) provided by the mangrove forest in the Amazon. A multidisciplinary approach is assumed, mobilizing various segments of the scientific community and potential beneficiaries of this ecosystem. This information had not yet been produced for mangroves in the Amazon region, therefore, it represents a substantial advance in *"Blue Carbon"*[41] studies under the Intergovernmental Panel on Climate Change (IPCC) targets.

41. *"Blue Carbon"* is a global initiative aimed at mitigating climate change through restoration and sustainable use of coastal and marine ecosystems, involving mangroves and marine plants. The global initiative integrates different governmental and non-governmental organizations, research institutions and communities, under the coordination of Conservation International (CI), the International Union for Conservation of Nature (IUCN), and the United Nations Intergovernmental Oceanographic Commission for Education, Science and Culture (IOC / UNESCO).

INTEGRATION BETWEEN SCIENTISTS, GOVERNMENT, THE PRIVATE SECTOR, TRADITIONAL COMMUNITIES AND LOCAL RESIDENTS

The involvement of traditional communities, especially the Taperaçu-Campo community, was a major differential in this project compared to the other projects assessed.

A grant recipient was hired to work as an extension agent, which allowed for the approximation and mediation between different languages and knowledge, and access to communities was facilitated by a previous relationship between the community and the university. This relationship was also maintained through the actions of the project, including social actions.

Although not anticipated by the initial objectives of the project, these social actions, coordinated by the extension grant recipient, were made in response to the demands raised by the community. They contributed to the collaboration of residents with planned actions, such as replanting, without having to reallocate or increase financial resources.

In this traditional academic/community relationship, the involvement of partner institutions was fundamental. The project mobilized technicians from the Pará State Rural Extension Technical Assistance Company - Bragança Development Unit (EMATER-UDB) to support agricultural activities, including planting and composting, and activities promoting alternative feeding. As a result, there is now a resident in the community who supports themselves from the garden created by the project.

Under the coordination of students from UFPA, the project also created a preparatory course (PROENEM), aimed at training the adolescents of this community, who had very poor performance in the ENEM exam. This intervention had a positive impact on the youths' self-esteem in the community and resulted in the approval of two students at universities. To make the classes viable, it was necessary to use the vehicle acquired by the project to provide transport for the students who taught the classes.

Other activities were also organised. For instance, the first holiday camps in the community, the first Children's Day party, a Christmas celebration, presentations on environmental education, a June Mid-Winter Party (with clothes made with materials sourced from mangroves, e.g. crab-shells).

With support from the project, governmental programmes were able to reach the community, for example Arca de Letras (Literature Arc) and Brasil Alfabetizado (Literate Brazil).

Various kinds of workshops were held. These included; musical instrument and rhythm workshops, re-purposing of fish leather to make bio-jewellery, and products made from banana fibre. The banana fibre workshops resulted in the creation of a "Banana Fibber Atelier", which promotes sales and production of the products. Today, one family is able to support themselves through the production and sale of these banana fibre products.

With the support of the Brazilian Micro and Small Business Support Service (SEBRAE), lectures on associativism / corporatism were held to contribute to the social organization of traditional populations.

Integration with the government is a result of many students completing public service courses (for example, the current Municipal Secretary of Fisheries is a former student of the department) and also due to the fact it is a smaller city, therefore, a closer relationship is possible due to closer proximity, especially with the ICMBio.

FUNDRAISING CAPACITY AND LOCAL RESEARCH GROUPS STRENGTHENED

The strengthening of the academic group in conducting research and technology generation through Amazon Fund funding has enabled the establishment of interinstitutional partnerships and for the fundraising for development projects from other sources.

The project has contributed to the strengthening of the graduate programme in Environmental Biology (level 5 CAPES) at the Bragança campus, which is renowned in the area of mangrove research. This contributes to the sustainability of the project funded by the Amazon Fund as the new projects are continuing with in-depth research and with partnerships established in the assessed project.

INSTITUTION	PROJECT	OBJECTIVE
Petrobras	Petrobras Socio-enviromental Programme *(Petrobras Socioambiental)*	Social and environmental actions for empowering traditional communities
Rare Brazil	Conservation of mangrove natural resources	Uçá-crab management and conservation and management of mangrove forests.
Avina Foundation	Mangrove forest management	Mangrove management and recovery actions
CNPq	Toxicological effect of heavy metal bioaccumulation in uçá-crab (CRUSTACEA, BRACHYURA) populations in the Brazilian Amazon mangroves	Evaluate the impacts of heavy metal bioaccumulation on the mangrove ecosystem
UNESCO/FUNDO VALE (THE VALE FUND)	Support for the construction and consolidation of sustainable production chains of coastal artisanal fisheries in the Brazilian Amazon	

Table 25 Projects generated and supported after financing by the Amazon Fund

EFFECTIVENESS

The construction and equipping of the two-story building to house the new Mangrove Ecology Laboratory (LAMA), which experienced delays in its construction, did not compromise the execution of the research activities foreseen in the project schedule during the five years of its implementation. This was only possible due to the existence of a robust group of researchers who worked in the old laboratory, developing research on mangroves in the Amazon region.

All products and services were fully realized, including the construction of the laboratory, the development of biomass and carbon sequestration models, the zoning (mapping) of the logging

areas, the zoning (mapping) of the uçá-crab exploration areas, the study of galling infestation, the measurement of seedling survival, mortality and growth and the dissemination of research results in different media[42].

The actions of mobilization and involvement of RESEX communities, although not explicitly contemplated in the project objectives, contributed greatly to the effective execution, both in the field and in the laboratory, of the different research axes conducted by students and teachers of this academic unit of UFPA. This facilitated the process of acceptance and internalization of the project, in which the involvement of traditional populations manifested in various phases of implementation. Hiring an extension scholarship was fundamental to the success of this strategy. It can be concluded that the project was effective in its implementation and in achieving the results.

EFFICIENCY

The execution of the Mangrove Forest project was managed in a highly efficient manner. The coordination grants allowed for the distribution of research tasks. The extension grant allowed for community coordination activities to be delegated to the receivers of these grants in order not to overload the general coordinator, Professor Dr. Marcus Fernandes. Therefore, the management of the project became more efficient.

The research was conducted efficiently due to the good relationship with the community and the collaborative surveying of their needs. The previous collaborative experience of planting seedlings between the technical staff and the community has also contributed to the efficient recovery of degraded areas.

The major difficulty was the delayed construction of the building, which extended the project term from three to five years. This delay at the beginning of the project was caused by technical and bureaucratic problems, as the Belém-based UFPA Campus Council took issue with the technical and architectural design. Construction in a flooded area compromised the budget, requiring institutional contribution from the university.

The university's governance structure tends to limit the autonomy of the management of technical-scientific projects, especially when they include building reform and construction. This issue is intrinsic to the university and is beyond the managerial competence of the project coordinator.

REPORTING PROCEDURES

In spite of the coordination's efficiency in filling out the report forms, there was some confusion over the records of research results and project results themselves. However, the systematic monitoring of the Amazon Fund team allowed this to be successively overcome. The relative flexibility and focus applied to the Fund's final objectives have contributed to more efficient project management.

42. These results can be accessed at http://www.ufpa.br/lama

MANAGEMENT ARRANGEMENT WITH FADESP

FADESP's efficient intervention in financial management and budget control, coupled with the ongoing monitoring work of the Amazon Fund team, contributed to meeting the project's goals.

CANCUN SAFEGUARDS (REDD+)

The project's compliance with the Cancun Safeguards (REDD+) has been realised in both objectives: research and development of knowledge and techniques related to the recovery of degraded mangrove areas in the northern region and development of models for biomass estimation and sequestration, and carbon stock assessment of mangrove forests (Table 26).

In a cross-sectional analysis, it was found that the project actions and intervention strategies adhered to a greater or lesser extent with the criteria referenced in these safeguards. It has shown adherence to the PPCDAm when communicating with local communities. It sought to sensitize them to sustainable use of mangrove natural resources, in particular, when it contributed to mangrove forest conservation and qualification of the RESEX management plan.

Safeguard/issue	Compliance[43]	Observation
1. Were the actions complementary or consistent with the objectives of national forest programs and other relevant international conventions and agreements?	**Yes**	**By contributing to the improvement of the Mangrove National Action Plan (PAN) via the Technical Advisory Group (GAT).**
Has the project proved to be in line with the PPCDAm and state deforestation prevention and control plans?	Yes	It is in line with the PPCDAm (2016-2020) and state plans that aim to reduce and control forest degradation.
With which other federal public policies or international agreements has the project demonstrated alignment? In what respects?	To some extent	Relative adherence to the National System of Conservation Units (SNUC) and Blue Carbon studies, according to the Intergovernmental Panel on Climate Change (IPCC) targets.
Has the project contributed or could it contribute directly or indirectly to reducing emissions from deforestation or forest degradation? In what way?	Yes	By contributing to the recovery, management, management and conservation of mangrove ecosystem resources.
2. Transparent and effective national forest governance structures for national sovereignty and national legislation	**Yes**	
To what extent has the project promoted the articulation between different actors (public, private, third sector or local communities)?	Yes	The project contributed to better dialogue between ICMBio and traditional RESEX communities.
To what extent has the project contributed to strengthening public instruments and forest and territorial management processes?	Yes	By contributing to the requalification of the Caexé-Taperaçu Marine RESEX Management Plan in the Bragança Region.
3. Respect for the knowledge and rights of indigenous peoples and members of local communities, taking into account relevant international obligations, circumstances and national laws and noting that the UN General Assembly has adopted the United Nations Declaration on the Rights of Indigenous Peoples.	**Yes**	

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43. These safeguards were not required of projects at the time of submission, so the project may not have developed specific strategies to address them.

Safeguard/issue	Compliance[43]	Observation
To what extent has the project influenced the constitutional rights associated with formal land tenure and designation in your area?	N/A	
To what extent has the project influenced the sustainable use of natural resources in your area?	Yes	The strengthening of the academia/community relationship resulted in an awareness of mangrove resource conservation practices.
If the project had as its direct beneficiaries indigenous peoples, traditional communities or family farmers were their socio-cultural systems and traditional knowledge considered and respected throughout the project?	Yes	The project respected the knowledge and rights of traditional peoples and members of the Caeté-Taperaçu Marine Extractive Reserve Extractives Association (ASSUREMACATA).
Are there effects that interfere with the traditional way of life of these groups? What kind of effects: on social, economic organization or the use of available spaces and resources? How do they interfere: positively, negatively, or both?	Yes	The project carried out various socio-economic and educational activities with an emphasis on the teçume workshops and the promotion of agricultural activities.
4. Full and effective participation of stakeholders, in particular, indigenous peoples and local communities, in the actions referred to in paragraphs 70 and 72 of Decision 1 / CP 16	**Yes**	
How has the project secured prior consent and local or traditional election of representatives of its beneficiaries (especially indigenous peoples and traditional communities)?	Yes	The project gained consent to work in and with communities.
What participatory planning and management tools did the project apply during planning and decision-making?	To some extent	The project held planning workshops and various socio-educational and awareness-raising seminars aimed at strengthening beneficiary participation mechanisms.
In the case of projects with economic purposes: were any benefits originating from the project accessed in a fair, transparent and equitable manner by the beneficiaries, avoiding a concentration of resources?	N/A	
To what extent has the project provided the general public and its beneficiaries with free access and easy understanding of information related to project actions?	Yes	Through participatory activities.
Has the project been able to set up an efficient result and impact monitoring system? Were the achieved results and their effects systematically monitored and publicized?	Yes	The project fully met the requirements of the Amazon Fund.
5. Actions consistent with conservation of natural forests and biological diversity, ensuring that the actions referred to in paragraph 70 Decision 1 / CP 1611 are not used for the conversion of natural forests, but rather to encourage the protection and conservation of natural forests and their ecosystem services and to improve other social and environmental benefits	**Yes**	**The actions were consistent with the conservation of mangrove forests and their biological diversity, ensuring the protection and conservation of mangroves and their ecosystem services and contributing to socio-enviromental quality.**
How did the project contribute to the expansion or consolidation of protected areas?	To some extent	Reclassifying the Caeté-Taperaçu Marine Extractive Reserve Management Plan and assisting in its implementation.
How did the project contribute to the recovery of deforested or degraded areas?	Yes	With the replanting of 55,400 seedlings and five thousand mangrove tree seedlings in an area of 9 ha.
In case of area restoration and reforestation activities, did the methodologies employed prioritize native species?	Yes	Reforestation prioritized native mangrove trees of the species: *Laguncularia racemosa; Rhizophora mangle and Avicennia germinans.*

Safeguard/issue	Compliance[43]	Observation
To what extent has the project contributed to establishing recovery models with an emphasis on economic use?	N/A	
6. Actions to address risks of reversals in REDD+ results	**To some extent**	
What factors pose risks to the permanence of REDD+ results? How did the project address them?	To some extent	Actions involving partner organizations and local communities addressed environmental risks to ensure results consistent with the REDD+ methodology.
7. Actions to reduce carbon displacement to other areas	**Yes**	
Have emissions reduced by project actions shifted to other areas?	Yes	Actions involving partner organizations and local communities addressed environmental risks to ensure results consistent with the REDD+ methodology.

Table 26 Cancun safeguards (REDD+) applied to the Mangrove Forests project

CROSSCUTTING CRITERIA

POVERTY REDUCTION

The socio-environmental reality of the Amazon imposes, even on scientific and technological development projects in the area of biological sciences, a constructive dialogue with the social surroundings in which the project is introduced.

Due to the numerous socio-educational activities, the project indirectly contributed to reducing the aggravation of rural poverty and hunger in all its forms, by promoting mangrove reforestation, resulting in the recolonization of the uçá- crab and fish, important sources of protein and income. This was especially true in the Taperaçu-Campo community.

The workshops involving partner institutions, such as SEBRAE, EMATER and the city council, and targeting traditional RESEX populations, were important in terms of promoting nutrition and income generation, teaching healthy eating and agroecology. Also in this conservational unit, unconventional food plants were introduced, and handicrafts and sustainable use of the natural resources were taught.

Of course, much needs to be done to truly reduce poverty, which in terms of the Amazon entails the implementation of long-term programmes and projects. In this sense, the UFPA / Bragança mangrove ecology research group is in the process of enabling a new project with support from the Petrobras Socio-environmental Programme ("Petrobras Socioambiental"), the "Mangrove House" ("Casa do Manguezal"), which will serve as a research base in the field, serving to implement socio-environmental and extension actions in local communities.

