Center for Integrated Studies of Biodiversity in the Amazon (CENBAM)

SUMMARY

The objective of the institute is to integrate Amazonian biodiversity research in efficient scientific/technological production chains. Presently, Amazonian biodiversity is not being conserved or utilized efficiently for lack of scientific/technological knowledge. The little research that is done is concentrated in the larger population centers, Belém and Manaus. Regional centers confront a vicious circle of lack of resources that destimulates the long-term establishment of researchers in remoter areas, the lack of qualified researchers results in low scientific productivity, the lack of productivity impedes obtaining finance, and the lack of finance makes it difficult to train local people. CENBAM will train people in remoter areas at diverse levels, from field assistants and parataxonomists to school children, laboratory technicians and graduate students, as well as improving infrastructure, such as museums, herbariums and live collections, the instalation and recovery of equipment and laboratories, and the scientific interchange necessary to make use of available resources efficiently. Planning and execution will be carried out in collaboration with various users of the information and material, such as biotechnology laboratories, reserve and forestry managers, and the organizations responsible for the evaluation of environmental impacts and monitoring of areas influenced by public works.

a) Detailed description of the institute´s program, with justification and demonstration of its relevance, and emphasis on the advances expected in Brazil for the subject or study area.

The Center for Integrated Studies of Biodiversity in the Amazon (CENBAM) will coordinate a network of Amazonian and extra-Amazonian institutions involved in biodiversity studies. The structure of this network will differ from existing networks in innovative ways that will be elaborated on in the following sections. The term "biodiversity" as used in this proposal follows the Directives for Policies on Biodiversity (DECRETO Nº 4.339 22/08/2002) (DPB), which defines the Brazilian government´s official position in relation to the areas that fall under this term. The objective of the CENBAM program is to create and consolidate production chains based on sound scientific knowledge that originate in studies of biodiversity and end with information, products or processes that are of value to specific users in the short, medium and long terms.

The Amazon holds a central position in relation to the world´s biodiversity, and has an important role in global carbon and water cycles that affects other regions, including the most important agricultural areas in Brazil (Marengo 2007). However, research in the Amazon remains timid, fragmented, and without the impact on public policies expected for such an important region. Investment in science in the Brazilian Amazon is restricted, and for many years Amazonian tax payers actually subsidized research in south-eastern Brazil. However, the lack of investment does not stem only from the lack of financial resources. There are insufficient researchers in the Amazon to receive the funding that is available. This leads to a situation in which the lack of infrastructure leads to a lack of qualified scientists, the lack of qualified scientists leads to low scientific

productivity, the lack of productivity impedes competition for finance, and the lack of finance impedes training of local people. The only way to break this cycle is to create the conditions for Amazonian residents, from local guides to research scientists and business people, to participate effectively in the knowledge-generating processes, and to benefit from the results obtained. That is the objective of the Center for Integrated Studies of Biodiversity Studies in the Amazon.

Many virtual networks involving biodiversity and Amazonian institutions have been created in recent years. Those networks were developed with the best of intentions, and many of the participants of this proposal have been involved with those networks. However, it is obvious that the virtual networks have not had as much effect as was hoped for when they were elaborated, and it is important to consider possible limitations in their structure. Fearnside (2003) referred to this problem as the "abordagem genoma", where highly structured networks to obtain a single result do not have the flexibility to include the social component. Most previous networks involved lead institutions, usually in southeastern Brazil, foreign countries, or the relatively highly developed centers of Manaus and Belém. Institutions from regional centers in the interior of Amazonia were involved, and the networks assumed star configurations, with each regional center linked to the lead institution, and contact between the regional centers mainly through the lead institution. This structure contrasts with highly effective networks set up by non-governmental organizations, mainly for socio-economic coordination, in which the links between regional centers were as strong as the links between the regional centers and the lead organizations, resulting in net, or at least spider-web, configurations. The network that we are proposing places as much emphasis on scientific exchange and collaboration between regional centers as between regional centers and the lead institution. By this means, all institutions and regions will be in contact, collaborating, and sharing practical results. That is, the network will be functional rather than virtual.

Despite the fact that most regional centers lack the infra-structure or trained personnel to effectively complete production chains based on biodiversity, the aggregate capacity is substantial. To use the limited resources available, most regional institutions have invested in specific parts of the knowledge-production chain, such as in biological collections, graduate programs (masters and doctoral) directed to specific areas, genetic or biochemical laboratories, geographic-information system facilities, or agricultural-extension activities. While it is important to identify specific links in production chains that are not well developed in the Amazon, it is also important to make use of the capacity that is already installed. One of the limitations of previous networks was that they either tried to install all the capacity for complete production chains in each regional center, or merely used the regional centers to obtain information or products that would strengthen the lead organizations. One of the principal objectives of CENBAM is to increase mobility and collaboration between regional centers, so as to stimulate ideas of leadership and integration in Amazonian institutions, rather than to continue promoting regional centers as mere providers of prime material.

The DPB defines many priority areas for biodiversity studies, and it is obvious that CENBAM cannot act effectively in all of them, at least in the initial stages. Also, there are many excellent initiatives in course which, although they may not result in complete production chains, are consolidating areas that are essential for some or all of the production chains. Therefore, it is important that CENBAM integrate these initiatives and avoids duplication of effort. For instance, the DPB contemplates taxonomic initiatives, and the Projeto Taxonomistas of the New York Botanical Garden is already promoting interchange of taxonomic specialists and training of local people in Acre. The Projeto GENOMA has installed capacity for genetic analyses in many regional centers. The Program for Biodiversity Research (PPBio) has installed many long-term ecological research (LTER) sites in collaboration with regional centers, and the PPG7 and others have financed bioprospecting (see section H for more information on previous experience of the participants with such initiatives). Integration of existing efforts in effective production chains is one of the primary objectives of CENBAM.

CENBAM is focusing on activities that require on-the-ground studies of biodiversity in Amazonia, which necessarily includes evaluation of local ecosystem processes contemplated in the DPB, such as the relationship between biological communities and hydrology, and the use of long-term vegetation plots for evaluation of biomass and carbon stocks. These studies will provide important data to some users, especially government agencies responsible for land-use planning. However, CENBAM does not contemplate specific actions in relation to climate modeling and remote sensing that can be done with little or no input from ground studies in the Amazon. Such studies are adequately covered by other initiatives, such as LBA and GEOMA, and CENBAM´s only role will be liaison with these users.

The Directives for Policies on Biodiversity contemplate five major components: (1) Biodiversity Knowledge, (2) Biodiversity Conservation, (3) Sustainable use of Components of Biodiversity, (4) Monitoring, Evaluation and Mitigation of Impacts on Biodiversity, and (5) Institutional Consolidation. Within each of these, specific directives are prescribed to reach national objectives. Although this structure is useful to organize topics, it fragments knowledge-production chains, which pass through several or all components. It has been this fragmentation of effort that has restricted the use of biodiversity knowledge in the Amazon, despite great technical advances in some components. The process must start with institution building or consolidation, because it is the institutions that link the components. The lack of a transversal institutional framework has lead to the perverse situation where components compete with each other for limited funds, without understanding that weakening one link in the knowledge-production chain weakens the whole system. This proposal cannot resolve all biodiversity issues in the Amazon. Rather, it seeks to achieve institutional integration by focusing on specific questions and showing how they can be answered more effectively by integrated actions of all components, which will generally require the integrated actions of several regional centers to deal with a single issue.

The principal uses of biodiversity research are for (1) information necessary for conservation and land management, (2) management of wildlife, forest products, and other commodities obtained directly by extractive industries, (3) prospecting for new products, and (4) domestication and development of new agricultural industries. Information obtained for one of these uses is likely to be useful for others, so it is important to keep in mind all probable users to make use of limited funds and avoid unnecessary duplication.

Most or all of these uses require accurate identification of species or other relevant taxonomic units, information on the distribution and abundance of organisms, and the relationships between distributions and potential and actual land uses. The same information is necessary for zoning within parks, regional land-use planning, evaluation of environmental impacts, determining quotas for extractive industries, and identification of the economic potential of new products. Differences generally relate to the time available to obtain the information (often limited in the case of evaluation of environmental impacts) or the geographic amplitude (often limited in the case of local industries). Although they are chronically under funded, biological collections (Gotelli 2004) and field sites with adequate infrastructure (Magnusson et al. 2008), are the basis for most biodiversity research. However, not all museum- or field-based studies will be useful to end users in the short and medium terms. By adopting standardized methods that generate information for a wide range of end users, taxonomists and field ecologists can greatly increase the value of their work for other groups (Gotelli 2004), and attract funding that would not normally be available for purely academic activities.

In summary, CENBAM will create an innovative network of Amazonian and extra-Amazonian institutions involved in biodiversity research that will use the limited resources available to deepen knowledge of biodiversity and the factors that affect biodiversity, that will integrate different parts of the knowledge-production chain to obtain products useful to society, and

will act as a catalyst to attract new sources of funding for Amazonian biodiversity research.We will contribute to societal development within the next 3 years by producing at least 50 graduate students, training at least 300 rural peoples, and linking to dozens of government and business interests, while developing strong functional linkages between geographically distant research and management groups. We will also advance the disciplines of ecology, geography, etc. while using interdisciplinary and complex systems approaches to integrate and generate breadth in our understanding of coupled knowledge and management networks.

b) Clearly defined objectives and goals that allow monitoring of progress and evaluation

The overall objective of CENBAM is to integrate actions within specific components of the DPB in functional knowledge-production chains. To do this, it will be necessary to modify some of the actions to make them more useful to final users, especially those actions associated with the basal component, biodiversity knowledge. This is best explained in terms of the demands of users identified by the DPB, and the recommended actions for each component. In this section, we will only give the information necessary to understand the specific objectives, and leave details for the subsequent sections.

Objective 1 – Create a network of biodiversity centers in the Amazon that can complete functional knowledge-production chains.

Goal 1-1 (1 year): Identify existing capacity and create functional networks to respond to at least one major question in relation to the use of biodiversity for each of Biodiversity Conservation, Sustainable use of Components of Biodiversity, and Monitoring, Evaluation and Mitigation of Impacts on Biodiversity. (Individual projects are listed in part c).

Goal 1-2 (3 years): Integrate initiatives in Sinop (MT), Rio Branco (AC), Porto Velho (RO), Boa Vista (RR), Macapá (AP) and Manaus (AM) to respond to the questions identified in Goal 1-1.

Goal 1-3 (5 years): Extend the objectives of Goal 1-2 to the capitals of all Amazonian States and some other regional centers, such as Santarém (PA), Cruzeiro do Sul, São Gabriel da Cachoeira and Humaitá (AM).

Objective 2 – Create the capacity for identification and maintenance of biological materials in collections in all Brazilian Amazonian States.

Goal 2-1 (1 year): Identify limitations of biological collections or the training of curators in Sinop (MT), Rio Branco (AC), Porto Velho (RO), Boa Vista (RR), and Macapá (AP) that impede the adequate long-term maintenance of biological material, or access to information contained in collections.

Goal 2-2 (3 years): Create conditions for certification of major existing collections in Sinop (MT), Rio Branco (AC), Porto Velho (RO), Boa Vista (RR), and Macapá (AP) by the Instituto Chico Mendes de Biodiversidade (ICMBIO) for deposit of material collected in biological inventories.

Goal 2-3 (5 years): Extend the objectives of Goal 2-2 to the capitals of all Amazonian States and some other regional centers, such as Santarém (PA), Cruzeiro do Sul, São Gabriel da Cachoeira and Humaitá (AM).

Objective 3 – Develop standardized integrated methods of biological survey for use in environmental-impact studies, monitoring of parks, forestry certification, and Long-Term Ecological Research (LTER) sites that provide data or material for taxonomy and systematics, for genetics, for bioprospecting, for land-use planning, and for evaluation of major impacts, such as those caused by large-scale infrastructure works and global warming.

Goal 3-1 (1 year): Identify the data required by users, such as IBAMA-DILIC, ICMBIO, State and Municipal governments, involved in licensing public works, monitoring parks, reserves and impacted areas, certifying forest products, undertaking land-use planning, as well as the requirements of genetics and bioprospecting laboratories for samples.

Goal 3-2 (3 years): Develop standardized methods for wide-scale monitoring applicable in LTER sites and rapid assessment (RAP) sites that can economically meet the demands of the majority of users to maximize the returns from both public and private financing of biological surveys.

Goal 3-3 (5 years): Incorporate recommendations from Goal 3-2 in legislation and regulations.

Objective 4 – Integrate training programs at all levels from community groups to graduate programs throughout the basin using existing human resources and training local teachers to give the courses regularly in their area.

Goal 4-1 (1 year): Initiate at least 10 training courses in Acre, Rondônia, Mato Grosso, Roraima, Amapá and Amazonas (see section D for details of courses).

Goal 4-2 (3 years): Train local teachers in Sinop (MT), Rio Branco (AC), Porto Velho (RO), Boa Vista (RR), and Macapá (AP) to teach and/or coordinate each of the courses.

Goal 4-3 (5 years): Extend the objectives of Goal 4-2 to the capitals of all Amazonian States and some other regional centers, such as Santarém (PA), Cruzeiro do Sul, São Gabriel da Cachoeira and Humaitá (AM).

Objective 5 – Remove infrastructure bottlenecks that impede the construction of effective knowledge-production chains in Brazilian Amazonian institutions.

Goal 5-1 (1 year): Identify infrastructure limitations (laboratory facilities, computer hard- and software, field accommodation, agricultural trial plots, transport, etc.) that cannot be remedied by integration with other centers (some of these have already been identified and have been included explicitly in the budget).

Goal 5-2 (3 years): Installation of the infrastructure identified in the budget.

Goal 5-3 (5 years): Installation of infrastructure identified in Goal 5-1 in Acre, Rondônia, Mato Grosso, Roraima, Amapá and Amazonas, and identification of infrastructure bottlenecks in other Brazilian Amazonian States.

c) Detailed description of the principal lines of inquiry to be developed, which should be of high quality and at the frontiers of knowledge, of a standard that is internationally competitive in the research area, or which contemplate a strong component of technological development and contribution to innovation in areas that are of strategic importance for the country

Line of Inquiry 1 - Integration of Lines of Inquiry

Each line of inquiry is presented below following conventional divisions. Although each is using state of the art procedures for that area, the most innovative aspect of this proposal is in the integration of lines of inquiry on a scale never before possible in the Amazon. Many of the innovations in relation to integration of research efforts over such large areas may appear radical, but we have proof-of-concept studies for all of them (see item h). The interactions among lines of inquiry are many and varied, and it is not possible to illustrate them all. However, an extremely simplified diagram of the interactions that does not show feedbacks indicates the importance of integration (Fig. 1).

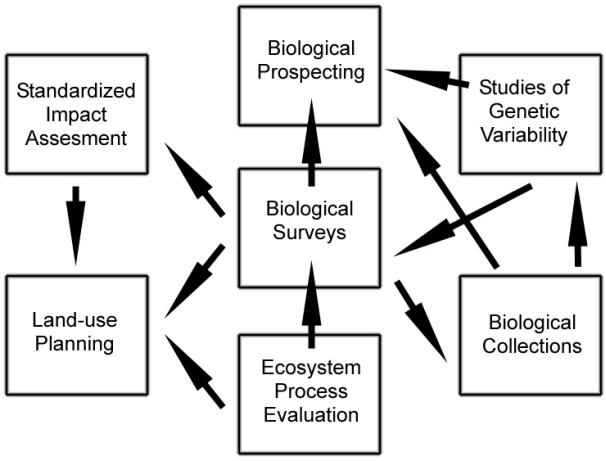

Figure 1. Main interactions among CENBAM lines of inquiry

Perhaps the greatest challenge is in data management. Individual scientists and research institutions generally do not have the resources to maintain data bases, especially in the Amazon, and large organizations are necessary for secure information storage (Lynch 2008). It is not simply a question of hardware, though it is important to have backups distributed across a range of institutions. Data management requires dedicated personnel to vet the quality of the data and to ensure that it is included in forms that permit efficient access. The simple lack of primary metadata (detailed descriptions of how data in each file were obtained) restricts the use of most of the data that is currently available.

It is a basic principal of CENBAM that data collected on public lands, by public servants, or with public financing should be made available to all potential users in the shortest possible time.

Therefore, all participants will be required to post their metadata within 1 month of collection and, except for cases involving traditional knowledge or potential patents, all data should be posted within 1 year. This is a similar requirement to other large biodiversity projects, such as the Tropical Ecology Assessment and Monitoring Initiative (TEAM), and the Program for Biodiversity Studies (PPBio). However, this means that the Center has to provide the personnel and infrastructure necessary to maintain the data bank.

Development of database technology is not a primary objective of CENBAM. Many proprietary and non-proprietary database programs are available and many more will appear in the future. The objective of data-management in CENBAM is to ensure the availability and integrity of the data. All conventional database programs presently available have two components: a depository of data tables and a search engine. All are capable of importing text files to compose the data tables, although the data are stored in formats that may not be accessible to other programs. The technology for storing data describing material in museum and herbarium collections is advanced (e.g. programs such as Brahms and Specify, and search engines such as those provided by Biota-FAPESP Program < http://www.biota.org.br/>). However, information systems for ecological field data are still in initial stages of development and confront major technical challenges, such as to create a truly generic data structure that will fit all survey data. Statically defined tables do not satisfy the data management needs of this system because the kind of data that will be accumulated is unpredictable.

Hard copies of data will be the responsibility of each researcher, but CEMBAM will store PDF copies of raw data to allow investigation of transcription errors. Metadata will accompany all data to describe how it was collected. Metadata will be stored in EML - Ecological Metadata Language, a metadata specification to document ecological datasets, developed at the National Center for Ecological Analysis and Synthesis (NCEAS), University of California (Fegraus et al. 2005). This will allow training researchers and students in documenting field data, a process being conducted in the PPBio Program since 2005 and starting in 2008 in a Theme Project of Biota Fapesp Program for the Atlantic Forest (Fapesp nº 03/12595-7) coordinated by Dr. Carlos A Joly (State University of Campinas – UNICAMP, São Paulo). Digital text files of all data will be made available through the CENBAM or associated web site to allow uploading to any user's data-manipulation program.

At the moment, the emphasis is on simplicity, with submission of files in any format as attachments or through ftp technology to the data-base manager. However, automatic uploading with programs, such as LBA's Beijaflor, may be implemented in the future. Searching files with many fields is inefficient, and making files available in original format for search engines might not be appropriate if the Center results in a very large amount of data in the medium term (10 years). Therefore, the center will develop a project in collaboration with Dr. Rolf A. de By (International Institute for Geo-information Science & Earth Observation - ITC, The Netherlands) and Msc. Debora P. Drucker (State University of Campinas – UNICAMP, São Paulo) to implement a system designed to accommodate generic biodiversity field data, even from future studies for which the design still has to be established (de By et al. 2008). The system stores data in such a way that it can be searched more efficiently, at the same time that it allows researchers to insert data in its original format, as well as allow external users to easily download data in ascii or excel files. Other developments, such as the integration of field and museum data bases, and automatic updating of taxonomic information may be implemented, depending on the demands identified by the Coordinating Committee.

Advances in the technology for storing taxonomic data describing material in museum and herbarium collections allowed the Biota-FAPESP Program to aggregate efforts from researchers specialized in different taxa. The São Paulo State Biodiversity Map (Rodrigues 2008) is used as

support by the State Environment Secretariat to establish criteria to concede licenses for deforestation within São Paulo State. This is an important example of use of results obtained by a research program to elaborate strategies of environmental problem solving. This could have been more effective if all the data stored in the Biota system were correctly geographically referenced. A considerable part of registers could not be used due to the lack of geographical reference or because of incorrect references. To avoid this kind of problem, data of whatever kind stored within CENBAM´s system will be geographically referenced. This is crucially important, as many of the core biodiversity science questions are spatial in nature: How do global environmental changes and deforestation affect species and ecosystems in a given location? How is species diversity and ecosystem function related? How do biodiversity patterns differ at different scales of analysis? Which causal relationships can be identified? What role does spatial autocorrelation pay in determining such patterns?

The way biodiversity data is organized and manipulated and how hypotheses are established are part of the complexity of ecology as a science (Cuddington & Beisner 2005, El- Hani 2006, Hilborn & Mangel 1997, Pickett et al. 1994, Taylor 2005), as is the development of methods of biodiversity data integration (Andelman et al. 2004). Scientific publications in this field are becoming more frequent, such as those related to large international initiatives, such as TEAM (Tropical Ecology Assessment and Monitoring Network, Fegraus et al. 2005) and LTER (Long Term Ecological Research, Brunt 2006), and a journal entitled “Ecological Informatics” dedicated to this field has recently been established (i.e. Michener 2006). The Center will contribute to this frontier of knowledge.

One of the major problems confronting Amazonian institutions in regional centers is the lack of expertise in statistical analysis, the costs of site licences for proprietary software, and lack of understanding of how the data being collected will be used by other researchers. Each research area has its own jargon and methods. However, all are linked by the need for sound sampling designs (Magnusson & Mourão 2003). Most analyses required by users in Amazonian institutions can be carried out with freeware, such as the program R, and training students and researchers in experimental design is one of the most effective ways of enhancing communication between different disciplines. Our group has been developing techniques in R for solving specific questions, and there is an international community developing programs based on the R language. This research line will identify needs of researchers in each center, train them in the use of standard techniques and, where necessary, put researchers in contact with programmers who can help them with problems that are not readily solved with currently available programs.

Processes operating over large areas, such as the Amazon basin are strongly spatially structured and this affects analyses and interpretations. However, understanding spatial processes is not a simple proposition, either within or between sites (Fortin & Dale 2005). Recent advances in spatial statistics have allowed novel procedures for understanding, or at least documenting, the scales at which these processes act (Bocard & Legendre 2002). However, few researchers understand or use spatial analyses in their work. This proposal includes finance for the evaluation of the use of spatial statistics in studies within and between LTER sites to increase the quality of individual studies, and to provide standard techniques that can be used by the majority of researchers for within- and between-site comparisons. We will also provide courses in Geographic-Information-Systems (GIS) analyses (see section D).

Initially, this proposal will be based around regional centers located in State capitals. However, each of these is expected to establish other centers in its region. The State of Amazonas occupies a large part of the Brazilian Amazon and has an extremely low density of researchers outside the Manaus municipality. The process of establishment of regional hubs has been started in São Gabriel da Cachoeira and Humaitá, and several other towns, such as Tefé and Coari, have

campi of State or Federal universities. The principal problem in these centers is scientific coordination, an area not considered by most funding agencies. However, the State of Amazonas Research Foundation (FAPEAM) has “Gestão” fellowships exactly to promote training in this area. We have therefore request additional funding from FAPEAM to include three Gestão fellowships and preliminary funding necessary to establish regional hubs in the State of Amazonas. besides that indicated in the standard form, which has no prevision for "Gestão" scholarships.

We will make spatial data available to different user groups, especially the three listed below. These vary from simple data sets used by most of the public to more complex data sets used by specialists.

(1) Schools and general public. These use simple data sets that visual and summarized to layouts easy to manipulate and comprehend. Data sets can be of Amazonian species' distributions, richness, biotic and abiotic traits and collection localities. This kind of data broadcasting is also a way to inform the public about what is being studied, where and by whom.

(2) Professionals, non GIS or data sets users. These users require geographical data selected to answer specific needs. These professionals may work within conservation units, with evaluation of forest-product economic potential, and public policiy support, which are mainly within government agancies. Our objective is to create an ergonomic access to geographical data to allow users to obtain data without the need of specific training, so that they can focus on their analyses and contribute to the decision-making process.

(3) Professional users familiar to GIS, geostatistics, modeling and macroecology. These users need layers or spreadsheets containing data aggregated according to specific rules. Usually the job routine with this kind of user is an exchange of files in which each user to aggregate data to the tables that allow the data-set manager to create new aggregations with SQL queries.

Currently, a test with these three kind of users is being conducted. The public and GIS professionals meet each other at “siifam-v3”, a tool from Google Earth that allows the representation of Radam inventories. Conceived as a kind of geographical input dictionary, users may visualize the georeferenced data and answer questions, such as where there is a Radam inventory, which genera or species were observed in this locality, what is the species distribution and abundance, what was the inventory protocol used, are there more species from one genus in one area than in other, etc.

For Acre’s State agencies for forestry products and the Amazonas State agency for sustainable development needs, a tool was developed to answer to specific demand in NWFP: distribution and abundance of species in zero stage (initial), corresponding to inventories conducted in the 1970s, before the implementation of sustainable development reserves. This system will be extended to current data.

The main objectives of this line of inquiry are:

(1) To implement in CENBAM the structure of data-set management proposed by de By and Drucker and associated management tools.

(2) To implement a shared management system of data sets based on an architecture server-client.

(3) To establish a protocol for data input produced by different kinds of research projects.

(4) To animate the input of data and metadata in the data-set management system.

(5) To provide data from other lines of inquiry through a geographical browser, Web services (Specification OGC, Web Feature Services – WFS, Web Process Services –WPS) and a map server.

(6) To offer training on metadata documentation in EML to researchers and students.

(7) To offer courses about geographic data management in spatial relational data sets.

(8) To offer a course about the use of PostgreSQL and PostGIS.

(9) To otrain employees of public institutions working with GIS (IBAMA, forest and environmental secretariats, etc.).

The expected products at the end of 3 years are as follows:

(1) a website for upload and download of data produced by CENBAM.

(2) an interface of input and visualization of data (in collaboration with CRIA, which has experience in transformation of projections).

(3) at least 100 high school or higher level technicians trained in the use of GIS tools.

(4) at least 100 researchers or graduate students trained in the use of GIS tools and data-set management.

(5) provision of data using geographic browsers, such as Google Earth, for the more general public (high school students, governmental agencies professionals, NGOs, etc.) that need the geographical information, but not necessarily in GIS format.

(6) a map server for data consulting;

(7) production of five scientific articles.

Line of Inquiry 2 – Development of standardized methods of short- and long-term biodiversity survey and monitoring

Our research group has been developing spatially standardized methods for biological inventory in LTER sites for many years (Magnusson et al 2005 RAPELD), and this has resulted in methods that are applicable for a wide range of taxa and ecological processes (http://ppbio.inpa.gov.br/Eng/public/). However, RAPELD methodology was also designed for rapid assessment (RAP) surveys for evaluation of environmental impacts (Magnusson et al. 2008), and many of the methods that are appropriate for medium- to long-term studies are not financially or logistically viable for the RAP studies that are usually required for issuing development licenses or environmental-impact statements. Therefore, it is important to develop faster techniques, which can also be incorporated in the LTER sites that are used as controls or to calibrate the RAP results.

It is not productive to limit the types of studies that can be undertaken in LTER sites because one of the major aims of these sites is to detect previously unappreciated processes (Doak et al. 2008). However, it is not viable to survey all elements of biodiversity in a short period of time, even

for a very small area, and management agencies need information from RAP surveys that they can use to make decisions in the short term. Unfortunately, those agencies have not been willing to make decisions on target groups that are useful for decision making, and that can be evaluated in the time available, leaving this up to the biologists. This has resulted in misunderstandings and possibly undeserved criticism of the biologists for not producing data that is useful for management. Therefore, a major part of this study will involve management agencies (IBAMA, ICMBIO, State Forestry Departments, etc.), which must define the targets in collaboration with the biologists, and understand the financial and logistic restraints on obtaining usable information in a short period of time.

Because the targets have not been defined, we cannot list the species involved. However, management agencies generally need information on vegetation composition and structure, terrestrial vertebrates, aquatic vertebrates, and some invertebrate groups. Although it is relatively easy to develop rapid survey techniques for many species groups, this is only useful to management agencies if these species are of economic or conservation importance. Even where the targets are well defined within the potentially impacted areas, very often decisions cannot be made if the same information is not available from other areas. Therefore, it may be necessary to finance RAP studies in LTER and other sites, which will be used to make decisions about irreplaceability for land-use selection algorithms (Pressey et al. 1994, Margules et al. 2002). One of the major problems in land management is that the information available is not used in management decisions (Knight et al. 2008). Selection of targets and preliminary testing will be made during workshops and courses with management agencies (see section D) to ensure the data can be plugged into decision algorithms. Testing of methods will be done in collaboration with graduate (Masters and Doctoral) students in each of the regional hubs.

The general objectives of this line of inquiry, for the first three years of the project, are the following:

(1) To promote workshops for technicians of environmental agencies and researchers, to define the target groups and sampling designs compatible with the logistic and financial limitations of RAP studies;

(2) To promote courses for technicians of environmental agencies, to develop the agency's capacity to deal with data produced by RAP studies;

(3) To test in the field the designs and protocols defined in the workshops, in areas which are under study for public works and in PELD sites, in order to determine their viability.

Expected Products after three years:

(1) 2 Environmental Agency Normative Instructions containing protocols to make evaluation of biodiversity in sites to be impacted more realistic and the data more useful for land-use planning;

(2) 4 dissertations or thesis on the evaluation of methods for RAP studies in impacted areas or areas to be impacted;

(3) 4 scientific publications on evaluation of methods for RAP studies in impacted areas or areasto be impacted;

(4) 20 environmental-agency technicians trained to use and develop methods for RAP studies and monitoring studies in impacted areas or areas to be impacted.

Line of Inquiry 3 – Evaluation of carbon stocks and hydrological resources in long-term ecological research sites across the basin

Long-term Ecological Research (LTER) sites are important for the study of local processes and the training of students from the region in scientific investigation. However, they also have an important role in understanding basin-wide processes, especially in relation to global processes, such as climate change. Despite the fact that 50% of Brazil lies within Amazonia, the only Amazonian site in Brazil´s LTER (PELD) network is near Manaus, whereas there are another 12 sites in the other regions. The principal justification for this was that no other Amazonian institutions were qualified to receive the funding. Despite the alleged superiority of the research capacity in southern and eastern Brazil, after 10 years of funding, the Brazilian LTER project based on sites in other regions has not produced a single cross-site study or publication. In an attempt to reduce the distortion in research effort, researchers at the Manaus LTER site developed standardized economical methods for long- and short-term biodiversity studies, which resulted in the RAPELD system (Magnusson et al. 2005, 2008).

The Brazilian Ministry of Science and Technology, through the PPBio program financed, or is financing the installation of 6 standard RAPELD grids and 2 RAPELD RAP modules in Amazonia. However, the number of other institutions installing the system is increasing exponentially. Full grids (G) or modules (M) have been or are being installed by researchers with funding from Biological Dynamics of Forest Fragments Project (3M), Areas Protegidas da Amazônia (4G, 4M), FINEP (1G), FAPEAM (3M), PRONEX (10M), FURNAS (6M), CNPq-Casadinho (1G), CNPq-Universal (2G), CPP (6M), PIME (30M), Ecological Corridors (2G), CENÁRIOS (1G) and PPG7 (1G), among others. This has given coverage of a large part of the Basin (Braga-Neto et al. 2008), especially near the regional hubs that are participating in this proposal.

Each full RAPELD grid has 30 uniformly-distributed permanent plots distributed over 25 km^2, and a variable number of permanent plots that sample more restricted landscape features, such as riparian zones. Modules have 5 or 10 uniformly-distributed permanent plots and proportionally less other permanent plots. This design is excellent to avoid the bias in tendencies in individual plots because of the sudden loss in biomass and long recovery period in tree-fall gaps (Baker et al. 2004, Chave et al 2006). The RAPELD system has been used to relate above-ground arboreal biomass (AGAB) to edaphic and topographic features (Castilho et al. 2006), and it is possible to obtain much more precise estimates coupled with environmental data for modeling than with other methods. However, biomass studies in RAPELD plots have been financed entirely by the Brazilian LTER and grants to individual researchers near Manaus. It is important to have this type of data from all Amazonian regions, and this project will install and coordinate AGAB studies in all of the RAPELD grids and modules under the responsibility of researchers from each regional hub. Detailed methods for these studies can be found in the paper by Castilho et al. (2006).

Current methods to estimate AGAB require the marking and identification of a large number of trees (Fischer et al. 2008). This has advantages in relation to collection of botanical material, estimation of the value of forestry resources, creation of living collections for monitoring population dynamics, genetic studies, and bio-prospecting. However, it may not be efficient for many studies where only general forest structure and gross estimates of AGAB are needed. Recent

advances in LIDAR (Light Detection and Ranging) technology have opened the possibility for more detailed studies of forest structure than were possible previously. The Reserva Ducke RAPELD site has recently been included in an LBA air-borne LIDAR study. However, air-borne LIDAR is too expensive to be used over large areas. In contrast to air-borne LIDAR, ground LIDAR is relatively inexpensive and can be operated by researchers after short-term training. This opens the possibility for LIDAR studies in all of the regional hubs, and the calibration of LIDAR data with known tree sizes and identities in a range of Amazonian forests. Therefore, this study will also evaluate the capacity of ground LIDAR to substitute detailed measurements of individual trees in short-term biomass studies.

One of the principal factors affecting forest structure and biodiversity is depth to the water table (Drucker et al 2008). There is evidence that many Amazonian soils are supersaturated and models have been developed to map hydrological terrain conditions using the depth of the water table from SRTM remote sensing data (HAND) (Rennó et al. 2008). However, because the data to calibrate the models is limited to a single site, the accuracy of the models for large-scale predictions is unknown (despite SRTM data availability). This data is essential for understanding the effects of climate change, because water-table depths will probably be affected long before the direct effects of temperature or lack of rainfall impact organisms. INPE/LBA researchers are collaborating with participants of this proposal in studies of the effects of topography and climate on water-table depths in two RAPELD grids in the Manaus region, and in modules along the BR 319. Although the information to calibrate the models is critical to modeling the effects of climate change and land-use practices on the distribution of most components of biodiversity, it is not difficult to collect. Dip wells can be installed and monitored by local people, and all regional hubs included in this proposal have the capacity to oversee the studies, given a minimum of training. Therefore, superficial (to a depth of 2.5 m) dip wells will be installed in all of the plots where biomass studies are being undertaken to relate water-table dynamics biomass stocks and AGAB dynamics.

Vegetation types are closely related with the hydrological cycle and soil fertility. Soil and leaf nutrition associated with water availability may define vegetation patterns distribution along a precipitation gradient through the Amazon basin. Moreover, isotopic measurements with canopy leaves show different patterns according to light and energy availability. Results from $\delta^{13}C$ measurements showed important physiologic characteristics such as water use efficiency, stomatic limitations and nitrogen use efficiency, the latter directly linked to ci/ca ratio at leafs (Farquhar et al., 1989; Ehleringer et al., 1993). Recent studies show that observed variation on leaf $\delta^{13}C$ production are related to Amazonian regional microclimatic variation (Ometto et al., 2002; Ometto et al., 2005; Ometto et al., 2006; Martinelli et al., 2007, Ishida, 2007). RAPELD sites are distributed through an important natural precipitation gradient in the Amazon region, considering that annual climatic variations are related to liquid carbon exchange at the ecosystem level. Therefore, carbon-stock variation in soil and vegetation studies, linked to floristic composition and stable isotopic investigations, are crucially important to identify potential global-change impacts on vegetation structure.

Specific short-term goals for this project are as follows:

1 – Coordinate a network for AGAB studies in all of the RAPELD grids and modules under the responsibility of researchers from each regional hub;

2- Training research groups in each regional hub with workshops on field work, data analyses and manuscript preparation;

3- To understand the role of terrain water conditions and other environmental variables (edaphic and

topographic features) on spatial distribution of forest structure and AGAB under climate changes;

4 – Integrate forest structure, AGAB and biodiversity data from all PELD sites with environmental variables in predictive models to understand ecological processes at large scales.

Within 3 years, the main products will be:

1 - Above-ground carbon-stock estimates for 7 LTER sites (at least 20 ha per site) which cover almost all Brazilian States in the Amazon Biome;

2 - Vegetation structure change scenarios (canopy height, tree density and biomass stocks) as a function of regional climatic change generated from predictive modeling;

3 - Vegetation structure maps: (i) high-resolution for inventory sites and (ii) less detailed (1-5 Km cells) for the Brazilian Amazon. All will be available in the CENBAM website;

4 - Field and laboratory procedures for vegetation structure, stable isotopes, hydrology and soil investigations reports. All will be available in the CENBAM website;

5 - 30 scientific articles published in indexed journals;

6 - 12 masters and 3 doctoral theses, ongoing or concluded.

Line of Inquiry 4 – Basin-wide studies of biodiversity and the ecological factors that affect it

Decisions on land-use require information on site complementarity in terms of natural resources and species composition. For biodiversity, the measure of site differences (beta diversity) is intimately linked to the spatial and temporal scales at which studies are conducted (Nekola & White 2002). Algorithms for decisions on land use are based on the concept of complementarity (Pressey 2004). Therefore, if we wish to include biodiversity in such decisions, we must have monitoring systems in compatible spatio-temporal scales. This was one of the criteria used in the development of the RAPELD system (Magnusson et al. 2005).

The use of compatible spatio-temporal scales allows the detection of community composition, and population genetic diversity (see line of inquiry 6 – Genetics), as well as predictions of the distribution of species and the effects of environmental change in the medium to long terms. This line of inquiry has the goal of undertaking standardized biological surveys in RAPELD sites distributed over the Brazilian Amazonia, in a way to allow understanding of biodiversity patterns from local to Amazonian scales. The methodology to be used differs from that traditionally used in biodiversity assessments, since it uses integrated studies to enable inter-site and inter-group comparisons, as well as the relationships between biodiversity and the environment (see data to be collected in research line 3).

The use of the same sampling points for all biological groups, and therefore, at the same spatial scale, will be possible through the use of the RAPELD grids and modules established by the Biodiversity Research Program (PPBio) of the Brazilian Ministry of Science and Technology. Each complete grid is made up of 5 x 5 km trails, regularly distributed in 1 km intervals, covering 25

km^2. Thirty permanent plots, uniformly distributed at 1 km intervals over the grid, are available. A variable number of plots are distributed over habitats with restricted distributions, such as small streams or riparian areas. It is not always possible to install a complete grid, as is the case when a large area must be covered, and therefore a large number of modules (which are subsets of the full grid) are distributed across the area. Whatever the size of the grid system, its structure is always conserved, with sampling plots of the same size and distributed with the same spacing, and the same environmental measures are taken in each plot. One of the dimensions of the grid (5 km) is always maintained if possible, to allow sampling of large sparsely-distributed animals, such as mammals. Standardization of the sampling design has the main advantage of easy comparison of data from different groups and sites, due to existence of precise information on site characteristics and sampling effort, and the fact that data will come from the same plots. This enables integration of research to produce an understanding of ecological interactions between distinct taxa, and encourages partnership in the production of papers.

The sampling design proposed here enables joint analysis of many biological groups in the same site, from microorganisms to large mammals, in a way that projects involving specialists in different groups can generate integrated studies in a short time frame and at a significantly lower cost than the present system of researchers working independently. Also, this method has a large potential applications in the monitoring of long-term anthropogenic impacts on organisms, such as those imposed by climatic change, deforestation and pollution.

Some ecological processes act at scales that can only be understood through integration of data from many sampling sites (Baccaro 2006). Also, models of ecological relationships developed with data from one site may have little or no predictive power in other sites (Cordeiro 2008). In the short term, cross-site comparisons can be done by promoting the mobility of individual researchers among PELD sites, however, long-term monitoring (as well as the detection of the resulting patterns) will only be possible when the capacity for high quality studies is installed in each PELD site, including the infra-structure and human resources.

This project has two parts. In the first, mobility of individual highly qualified researchers will be financed to undertake standardized biological inventories in several PELD sites, to allow cross-site comparisons. In the second, these researchers will collaborate with local organizations and teaching institutions (see part d) to develop long-term studies of these taxa or ecological processes in each site.

We propose the use of the RAPELD modules or grids, following the recommendations of the Program for Biodiversity Research (PPBio) to increase the efficiency of studies for survey and monitoring of Amazonian biodiversity. The RAPELD system is based on spatially standardized and integrated protocols. RAPELD sampling sites are already installed and working in the Manaus region, Amapá and Roraima, and others are being installed in regions close to Rio Branco (Acre), Rondônia, São Gabriel da Cachoeira (AM) and Santarém (PA). Support for installation of sampling modules in Cruzeiro do Sul (Acre), Humaitá (RO) and Sinop (MT) is being requested.

In synthesis, the sampling strategy we propose has the following advantages:

- The sampling modules allow sampling of every biological group, enabling integrated studies of the effects of local factors (such as soil, topography or biotic interactions), at a lower total cost than when groups are sampled independently;

- The use of a standardized sampling system will enable intra- and inter-site comparisons in the Amazon;

- Systematic integrated sampling, over many sites in Amazonia will enable monitoring of the effects

of climate change in the short and long terms.

- Systematic measurement of environmental variables in sampling plots will enable the establishment of the relationship between species and habitat features.

The general objectives of this line of inquiry, for the first three years of the project are as follows:

(1)To create and maintain the field infra-structure for RAPELD biological inventories, in three research sites;

(2)To obtain and make available (through a website) the basic environmental data (soil, topography and water quality) for three LTER sites;

(3)To obtain and make available (through a website) data and metadata of the biological inventories of 9 taxonomic groups in 11 research sites;

(4)To qualify human reasources, from technical to post-gradutation level, to collect and analyse data from biological surveys.

Expected Products after three years:

(1) 70 data banks (data and metadata) available in the internet for 9 groups in 11 research sites;

(2) At least 30 scientific articles published in international journals;

(3) At least 20 scientific articles submitted to international journals;

(4) At least 100 presentations in national congresses;

(5) At least one live Herbarium in each of 6 LTER sites;

(6) At least 1000 vertebrates, 10000 invertebrates and 2000 plant fertile exsiccates deposited in museums and collections;

(7) At lest 200 records and/or vídeo-records of anurans and birds in sound libraries and internet sites.

Line of Inquiry 5 – Restructuring and modernization of Amazonian biological collections

Basic tasks, such as collecting, sorting and deposition of biological material in scientific collections are paramount to biodiversity studies. The material in depositories is a testimony to scientific inventories and is also used for consulting. It is impossible to think of activities such as

biotechnology without collections and related activities. Taxonomists are the most qualified specialists for these activities. The Amazon covers 45% of the area of Brazil, but less than 5% of Brazilian PhDs work in the Amazon. The lack of qualified researchers working in many Amazonian institutions is directly related to the lack of knowledge on the biodiversity of the Amazon Basin. In this proposal, our focus is to increase the knowledge of Amazonian biodiversity by supporting and strengthening collaborating researchers and institutions, and training of local students, taxonomists and parataxonomists. Additionally, we will integrate taxonomists working in other Brazilian biomes in the process of identifying and cataloguing amazonian biodiversity.

Scientific collections in the Amazon basin are few, and mostly of poor quality in comparison to those in other regions. There are only two important Amazonian depositories, Instituto Nacional de Pesquisas da Amazônia (INPA) in Manaus, and Museu Paraense Emílio Goeldi (MPEG) in Belém. The others are neglected collections in poor conditions and without financial support to adequately keep their holdings, and it is not uncommon for curators of these collections to have to discard spoiled specimens. Without qualified depositories it is largely pointless to carry out comprehensive Amazonian biodiversity inventories. We intend to raise minimum adequate conditions for those collections located in collaborating Amazonian institutions.

Tissue collections at INPA are scattered among several departments, mainly linked to bird and mammal collections, without proper space, human resources and financial support. Such collections are very importante for genetic and bioprospection studies. We propose to unite all existing small tissue collections into one well-established collection, under the joint responsibility of one genetic resources curator and curators for the different taxonomic source groups, and to stimulate the collection of tissues as a routine practice in the Amazon. These actions will be performed along activities linked to lines of inquiry 6 and 7.

We stress that it is worthless inventorying sites without a stable program for depositing the biological samples adequately. This is the only way to secure the availability of the information contained in the sampled material for the future. It is also important to provide online access to the information on collection material. CENBAN will implement modern tools for data management of scientific collections, and train personel in the use of these resources. We will build on existing programas in collaboration with other institutions in Brazil and abroad to develop a data management system that is easy to access, even for the non technical public.

Specific goals in this research line are as follows:

- To increase the synergism between taxonomists from regional hubs and the main Brazilian institutions. To train new researchers with emphasis in taxonomy and collection curators mainly in regional hubs, investing in courses and scientific exchange between regional hubs and other institutions.

- To improve the taxonomic resolution and infrastructure from nine biological collections located in institutions that integrate this proposal, and to establish a tissue collection of animal samples.

- To integrate new data sets that will be created after the digitalization of collections from regional hubs to existing data sets. To develop an web tool to allow general public access to information in collections.

The expected products for the first three years are:

- To have all participating collections to in full operational conditions (e.g., equipments, materials, etc.)

- To increase by 30% the number of dissertations and thesis related to systematics in the graduate programs located in the Amazon, and to increase by 30% in the number of publications in taxonomy by participating institutions.

- To increase by 10% the number of taxonomists in Amazonian institutions as staff or scholarship students. To improve the distribution of taxonomy expertise in the region.

- To digitalize up to 60% of participating collections and to provide ways to increase communication among different collections, with standards and protocols provided online.

- To increase by 15% the number of experts visiting or requesting loan from collections.

- To increase by 30% the number of the general-public visits to collections.

- To have at least 150 persons qualified in courses of taxonomic identification (researchers, graduate and undergraduate students).

- To have at least 240 para-taxonomists qualified in sampling techniques, preservation of collected material and of basic identification of specified biological groups;

- Production of at least 30 scientific articles;

Line of Inquiry 6 – Genetics applied to biodiversity

Biodiversity can be viewed hierarchically in three levels: diversity of ecosystems (habitats and interspecific interactions), diversity of species and genetic diversity. The maintenance of each level is essential to maintain ecological stability and continued evolution of species within ecosystems (Wilson, 1986).

Brazil is thought to contain between 15 and 20% of global biodiversity and at least half is in Amazonian ecosystems (Lewinsohn & Prado, 2005). The degree of infra and inter-specific genetic differentiation in Amazonian fauna and flora is poorly known, as is the taxonomy of Amazonian species. To generate advances in our knowledge about this variability and tackle the logistic difficulties that Amazonia presents requires integrated multidisciplinary research, as only this integration will permit us to understand the biological diversity in the region and allow us to generate possible benefits for local, regional, national and global society. Integrating species surveys and biological collections with research on genetic diversity is the focus of this research segment.

One of the important questions is how the great diversity present in Brazil's different biomes originated, especially in Amazonia. Numerous models and hypotheses were formulated during the last 50 years, based mostly on species distribution and ecology, allied with knowledge of regional geologic and climatic history, without, however, reaching any wide ranging conclusion. Moritz et al. (2000) showed that the integration of molecular genetic diversity analysis of a large number of species (comparative phylogeography) with the other disciplines already active is an extremely promising framework for understanding the processes that gave origin to Amazonia's mega-biodiversity. Today the correct taxonomic identification of a species requires the integration of morphology, behavior and genetics, so the need for integrating genetics at other levels is obvious .

Parallel to its natural biodiversity, Amazonia contains significant agrobiodiversity and is an important region of crop domestication, comparable with Southeast Asia in both numeric and economic values (Clement, 1999). The majority of the domestication events occurred in the Amazonian periphery, specially in the Southwest (Acre, Rondonia, Bolivia and the south of Peru), in the West (Peru, Ecuador, southern Colombia and upper Solimões River, Amazonas) and in the Northwest (Roraima, upper Negro River in Amazonas, eastern Colombia and southern Venezuela) (Clement, 2006; Clement & Junqueira, 2008). From their centers of domestication, these species were dispersed throughout Amazonia and the Neotropics in the pre-Columbian era, and later throughout the world tropics (Pickersgill, 2007). Some of these crops are important, e.g., manioc and peach palm from the Southwest, cocoa from the West, and pineapple from the Northwest of Amazonia, and other crops are emergent or important within Amazonia, e.g., hot pepper, biribá, abiu, annatto. The identification of current concentrations of diversity and probable routes of dispersal is important to guide future prospecting of genetic resources to support crop improvement programs and both in situ and ex situ conservation, all essential to support expansion of the economic importance of these crops in highly competitive modern markets.

Numerous DNA sequences of Amazonian species are deposited in public data banks, such as GenBank, but the number is small in comparison with Amazonian biodiversity, both in species and in geographic distribution of species included. A comparison between these sequences and our proposal for collection is fundamental to better characterize these species and understand their relationships with Amazonian ecosystems.

We propose a research framework that will integrate genetics, including molecular and chromossomal characterization, with other research areas within the project to leverage the various sets of knowledge about biodiversity. Our work will use primarily DNA markers as tools of taxonomic and population studies of species that are important for medical, social or commercial reasons in Amazonia. The mitochondrial genome will be the principal target in animal studies, because it is being used in bar coding to assist species identification and biodiversity monitoring. The sequencing and genotyping steps will be done principally in laboratories at the Federal University of Amazonas (UFAM) and the National Research Institute for Amazonia (INPA). Sub-samples of tissues collected will be deposited in existing collections at INPA, UFAM and other participating institutions. Most of the biological material will come from other research areas within the proposal, permitting the integration of genetic information with ecological, taxonomic and economic information to increase the relevance of this knowledge for the scientific community and society.

More specifically we aim to reach the following goals:

1) Modernize, equip and restructure participating genetic laboratories (Thematic and Associate Laboratories in Manaus and Associate Laboratories in the regional nuclei);

2) Genotype samples of fish, reptiles, amphibians, turtles, small mammals, insect vectors and dengue disease organisms, stingless bees and crop plant species using biological materials from integrated collection expeditions or existing Zoological and Botanical Collections;

3) Attend demands for molecular taxonomic information from other research segments and regional nuclei outside of the Manaus-Belém axis via training in the use of DNA as a tool to analyze biodiversity.

Products expected after 3 years are as follows:

(1)Five laboratories in regional centers equipped and with qualified human resources to make taxonomic genetic analyses

(2)Data and metadata banks relative to the genetic studies for at least 20 fish, 10 small to medium sized non-fish vertebrates (amphibians, reptiles and rodents), 4 insect (bees and mosquitoes) and 10 cultivated and non-cultivated plant species;

(3)Amazonian scale information on the taxonomy and phylogenetic relationships for 4 vertebrate groups (amphibians, chelonians, lizards and rodents) and two invertebrate groups (stingless bees and dengue vector mosquitoes);

(4)Amazonian scale information on the genetic diversity of at least 4 native fruits and its cultivated varieties;

(5)At least one demonstration stingless-bee colony installed in each regional center;

(6)At least 30 scientific articles published or submitted to international journals;

(7)At least 40 scientific communications in national and international meetings;

(8)At least one extension program conducted in each of the regional centers.

Line of Inquiry 7 – Bioprospection for nutraceuticals, phytocosmetics, plant derived insecticides and phytofarmaceuticals

In the last few years, the search for products conceived within the concept of "nature and sustainability" has increased significantly, in the sense of what is known as the "naturalist race". The Amazon, with its enormous and practically unexplored biodiversity, has attracted the attention of researchers, businessmen and traders from all parts of the world. The forest potential as a source of new drugs, cosmetics and nutraceutics is enormous, not only due to intrinsic biodiversity, but also by the traditional knowledge associated with Amazonian people.

Recent data show that, only in USA, one quarter of medicines available from drugstores contain substances extracted from plants, 13% contain substances from microorganisms and 3 % from animals. Hence, 41 % of all medicines are rooted in biodiversity. This value may increase significantly, because only 3 % of all flowering plants of the world (about 5,000 of 220,000 described – Wilson 1988) has been examined for substances with biological activity. As many plants have not yet been described by scientists, the number of species with biological activity can be expected toincrease sharply in the near future.

One of the foundations of the study of plant chemicals is to search of active substances. There is an urgent need to test Brazilian plants with the intention of finding substance that promote the cure, or at least, the relief of harmful effects of Brazilian typical diseases, although without overlooking the potential of providing products of global importance. The big pharmaceutical transnational industries invest huge amounts of resources in the search of medicines to treat diseases, such as AIDS, Alzheimer illness, cancer, depression, diabetes, cardiac diseases, stroke, osteoporosis, among others, aiming to profit from patients that suffer from these diseases (Montanari e Bolzani, 2001).

Basically, plants to be chemically studied are pre-selected based on some previous indication of ethnobotanical use (e.g. they are used by traditional people - indians, ribeirinhos, etc.) or because they belong to genera or botanical families known to have biological activity. Brazil, and particularly the Amazon, has an enormous biological potential for chemical studies, from which active molecules may be found, or chemical models to be transformed into active molecules.

The study of bioactive substances from Amazonian plants represents an important line of inquiry, due to the potential to utilize and agregate value from more than one forest product, generating production alternatives, jobs and socio-economical benefits for the Amazon region. Thus, local society will benefit from project results. This line of inquiry deals with the necessary steps to create viable production chains linking basic and applied research aimed at obtaining nutraceutic products, cosmetics, insecticides and medicines from plants. The importance of the structure of this proposal is the easy integration, decreasing costs and yielding products with increased aggregated value. Each step of the line of inquiry is integrated with other lines in the proposal. This line covers collections, botanical identification, extract preparation, evaluation of nutrient content or biological/pharmacological activity of vegetal extracts. For this, we will benefit from the structure and functionality of local herbaria and associated taxonomists, that are part of the line of inquiry Biological Collections, to identify plant species. We will work in collaboration with ecologists and students from regional hubs (Roraima, Amapá, Acre, Rondônia e Mato Grosso) that compose the line of inquiry Biological Surveys, to increase the amount of biological material that is available to extract and isolate of active principles with potential to obtain nutraceutical, cosmetical, insecticidal and pharmacological products. Moreover, there will be an evaluation of toxicity and evaluation of potential uses for the agro-environmental productive chain. Courses will be given to train diverse groups and results will be published in the form of scientific papers, congress communications and patents, whenever needed.

The principal objectives for this line of inquiry are as follows:

(1) to equip and qualify human resources from laboratories of regional hubs for basic studies of bioprospection.

(2) to conduct agro-environmental diagnosis in relation to needs of regional hubs.

(3) to screen plants for bioactivity potential.

(4) to identify products of potential interests for the investment in bioprospection in the regional hubs.

(5) to evaluate the proteolytic, anti-tuberculosis, leishmanicida, antibacterial or antifungal potential of vegetal extracts to choose candidates for pharmaceuticals.

(6) to evaluate the nutrient content (vitamins and flavonoids) of plants of interest in the regional hubs.

(7) to evaluate the geographical variation in biotechnological activity within selected species.

The expected products after three years are:

- to have at least 10 vegetal extracts to compose a pharmaceutical, a cosmetic, an insecticide or a nutraceutic, with insurance of biological activity and toxicological with use safety.

- to have at least 5 diagnosis agro-environmental conducted with regional hubs.
- to have at least 30 scientific papers published or submitted to Qualis A or B journals (CAPES).
- to have at least 6 patents registered.
- to have at least 2 laboratories of regional hubs capacitated to conduct bioprospection research.
- to have technical human resources in each regional hubs trained in collecting protocols and plant and animal identification with biotechnological potential.

d) Details of the program to increase the number of qualified personnel through graduate (masters and doctoral) programs, training in the business environment, short and long courses, training of technicians, among others, that permits the institute to increase the number of qualified scientists, as well as personnel for innovative technology companies when pertinent to the institutes theme

Formal Education Facilities

CENBAM will interact with graduate education at three levels: the structure of programs, content of courses, and supervision of students. The model for restructuring programs follows that of the CNPq/Casadinho and CAPES/PROCAD projects. INPA's graduate program in Ecology (PGECO) is the only graduate program in the Amazonian regions covered by this proposal with CAPES level 5, and hence the only program that can act as a catalyst for other programs. Although the Casadinho and PROCAD projects are effective, they integrate only two to three graduate programs and, given the limited capacity of each regional center outlined in section C, they do not take advantage of the complementary capacity available throughout the basin.

PGECO undertook a successful Casadinho project with the State University of Mato Grosso (UNEMAT) in 1998-1999. In 2004 PGECO started a Casadinho project with the graduate program in Ecology of the Federal University of Mato Grosso (UFMT) based on the use of LTER sites for biodiversity studies and training students. One of the principal aims of the project was to increase the scientific output of the UFMT program which was only 5 publications in CAPES recognized journals in 2003. Output increased to 11 in 2004, 10 in 2005, and 21 in 2006, and continues to rise after the Casadinho terminated. Today, PGECO has PROCAD projects with graduate programs at UFAC (Acre), UFRR (Roraima), and UNIFAP (Amapá). The objective of CENBAM is not to substitute Casadinho and PROCAD projects, but to integrate them in a process that allows greater interaction among higher-education institutions in different regional centers, and mobility of professors between institutions. In many regional centers there are no graduate programs, and increasing the quality of courses given to undergraduates and students of technical colleges is the aim. One of the aims of CENBAM is to stimulate the Ministry of Education (MEC) and State-Government Education Secretariats to provide more long-term contracts for regional universities and other education facilities, but in the short term much of the increase in quality of regional education will depend on increasing mobility between regional centers. The increase in scientific interchange brings benefits to both the education facilities and the professors/researchers involved.

Graduate programs in regional centers generally originate as "multidisciplinary". This does not indicate that they integrate various disciplines in knowledge-production chains as promoted by CENBAM, but that they lack professors to create a program in any particular discipline. The

consolidation of programs, and creation of new programs, requires that they are truly multidisciplinary and integrate information from various disciplines. Otherwise, the students they produce will not be prepared for market-place demands. This is one of the major reasons that integrated actions among higher-education facilities in different regional centers will be necessary. All the integration necessary for research is also necessary for higher education. Synergy between research and graduate training must be promoted to enable the creation of functional knowledge-production chains which are the major objectives of CENBAM.

Course contents generally reflect the experience of local professores, rather than the demands of future employers. Most programs do not have effective courses in research planning that show how information from diverse disciplines can be integrated to solve practical problems. Some demands have already been identified and are indicated in the principal lines of investigation (section C) and specific courses that have already been planned are indicated below. However, the identification of future demands and opportunities needs to be made by the regional centers acting in collaboration. In regional centers in which graduate programs are not available, considerable advances can be made in restructuring undergraduate and technical-college courses. Regular meetings of coordinators of programs and courses are necessary for integration. For this reason, CENBAM will promote workshops involving all programs, and representatives of potential new programs, each semester, with the venue always being a different regional center.

Mobility among regional centers will promote opportunities for co-supervision of graduate students, enabling students to undertake more relevant studies than would be possible if they had to remain within the narrow confines of the discipline of their major professor. Standard methods of financing promote competition among researchers and restrict possibilities for truly integrated studies. The CENBAM philosophy promotes multi-authored papers, integration within and between courses given by different professors, and co-supervision of graduate students. Especially for doctoral students, this opens opportunities for comparative studies between regions.

Technical training outside formal institutions

Biodiversity knowledge-production chains do not begin with graduate students or even researchers. Much of the knowledge of biodiversity in the Amazon is contained within personal or traditional knowledge of the local people. They live and interact with Amazonian biodiversity every day. Today, much effort is placed on tapping into this knowledge so that benefits can be passed up the chain. However, benefits to local people are localized, essentially focused on monetary gain, and do not promote integration of those involved in knowledge-production chains or the conservation of traditional knowledge. The role of local people in finding, collecting and passing biodiversity products to researchers is extremely undervalued, and their potential role if educated to understand the value of their knowledge to other segments of society is completely unexplored.

The idea that local people in the Amazon will be content to live at the subsistence level and continue to provide biodiversity information to researchers for the foreseeable future is naïve, and is not in accordance with the history of any other part of the globe. Local people in the Amazon want health-care services and education for their children, and almost all are dependent to some extent on industrialized products. Either they will see potential to achieve those goals while involved in biodiversity-related industries, or they will turn to agriculture, mining, and other activities that drastically reduce most biodiversity resources.

Education is a complex process and in most industrialized countries formal education is given to each citizen over a period of 10-20 years. The home environment and the opinions of family and peer groups are important influences, so educational activities must consider larger

groups than the students involved. Local people provide valuable services to researchers as guides, collectors, tree climbers etc., but generally receive little monetary return because such activities do not form part of a formal occupation and are considered unskilled. However, in LTER sites, or areas with coordinated studies by many research groups, such activities are valued, and the more accomplished guides and collectors demand higher economic returns. Guiding and collecting are important scientific-support occupations and training courses serve not only to provide more highly qualified support personnel, but also for those workers to understand the value of their services.

In many areas, such as extractive and sustainable-development reserves, local people are involved directly in decisions about land use. In other areas they are involved indirectly as citizens and users. However, schooling is usually limited and they have little idea of the value of biodiversity services in relation to other uses of the land. Therefore, training courses directed to local people have two benefits: they train local people to contribute more to the scientific activities, and they educate them in the value of their services to researchers and the larger community. The activities listed in this section refer to activities related principally to training of scientific-support personnel. Activities directed more to the larger local community, although forming part of a larger local strategy, are listed in section E.

Training in the business environment

IBAMA and State Secretariats have to make licensing decisions or approve projects that are or will be applied immediately. The short-term courses for training technicians from these agencies will be based on decisions that have to be taken immediately and, where feasible, field training will take place at sites where licensing, monitoring, or forestry certification is being undertaken. That is, indicators will be derived for practical problems facing specialists in real time, in collaboration with government agencies, and the companies that they contract to undertake services.

All training activities for local people will be undertaken in relation to survey or monitoring projects being undertaken in their local area. One of the major problems with the involvement of local people is that they are part of the informal workforce, generally without the legal benefits of formal employment. One justification for this is that there is no consistent demand for workers with biodiversity skills, a situation that coordinated programs, such as CENBAM, are designed to change. While the overheads of formal employment do not compensate for the costs when employment is sporadic and unpredictable, the network of institutions involved in CENBAM will provide a consistent demand for biodiversity services from local people.

Recent changes in legislation relating to business registration and reporting permit small businesses based on one to three participants with minimal overhead costs. Other, though more complicated arrangements are available for cooperatives. One of the objectives of CENBAM is to register regional demand for diverse biodiversity services and, where there is sufficient demand, stimulate the formation of small businesses by local people to meet those demands. Most funding agencies have severe restrictions on contracting individuals because of the very strict Brazilian labor laws. However, there are few restrictions on contracting small businesses because they are responsible for taxes, insurance, and other labor-related costs that cannot be paid directly by funding agencies.

CENBAM will maintain a register of biodiversity technicians, their qualifications and experience, in each area, as well as lists of projects in execution that will allow local people to use their informal and course-acquired skills to improve their employment potential.

The needs of institutions in regional hubs have already been identified. They are mainly to

train para-taxonomists (mostly botanical), researcher and technicians related to digitalization and management of collections, including specific software courses, training of collection techniques at different levels, preservation and taxonomic identification for several groups, training methodologies of RAPELD sampling, courses about sampling design, basic and multivariate statistics, population and community ecology, training of molecular techniques and bioprospection procedures at different levels.

To accomplish these demands during the first three years of the project, we intend to implement the following educational actions:

(1) to implement a professional course in plant taxonomy and field techniques, organized by Dr. Roberto Vicentini (USP/STRI/CTFS). This course will be annual, located in Manaus, using infrastructure of PDBFF project, but could be organized in other regions to attend local needs and minimize transportation costs. Each course last one month and can accomodate 20 students..

(2) to administer training courses in collections preparation, preservation and identification of biological material, including tissue banks and genetic samples, for teachers, graduate students and technicians. The focal public, the taxonomic group and the place where the course will be held will be decidedin accordance with needs of regional hubs.

(3) training in the digitalizing and management of collections for curators, including training in the use of software, such as BRAHMS and SPECIFY.

(4) training in RAPELD techniques for teachers and graduate students will be conducted by interchanges between regular field courses offered by each graduate participating program (e.g., