

# Annual Report 2017



*The BRC agreement is extended until 2023. Norwegian ambassador, Mr. Nils Martin Gunneng (top) and the five BRC partners UFPA, MPEG, Hydro, UFRA and UiO (bottom) during the signing ceremony in Belém. Photos: BRC.*

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Annex 1: BRC - overview research projects 31.12.17

## 1. Introduction and background

The Biodiversity Research Consortium Brazil-Norway (BRC) carries out research on biodiversity and climate change issues in the Brazilian Amazon. Established in 2013, the consortium comprises the Federal University of Pará (UFPA), the Emilio Goeldi Museum of Pará (MPEG), the Federal Rural University of the Amazon (UFRA), the University of Oslo (UiO) and the Norwegian mining and aluminium company Norsk Hydro (Hydro).

BRC is the result of a Hydro initiative. In 2012, not long after taking over Vale's aluminium operations in Pará, Hydro approached the Natural History Museum (NHM) at the University of Oslo. NHM was given the responsibility to facilitate the creation of a research cooperation based on the recommendations in the Hydro technical report "Reforestation and Wildlife Program - HYDRO Paragominas, Pará, Brazil" by Salomão et al. (2012).

In the BRC Cooperation 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" among the partners. The consortium shall also contribute to "increased university – industry partnership". In addition to joint research and publications, "graduate education (master and PhD) will be important elements of the consortium activity."



Picture 1: BRC Board meeting in Paragominas in March 2017. Photo: BRC.

**This report** is prepared by the BRC secretariat. It presents the consortium's main results and activities in 2017. In the final section, important lessons learned are presented. We refer to minutes from BRC Board and Scientific Committee meetings and specific event reports for further details.

## 2. Main results 2017

In 2017, BRC made substantial progress on all defined aims – research, partnerships and student involvement – as well as on the consortium’s long-term sustainability. With an extended consortium agreement, the next six years of the BRC activities are now guaranteed. The main results in 2017 were:

- The number of approved research projects continued to increase, reaching 15 by the end of the year. Further, each project’s field and lab activities expanded, and we managed to overcome obstacles in contract negotiations. (See section 6 and 7 for further details.)
- In Paragominas, BRC carried out an implementation workshop, uniting researchers and Hydro staff in order to take results and experiences from BRC research projects into Hydro Paragominas operations. (See section 8 for further details)
- BRC organized a large biodiversity seminar in Belém in October, showing the potential for expanded research cooperation and bringing Norwegian and Pará government and relevant funding agencies to the table. (See section 10 for further details)
- 59 students were involved in BRC research projects, an 84% increase in relation to 2016. The 2017 numbers include 18 master and 12 PhD students. (See section 13 for further details)
- BRC carried out an external mid-term review. Important recommendations are being implemented. (See section 11 for further details)
- BRC succeeded in getting funds for a new, Brazilian-Norwegian master course in Amazon rainforest ecology and biodiversity. (See section 9 for further details)
- The BRC Consortium Agreement was extended until 2023 (See section 12 for further details)

## 3. The BRC board

The BRC board consists of one representative from each member institution. In 2017, the board members have been: professor Marcos Piedade (UFRA), professor Marlucia Martins (MPEG), professor Leonardo Sena (UFPA), head of HSE Domingos Campos (Hydro B&A) and research director Fridtjof Mehlum (UiO). Leonardo Sena (UFPA) exercised the function as chair of the board.

The board had two meetings in 2017. The first was an ordinary meeting in Paragominas in March (Picture 1) and the second an extraordinary meeting in Belém in November. The main discussions focused on the extension of the BRC Consortium Agreement, the mid-term review, the annual report and the MoU Pará – Norway.

#### 4. The BRC scientific committee

The BRC scientific committee takes all the overall scientific and operational decisions. It consists of two representatives from each member institution.