Crosscutting criteria/issue	Compliance[44]	Observations
Poverty reduction	**To some extent**	
To what extent has the project effectively contributed to economic alternatives that value standing forest and sustainable use of natural resources?	To some extent	The project contributed to the involvement of local communities in a set of socio-environmental activities that promote income generation.
To what extent has the project positively influenced poverty reduction, social inclusion and improved living conditions of the beneficiaries (mainly: traditional communities, settlers and family farmers) living in their area?	To some extent	It was important in promoting training for additional sources of income, in articulating and promoting the involvement of different organizations in a constructive dialogue with the social environment in which the project was inserted.
Has the project been able to promote and increase production in value chains of timber and non-timber forest products sourced from sustainable management?	N/A	It was not part of the scope of the project.
In the case of any project that contains a scientific and technological development component, has this contributed to the construction of a development model suitable for the region?	To some extent	The information generated has allowed for a greater understanding of the scale of mangrove forest ecosystem services, contributing to their conservation.

Table 27 Crosscutting criteria "poverty reduction" applied to the Mangrove Forests project

GENDER EQUALITY

The project did not have a specific gender strategy that sought to promote women's participation. Even so, its execution involved women and men, both in the research agenda and in the socio-environmental activities with the communities.

The majority of the activities maintained their standard gender division of labour, for instance, women involved in culinary and craft activities and men in fishing and uça-crab catches.

In the case of the project's principal and most important activity, mangrove reforestation, the participation of women was significant, but this was mainly attributed to the phase of potting seedlings with soil, while the men were responsible for the planting.

The project contributes to the financial independence of at least one resident of the Caeté-Taperaçu community, who, with the help of the banana fibre repurposing workshops, began to dedicate themselves to handicrafts as their source of income.

44. Crosscutting criteria were not required of projects at the time of submission, so the project may not have developed specific strategies to meet them.

Crosscutting criteria/issue	Compliance[45]	Observations
Gender equality	**No**	
Has the project been able to integrate gender issues into its strategies and interventions or address the issue in isolation? How?	No	The project did not have a specific gender strategy. However, it involved women and men equally in both research and community action.
Was there gender separation in data collection for project planning and monitoring?	No	
How did the project contribute to gender equality?	No	The project did not have a defined gender strategy, but involved men and women equally in its activities, even if it maintained the traditional social division of labour.

Table 28 Crosscutting criteria "gender equality" applied to the Mangrove Forests project

CONCLUSIONS

In conclusion, the project, based on the three proposed objectives, fully achieved the targets related to the construction and equipment of LAMA, the development of technologies for the recovery of degraded areas and the generation of models for estimating biomass, sequestration and mangrove forest carbon stock.

Regarding the recovery of degraded mangrove areas, the project exceeded the expected targets, as although 5.7ha was planned to be replanted, a larger area of 9ha was replanted, and of the estimated 40,000 seedlings, 55,400 seedlings and five thousand propagules were planted.

The Bragança region encompasses the largest degraded mangrove area of the Brazilian Amazon coast, however, tree replanting has enabled the development and adaptation of technologies aimed at the recovery of degraded areas of this ecosystem.

With regard to the Cancun Safeguards (REDD+) it can be concluded that the project met, to a greater or lesser extent, all criteria for raising awareness of the sustainable use of mangrove natural resources and contributed to the conservation of mangrove forests and also qualification of the RESEX management plan.

It is also concluded that the project added to its objectives, by strategically adopting the tripod "research, training and extension", which eased interaction with the community, facilitating the implementation of proposed activities, and consolidation of the largest mangrove forest research group in the Brazilian Amazon.

RESEX community actions have contributed to raising awareness among traditional populations, which could result in a change in the way they relate to the mangrove forest with regard to the sustainable use of available mangrove resources and services.

45. See previous footnote.

RECOMMENDATIONS

FOR PROJECT COORDINATORS

- Develop large-scale and not just pilot-scale replanting activities; increase the involvement of community members and the dissemination of knowledge and techniques, contributing to the impact of scientific and technological development projects and the sustainability of their results.

FOR THE DEPARTMENT OF ENVIRONMENT AND MANAGEMENT OF THE AMAZON FUND / BNDES

- Extend the execution time of scientific and technological development projects that include infrastructure construction, so as to circumvent the possible technical, bureaucratic and operational problems and allow it to have a significant impact on the research conducted;
- Facilitate interinstitutional arrangements that involve the establishment of partnerships in order to minimize the bureaucratic obstacles inherent to the administration and operation of a public university, seeking to speed up the internal and external processes of the project.

LESSONS LEARNED

- The involvement and awareness of the community members, who are included in the scope of the project, are essential to the effective implementation of project activities and for the sustainability of the project's results.

7.1.4 BELÉM ISLANDS PROJECT

INTRODUCTION

Project title:	Belém Islands project
Responsible body (project management):	Federal University of Pará (UFPA)
Responsible body (financial management):	Research Support and Development Foundation (FADESP)
Project timeframe:	4th semester 2012 to 3rd semester 2015
Territorial scope:	Pará State
Beneficiaries:	Public policy executors in territorial management, island populations around the city of Belém and UFPA
Objective:	Implement methodology to support local scale economic and environmental zoning of the islands around the city of Belém and expand the research infrastructure of the UFPA Graduate Programme for Aquatic Ecology and Fisheries
Total value of the project:	R$1,138,083.93
Value of support provided by the Amazon Fund:	R$1,138,083.93

Table 29 Belém Islands project fact sheet

PROJECT RESULTS

The "Belém Islands" project aimed to support economic and environmental zoning in the Mosqueiro, Cotijuba, Onças and Combu islands, near the city of Belém in the state of Pará, and to expand the research infrastructure of the UFPA Aquatic Ecology and Fishing Postgraduate Programme by constructing a laboratory.

The islands are located in a transitional area of the Amazon estuary, i.e. an area between freshwater (south of Guajará Bay and to the right of Guamá River) and saltwater (north of Belém, up until the city of Colares). Here, there are rivers, tidal canals ("igarapés"), forests, floodplains, bays, flooded fields and beaches. On the islands, river-dwellers are the majority of the population and live mainly from extractivism and fishing. The region contributes to the local economy mainly as a supplier of primary products.

The islands are relatively untouched environments considering their proximity to the Belém metropolitan area. However, they are not free from contamination. In 2018, the municipality of Barcarena, neighbouring Belém, where Onças Island is located, faced contamination caused by the leakage of bauxite tailings from the Hydro dam, a Norwegian company located in the region. In 2015, in Barcarena, a ship sank with more than 5,000 live oxen and 700 tons of oil on board. The environmental impact of the wreck has affected the lives of thousands of people in this region and the ecosystem of the islands.

Before these incidents happened, the project had collected biological and socio-economic data from the region from fish and shellfish sampling and interviews, producing information on the local economy, health and education infrastructure, agricultural suitability, breeding zones, and fish feeding.

Based on this, five maps were produced that indicate the areas of priority for environmental conservation and sustainable development incentives. The research results were presented in workshops with local communities and disseminated through informative print material, and presented in meetings with public agencies and members of the local academia.

INTERVENTION LOGIC

Figure 9 shows the intervention logic agreed on between the project executors and the Amazon Fund:

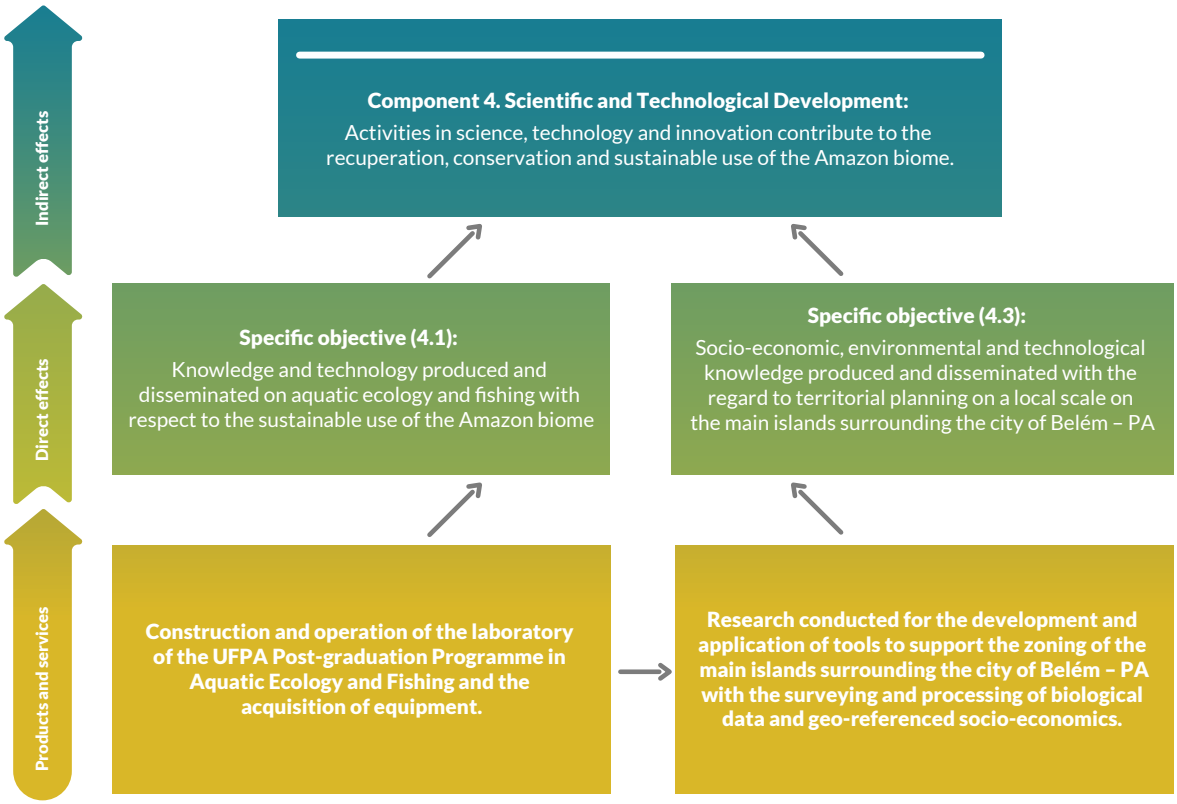

Figure 9 Intervention logic according to the Belém Islands project logical framework

METHODOLOGY SPECIFICS

GUIDING QUESTIONS

The assessment followed the methodology and evaluation criteria described in section 3 of the report. Each individual assessment has specific questions referring to each of the different topics. In the case of this assessment, questions were prepared for the following topics during the field mission:

- Stakeholders, their degree of satisfaction and involvement
- Use of data generated in public policies (especially in the creation and improved management of protected areas, to meet demands for and implementation of health policies, education and promotion of sustainable use) and in scientific research.
- Quality of socio-economic and environmental diagnoses, as well as maps of priority areas (zoning) and degree of consideration of beneficiaries' concerns or opinions.
- Quantity and quality of the scientific production carried out by the project, its dissemination and availability
- Progress with construction work on the CEABIO and laboratories and their contribution to the diagnostic and research activities on biodiversity and bioactivity of Amazonian plants
- The effect the projects have on the communities.

ASSESSMENTS OF RESULTS

ASSESSMENT OF INDICATORS

In the first step of the individual assessment, the results and impacts indicators were evaluated, which were agreed on with BNDES at the beginning of the project. Table 30 shows the key indicators.

Key indicators	Target	Status at the end of the project
Direct Effects (former Specific Objectives): Socio-economic and environmental knowledge and technologies related to territorial planning on a local scale in the main islands around the city of Belém-PA and knowledge and technology produced and disseminated on Aquatic Ecology and Fisheries focused on the sustainable use of the Amazon biome.		
• Number of scientific publications o Dissertations o Specializations o Course completion papers o Articles	Not defined	7 3 1 1 2
• Number of researchers and technicians established in the region involved in RD&I activities	Not defined	2
Products and services		
• Number of attendances at networking events (seminars and forums) aiming to disseminate the knowledge produced	Not defined	2

Key indicators	Target	Status at the end of the project
• Number of educational or informative publications	Not defined	1
• Number of new products or technological processes developed on territorial management.	1	1
• Amount invested in infrastructure (R$)	R$493,962.96	R$487,889.98
• Laboratory area constructed	200 m²	200 m²
• Number of priority maps produced	2	5

Table 30 Belém Islands project key indicators

As Table 30 shows, as a result of the research, three master dissertations were produced, two undergraduate research papers and one journal article published. Therefore, in addition to the knowledge produced, the project contributed to the consolidation of the first masters and doctorate programme in ecology of the State of Pará, training qualified personnel to work in the Amazon region.

Regarding the number of new products or technological processes developed dealing with territorial management; the data collected in the survey produced five priority maps for the four islands covered by the project. These maps showed, among other things, the distribution of human activity on the islands, as well as the identification and size of degraded areas, the good state of conservation of the islands' canals or "igarapés", and the high environmental importance of these environments for the maintenance of aquatic fauna.

The maps resulting from the research were presented by the project coordinators in discussions promoted by the Pará State Public Prosecutor. These discussions were about the Fishing Colony of Baía do Sol (Mosqueiro Island) requesting the implementation of financial security in the form of a benefit paid to local small-scale fishers who are prohibited from fishing any fish at all during a certain defined period.

Included in the number of educational or informative publications was a booklet summarizing the results of the studies carried out during the project and presented them in an accessible and didactic manner to the population of the study region. It was also a means of communicating to all those interested in environmental preservation. About 1,000 copies of this booklet were distributed.

With a view to publicise the knowledge produced, the project team participated in two networking events: the XXI Brazilian Ichthyology Meeting (Recife - PE, 1st to 6th February 2015) and the 55th Meeting from the Estuarine Coastal Sciences Association (London - England, 6th to 9th September 2015).

R$487,889.98 was invested in infrastructure, corresponding to 200m² of laboratory space built.

As expected, knowledge produced has contributed to fostering public policy, but the actual implementation of the policy is beyond the project's reach and this has not yet materialized.

Considering the development of new methodologies and new knowledge on socio-economic and environmental aspects on the four islands covered by the project, it can be concluded that the project has achieved its objectives through; the construction of expanded facilities at

the Fisheries Biology and Aquatic Resources Management Laboratory, the dissemination of acquired knowledge, the initial impacts for public policy discussion and the academic studies produced as a result of the research.

