

BRC Research Program 2018-2023

(Approved by the BRC Scientific Committee, 13 Sept. 2018)

1. Introduction

This BRC Research Program is an update of the BRC Research Program document that was approved by the BRC scientific committee in Belém on 20 November 2015. The updated Research Program was approved by the Scientific Committee on 13 September 2018. The update is based on recommendations made in the BRC mid-term review, assessment of priority themes covered, and new research questions generated by completed or on-going BRC projects.

2. Why a BRC Research Program?

BRC needs research programs in order to design and commission research projects that address the questions that are most critical and relevant to the consortium.

According to the Consortium Agreement *“the main aim of the cooperation is to develop research activities both applied and basic and build a strong base of outputs in biodiversity and climate knowledge.”* Within this broad frame, BRC is currently focusing on research with a bearing on the environmental issues following from mining activities in the Eastern Brazilian Amazon, especially at Mineração Paragominas S.A. (MPSA).

BRC was constituted in November 2013 and the first projects were presented to the scientific committee in March 2014. At that time, the consortium had limited knowledge of the MPSA, little knowledge of the biodiversity reports commissioned by Vale and Hydro, and the level of internal contact and trust was considerably lower than today. The first projects proposed, and in turn selected by the BRC scientific committee and recommended for funding by Hydro, covered some key topics related to forest restoration and were the results of what was possible to present straight away, without the ideal development of a larger, coherent research program with links between the individual projects. Subsequently, the Research Program document of November 2015 was used as a guide for research priorities, calls for proposals and evaluation of proposals.

3. Objective

The overarching objective of this Research Program is to initiate, promote and implement collaborative research projects on the environmental impacts of strip mining activities in the Eastern Brazilian Amazon. This program covers only parts of the more general research scope of the BRC Consortium Agreement.

4. Baseline

- Institutional: BRC was constituted in November 2013. Consists of 5 members with different profiles and expertise. BRC has a board and a scientific committee.
- Knowledge of MPSA: Two important documents produced:
 - a. Salomão, R. et al. (2012) Reforestation and Wildlife Program HYDRO Paragominas
 - b. Sena, L. & Ferreira, G. (Eds.) (2015) Synthesis Report
- Experimental area access: BRC researchers have access to MPSA for a long period of time, enabling long term projects and student involvement.
- Ongoing research by September 2018: A total of 15 research projects funded by Hydro and the universities' own contributions have been initiated. Of these, 7? projects will be completed by the end of 2018.
- Several associated projects initiated by BRC partners. Funding: external or university.

5. Thematic areas and priorities

Environmental studies that can be related to the mining and recovery phases of strip mining can be divided into three main areas:

Before mining: Forest and floristic inventories / fauna inventories, soil characterization, landscape studies, studies of ecological networks (pollination, herbivory, seeds dispersion), phenology and seedling production technology.

During suppression and mining: Suppression methodology (removal of vegetation and soil), stripping methodology (extraction of minerals), closure methodology (replacement of overburden and topsoil), greenhouse gas emissions, dispersal of wildlife, wood storage, propose appropriate wood volume equations.

After mining: Monitoring the process of reshaping the ground, evaluation of recovery techniques (planting, natural regeneration and nucleation), soil and soil biodiversity monitoring, wildlife monitoring; monitoring of water bodies, monitoring of herbivorous, pollinators and dispersers (ecological networks)

In this context, the thematic areas of environmental studies relevant for BRC that would cover all of these steps are:

- a) Biodiversity surveys and monitoring in the mining areas and surroundings.
- b) Greenhouse gas fluxes and carbon footprint related to mining operations.
- c) Restoration of tropical forests, including restoration of biodiversity and forest soils.

Given the limited resources available to BRC, this research program should guide the scientific committee's work in prioritizing both a) thematic areas and b) individual project proposals.

The knowledge obtained from assessment reports Salomão et al. (2012) and Sena & Ferreira (Eds.) (2015) and results of previous BRC projects are considerable. Priorities of new research projects will be based on the need to fill important knowledge gaps and new research questions generated by completed or on-going projects. Additionally, special requests from Hydro for projects to address their specific needs will be of high priority.

Priority research themes:

a) Before mining

- Improved surveys and sampling programs of vertebrates and methodology for design of long-term monitoring
- Extra focus on red-listed and rare species, and other species of high conservation value
- Surveys and monitoring methodology of selected invertebrate groups (terrestrial and aquatic) with potential as indicators of long-term monitoring ecosystem restoration
- Priority to species or species groups with key ecological significance (such as pollinators, seed dispersers)
- Improved forest inventories, including herbaceous vegetation and selected groups of fungi and lichens with potential as indicators of long-term monitoring ecosystem restoration
- Focus on heterogeneity of species occurrence/abundance at different spatial scales (β -diversity) in rainforest environments
- Soils qualities in forest systems

b) During suppression, mining

- Quantification of hydrology changes affecting soil moisture and run-off to adjacent creeks and rivers, and documentation of effects
- Suppression, stripping, and closure methodology
- Technical problems related to soil management during reposition of soil
- Effects of soils by wood storage,
- Greenhouse gas emissions and balance
Determination of plant biomass volume equations, including vegetation specificities (based on different stages of vegetation) for indirect estimates of carbon emission balance between suppression and recovery.
- Movements of birds and mammals that have lost their habitat by forest removal (using new technology)

c) After mining

- Assessment of recovery of degraded areas versus time of regeneration and type of rehabilitation, including experimental studies. Include ecosystem functioning, soil, vegetation, fungi and animals.