In 2017, the members of the committee have been: professors Gracialda Ferreira and researcher Tâmara Lima (UFRA), researchers Lourdes Ruivo and Rogerio Silva (MPEG), professors Leonardo Sena and Leandro Juen (UFPA), Vice President - Environment Bernt Malme (Hydro corporate), head of HSE Domingos Campos (Hydro B&A), and research director Fridtjof Mehlum and professor Karl-Henrik Larsson (UiO). Fridtjof Mehlum (UiO) exercised the function as chair of the committee. Prior to the last meeting, professor Jonas Castro (UFRA) substituted Tâmara Lima, and professor Øystein Wiig (UiO) substituted Karl-Henrik Larsson.



*Picture 2: Scientific committee meeting at the Hydro office in Belém in November 2017. Photo: BRC.*

In 2017, the committee had two ordinary meetings, in Paragominas in March and in Belém in November (Picture 2). The main discussions focused on ongoing and new research projects, the Amazon Fund proposal and on how to follow up the MoU Pará – Norway.

## 5. The BRC secretariat

The BRC secretariat is responsible for coordinating the consortium's activities. It is hosted by the Natural History Museum, UiO, and has since the start been staffed by one full time person, human geographer Torkjell Leira. Because of increasing research activities in 2017, BRC strengthened the secretariat with a person working one day a week in Belém, namely environmental engineer André Carvalho. (Picture 3 – André and Torkjell on the right side).



*Picture 3: After BRC preparatory meeting about the Biodiversity seminar. Photo: BRC.*

## 6. New research projects

In 2017, the BRC scientific committee approved two new research proposals. The first is about monitoring reptiles and amphibians (herpetofauna). The project responds to a lack of information about these groups at Hydro Paragominas, identified in the 2015 Synthesis report. The main goal of the project is to evaluate the impacts of bauxite mining activities and different reforestation techniques on the community structure and species composition of reptiles and amphibians. The coordinator of the project is professor Maria Cristina Costa from UFPA Belém.

The second project relates to top soil quality. The project will test the germinative power and the diversity of plants originated by the topsoil, related to place of origin and time of storage. Professor Gracialda Ferreira from UFRA Belém is the coordinator. The proposal was approved with some recommendations from the Scientific Committee.

## 7. Research project activities

2017 was the year when BRC research activities finally reached a sufficient level. BRC partners have needed more time than expected to calibrate administrative and operational procedures, but we have now overcome the main hurdles. Consequently, 12 out of 15 approved projects have signed contracts between the coordinating academic institution and Hydro. All pending projects, apart from one, were solved in 2017. (See annex 1 for further details.)

During 2017, BRC adopted a new reporting format. This allows us to get more systemized information about research activities and statistics over results, staff and students involved. For more information about specific research projects, we refer to the reports available through the BRC dropbox account, or by request to the BRC secretariat.



*Picture 4: Hydro training about Health, Security and Environment (HSE) at UFPA Belém in January. Photo: BRC.*

As part of preparations for fieldwork in Paragominas, Hydro staff came to UFPA Belém in January to provide a three-day HSE training for all students and researchers involved in BRC projects. (Picture 4).

Some research projects have special working hours. One example is the BRC 13/16 Tracking jaguars project, that monitors jaguar traps all night long. To facilitate the logistics, Hydro provided 7 rooms for the research teams in the Paragominas mining area. There are rooms with air conditioning and beds, female and male bathrooms, fridge and a laundry machine. They are available for all BRC research projects. (Picture 5).

## 8. Hydro-BRC implementing workshop in Paragominas

In October, Hydro organized a full-day workshop in Paragominas aiming at implementing results from BRC research into Hydro operations. The workshop united representatives from Hydro Paragominas and Hydro corporate, BRC researchers and secretariat.

The selected topics were biodiversity hotspots, the drone survey, topsoil management, rehabilitation methodologies, rehabilitation tailing dams and biodiversity indicators. The workshop was successful in sharing information and giving scientifically based advice to Hydro Paragominas. However, it would have been better if more people from the operational side could have been present all day. The participants agreed to develop a new project proposal to BRC on rehabilitation of tailing dams.