THEORY OF CHANGE

Based on the analysis of project performance indicators and reports, and following the methodology presented in item 3 of the report, a project change theory was developed, revised before and after the field mission and interviews (Figure 10):

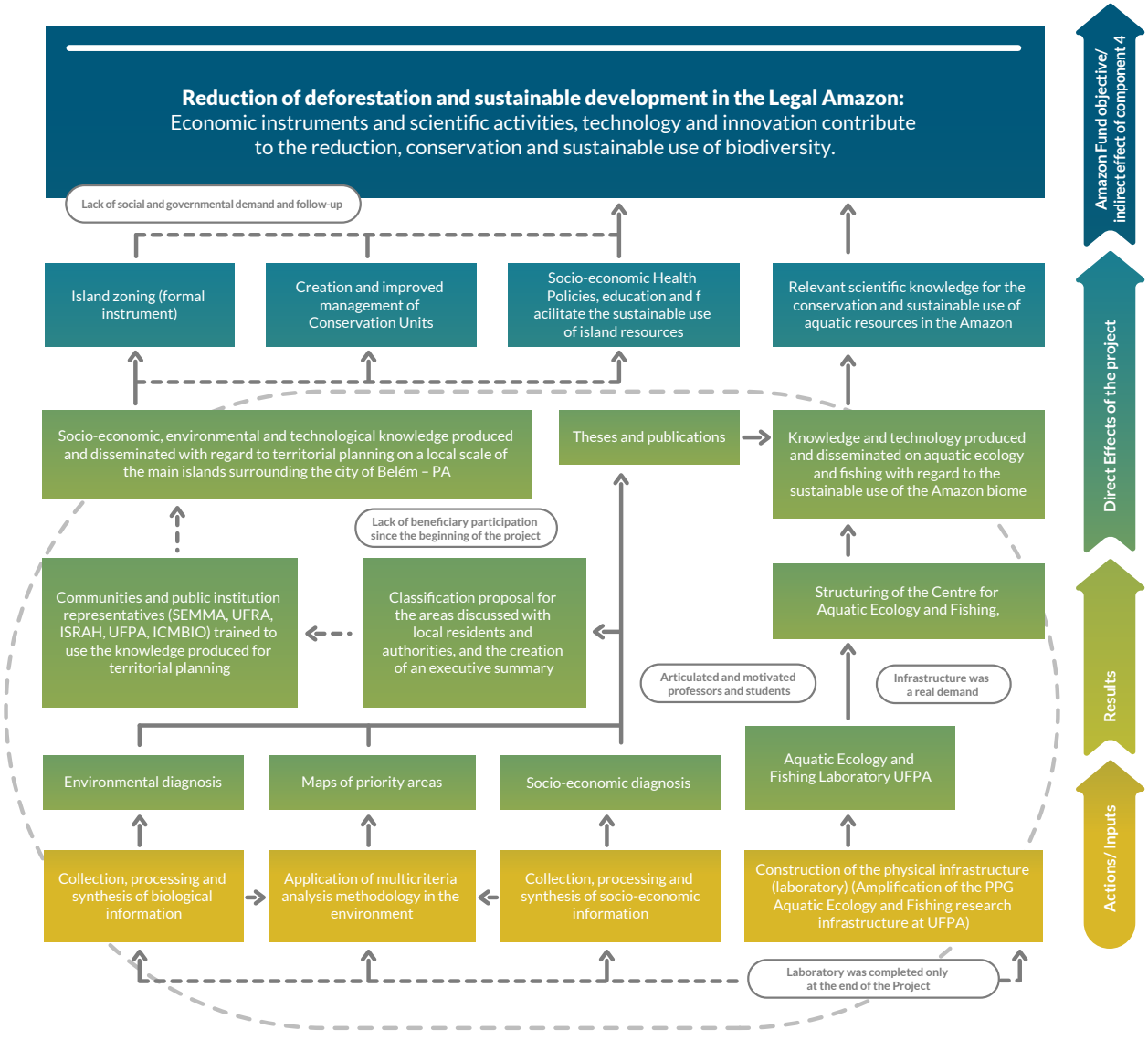

Figure 10 Theory of change of the Belém Islands project revised after field mission
(The arrows represent the hypotheses, that is, the assumptions regarding the interaction among results; the boxes contain the objective that was negotiated and agreed upon with the Amazon Fund; the space enclosed by the dotted line shows the area of responsibility of the project)

The Belém Islands project theory of change presumes that building a laboratory, funding research activities, and developing a methodology for analysing and mapping environmental priorities would result in environmental diagnosis, priority area maps, and socio-economic diagnosis. These subsidies would then be used for participatory and capacity building activities that should result in island zoning, establishment of Conservation Units and / or environmental

and social public policies. The laboratory would also serve to strengthen the aquatic and fisheries ecology research group, establish researchers in the region, and generate knowledge about the sustainable use of natural resources beyond the project implementation period. Together, these direct effects of the projects should contribute to the Amazon Fund objective.

From the revised theory of change (Figure 10), it is noted that:

- The construction of the laboratory did not contribute to the research foreseen in the project, as it was not ready until the project's end. However, it did contribute to the structuring of UFPA's Centre for Aquatic and Fishery Ecology.
- The research carried out by the project did not achieve the expected indirect effects regarding the territorial management of the islands.
- This was because there was a lack of community and local government involvement since the beginning of the study, and a lack of social and governmental demand for the research results.
- This lack of involvement resulted in the maps produced not being well utilized. This, coupled with the lack of follow-up of the project, meant that some of the expected indirect effects did not happen.
- The structuring of the Centre was important for the sustainability of the project and the generation of indirect effects related to scientific knowledge in general. The Centre has the ability to capture resources and multiply results.
- This is probably because the faculty and students are of excellent quality and are motivated, both to publish and to seek new resources, which gives sustainability to the project impacts.

IMPACT, SUSTAINABILITY AND RELEVANCE

USEFUL SCIENTIFIC KNOWLEDGE FOR CONSERVATION AND SUSTAINABLE USE OF AMAZONIAN AQUATIC RESOURCES

The main direct effect the Belém Islands project had was on the ability to produce scientific knowledge useful for the conservation and sustainable use of Amazonian aquatic resources through the structuring of the Aquatic Ecology and Fisheries Centre at the Federal University of Pará (UFPA).

The main impact funded by the project was the creation of UFPA's Aquatic Ecology and Fishing Centre in 2018, as a result of the construction of the Laboratory. The Centre has 10 teachers, with two titleholders. Despite being interdisciplinary, land is not the focus of the Centre, and this has had an influence on activity on the islands, where the focus has been on aquatic resources.

The sustainability of this direct effect is ensured by the Centre's access to other sources of funding. In addition to the Amazon Fund, the Centre has been supported by scientific and technological development agencies, such as the National Council for Scientific and Technological Development (CNPq) and the Funding Authority for Studies and Projects (Finep). The Laboratory is used for other projects: Xingu (Belo Monte Hydroelectric Power Plant), Coastal Fishery Economics (CNPq), Shrimp Fishing (CNPq), Alternative Shrimp Fishing Methods (United Nations Food and Agriculture Organization - FAO), support for the development of specific legislation for mapará fish in Tocantins (Colony Z15). These resources

are all external. There are scholarships for researchers and students do not fund their research with their master's scholarships. Therefore, they need other resources for scientific and technological development projects.

Therefore, the structuring of laboratories has a longer-lasting effect than just for supported research because it multiplies subsequent results and contributes to structuring research groups. The Amazon Fund has helped to consolidate a permanent group of researchers and a research institution (UFPA Centre for Aquatic Ecology and Fisheries), which in addition to producing science, facilitates the acquisition of resources from other sources. The Centre has full administrative autonomy (the university structure is made up of institutes, with postgraduate degrees, and centres without their own postgraduate, but which support postgraduate students from the institutes). Public resources are minimal, but management arrangements with the Amparo Research Development Foundation (FADESP) and other management of resources allow for extra budget resources. In these arrangements, independent entities manage the resources and procurement of construction work, products and services for the realization of scientific and technological development projects.

Despite this ability to raise funds, sustainability is limited because, according to the researchers, the problem with projects is lack of continuity as resources run out. In addition, they depend on students who then graduate and leave at the end of the course. Therefore, there is a sustainability problem, but this is mitigated by the coherence and continuity of the lines of research developed by the Research Centre. That is, the institutional strengthening of the Centre through the physical construction of the laboratory allowed the multiplication of results and subsequently contributed to the sustainability of the Centre.

The generation of scientific knowledge on aquatic ecology and fishing is extremely relevant for the Amazon and the country. The Amazon has the greatest diversity of freshwater fish species, many of them still unknown to science. Fishing is a fundamental part of the urban and rural population's staple diet and important for the economy in many of the municipalities.

To remain sustainable, fishing needs the conservation of terrestrial ecosystems, particularly in the floodplain. This creates a natural alliance between the use of aquatic resources and forest conservation and, consequently, the reduction of emissions from deforestation and forest degradation (REDD+). Therefore, the Centre and the establishment of the Ecology and Fisheries Laboratory are of great importance.

Over the course of the project, the scientific research produced and resulted in two science initiation papers, three maters dissertations, one article in a scientific journal and two attendances at networking events.

Therefore, scientific production was modest, with the focus mainly geared toward the study of the island environments, which should serve to better manage these areas. An important, though not extraordinary scientific finding was that the most conserved areas of forest had the most abundant fishing resource. In general, it can be said that the impact linked to the generation of new scientific knowledge was weak, also for reasons explained in the following impact analysis. However, the construction of the laboratory had a strong impact in providing continuity to aquatic research and training of researchers in the region.

SUSTAINABLE TERRITORIAL MANAGEMENT

The project's theory of change anticipated three direct effects related to sustainable territorial management:

- Island zoning (formal instrument)
- Creation and improved management of protected areas
- Socio-environmental policies on health, education and promotion of sustainable use in the islands

However, these effects did not happen. The research has been completed and the products are available in publications and maps. These products may be used in the future, but are gradually losing their validity due to changes in the social and ecological situation (the environmental disasters caused by the mining company Hydro and the sinking of the ship loaded with thousands of livestock previously mentioned, which deserves its own separate impact study). There is no island-monitoring programme and, as the dynamics between economic enterprises, local population and the natural environment are quite intense in this region, the results may no longer be representative. Therefore, the knowledge produced has limited sustainability.

On the other hand, the methodology is being used in other scientific and technological development projects with at least one master's dissertation.

The impact was limited due to insufficient communication with important institutional actors, such as the Brazilian Institute of Environment and Renewable Natural Resources (Ibama), the Secretary for the Environment, the Municipalities of Belém and Barcarena and other public management. Invitations were sent to submit research results at the conclusion of the project, but were late and there was little response. Possibly, if these actors had been involved in the design of the research and the project as a whole, their interest would have been greater.

There have been no noted effective efforts made for the project's results to be incorporated into public policy. One of the principal products, Island Zoning, should have been taken advantage of for master plans, management plans, and for processes in defining Conservation Units; however, this had never materialized.

Regarding relevance, according to informants, communities do not have organised demands via management tools such as fishery agreements or protected areas. Therefore, the results of research supported by the project have had limited relevance in the context of island management and community well-being because they did not respond to such demands[46].

However, if the research has any relevance, it may have more influence on social demands. The islands studied are under pressure from economic activities in the municipalities, especially mining, port activity and navigation (which affects the riverbanks), as well as growing recreational activity, with the building of restaurants and other developments on Combu Island.

46. The biologist of the Cotijuba Island's women's movement uses the maps to introduce the island to visitors who come to study, locating natural resources (which are not always on the maps). That is, it uses the cartographic base of the project, not its research results.

EFFECTIVENESS

The laboratory has been completed and effectively houses the researchers and their activities. However, the time it took to build it did not allow it to be used in supported research. Upon completion of the project, the laboratory enabled the structuring of the Aquatic and Fishing Ecology Centre and the generation of more knowledge about aquatic ecology and fishing.

The research activities produced the expected results for the project: environmental and socio-economic diagnoses were done, as well as methodology and environmental prioritization maps for the area. However, the validation activities of these diagnoses and the elaboration of a zoning proposal with the communities and public agencies were ineffective due to the low involvement of these stakeholders from the beginning. Thus, knowledge was generated, but with limited utility for potential beneficiaries.

EFFICIENCY

REPORTING PROCEDURES

The researchers reported large differences between CNPq and Amazon Fund procedures. In fact, it is clear from the reports that the forms were not well understood by those who filled them out, who misunderstood that they should report research results rather than project results.

The researchers have also felt the difference made by the close monitoring by BNDES. Sometimes it was considered burdensome; other times it has improved the quality of the project. This has also been reported by FADESP, which was the project's financial manager.

FADESP project managers considered the Amazon Fund as very flexible. An example of how this flexibility contributed to the project was that construction of the laboratory took a long time, and this added to the expense of the project (the funding was slow in arriving). However, as BNDES authorized the use of proceeds to purchase equipment, there was no loss. According to one manager, BNDES is focused on results and not bureaucracy. They consider BNDES technicians always present and that they had accompanied the project well. They are demanding when necessary and flexible when possible.

Therefore, the monitoring performed by BNDES is considered to have contributed to the efficiency of the project.

MANAGEMENT ARRANGEMENT WITH FADESP

The arrangement with FADESP worked well. Regarding the procedures, there was only difficulty in performing some activities due to the need to use informal documentation due to the informality of the Amazon. In this project, execution was almost 100%, which is considered very good (just over R$200 was returned to the Fund).

It can be concluded that the project was generally efficient considering the way the obstacles were overcome and the use of the infrastructure created post-project.

CANCUN SAFEGUARDS (REDD+)

With regard to the Cancun Safeguards (REDD+), the project could have had a more participatory management, having obtained the prior consent of the communities, and having had more inclusion in public policy making in order for the results to generate more positive and effective impacts.

Safeguard/issue	Compliance[47]	Observations
1. Actions complementary or consistent with the objectives of national forest programmes and other relevant international conventions and agreements.	**Yes**	**Project's focus is on aquatic resources that depend on forest conservation**
Has the project proved to be in line with PPCDAm and state deforestation prevention and control plans?	N/A	PPCDAm and state plans have no emphasis on aquatic resources
With which other federal public policies or international agreements has the project demonstrated alignment? In what respects?	N/A	
Has the project contributed or could it contribute directly or indirectly to reducing emissions from deforestation or forest degradation? In what way?	Yes	By contributing to the sustainable management of aquatic resources, it establishes an alliance with forest conservation.
2. Transparent and effective national forest governance structures for national sovereignty and national legislation	**To some extent**	
To what extent has the project promoted the articulation between various actors (public, private, third sector or local communities)?	To some extent	Meetings held to present the final results
To what extent has the project contributed to strengthening public instruments and forest and territorial management processes?	To some extent	Developed maps of priority areas (not used) and methodology for this (which has been applied in other contexts / projects)
3. Respect for the knowledge and rights of indigenous peoples and members of local communities, taking into account relevant international obligations, circumstances and national laws, and noting that the UN General Assembly has adopted the United Nations Declaration on the Rights of Indigenous Peoples.	**To some extent**	
To what extent has the project influenced the constitutional rights associated with formal land tenure and designation in your area?	To some extent	Results may support the legalization of deeds and usage rights, but this has not been realised.
To what extent has the project influenced the sustainable use of natural resources in your area?	To some extent	It improved the condition of natural resources in the Belem Islands, but this did not result in improved management. The laboratory has supported the management of fishery resources in the region.
If the project had as its direct beneficiaries indigenous peoples, traditional communities or family farmers, were their socio-cultural systems and traditional knowledge considered and respected throughout the project?	To some extent	Community members contributed to the collection of material, but traditional knowledge was not the focus of the project.
Are there effects that interfere with the traditional way of life of these groups? What kind of effects: on social, economic organization or the use of available spaces and resources? How do they interfere: positively, negatively, or both?	To some extent	Knowledge was given back to the communities through lectures. Positive effects could have been greater with the integration of information in school education.

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47. These safeguards were not required of projects at the time of submission, so the project may not have developed specific strategies to address them.

Safeguard/issue	Compliance[47]	Observations
4. Full and effective participation of stakeholders, in particular, indigenous peoples and local communities, in the actions referred to in paragraphs 70 and 72 of Decision 1 / CP 16	**To some extent**	
How did the project ensure prior consent and local or traditional election of representatives of its beneficiaries (especially indigenous peoples and traditional communities)?	To some extent	No consent was sought to operate in the communities, the only involvement was of the leaders in indicating collection sites.
What participatory planning and management tools did the project apply during planning and decision-making?	N/A	
In the case of projects with economic purposes: were any benefits arising from the project accessed in a fair, transparent and equitable manner by the beneficiaries, avoiding a concentration of resources?	N/A	
To what extent has the project provided the general public and its beneficiaries with free access and easy understanding of information related to project actions?	Yes	Through community lectures, booklets and maps that were distributed
Has the project been able to set up a good result and impact monitoring system? Have the results achieved and their effects been systematically monitored and disseminated?	To some extent	The project met the requirements of the Amazon Fund and created booklets and maps. The impacts of building the Laboratory (e.g. student numbers and research) have not been systematically monitored or reported
5. Actions consistent with the conservation of natural forests and biological diversity, ensuring that the actions referred to in paragraph 70 Decision 1 / CP 1611 are not used for the conversion of natural forests, but rather to encourage the protection and conservation of natural forests and their ecosystem services and to improve other social and environmental benefits.	**N/A**	
How has the project contributed to the expansion or consolidation of protected areas?	N/A	Research products could support the creation of protected areas, but there has been no demand
How did the project contribute to the recovery of deforested or degraded areas?	N/A	
In case of area restoration and reforestation activities, have the methodologies employed prioritize native species?	N/A	
To what extent has the project contributed to establishing recovery models with an emphasis on economic use?	N/A	
6. Actions to address risks of reversals in REDD+ results	**N/A**	
What factors pose risks to the permanence of REDD+ results? How has the project addressed them?	N/A	
7. Actions to reduce carbon displacement to other areas	**N/A**	
Have emissions reduced by project actions shifted to other areas?	N/A	

Table 31 Cancun safeguards (REDD+) applied to the Belem Islands project

The profile of the community members involved in the project varied by island. For example, on Mosqueiro Island, there was articulation with the local fishing colony. In Cotijuba Island, the articulation was with the leadership of the Belém Islands Women's Movement (MMIB), a group with 60 members, 40 of them women, some of them work in fisheries, but most work with handicrafts.

No consent was sought from communities, but rather their support was sought in identifying people to interview and in identifying survey collection sites, and in doing the collecting themselves. In addition to this form of participation, the research results were presented in two events, through maps and booklets, where appropriate language was used to facilitate understanding for all involved. Community members considered the material to be of high quality, but the feedback was very brief. According to the community members interviewed, there was no feedback from the social aspect of the diagnosis. It was repeatedly mentioned that it would be positive if the research results were used in schools with the students. Interaction with the university did not result in success with science classes. Regardless, the feedback had plenty of numerical reach.

This research would have been better to have been preceded by meetings within the community, to facilitate their participation in the research design, in the negotiation of project counterparts in alignment with the community and in the type of return and utilization, the results produced. This was not done.

Although the incorporation of the Cancun Safeguards is subsequent to project implementation, if these aspects of community participation had been better addressed, the project would have been more effective in generating useful knowledge and could have had more impact on public policy.

CROSSCUTTING CRITERIA

POVERTY REDUCTION

Impressions on the capacity of the project to contribute to poverty reduction came from interviews with community members from the islands of Mosqueiro, Cotijuba and Onças. On Mosqueiro Island, fishing provides a significant source of income, where the Z9 Fishing Colony operates. The colony's president, Roberto das Gracias informed that the project supported the argument for securing financial assistance from the government, which constitutes an additional income for approximately 40 local fishers. This results in a local annual benefit of about R$160,000 per year, or more than 14% of the project value (which would pay the project in seven years)[48]. However, the socio-economic diagnosis did not result in any benefit. The Centre did not follow up on the demands raised.

There seems to be a lack of institutional integration of project products in relation to the reduction of poverty and other socio-economic transversal aspects. The Centre has this integration, but it does not seem to have been mobilized for the project.

The project coordination did not know if the social agenda advanced post-project, but believes it did not. Creating a social agenda without following through can create difficulties for future initiatives that consequently lose credibility.

48. According to IBAMA Ordinance No. 48, of 05/11/2007, the benefit payments occur in the region (Marajó) between January and April. Each fisher receives a minimum wage per month during this period. Hence, 40 fishers x $ 998 per month x 4 months = $ 159,680 per year.

On the island Ilha das Onças, there is a community discord with the projects and studies developed in the area (not only the project in question), with little return given the community, either in information, opportunities for participation or growth. This is illustrated, for example, by a shed of an abandoned UFPA community project that was built in front of the school, which could be used for teaching activities. There are also professional sewing machines that could be used by women in the community. Another example is a solar boat, abandoned and in disrepair.

One of the identified challenges for projects is that of discontinuity. One interviewee stated that they suspect the island *Ilha das Onças* could lose future projects due to some projects that are currently registered but have been discontinued and do not generate any benefits.

Crosscutting criteria/issue	Compliance[49]	Observations
Poverty reduction	**To some extent**	
To what extent has the project effectively contributed to economic alternatives that value standing forest and sustainable use of natural resources?	To some extent	Knowledge about aquatic resources favours their sustainable use, which can result in a conservation alliance with the forest.
To what extent has the project positively influenced poverty reduction, social inclusion and improved living conditions of the beneficiaries (mainly: traditional communities, settlers and family farmers) living in their area?	No	
Has the project been able to promote and increase production in value chains of timber and non-timber forest products sourced from sustainable management?	To some extent	The project mapped the islands' açaí plants, favouring their management
In the case of a project that contains the scientific and technological development component, has this contributed to the construction of a development model suitable for the region?	To some extent	It pointed out priority areas for conservation and management, but this was not incorporated into public policy. The methodology is available and has been applied in other cases.

Table 32 Crosscutting criteria "poverty reduction" applied to the Belém Islands project

GENDER EQUALITY

With regard to the gender question, the project did not foresee the promotion of gender equality in its planning. Even without being part of a gender strategy envisaged since the beginning of the project, the promotion of women happened spontaneously. This happened in the leadership positions of the research groups, where women played a key role, as they are the Centre's most senior researchers, as well as in the area of participation, where female students predominated in activities of scientific initiation and post-graduation.

49. Crosscutting criteria were not required of projects at the time of submission, so the project may not have developed specific strategies to meet them.

Crosscutting criteria/issue	Compliance[50]	Observations
Gender equality	**Yes**	
Has the project been able to integrate gender issues into its strategies and interventions or address the issue in isolation? How?	To some extent	Gender issues were not considered relevant and the project has gender equality. It was not considered important in the context of the project, so a specific strategy was not implemented.
Was there gender separation of data collection for project planning and monitoring?	No	
How did the project contribute to gender equity?	Yes	Through the laboratory, there is a chance of improvement and advanced training for a group of students and researchers in which women are the majority.

Table 33 Crosscutting criteria "gender equality" applied to the Belém Islands project

CONCLUSIONS

The Belém Islands project generated interesting research results, but had limited impact due to its low social demand. Thus, the results did not lead to improvements in the management of the islands, nor in the quality of life of the communities. The main gain of the project was the laboratory, which continues to support research activities and training of human resources, as well as other projects that have greater social demand, such as research that supported the granting of financial assistance on Mosqueiro Island.

The laboratory has ensured its sustainability, while research has had limited territorial relevance over time. The project appears to have been effective and efficient in its use of resources. To give greater contribution to the Amazon Fund's goal of research contributing to the recovery, conservation and sustainable use of the Amazon biome, it would be necessary to shift the focus from only basic core-research and focus more on the impacts (indirect effects).

RECOMMENDATIONS

FOR PROJECT COORDINATORS

- Consider demands and involve beneficiaries in project design.

FOR THE DEPARTMENT OF ENVIRONMENT AND THE MANAGEMENT OF THE AMAZON FUND / BNDES

- Take into consideration the duration of implementing infrastructure for conducting research supported by the project, the duration of the project should consider the time

50. See previous footnote.

required for construction, from two to three years. Otherwise, alternative infrastructure should be provided (existing or partner) that can support research in the meantime. The construction of the laboratory was very important to consolidate institutionally the research group at UFPA. This Centre has been able to mobilize resources and partnerships, increasing the scope of project results. In other initiatives, support from the Amazon Fund may have the same effect. Therefore, other projects may support the construction of laboratories as an outcome (rather than a medium) as long as their demand is justified.

- Request that evidence be given that the results generated from the project will achieve institutional integration; serve the demands of the local communities and those responsible for creating public policies.

LESSONS LEARNED

- It was evident that a social demand for research would increase the utilization of their results, increasing their positive impact. Participation could also have been strengthened, including prior consultation and adjustments to the project to more effectively meet the demands of communities and public agencies.
- The duration of the project was insufficient to allow the constructed installations to be utilized for research within the project timeframe.
- Aquatic resources are not directly associated with forest conservation, but their conservation has a synergy with REDD+, as on the one hand, they depend on the forest for their conservation and, on the other, provide income without the need for deforestation. Therefore, supporting this type of project is an advantageous investment for conservation.
- In addition to the impact of the research results, consideration should be made for the effect training personnel and the construction of methodologies will have on to future research.

7.1.5 AMAZON PUBLIC POLICY INCUBATOR PROJECT

INTRODUCTION

Project:	Amazon Public Policy Incubator project
Responsible body (project management):	Federal University of Pará (UFPA)
Responsible body (financial management):	Research Support and Development Foundation (FADESP)
Project timeframe:	1st semester 2012 to 2nd semester 2016
Territorial scope:	All states of the Amazon biome
Beneficiaries:	UFPA, the scientific community and population of the Legal Amazon
Objective:	Develop an interdisciplinary research project on the socio-economic and environmental impacts arising from the expansion of the Amazonian economic frontier, within the framework of the Amazon Public Policy Incubator, linked to the Forum for Research and Graduate Studies in Sustainable Development of the Amazon.
Total value of the project:	R$2,704,084.90
Value of the support provided by the Amazon Fund:	R$2,704,084.90
Period of execution:	65 months

Table 34 Amazon Public Policy Incubator project fact sheet

PROJECT SUMMARY

The main objective of the Amazon Public Policy Incubator (IPPA) project was to conduct interdisciplinary research on the socio-economic and environmental impacts of expanding the Amazonian economic frontier. The intended impact was to strengthen the capacity and performance of public and private organizations that act in preventing deforestation and in the social and environmental management of Amazonian states and municipalities.

The nine states of the Legal Amazon (Figure 11) make up the geographic scope of the project. In this context, a decentralized approach to project management and implementation was applied, consisting of a central nucleus and nine state centres. In total, the project involved 84 professionals divided into centre coordinators, researchers and beneficiaries. Institutionally,

the overall coordination of the project was in charge of the Centre for Advanced Studies on the Amazon (NAEA) of the Federal University of Pará (UFPA). Additionally, IPPA was incorporated as part of the Amazon Sustainable Development Research and Postgraduate Forum, which brings together twenty graduate programmes in the nine states of the Brazilian Amazon. The implementation of IPPA was highlighted by the coordinators as one of the core results of the project, which made possible the systematic, regular and permanent articulation between society and the Amazonian universities, bridging the gap between academia, society and productive sectors in the region.

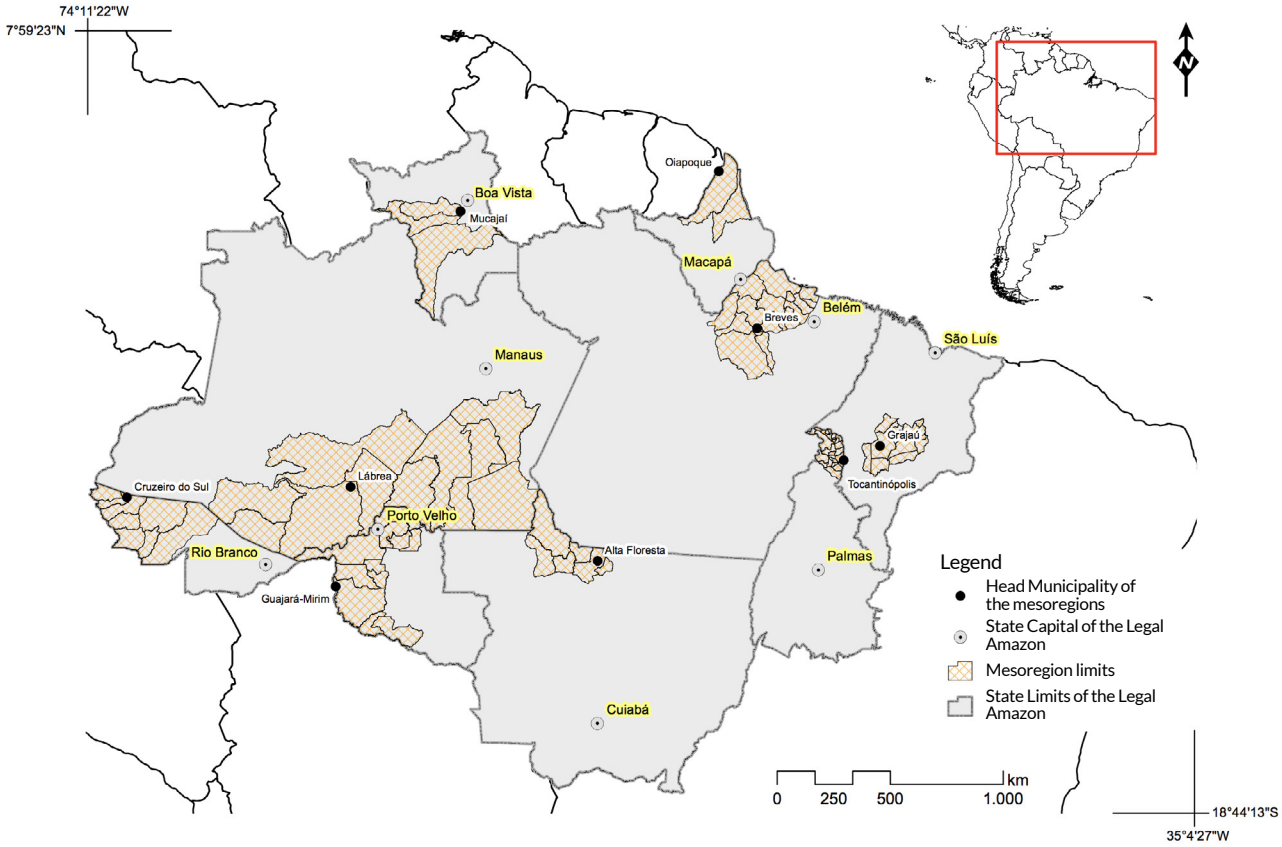


Figure 11 Location of the nine states of the Legal Amazon and the mesoregions that were the subject of the project study [51]

The research was developed in two stages. In the first, interdisciplinary research was conducted on the socio-economic and environmental impacts resulting from the expansion of the economic frontier in the nine states of the Legal Amazon. In the second, "Action Research" was conducted on the socio-economic and environmental impacts resulting from the expansion of the economic frontier in the mesoregions, defined in step one, as the areas of greatest social and environmental vulnerability in each of the nine states of the Legal Amazon.

Based on the results presented, as well as the field research carried out during the project evaluation process, it was possible to identify that the project generated the following products; the Sustainability Indicators System of the Municipalities of the Amazon (ISMA), the definition of the most vulnerable socio-environmental mesoregions in the Amazon states, and the collection of books "Regional Formation of the Amazon", with varied scientific production and the training of personnel.

51. Base Map Source: IBGE, 2015; ESRI, 2019.

INTERVENTION LOGIC

Figure 12 presents the intervention logic agreed on between the project executors and the Amazon Fund:

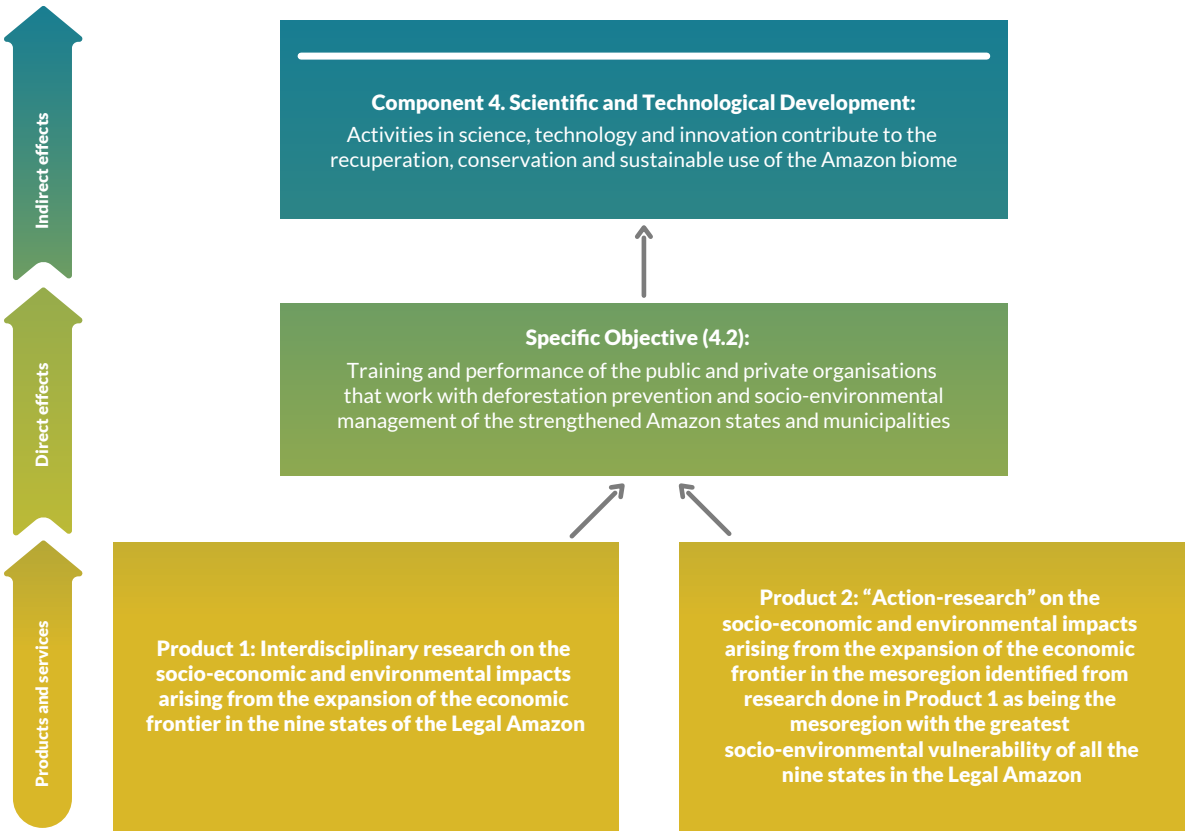


Figure 12 Intervention logic according to the Amazon Public Policy Incubator project logical framework

METHODOLOGY SPECIFICS

The assessment followed the evaluation criteria and the methodology described in section 3 of the report. In terms of methodology, the assessment of the IPPA project is noted for having applied a quantitative questionnaire to the coordinators, researchers and scholarship recipients involved in the project, which utilized the survey platform *SurveyMonkey* (an example of this questionnaire is found in Annex 7.3). This is because if it were not done, it would not be possible to create a plausible sample to assess the effectiveness of the project due to the geographical breadth and the diversity of actors participating in the project, as concluded from previous information obtained and other data collected in the field.

The questionnaire was sent to 62 people who participated in the project (see Annex 7.3). The return was 24% (15 completed questionnaires). Of these, eight are women (53%) and seven are men (47%). The vast majority (93%) participated in the project for more than two years and 73% worked in a researching role. All participants belong to universities. It is worth mentioning that the project coordinators and other participants (government agencies) are not highly represented in the survey. For this reason, only plausible results are presented according to the sample.

The following questions orientated the data collection process, whether from secondary sources or interviews.

GUIDING QUESTIONS

- Who are the project stakeholders? How satisfied and involved are they? Did stakeholders participate in lectures and other participatory activities?
- Is the data produced by the project publicly available? How? Were they disclosed? How? Are these means of availability and dissemination effective?
- Was there interest from the government, civil society organizations and communities for data and participatory activities?
- What was the scientific production realised by the project or the project's base production? Was this production significant considering the resources spent?
- Is the data produced by the project publicly available? How? Was this data disseminated? How? Are these means of availability and dissemination effective?
- Were the inputs effectively available for the activities?
- What is the current situation and future prospects of the IPPA project?
- Are there any suggestions for improving the AF / BNDES relationship with project executors given previous experience in project development?

ASSESSMENTS OF RESULTS

ASSESSMENT OF INDICATORS

In the first step of the individual assessment, the results and impacts indicators were evaluated, agreed on with BNDES at the beginning of the project. Table 35 shows the key indicators.

Key indicators	Target	Statius at the end of the project
Effect (Outcome): Capacity and performance of public and private organizations that work towards the prevention of deforestation and in the socio-environmental management of the strengthened Amazon States and Municipalities.		
• Number of scientific publications o Dissertations o Doctoral theses o Course completion papers o Articles	Not defined	
• Number of educational or informative publications (books)	Not defined	4
• Number of researchers and technicians established in the region involved in RD&I activities	Not defined	84[52]
Products and services:		
• Number of networking events (seminars and forums) dedicated exclusively to the dissemination of research results:	Not defined	2
• Number of supported networks	1	1

52. There were 84 researchers established throughout the project, as there were alternating recipients among the 50 grants constantly available from the beginning to the end of the project.

Key indicators	Target	Statius at the end of the project
• Number of regional incubator committees in the Amazon mesoregions	Not defined	9
• Number of State Centres for research, monitoring and evaluation of public policies implemented in the Amazon states	Not defined	9
• Number of social and environmental indicators developed with baseline values	1	12
• Number of Legal Amazon mesoregions with ecological, economic and social system characterization	9	24
• Number of mesoregions of the Legal Amazon with an assessment of its socio-economic dynamics	9	9
• Number of Legal Amazon mesoregions with an assessment of recent experiences in management and natural resource management	9	9

Table 35 Public Policy Incubator project key indicators

It was shown that research was carried out in all its dimensions in the nine states of the Legal Amazon, according to the goals established by the project, as well as the creation and calculation of the Sustainability Index of the Amazonian Municipalities (ISMA). Participatory activities related to action research were conducted in the nine states of the Legal Amazon, where priority projects for the development of mesoregions were created. All these results were consolidated into a collection of four books titled Regional Formation of the Amazon.

The set of indicators followed shows that the IPPA project, coordinated by the NAEA and implemented within this incubator, has achieved its objectives, producing quality research documented in a collection of books available to academia, managers and the general public. Through networking events, the results that had so far been achieved (three of the four volumes of the collection) were disseminated, including a system of sustainability indicators of the Amazon municipalities, which was developed and calculated through the research. The finalized collection (including volume 4) was made available on the IPPA and Amazon Fund website.

Finally, the supported project made possible the establishment of nine regional committees for the Amazon Public Policy Incubator, promoting greater integration of universities and research centres with other actors in the region, expanding the regional capacity for monitoring and evaluation of public policies for the sustainable development of the Amazon. The lack of resources for project continuity has slowed down the process and the potential leverage that could have led to an impact at the municipal and state levels (specifically with regard to “action research”).

THEORY OF CHANGE

Based on the analysis of project performance indicators and reports and following the methodology presented in item 3 of the Report, a project change theory was developed revised before and after the field mission and interviews (Figure 13):

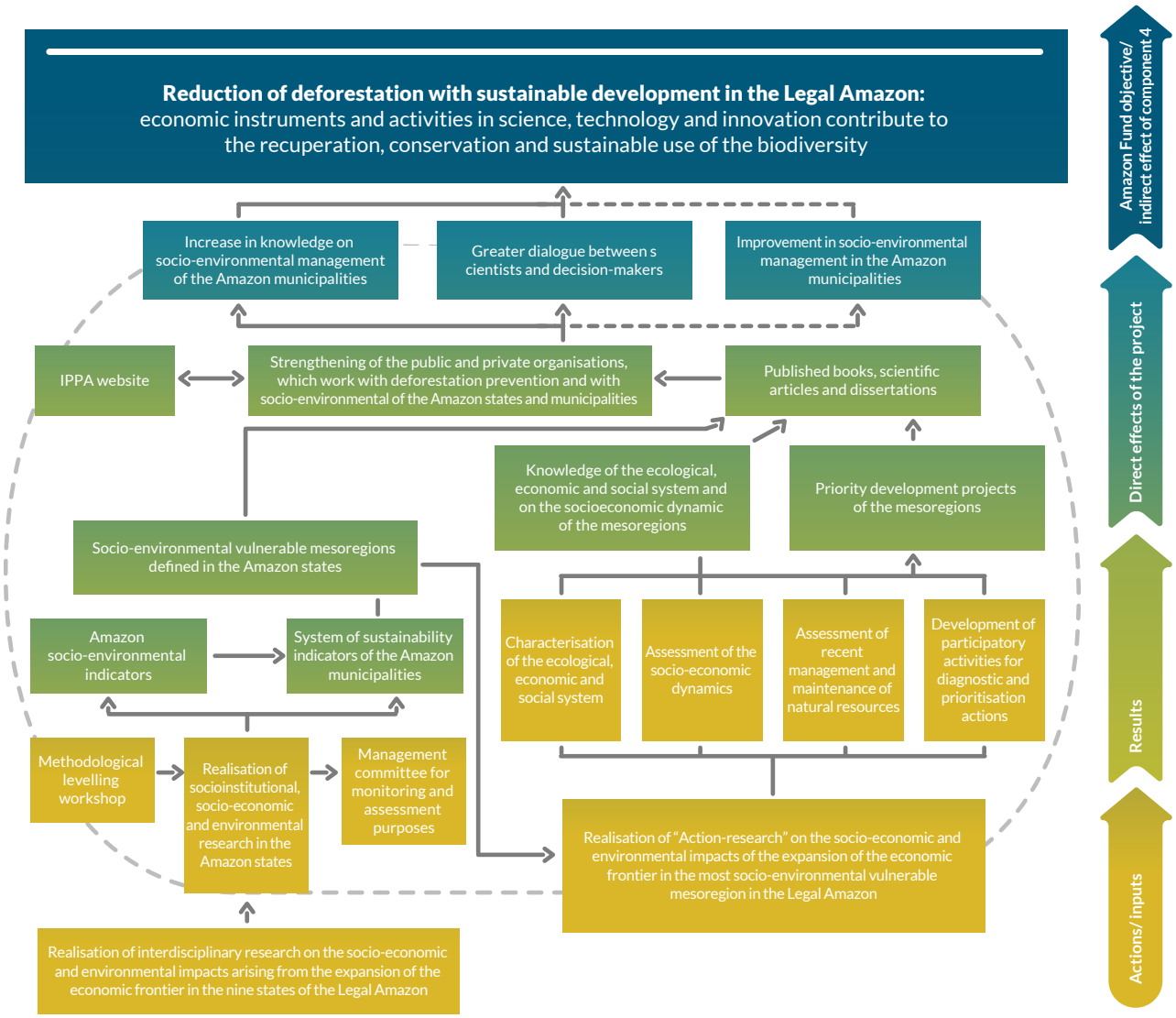


Figure 13 Theory of change of the Amazon Public Policy Incubator project, revised after field mission
(The arrows represent the hypotheses, that is, the assumptions regarding the interaction among results; the boxes contain the objective that was negotiated and agreed upon with the Amazon Fund; the space enclosed by the dotted line shows the area of responsibility of the project)

The theory of change of the Amazon Public Policy Incubator project (Figure 13) assumes that conducting socio-economic and environmental interdisciplinary research, initially in the nine states of the Legal Amazon and then focusing on regions with the highest socio-environmental vulnerability (mesoregions) in each state would result in the development of a sustainability indicator system for all municipalities of the Amazon. These being; the production of knowledge about the ecological, economic and social system of the mesoregions; conception and implementation of priority mesoregion development projects; scientific and academic publications; as well as the strengthening of public and private organizations active in the prevention of deforestation and in the social and environmental management of the Amazonian states and municipalities.

These subsidies would then be used to improve the socio-environmental management of Amazonian municipalities, increase dialogue between scientists and decision-makers, and increase knowledge about socio-environmental management of Amazonian municipalities. The project activities would also serve to strengthen research groups at the nine universities of the Legal Amazon and establish researchers in the region. Taken together, these direct effects of the project should contribute indirectly to the Fund's objective of reducing deforestation

and promoting sustainable development. From the revised theory of change (Figure 13), it is noted that:

- the system of sustainability indicators of Amazon municipalities was developed;
- Knowledge about the ecological-economic-social system of the mesoregions was produced;
- Priority projects for the development of the mesoregions were developed. However, most not implemented;
- Four books were published, but it was not possible to assess the quantity and impacts of the scientific articles, theses and dissertations produced;
- Mainly due to the lack of implementation of the priority projects for the development of the mesoregions, and the lack of strategy for communication and dissemination of results, the strengthening of public and private organizations of the Amazonian states and municipalities has not been achieved as expected.

IMPACT, SUSTAINABILITY AND RELEVANCE

INCREASED KNOWLEDGE ON SOCIO-ENVIRONMENTAL MANAGEMENT OF AMAZONIAN MUNICIPALITIES

The project was active in a wide geographical area of about 980,000 km^2. The conception of the System of Sustainability Indicators of the Municipalities of the Amazon (ISMA) covering the 771 municipalities of the Legal Amazon has in some ways contributed to increase the knowledge of socio-environmental management in this region. ISMA represents a major advance in diagnosing the socio-environmental management capacity in the Amazon, as it makes it possible to geographically create a panorama of the entire region and to list priorities for political intervention. As a result, it was possible to identify, in each state of the Legal Amazon, the most socio-environmental regions, called mesoregions (see Figure 11).

All the technical-scientific knowledge generated in the project was synthesized in four volumes of the "Regional Formation of the Amazon"[53] collection. Although not properly reported in the reports and interviews, publication of scientific articles and academic papers were published (theses and dissertations). At least 89% of researchers who answered the questionnaire (see Annex 7.3) via the SurveyMonkey platform reported that they contributed with these types of publications. The project also established, according to the definition used by the Amazon Fund, about 84 researchers during the execution period.

At the time of the evaluation, the existence of initiatives to update ISMA was not evident. An important part of the indicators depends on census information. In 2020, the Brazilian census will take place, which will update census information, and this would be an excellent opportunity to update ISMA. This is not currently guaranteed due to a lack of resources, which subsequently shows a lack of sustainability in the project. Due to a lack of access to information, it is concluded that this direct effect was weak.

GREATER DIALOGUE BETWEEN SCIENTISTS AND DECISION MAKERS

In some cases, the process of socio-environmental characterization and construction of mesoregion development projects has increased the dialogue between academia and decision-makers at various institutional levels, as well as bringing these two actors closer to communities.

53. Available at: http://www.amazonfund.gov.br/pt/projeto/Incubadora-de-Politicas-Publicas-da-Amazonia/ .

In the state of Pará, where we obtained more details about this interaction between academia, decision-makers and local communities, the participatory activities of the project encouraged the formation of a special class for the Professional Master's in Public Management of the Federal University of Pará (UFPA), in Breves, Marajó Island. This island is considered by the Human Development Index (HDI) of the Brazilian Institute of Geography and Statistics (IBGE) as the poorest region of the country. Coordinated by IPPA, but with financial resources from UFPA, the course trained 21 masters' students, all from the region and still working locally. They currently perform public management duties, in various departments including in the military and four municipal departments. A good example is Maila Costa, who was a volunteer in the project, coordinator of the Pará state mesoregion and Breves Administration Secretary. She has a master's degree in Public Management, from the special class promoted by IPPA, and is currently studying for a doctorate linked to the project coordinators. She still lives in Breves.

For the other states, an in-depth verification of interaction between scientists and decision-makers was not possible.

IMPROVEMENT OF SOCIO-ENVIRONMENTAL MANAGEMENT OF AMAZONIAN MUNICIPALITIES

The main impact sought by the project was the strengthening of public and private organizations active in the prevention of deforestation and in the socio-environmental management of Amazonian states and municipalities. The basic inputs required to achieve this impact were; the design of the Sustainability Indicators system of the Amazonian Municipalities (ISMA), the definition and socio-economic characterization of the mesoregions in the states of the Legal Amazon and the conception and implementation of the priority development projects of the Mesoregions. With the exception of the priority projects, all others were achieved.

"Priority projects" are community development plans built in a participatory manner with the local community, governments and academia, based on the diagnoses made by the community project and self-awareness, aiming for local and institutional, social and environmental development and strengthening. These projects were designed through participatory activities. However, due to a lack of resources and local commitment, they did not progress. The resources required for the implementation of the priority projects depended on the continuity of the IPPA project and this was never realized. This lack of continuity was indicated as the main factor for the non-implementation of the priority projects. In addition, there was found to be no previous involvement of the beneficiaries, as was the case in the State of Acre, a fact that may have contributed to the lack of local commitment in carrying out the priority projects.

Participatory activities in the State of Pará, where more information was obtained, took place on Marajó Island, involving sixteen municipalities that form the mesoregion. In order to achieve the conception of the priority project for development in the mesoregion, activities, led by Breves, were concentrated in five municipalities, due to the difficulties of access that prevail in the region. The project was designed in a participatory manner, but was not implemented for the reasons mentioned above. Analysing the results of the questionnaire to IPPA project participants, it can be seen that this dynamic was reproduced in the other states, with the difference that in some states, the priority project was implemented.

The project generated valuable data and products and their use and reproduction could be enhanced through better dissemination and communication. For example, the indicator methodology and summary index are available in volume 4 of the Amazon Regional Formation

Collection[54] and on the IPPA website[55]. However, the database including the geographic database, which could serve as input for further research, was not available. The project's main product, the book collection, was not distributed and disseminated for financial and communication reasons and responsibility fell on the state universities. Regarding the scientific publications produced and trained personnel, in consultation with the IPPA website (their own site and their page hosted on the Amazon Fund website) and with the project coordinators, an updated list was obtained. However, when analysing the participants' answers to the project's online questionnaire, it is seen that these products would have been (auto) generated.

Some institutional structures generated by the project were discontinued after its completion. The Amazon Public Policy Incubator (IPPA), created as part of the Amazon Sustainable Development Research and Postgraduate Forum, since the project closure has suspended activities. It brought together twenty postgraduate programmes in the nine states of the Brazilian Amazon. However, depending on the financial situation it may be reactivated in the future. The IPPA website is still active but is no longer being updated.

EFFECTIVENESS

ISMA was developed effectively and allowed the identification of mesoregions. These are regions with greater social and environmental vulnerability in each state of the Legal Amazon. However, regarding the priority development projects of the mesoregions, most were not implemented. Four books were published, but it was not possible to measure the quantity and impacts of the scientific articles, theses and dissertations produced.

A possible impact indicated by the theory of change was not achieved, this being the improvement of environmental management of Amazon municipalities by strengthening the capacity and performance of public and private organizations active in preventing deforestation and environmental management. However, the principle also was not anticipated within the scope of the project. It was limited mainly due to non-implementation of the priority development projects of mesoregions and as there was no additional fundraising strategy, the implementation depended on the extension of the project financed by the Amazon Fund / BNDES, which did not happen.

EFFICIENCY

Overall, the financial execution of the Research Support and Development Foundation (FADESP) was efficient. Payments and recruiting went as planned except for some bureaucratic and procedural problems and delays in product delivery by project executors. At the beginning of the project, it was a challenge to adapt financial execution to the complexity of the territorial range and the number of participants. However, according to the technician responsible for the financial execution of the project at FADESP, in relation to other financial sources, BNDES's execution practices facilitated this process because they are simple to carry out and distinctive in their flexibility.

The project was not executed on schedule due to the late delivery of the products. In terms of cost-benefit, if considering the quantity and availability of the products officially declared by the project, it could be concluded that the cost (amount spent R$2,660,567.23)[56] was high for the

54. Books available at: http://www.fundoamazonia.gov.br/pt/projeto/Incubadora-de-Politicas-Publicas-da-Amazonia/#

55. Access: http://www.amazonia.ufpa.br/ippa/.

56. It was planned that 80% would be spent on research grants, 6% on travel, 4% on daily expenses, 3% third party legal services, 1% consumables and 6% administrative expenses.

potential benefits. However, considering the geographical breadth and the fact that information was obtained from only about 25% of the actors directly involved, it would be premature to reach this conclusion. This is because it seems evident that the quantity and breadth of the products were larger than officially stated, as the activities were developed within the nine federal universities of the states of the Legal Amazon, linked to postgraduate programmes, and involving participatory activities in nine mesoregions.

CANCUN SAFEGUARDS (REDD+)

Regarding Cancun Safeguards (REDD+)[57], the IPPA project, being a "Science, Technology and Innovation" project, does not correlate to most of these safeguards (Table 36). Where relevant, the framework may be completely or only partially met.

Safeguard/issue	Compliance	Observations
1. Actions complementary to or consistent with the objectives of national forest programmes and other relevant international conventions and agreements.	**Yes**	**Project focus on deforestation prevention and socio-environmental management of the Amazon states and municipalities.**
Has the project proved to be in line with PPCDAm and state deforestation prevention and control plans?	Yes	Yes, with PPCDAm and state plans that aim to reduce and control forest degradation.
With which other federal public policies or international agreements has the project demonstrated alignment? In what respects?	N/A	
Has the project contributed or could it contribute directly or indirectly to reducing emissions from deforestation or forest degradation? In what way?	Yes	By contributing, even partially, to the strengthening of public and private organizations active in the prevention of deforestation and in the social and environmental management of the Amazonian states and municipalities.
2. Transparent and effective national forest governance structures for national sovereignty and national legislation	**Yes**	
To what extent has the project promoted the articulation between different actors (public, private, third sector or local communities)?	Yes	Supported the process of creating the priority projects for the development of mesoregions in the states.
To what extent has the project contributed to strengthening public instruments and forest and territorial management processes?	To some extent	Facilitating actions in conjunction with socio-environmental institutions
3. Respect for the knowledge and rights of indigenous peoples and members of local communities, taking into account relevant international obligations, circumstances and national laws, and noting that the UN General Assembly has adopted the United Nations Declaration on the Rights of Indigenous Peoples.	**To some extent**	
To what extent has the project influenced the constitutional rights associated with formal land tenure and designation in your area?	N/A	

→

57. These safeguards were not required of projects at the time of submission, so the project may not have developed specific strategies to address them.

Safeguard/issue	Compliance	Observations
To what extent has the project influenced the sustainable use of natural resources in your area?	To some extent	The knowledge produced could be used for the development of public policies that improve the social and environmental management of Amazonian municipalities, including Indigenous land.
If the project had as its direct beneficiaries indigenous peoples, traditional communities or family farmers were their socio-cultural systems and traditional knowledge considered and respected throughout the project?	To some extent	The participatory articulations for the creation of the priority projects of the mesoregions involved traditional communities and farmers.
Are there effects that interfere with the traditional way of life of these groups? What kind of effects: on social, economic organization or the use of available spaces and resources? How do they interfere: positively, negatively, or both?	N/A	
4. Full and effective participation of stakeholders, in particular, indigenous peoples and local communities, in the actions referred to in paragraphs 70 and 72 of Decision 1 / CP 16	**To some extent**	
How has the project secured prior consent and local or traditional election of representatives of its beneficiaries (especially indigenous peoples and traditional communities)?	To some extent	There was no request for consent to operate in the communities, only for involvement in participatory activities.
What participatory planning and management tools did the project apply during planning and decision-making?	N/A	The project could have had more participatory management.
In the case of projects with economic purposes: were any benefits arising from the project accessed in a fair, transparent and equitable manner by the beneficiaries, avoiding a concentration of resources?	N/A	
To what extent has the project provided the general public and its beneficiaries with free access and easy understanding of information related to project actions?	Yes	Through participatory activities.
Has the project been able to implement an efficient result and impact monitoring system? Have the results achieved and their effects been systematically monitored and disseminated?	To some extent	The project met the requirements of the Amazon Fund.
5. Actions consistent with the conservation of natural forests and biological diversity, ensuring that the actions referred to in paragraph 70 Decision 1 / CP 1611 are not used for the conversion of natural forests, but rather to encourage the protection and conservation of natural forests and their ecosystem services and to improve other social and environmental benefits	**N/A**	
How did the project contribute to the expansion or consolidation of protected areas?	N/A	Research products could have supported the creation of protected areas, but this was beyond the scope of the project.
How did the project contribute to the recovery of deforested or degraded areas?	N/A	
In case of area restoration and reforestation activities, did the methodologies employed prioritize native species?	N/A	

Safeguard/issue	Compliance	Observations
To what extent has the project contributed to establishing recovery models with an emphasis on economic use?	N/A	
6. Actions to address risks of reversals in REDD+ results	**N/A**	
What factors pose risks to the permanence of REDD+ results? How did the project address them?	N/A	
7. Actions to reduce carbon displacement to other areas	**N/A**	
Have emissions reduced by project actions shifted to other areas?	N/A	

Table 36 Cancun safeguards (REDD+) applied to the Amazon Public Policy Incubator project

CROSSCUTTING CRITERIA

POVERTY REDUCTION

As can be seen in Table 37, in relation to the crosscutting criterion "Poverty Reduction"[58], the project actions with the highest potential were the priority mesoregion development projects. These regions were selected based on the high degree of social and environmental vulnerability. This was in order to identify, prioritize and agree on the creation of participatory activities for local development. As most of these projects have not been implemented, the potential to promote poverty reduction in these regions has not been realized.

Crosscutting criteria/issue	Compliance	Observations
Poverty reduction	**To some extent**	
To what extent has the project effectively contributed to economic alternatives that value standing forest and sustainable use of natural resources?	To some extent	Knowledge generated can be used to develop actions that value and promote sustainable development.
To what extent has the project positively influenced poverty reduction, social inclusion and improved living conditions of the beneficiaries (mainly: traditional communities, settlers and family farmers) living in their area?	To some extent	The project constituted priority mesoregion development projects, but most were not implemented.
Has the project been able to promote and increase production in value chains of timber and non-timber forest products sourced from sustainable management?	Undefined	Not enough information was obtained to address this issue.
In the case of a project that contains the scientific and technological development component, has this contributed to the construction of a development model suitable for the region?	To some extent	The project constituted priority mesoregion development projects, but most were not implemented.

Table 37 Crosscutting criteria "poverty reduction" as applied to the Amazon Public Policy Incubator project

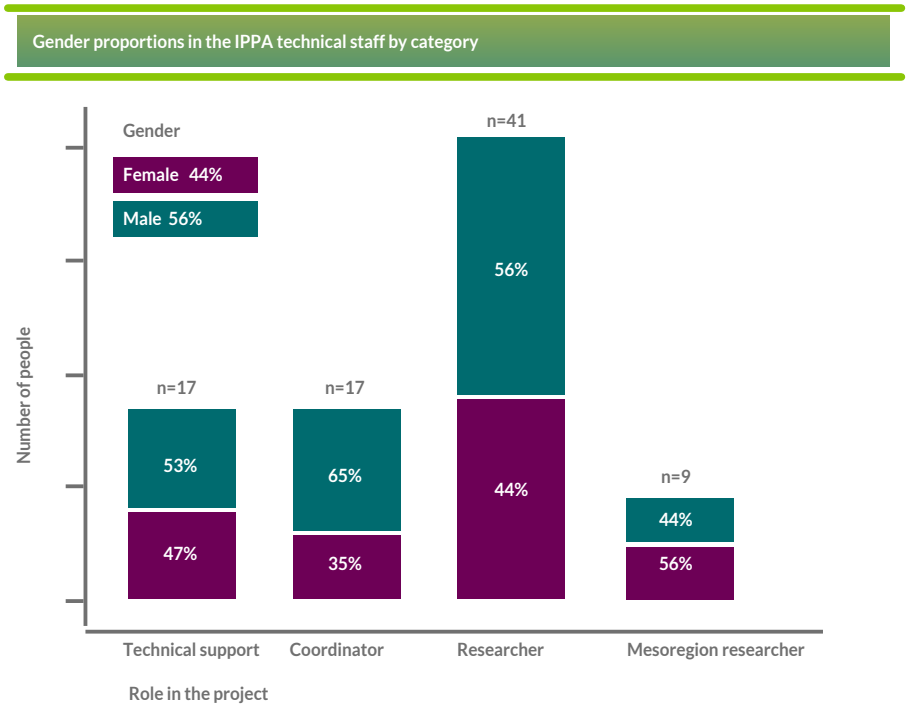
58. Crosscutting criteria were not required of projects at the time of submission, so the project may not have developed specific strategies to meet them.

GENDER EQUALITY

Regarding the promotion of gender equity (Table 38), no specific actions were addressed. Analysing the profile of the technical team that developed the project shows that there is relative gender proportionality, being 44% female and 56% male (Graph 3). With stratification of the functions performed in the project, it is found that most follow the general trend, however, the coordinating category presents gender disparity (35% female and 65% male). The importance given of this category shows that qualitatively it is still necessary to make advances in the promotion of gender equality in the context of scientific and technological development projects in general and specifically in the promotion of women in coordination roles.

Crosscutting criteria/issue	Compliance[59]	Observations
Gender equality	**No**	
Has the project been able to integrate gender issues into its strategies and interventions or address the issue in isolation? How?	No	According to a survey with the participants, there was no insertion of gender issues in the project development process, although, there was female participation in the project. On the other hand, due to the complexity of the project, it is not possible to specify this issue.
Was there gender separation of data collection for project planning and monitoring?	No	
How did the project contribute to gender equality?	No	Although, in the case of IPPA, composition of the project staff shows relative gender proportionality (see Graph 2), there were no specific actions to promote gender equity.

Table 38 Crosscutting criteria "gender equality" applied to the Amazon Public Policy Incubator project



Graph 3 Gender proportions in the IPPA technical staff by category[60]

59. See previous footnote.

60. Source: Project's Financial Report.

CONCLUSIONS

The Amazon Public Policy Incubator project generated relevant research results that, in addition to the products achieved (ISMA and the Collection of Books), although insufficiently publicized and exploited, had the potential to improve municipal sustainable management of the nine Amazon states at the impact level. However, this was limited mainly due to the non-implementation of the priority mesoregion development projects and as there was no additional fundraising strategy, implementation depended on the extension of the project funded by the Amazon Fund / BNDES, which did not occur.

From a point of view of possible impacts, the project presented low sustainability of the benefits achieved. Because of the nature of the project, the Cancun Safeguards were mostly not applicable. Among the applicable safeguards, it is worth noting the fact that there was no prior articulation of the project's target audience. Actions that did have a potential impact on poverty reduction were not developed in all areas of the project and it was not possible to confirm whether actions related to the promotion of gender equality were developed, although in general there was relative gender proportionality in the composition of the project's technical team.

RECOMMENDATIONS

FOR PROJECT COORDINATORS

- In order to increase impacts and facilitate the project implementation process, the proponents will need to develop some prior consultation / articulation mechanism for the project target audience similar to what is already common in the Fund's projects with indigenous, traditional populations or small producers.
- To ensure the sustainability of such projects, executors need to implement a strategy to raise additional funds from other sources.
- For projects with a wide geographical range and a large number of stakeholders, such as IPPA, decentralized management is an interesting approach, but it requires a refined monitoring strategy. For future projects, it is recommended that this aspect be fundamental to the project implementation strategy.

FOR THE DEPARTMENT OF ENVIRONMENT AND MANAGEMENT OF THE AMAZON FUND / BNDES

- It is recommended that strategy design for dissemination and communication of products and results is a prerequisite for submission of a project in component 4 of the Amazon Fund. This strategy should preferably be linked to a previously existing platform and thematic forums and make the most of digital and social based media. This is to increase the likelihood of use by the target audience and the creation of networks, as well as the cooperative production of new knowledge.
- It is recommended that the inclusion of the following proposed items be considered for eligibility criteria of projects submitted to the Amazon Fund: a mechanism for prior consultation with the beneficiaries (final public); a communication strategy and dissemination of results; a results sustainability strategy based on raising additional financial resources and the existence of institutional mechanisms to ensure continuity.

7.2. OECD CRITERIA, REDD+ SAFEGUARDS, CROSSCUTTING THEMES AND EVALUATION TOPICS

OECD CRITERIA

This evaluation was based on the relevance, effectiveness, efficiency, impact and sustainability criteria of the Organization for Economic Cooperation and Development (OECD) (Table 39), defined in 1991 by its Development Assistance Committee (DAC):

Criteria	Brief definition (based on DAC/OECD)	Relationship to the theory of change	Possible values
Relevance	Assesses the coherence of project objectives according to the demands of the beneficiaries and the political priorities of the target groups, the recipient and the donors.	Relationship of the "direct and indirect effects" of projects to the "indirect effect of the component" and the overall objective of the Amazon Fund.	Irrelevant; moderately relevant; very relevant.
Impact	Assesses the positive and negative changes arising from the project, either directly or indirectly, intentional or involuntary.	Direct and indirect effects of project products	Effect not achieved; weak effect; strong effect
Sustainability	Assesses whether the project benefits continue to occur after its completion, with an emphasis on social, economic and environmental aspects.	Continuity of direct and indirect effects of project products	Unsustainable; moderately sustainable; very sustainable
Effectiveness	Assesses the extent to which the project's direct objectives have been achieved or are expected to be achieved and which factors were important.	Contribution of actions to project product generation	Not effective; moderately effective; effective
Efficiency	Measures the cost-effectiveness of the results and if the financial resource was invested economically and if the results were satisfactorily achieved.	Contribution of the procedures, management arrangement, construction work, equipment and other inputs into project actions.	Not efficient; moderately efficient; efficient.

Table 39 Five evaluation criteria defined by the OECD

CANCUN SAFEGUARDS (REDD+)

Assessments of individual projects carried out under the Amazon Fund should also consider the Cancun Safeguards defined by the UNFCCC for REDD+ actions as specific criteria. However, although UNFCCC REDD+ Safeguards were agreed in 2010 during COP16 in Cancun, Mexico, the Amazon Fund projects' evaluation criteria was proposed in 2016, with the publication of the Conceptual Framework for the Evaluation of Projects Supported by the Amazon Fund, when the projects here evaluated had already been approved, completed or were being implemented, so it could not be expected in this case that they would be able to meet all of the criteria. For each safeguard, key questions were assessed for each project (Table 40), to verify whether the safeguard was met.

The projects partially or fully meet the nine Cancun Safeguards that apply to them.

Safeguard/issue	Biodiversity	Amazon Bioactive Compounds	Mangrove Forests	Belém Islands	Amazon Public Policy Incubator
1. Actions complementary to or consistent with the objectives of national forest programs and other relevant international conventions and agreements.	Yes	To some extent	Yes	Yes	Yes
1. Transparent and effective national forest governance structures for national sovereignty and national legislation	To some extent	To some extent	Yes	To some extent	Yes
2. Respect for the knowledge and rights of indigenous peoples and members of local communities, taking into account relevant international obligations, circumstances and national laws, and noting that the UN General Assembly has adopted the United Nations Declaration on the Rights of Indigenous Peoples.	To some extent	Yes	Yes	To some extent	To some extent
3. Full and effective participation of stakeholders, in particular indigenous peoples and local communities, in the actions referred to in paragraphs 70 and 72 of Decision 1 / CP 16	To some extent	Yes	Yes	To some extent	To some extent
4. Actions consistent with the conservation of natural forests and biological diversity, ensuring that the actions referred to in paragraph 70 Decision 1 / CP 1611 are not used for the conversion of natural forests, but rather to encourage the protection and conservation of natural forests and their ecosystem services and to improve other social and environmental benefits	N/A	Yes	Yes	N/A	N/A
5. Actions to address risks of reversals in REDD+ results	N/A	N/A	To some extent	N/A	N/A
6. Actions to reduce carbon displacement to other areas	N/A	N/A	Yes	N/A	N/A

Table 40 Cancun safeguards (REDD+) applied to assessed projects

CROSSCUTTING CRITERIA

POVERTY REDUCTION

The contribution of projects to poverty reduction is limited due to the nature of the projects. For example, in contrast to projects that work with governance or social inequality, the projects assessed focus on science, technology and innovation activities that contribute to the recovery, conservation and sustainable use of biodiversity. Even so, the Mangrove Forests project went beyond its intended objectives, related to scientific and technological development, and resulted in positive economic, social and environmental impacts on a community in one of the Marine Extractive Reserves (RESEX). These impacts were achieved through mangrove replanting activities developed by the project, which contributed to the maintenance of the crab and fish population (main source of income and protein in the population's diet). Workshops were also held on the use of banana leaves to strengthen the handicraft production chain (which has become a source of income for a family in the community) (Table 41).

Crosscutting criteria/issue	Biodiversity	Amazon Bioactive Compounds	Mangrove Forests	Belém Islands	Amazon Public Policy Incubator
Poverty Reduction	Yes	No	Yes	To some extent	To some extent
1. Has contributed to reduction in poverty	No	No	Yes	No	No
2. Empowerment of the poor	No	No	Yes	To some extent	To some extent

Table 41 Crosscutting criteria "poverty reduction" applied to assessed projects

GENDER EQUALITY

Regarding gender equality, the projects did not have a specific strategy for women's empowerment (Table 42). However, women's involvement in the projects was strengthened based on the support received for the development of their research. This participation of women in research groups is important to note, as in academia, especially in the field of exact and earth sciences, women have not yet achieved equitable representation (only 32% of all researchers)[61]. This participation even occurred in project leadership: women performed prominent roles in the Belém Islands (coordinated by Professor Victoria Isaac) and Biodiversity projects (coordinated by Professor Barbarella Macchi). Regarding the beneficiaries, the Mangrove Forests project had positive impacts for both women and young people. Women were involved in handicraft and training activities, which made it possible to generate income from handicrafts, young people benefited from an entrance exam preparation course.

61. Source: Vanderlan da Silva Bolzani. 2017: "Mulheres na ciência: por que ainda somos tão poucas?". (Women in Science: why still so few?) Ciência e Cultura. Accessed on: 4th July 2019. Availabe at: <http://cienciaecultura.bvs.br/scielo.php?script=sci_arttext&pid=S0009-67252017000400017>.

Crosscutting criteria/issue	Biodiversity	Amazon Bioactive Compounds	Mangrove Forests	Belém Islands	Amazon Public Policy Incubator
Gender equality	To some extent	To some extent	To some extent	To some extent	To some extent
1. Is there a gender strategy?	No	No	No	No	No
2. Empowerment of women	To some extent	To some extent	To some extent	To some extent	To some extent

Table 42 Crosscutting criteria "gender equality" applied to assessed projects

7.3. QUESTIONNAIRE APPLIED VIA THE PLATFORM SURVEYMONKEY

Dear participant,

As part of the cooperative project between the *Deutsche Gesellschaft für Internationale Zusammenarbeit GmbH (GIZ)* and the BNDES / Amazon Fund, one of the actions supported by GIZ is the ex-post effectiveness evaluation of the completed projects supported by the Amazon Fund, with the aim of understanding the results and lessons learned from these projects.

We are currently assessing the project "Amazon Public Policy Incubator", which was implemented from 2012 to 2016 by the Federal University of Pará (UFPA).

Based on the information provided by the project, we understand that you participated in some way in the project, whether as coordinator, researcher or otherwise. However, due to the scope of the project in the nine Amazon states, unfortunately, we cannot interview you personally.

Therefore we have prepared and sent you this questionnaire and ask for your input to evaluate the project correctly. Your opinion is very important and the questionnaire will take no more than 15 minutes!

Thank you for your contribution. This questionnaire is open until Monday, May 27th.

Thank you very much!

The GIZ and BNDES team

Guiding question	Type of Participant (V = *ask if question applies to respondent type*)			
	Type of question	State Coordinator	Researcher	Other
WHO ARE THE PROJECT'S INTERESTED PARTIES? WHAT IS YOUR DEGREE OF SATISFACTION AND INVOLVEMENT? HAVE INTERESTED PARTIES PARTICIPATED IN LECTURES AND OTHER NETWORKING ACTIVITIES?				
Name and Institution; Genre; Function; Participation time in the project	Various	V	V	V
Has an IPPA State Management Council been formally established in your state?	Yes/no	V		
If so, can you tell who the members were and how often the regular meetings were held?	Free answer	V		
Besides your institution, what others participated in the project in your state?	Name of your institution + free answer	V		
Have there been participatory activities in your state?	Multiple choice -Workshops, lectures, seminars, courses, others	V		
Have you participated in any participatory activities promoted by the project?	Multiple choice - lecture, seminar, course, others		V	V
Have roundtable meetings been held with the government, private sector and / or civil society actors in your state?	Yes/no	V		V
If yes, did you participate?	Yes/no	V		V
If yes, could you name more actors who participated?	Yes/no + Free answer	V		V
Have you been part of the Regional Incubator Committee in your state?	Yes/no	V	V	V
If so, in which mesoregion?	Multiple choice: Cruzeiro do Sul (Acre); Guajará Mirim (Rondônia); Lábrea (Amazonas); Oiapoque (Amapá); Alta Floresta (Mato Grosso); Grajaú (Maranhão); Breves (Pará); Tocantinópolis (Tocantins) and Mucajaí (Roraima).	V	V	V
Have you been part of the State Centre for Public Policy Research, Monitoring and Evaluation in your state?	Yes/no	V	V	V
In which mesoregion?	Multiple choice: Cruzeiro do Sul (Acre); Guajará Mirim (Rondônia); Lábrea (Amazonas); Oiapoque (Amapá); Alta Floresta (Mato Grosso); Grajaú (Maranhão); Breves (Pará); Tocantinópolis (Tocantins) and Mucajaí (Roraima).	V	V	V
IS DATA PRODUCED BY THE PROJECT ACCESSIBLE TO THE PUBLIC? HOW? HAS THE DATA BEEN DISSEMINATED? HOW? ARE THESE METHODS OF ACCESSIBILTY AND DISSEMINATION EFFECTIVE?				
What data / products in your state were produced by the projects?		V	V	
Have you published any material based on the data produced by the project?	Multiple choice - book, article, thesis, coursebook or other document	V	V	
Did you participate in the elaboration of social and environmental indicators?	Yes/no	V	V	
If yes, in what way?	Free answer	V	V	

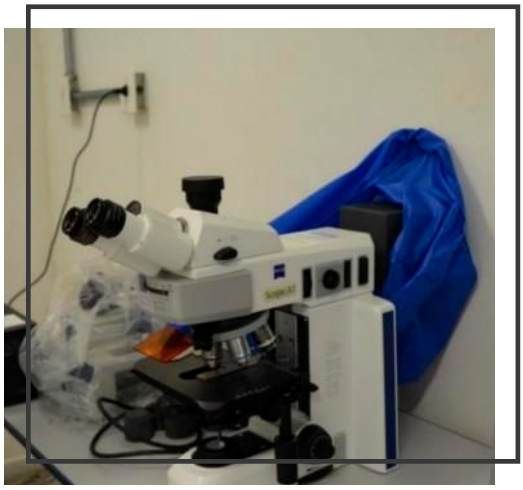
Guiding question	Type of Participant (V = *ask if question applies to respondent type*)			
	Type of question	State Coordinator	Researcher	Other
Did you receive any publications produced by the project?	Multiple choice - book, leaflets, others		V	V
Did you use any material (book, booklet, article, etc.) produced by the project in its institutional activities?	Yes/no	V	V	V
If so, what material and how so?	Free answer	V	V	V
If yes, are you still using these materials today?	Yes/no	V	V	V
Was there an official release of the book collection "Regional Formation Collection of the Amazon" in your state?	Yes/no	V	V	V
If yes, for which audience was this release given?	Free answer	V	V	
Have participatory activities been carried out in your state mesoregion?	Yes/no	V		
Have you been involved in any participatory activity in your state mesoregion?			V	V
If yes, which?			V	V
Did you participate in one of the networking events for the presentation of the survey results?	Yes/no	V	V	
If yes, in which?	Multiple choice -> II Amazonian Congress of Sustainable Development, Palmas (TO), October 24-26, 2012, UFT Campus. III Amazonian Congress of Sustainable Development, Cuiabá (MT), November 19-22, 2014, UFMT Campus	V	V	
Has a priority project been created in your state mesoregion?	Yes/no	V	V	V
If yes, was this project implemented?	Free answer	V	V	V
Did you use the project Website for your state coordination activities?	Yes/no	V		
If yes, can you tell how?	Free answer	V		
Have you ever visited the project website for information about the project or for information produced by it?	Yes/no		V	V
If yes, could you mention what information was obtained?	Free answer		V	V
Did project activities have an impact on your work?	Yes/no	V	V	V
If yes, what in what way?	Free answer	V	V	V
WAS THERE INTEREST FROM PUBLIC AUTHORITIES, CIVIL SOCIETY ORGANIZATIONS OR COMMUNITIES FOR DATA AND PARTICIPATING ACTIVITIES?				
Have you been approached by any institution, member of civil society or government with an interest in accessing and / or using the data produced by the project?	Yes/no	V		
If yes, which?	Free answer			

Guiding question	Type of Participant (V = *ask if question applies to respondent type*)			
	Type of question	State Coordinator	Researcher	Other
WERE THE INPUTS EFFECTIVELY AVAILABLE FOR CARRYING OUT THE ACTIVITIES?O				
What kind of support did you receive from the project?	Multiple choice: grant, consumables, daily allowance, others	V	V	V
Were there any problems in delay, bureaucracy and such in providing support for the project?	Yes/no + if yes: free question	V	V	V
IMPACT				
Have you noticed an increase in the discussion about the importance of socio-environmental management of the Amazon municipalities driven by the project?	Yes/no, free question: in what way?	V	V	V
Have you noticed an increase in the participation of researchers involved with the social and environmental theme in the Amazon?	Yes/no + If yes: free answer	V	V	
Do you think that knowledge about socio-environmental management of the Amazon municipalities has increased?	I	V		V
CROSSCUTTING CRITERIA - OECD				
In participatory activities in your state mesoregion, were gender issues considered as diagnostic parameters?	Yes/no, free answer: How?	V		
How has the priority development project, developed for the mesoregion, contributed to gender equality?	Free answer	V		V
How has the mesoregion development project positively influenced the reduction of poverty and the social inclusion of people?	Free answer	V		V

7.4 LIST OF PHOTOS

Biodiversity

CEABIO



Equipment purchased under the Biodiversity project

Meeting with Professor Barbarella (responsible for the Biodiversity project)

Mangrove Forests

Reforested Mangroves

Uçá Crab

Prof. Marcus (project manager)

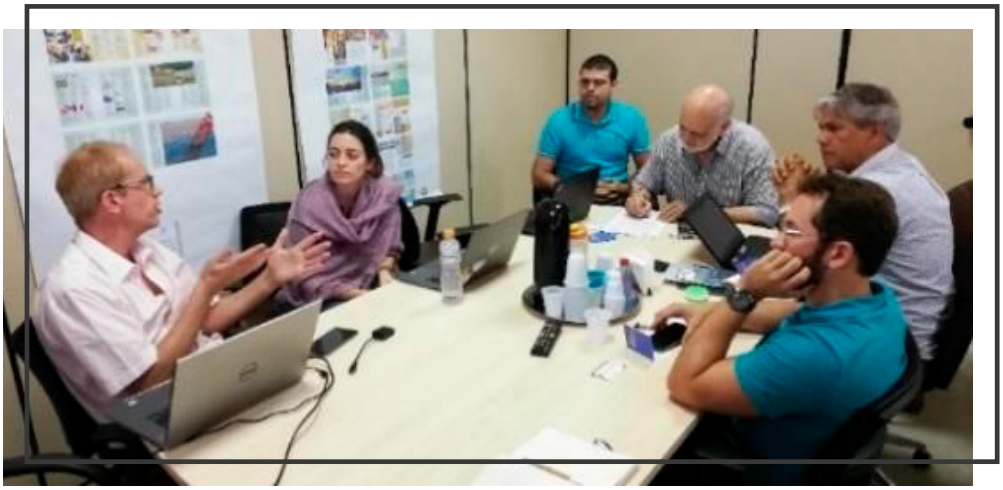
Evaluation Team visits the mangrove: Tim Höflinger (GIZ), Ronaldo Weigand (external consultant), Willian Flores (external consultant), Ester Gomila Pons (GIZ), Luisa Fenizola Rodrigues (GIZ), Prof. Marcus (UFPA), Neliton Marques (external consultant), Leonardo de Oliveira Santos e Vinícius Cordeiro (both BNDES)

Prof. Marcus and the evaluation team

The CVACBA Laboratory

Passion fruit for biocomposite extraction

PST Guamá - CVACBA Building



Meeting at the PST Guamá Foundation

Visiting the community school

Community School

7.5 LIST OF INTERVIEWS

Name	Institution	Role	Project	Data
Fábio Carlos da Silva	Federal University of Pará (UFPA) / Centre for Advanced Amazonian Studies (NAEA)	Project manager / General coordinator for the core group	Amazon Public Policy Incubator (IPPA)	02/05
Mário Miguel Amin G. Herreros	UFPA / NAEA	Pará coordinator	IPPA	02/05
Maila Costa	UFPA / NAEA	Project volunteer at Marajó Island / Student in the Breves class	IPPA	02/05
Rubicles Gomes da Silva	Federal University of Acre	Project researcher	IPPA	02/05
Victoria Isaac	UFPA	Project manager	Belém Islands	03/05
Bianca Bentes	UFPA	Project manager	Belém Islands	03/05
Marcio Raiol	UFPA	Project manager	Belém Islands	03/05
Keila Mourão	UFPA	Project manager	Belém Islands	03/05
Mayra Nascimento	ONG RARE	Scholarship recipient in the project	Belém Islands	03/05
Marcio	Cotijuba Island	Health worker and community leader	Belém Islands	03/05
Roberto da Silva	Z-9 Fishing Colony (Mosqueiro Island)	President	Belém Islands	03/05
Adriana Lima	Belem Islands Women's Movement	Responsible for the movement	Belém Islands	03/05
Carlos Maneschy	State Secretary of Science, Technology, and Vocational and Technological Education	Secretary	General	03/05
Crisomar Lobato	Ideflor-Bio	Director of biodiversity management	General	03/05
Marlene Perotes	Research Support and Development Foundation (FADESP)	General coordinator	Mangrove Forests, Biodiversity and Amazon Bioactive Compounds	02/05
Gracy de Jesus	FADESP	Lead analyst	Biodiversity - CEABIO and Biotechnology	02/05
Rosilene	FADESP	Lead analyst	IPPA	02/05
Rúbia Valença de S. Siqueira	FADESP	Lead analyst	Mangrove Forests	03/05
Reginaldo Cardoso da Conceição	UFPA	Lead analyst	IPPA	03/05
Prof. Francisco Costa	UFPA/NAEA	Student in the Breves class	Amazon Bioactive Compounds	20/05
Prof. Herve Rogez	UFPA	Participated in the planning of EMPRAPII	Amazon Bioactive Compounds	20/05
Ivan Hotoshi Saiki	CAMPTA	Scientific coordinator	Amazon Bioactive Compounds	20/05

Name	Institution	Role	Project	Data
Raimundo Dias	LASA	Director	Amazon Bioactive Compounds	20/05
Rodrigo Quites Reis	GUAMÁ Foundation	CEO of PST Guamá	Amazon Bioactive Compounds	20/05
Arnaldo José de Miranda	GUAMÁ Foundation	Chief financial officer	Amazon Bioactive Compounds	20/05
Fabio G. Moura	GUAMÁ Foundation	Doctoral student in the project and technician at UFRA	Amazon Bioactive Compounds	20/05
Prof. Júlio Cesar Pieczarka	UFPA	Project manager	Biodiversity	Via e-mail
Profa. Barbarella de Matos Macchi	UFPA	Project co-manager	Biodiversity	20/05
Edilene Oliveira da Silva	UFPA	Project researcher	Biodiversity	20/05
Leonardo dos Santos Sena	UFPA	Project researcher	Biodiversity	20/05
Ferdinando Prado	UFPA	Project researcher	Biodiversity	20/05
Raoni Nascimento da Silva	UFPA	Project researcher	Biodiversity	20/05
Carolina Domenico	Natura	Biologist	Amazon Bioactive Compounds	21/05
Cezar Antonio Rabelo da Silva	Natura	Employee	Amazon Bioactive Compounds	21/05
Prof. Marcus Emanuel Barroncas Fernandes	UFPA Bragança	Scientific Coordinator	Mangrove Forests	22/05
Danilo César L. Gardonho	UFPA Bragança	Researcher	Mangrove Forests	22/05
Dayene Santiago Mendes	UFPA Bragança	Researcher	Mangrove Forests	22/05
Antonia Aparecida M. do Nascimento	UFPA Bragança	Researcher	Mangrove Forests	22/05
Eliete Santana de Castello	UFPA Bragança	Researcher	Mangrove Forests	22/05
Adria de Carvalho Freitas	UFPA Bragança	Researcher	Mangrove Forests	22/05
Eliane Barrozo Silva	UFPA Bragança	Researcher	Mangrove Forests	22/05
Indira Angela Eyzaguirre	UFPA Bragança	Researcher	Mangrove Forests	22/05
Madson Lucas Galvão de Brito	UFPA Bragança	Researcher	Mangrove Forests	22/05
Diego N. C. da Silva	UFPA Bragança	Researcher	Mangrove Forests	22/05
Darlan J. B. Smith	UFPA Bragança	Researcher	Mangrove Forests	22/05
Hudson Silva	UFPA Bragança	Researcher	Mangrove Forests	22/05
Rodolpho Zaluth	SEMAS (State Secretary for the Environment and Sustainability)	Assistant secretary	General	24/05

EFFECTIVENESS EVALUATION OF

SCIENTIFIC AND TECHNOLOGICAL DEVELOPMENT PROJECTS WITHIN THE SCIENCE, INNOVATION AND ECONOMIC INSTRUMENTS COMPONENT

SUPPORTED BY THE AMAZON FUND/BNDES

Effectiveness Evaluation Report

December / 2019

Ester Gomila Pons | Luisa Fenizola Rodrigues | Neliton Marques | Ronaldo Weigand Jr. | Willian Flores