- Focus on heterogeneity of species occurrence/abundance at different spatial scales (β -diversity) in rehabilitated areas
- Methods for enhancing seed dispersal and pollination from adjacent forests to rehabilitation areas
- Quantifications of the climate gas emissions in the restoration areas for estimating the total carbon footprint of the mining activities

6. Actors/partners

BRC consists of five members: MPEG, UFRA, UFPA, UiO and Hydro. The Consortium Agreement between these institutions have been extended for a second five-year period (29 November 2018 – 28 November 2023). We cooperate with other partners, mainly with Brazilian institutions. Given the extensive formalities of including new members in the consortium, and the openness towards including external partners in projects, currently we don't see the necessity to change the consortium architecture.

BRC will prioritize research projects that are based on joint research, including at least two consortium partners. At the same time, we encourage our researchers to cooperate with external actors, in order to improve the quality, the scope and the dissemination of research.

7. Time frame

The current Consortium Agreement is valid for the period November 2018 to November 2023, and "may be extended upon mutual agreement between the parties."

We propose this Research Program to follow the Consortium Agreement time-line and have a five-year horizon from November 2018 to November 2023. We propose that the Program is revised after two years, based on new assessments of project theme priorities. The program needs to be in-line with the long-term strategy of BRC, which will be developed at the start of the new five-year period.

8. Reporting and assessments of project results

- a) Each project should produce a written progress report every half year that will be presented to the Scientific Committee (SC) meetings. The report should follow a format provided by the BRC Secretariat. An annual seminar where all project leaders, Hydro and the Scientific Committee discuss progress reports and project results should be organised. The outcome of the seminar should be summarised and presented at the next SC meeting. (The seminar should preferable in September, the day before the SC meeting)
- b) A final report of should be submitted by the end of the project period. The report should follow a format provided by the BRC Secretariat.

The SC should organise workshops, where representatives from BRC projects meet and discuss project results and propose how the results can be implemented by Hydro. Synthesis reports of project results should be produced at certain intervals, preferably every 2-3 years. Larger meetings (conferences) should be organised or supported by the consortium every 2-3 years with representation from BRC projects together with other research groups working on rainforest biodiversity and restoration.

9. Procedures for calls

The Research Program includes both projects financed (partly or fully) by Hydro and projects financed by other sources. However, the procedures for calls and evaluation of new projects only relate to projects financed by Hydro. Calls for new projects will be decided by the scientific committee when funding is available from Hydro. The themes for projects are based on a priority list made by the scientific committee.

Calls and application forms are posted on the BRC web-site. Hydro will provide a list of equipment for personal protection, medical examination and other logistic requirements that all projects have to consider in the budget for the proposal.

Only proposals addressing the themes listed in the call will be considered. Incomplete proposals and proposals not following the guidelines in the application form will not be accepted.

10. Procedures for evaluation of proposals

The scientific committee has the main responsibility for evaluation of proposals. Associated with each call for project proposals, the procedures for evaluation of the proposals will be given. The procedures might vary between calls. These will be posted on the BRC-web-site together with the call.

In principle, the evaluation of proposals follows two lines:

1. Technical
Incl. relevance to the Research Program, feasibility, logistics, budget plan etc.
2. Scientific quality, and potential for gaining important new knowledge on restoration and biodiversity

A pre-selection of the proposals will be made that eliminates proposals that are considered not relevant for funding.

The aim is to apply evaluation procedures that are not too time consuming, expensive and bureaucratic. At the same time, the procedures should be transparent, and impartiality problems

should be avoided. As a principle, SC members are not allowed to be project coordinators of new proposals.

Based on the technical and scientific evaluations of proposals, the Secretariat will compile the evaluations and present the results to the scientific committee. The committee can accept, suggest modifications or reject the projects. Every accepted project will be ranked by the SC.

The project proposals will be ranked according to the following assessment criteria:

- Addressing important gaps identified in existing knowledge, not covered by current projects
- Scientific quality (note from external committee), including innovativeness, clear objectives and research questions, and proper data collection methods and statistical analysis to obtain reliable results.
- Projects based on joint research, including two or more consortium partners.
- Projects mainly carried out in Eastern Brazilian Amazon.
- Projects with a high academic impact, both in terms of scientific publications and increased qualification of students and researchers.
- Feasibility of proposed activities and deliverables
- Adequacy of deliverables/products.
- Budget plan (Budget should be compatible with activities and deliverables)
- In-kind budget contributions from BRC partners and/or partial external funding

The scientific committee will propose a ranked list of proposals recommended to be funded by Hydro.

11. Important background documents

- Consortium agreement
- Salomão, R et al. (2012) Reforestation and Wildlife Program HYDRO Paragominas, Pará, Brazil.
- Sena, L. & Ferreira G. (Eds.) (2015) Synthesis Report
- BRC Research priorities 2014
- BRC Research priorities 2015
- BRC Research Program, dated November 2015