*Picture 5: Entrance to the dormitories at Hydro Paragominas. Photo: Øystein Wiig.*

## 9. Fundraising activities

BRC is continuously looking for external funding. So far, we have received support to several seminars in Norway and Brazil, and to some punctual research activities through MPEG. In 2017, we succeeded in getting funds to a new master level course in tropical rainforest ecology and biodiversity. The course is a cooperation between all BRC members, as well as the Norwegian University for Life Sciences (NMBU), and support to a four-year construction period comes from the Norwegian Centre for Internationalization in Higher Education (SIU). The course will have

two components: A field course at the Ferreira Penna station in the Caxiuanã National Park and a lab course at the Natural History Museum in Oslo. The first pilot will run in August/September (Brazil) and October/November (Norway) 2018.

The largest joint effort has been the Amazon Fund application. BRC has since 2015 worked with an initiative, and in 2017 the scientific committee decided to integrate it with UFRA's proposal called "ReflorestaPará". A task force composed by one person from each member institution was established, and the BRC secretariat was put in charge of coordinating the process. In May, there were specific meetings in Belém about the joint application. New confirmed information has told us that federal universities cannot apply for specific calls from the Amazon Fund, and there are limitation to what funds can be used for in the open calls. This has delayed the process, and by the end of 2017, the selected strategy was to submit a smaller proposal in the open call in the beginning of 2018.

## 10. Amazon biodiversity and evolution seminar

In cooperation with the Royal Norwegian Embassy in Brazil and the Brazilian federal innovation agency FINEP, BRC organized the seminar "Amazon Biodiversity and Evolution" in Goeldi Museum in October. The first session was about research cooperation and funding opportunities, and included a speech from the new Norwegian ambassador, Mr. Nils Martin Gunneng, and several interesting presentations from funding agencies. (Picture 6)



Picture 6: The new Norwegian ambassador, Mr. Nils Martin Gunneng, speaking at the Amazon biodiversity and evolution seminar at the Goeldi Museum in October. Photo: BRC.

The second session was about Amazon biodiversity and evolution, opened by a short presentation of BRC (Picture 7). The program was set up consciously to present new areas of research that could be included in Norwegian-Brazilian cooperation, both inside and outside BRC. There were talks about metabarcoding and bird evolution, with presenters from MPEG, UFPA and UiO. The final session gathered Nilson Gabas jr. (Director, MPEG), Marcel Botelho (Rector, UFPA), Claudio Szlafsztein (Head of International Department, UFPA) and Morten Dæhlen (Dean, UiO), to discuss the way forward.

After the biodiversity seminar, the geosciences departments at UFPA and UiO organized a seminar entitled “Exploration of mineral resources and sustainable development in the Amazon”. Both seminars were part of the Norwegian-Brazilian Business and Science Weeks and contributed to making BRC more recognized in both countries.



*Picture 7: BRC coordinator Torkjell Leira presenting the consortium at the Biodiversity and evolution seminar. Photo: BRC.*

## **11. BRC midterm review and follow up**

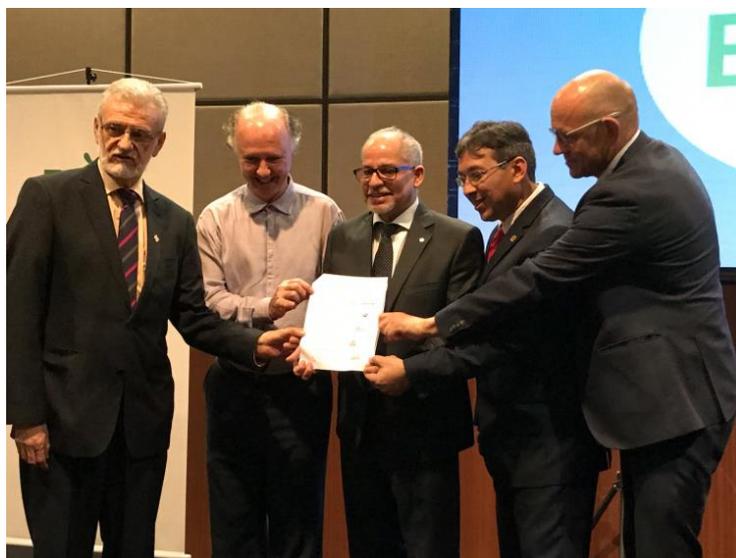
In March, the board decided to carry out a midterm review of the Consortium. The secretariat was responsible for the coordination and developed the Terms of Reference (ToR). The purpose of the review was to improve BRC as a research actor in the Brazilian Amazon, and the ToR focused on the consortium’s relevance, architecture and sustainability. We employed evaluator Dalembert Jaccoud to execute the review, and he delivered a written report in September. The primary recommendation was to “develop a shared medium and long-term vision of the BRC, through a strategic planning process, reinforcing the roles, benefits and impacts sought by Consortium member and non-member partners.” The review further stated that “processes aimed at intensifying institutional awareness and societal participation are seen as essential to enhance BRC relevance and sustainability.” Please see the full report for further details.

In October, BRC representatives met with the evaluator in Belém. The workshop was an opportunity to ask questions and discuss the perceptions, limitations and suggestions presented in the review, and how to follow up.

The board decided that Leonardo Sena (UFPA) should coordinate a small group to make a short document presenting the main recommendations from the workshop and the midterm review itself. The document should include suggestions on the possibility of transferring more of the secretariat functions to Pará and on how to improve the internal communication in BRC. The review will be followed up in 2018.

## 12. Signing Ceremony for BRC agreement extension

The original BRC Consortium Agreement set the validity of the cooperation to five years (2013-2018). In the light of a positively evaluated cooperation – both by BRC partners and external actors – and the need for formal backing of ongoing research, the BRC agreement was extended to 2023. The BRC agreement extension was signed during a beautiful ceremony at the Hangar in Belém on 31 October, in connection with Ethos Conference. This conference is one of the most important in Brazil on corporate social responsibility and sustainable development. Many people from all the BRC member institutions, partners of BRC and Pará and Norwegian government representatives attended the event. (Picture 8). The signing ceremony made it to the Belém newspapers.



*Picture 8: Representatives from the five BRC members showing the signed agreement extension. From left: Horácio Schneider (Dean, International relations, UFPA), Nilson Gabas jr. (Director, MPEG), Silvío Porto (Vice-President, Hydro Brasil), Marcel Botelho (Rector, UFRA), and Morten Dæhlen (Dean, Faculty of Mathematics and Natural Sciences, UiO) Photo: Hydro.*

### 13. Student Involvement and Exchange

One of BRC’s main aims is to integrate students in research projects. With research activities expanding, so is the number of students involved. By the end of 2017, a total number of 59 students were taking part in the BRC research projects: 29 on bachelor level, 18 on master’s level and 12 on PhD level. Comparing with 2016, there was an increase of approximately 84% in the number of students involved, and the increase was higher among master and PhD students (Figure 1).

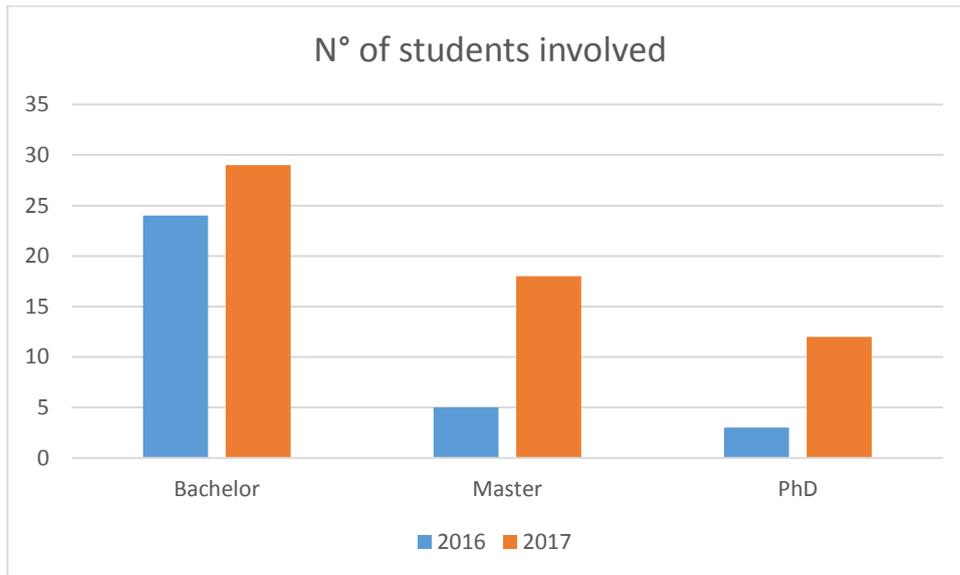


Figure 1: Comparison of students involved in BRC research projects in 2016 and 2017.

In 2017, there was no international student exchange between Brazilian and Norwegian BRC partners. This will change in 2018, particularly due to the new master level course in tropical rainforest ecology and biodiversity, already mentioned in section 9. The first pilot will run in 2018, in August/September (Pará) and October/November (Oslo), and will include 08 Norwegian students going to Brazil, and 08 Brazilian students going to Norway. They will work in Brazilian-Norwegian pairs.

In June, the BRC secretariat facilitated contact between a group of forestry students at the Norwegian University of Life Sciences (NMBU) and Hydro and UFRA in Brazil. They visited the UFRA campus in Belém and the Hydro mining site in Paragominas, learning more about BRC research projects and Hydro restoration activities. (Picture 11)



*Picture 9: NMBU forestry students in Paragominas. Photo: BRC.*

## 14. Networking and promotion

BRC has carried out a series of activities to promote the consortium's research and increase its relevance. In January 2017, the project BRC 09/15 Wood-decay fungi did fieldwork at Mineração Rio do Norte (MRN) in Trombetas (Picture 10). It was the first BRC project to study the Trombetas mining area. The BRC representative officer, André Carvalho, went with the research team and had meetings about BRC with the MRN environmental department and the Trombetas environmental agency.

In connection with the March meetings, BRC organized a workshop for the Paragominas community, especially the farmers around the mining area. We presented the research projects with most interest in cooperating with the farmers and had a banner session about BRC research where the visitors could learn more about the projects and talk with researchers and students (Picture 10).



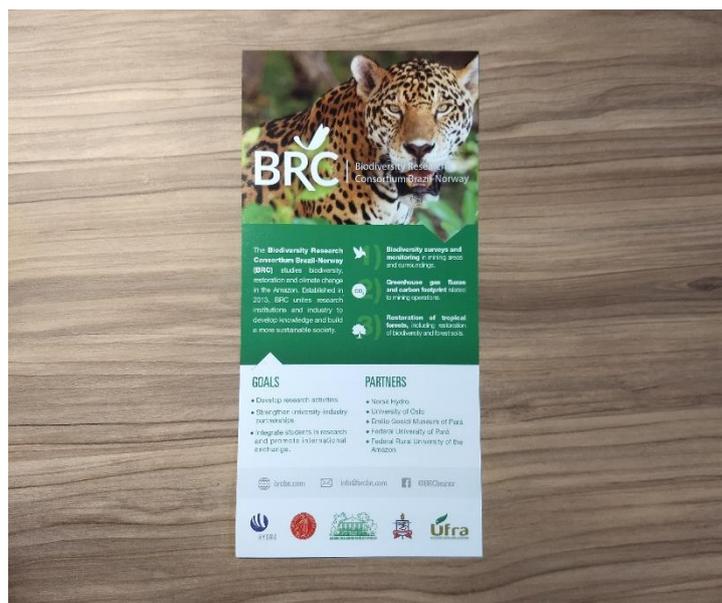
*Picture 10: Banner session of BRC projects in Paragominas in March 2017. Photo: BRC.*

In August, Hydro has a stand at the Agrobusiness Fair of Paragominas. BRC was presented in 5 interactive monitors and by André Carvalho and students from several BRC projects. It was an opportunity to share the first research results with the Paragominas community and other private companies (Picture 11).



Picture 11: André Carvalho presenting BRC for other company staff. Photo: Hydro.

In order to promote BRC, the secretariat produced bilingual flyers and banners. The material highlights BRC’s main research areas, goals and member institutions. It has already been used in events organized by BRC and others. (Picture 12)



Picture 12: Bilingual BRC flyer. Photo: BRC.

During the Ethos Conference in Belém in October, Domingos Campos (Hydro), Leonardo Sena (UFPA) and Torkjell Leira (UiO/BRC) had the opportunity to present BRC and some of the results from the research projects. Both the presentations and the signing ceremony of the BRC agreement were news in the main newspapers of Belém (Picture 13).



Picture 13: Newspaper article about the BRC agreement extension. Photo: BRC.

## 15. Lessons Learned

2017 was another year of progress for BRC. The consortium advanced on the defined main aims of the cooperation, namely to develop research activities, to improve university – industry partnership and to integrate graduate students in research. Still, there are challenges.

- As in 2016, the most challenging issue has been the time- and energy-consuming contract negotiations. Fortunately, we have now solved the main hurdles, thanks to competent staff, good faith and a lot of patience. All four academic partners have established research project contracts with Hydro, so the next projects in line will hopefully have a much easier way.
- Some projects relying on contracts with FADESPA have met challenges in using the resources, due to FADESPA's strict rules for reallocation of resources within existing budgets. One solution to this is to distribute more of the original budget to the Norwegian counterpart, as reallocation there is easier.
- The midterm review was a milestone. It was the first external evaluation of BRC, and it gave us important input to improve our relevance, architecture and sustainability. However, the recommendations could have been sharper, and the follow-up has so far been modest. The board and scientific committee must take concrete steps in March 2018, in order to improve the consortium's relevance and performance.

- External funding for research projects continues to be a concern for BRC. We have not yet managed to submit an application to the Amazon Fund, and other sources have mainly funded seminars, master course development and student exchange. The secretariat has reached the conclusion that smaller initiatives than the large Amazon Fund proposal might be a more effective way to use fundraising resources.
- Language is still a challenge. Using English as common ground slows down meetings and creates some misunderstandings. However, the secretariat considers that BRC has evolved, and that the language barrier is lower than some years ago.
- The secretariat has periodically had lower capacity than usual, due to coordinator Torkjell Leira's partial leave. This has slowed down several BRC processes, and has shown the need for a well-staffed secretariat. At the same time, the experience of having André Carvalho as a part time officer in Belém has been very well evaluated. It tells us that secretariat functions can be transferred from Oslo to Belém.

Oslo and Belém, 15 February 2018

Fridtjof Mehlum, Torkjell Leira and André Carvalho

Annex 1: BRC - Overview research projects 31.12.17				
Project title	Main goal	Institution / Coordinator	Other participant Institutions	Contract signed
BRC 01/14: Arbuscular mycorrhizal fungi in natural areas and areas in restoration after bauxite mining in Pará	To determine the mycorrhizal condition of the plants, the infective potential of the soil and the richness of arbuscular mycorrhizal fungi (AMF) in natural areas and areas under restoration after bauxite mining in Pará.	UFPA Altamira / Magali Gonçalves Garcia UNIFESSPA /	UFPE, UNIFESSPA	YES
BRC 02/14: Measuring the emissions of trace gases in chrono-sequence of reforestation in areas influenced by bauxite mining in Paragominas, Pará	To measure the CO2 and CH4 emissions from the soil, in the restoration areas after bauxite mining in active mining areas.	UFPA Braganca / Hudson Cleber Pereira da Silva	EMBRAPA	NO
BRC 03/14: Biodiversity, proliferation of plant species and restoration of degraded areas from bauxite mining in the southeast region of Pará	To evaluate soil attributes, biodiversity and plant propagation to develop a model capable of promoting the conformation of the mining environment to the landscape, with ecological and economic efficiency.	UFRA / Marcos André Piedade Gama	MPEG	YES
BRC 04/15: Entomology Survey and Bioindicators for Biodiversity Monitoring at Mineração Paragominas SA, Pará, Brazil	To implement the first thorough entomology survey on Hydro's property in Paragominas. Execute a pre-project on defining the best indicator families and species for future monitoring activities. Design an entomology monitoring program for the Hydro Paragominas mining area.	MPEG / Rogerio Rosas	UIO	YES
BRC 05/15: Camera trap survey of ground-living mammals in the Hydro bauxite mine area in Paragominas, Brazil.	Analyze the impacts of the bauxite mining activity on the ground-living mammals in the Hydro Paragominas mining area, with special emphasis on red listed species.	UIO / Øystein Wiig UFPA / Ana Cristina de Oliveira	UFPA, Hydro	YES
BRC 06/15: Evaluation of chemical compounds of different forest species stored, susceptible to contamination in the soil.	Assess whether stored wood in areas where recovery by nucleation and patios can cause contamination of soil, either by leaching of chemical constituents of wood, bark and natural degradation of the material through its anatomical structures, especially the parenchyma cells or contributing to the resilience place by nutrient availability in the field.	UFRA / Graciolda Costa Ferreira	UFLA (MG)	YES
BRC 07/15: Impact study of a biodiversity recovery program in a bauxite mining area on populations of insect vectors in the Amazon forest, Pará, Brazil	Evaluate the impact of a biodiversity restoration program in a bauxite mining area on populations of insect vectors of diseases in the Amazon rainforest, Pará, Brazil	UFPA / Ivoneide Maria da Silva		YES
BRC 08/15: Bird diversity in three areas in different states of conservation in the Eastern Amazon.	Assess how bird communities use areas with different types of reforestation compared to forest environment (forests and secondary forests) in a region in the eastern Amazon.	UFPA / Marcos Persio Dantas Santos		YES
BRC 09/15: Wood-decay fungi in Paragominas and Trombetas: baseline information, monitoring priorities, and how to achieve the "no net loss" target?	We aim to (1) attain baseline information of wood-decay fungi in landscape matrix of the mining areas, which is used as a basis for defining monitoring priorities, (2) to test a method for creating compensatory habitat for these fungi for achieving "no net loss".	UIO / Karl-Henrik Larsson	MPEG, NINA (Norway), UFRA, UFPE	YES
BRC 10/15: Aquatic biota monitoring of streams in mining areas of Paragominas SA, Pará, Brasil	Assess whether the mining and reforestation activities are affecting the integrity of aquatic ecosystems and their fauna, considering different scales of analysis.	UFPA - MPEG / Akama, Juen and Montag	UIO, IEC	YES
BRC 11/15: Diversity of the herbivorous insects in four areas of the Hydro mining company	Survey targeted herbivorous insects in areas with different human impacts and indicate potential pest or pathogen transmission species	UFPA / José Antonio M. Fernandes		YES
BRC 12/16: How ecological interactions are influenced by mining activities and efforts for environmental restoration after exploration in the municipality of Paragominas	To determine the effect of the mining activities on the networks of interactions between plants and animals and to support Hydro in selecting strategies for compensation and mitigation of the impacts of its activities. The three ecological interactions addressed as subprojects are: pollination, herbivory and seed dispersal.	MPEG / MarluCIA Martins	UFPA, UFRA, UIO, EMBRAPA	YES
BRC 13/16 Tracking jaguars in the Hydro bauxite mine area in Paragominas, Brazil	To analyze the impacts of the bauxite mining activity on the movement of jaguars in the Hydro Paragominas mine area.	UIO / UFPA Østein Wiig / Leonardo Sena	UFPA	YES
BRC 14/17 Monitoring Amphibians and Squamata Reptiles in Reforestation Areas in the Hydro Bauxite Mine Area in Paragominas, Brazil.	The main goal of the project is to evaluate the impacts of bauxite mining activities and different reforestation techniques on the community structure and species composition of reptiles and amphibians.	UFPA / Maria Cristina dos Santos Costa	MPEG, UFRA	NO
BRC 15/17 How topsoil collection methods, the origin and storage periods influence environmental restoration in areas of bauxite mining in Paragominas, Pará, Brazil	The main objective of this project is to ensure the acceleration of natural regeneration from topsoil from vegetable suppression in areas degraded by mining.	UFRA / Graciolda Ferreira	Hydro	NO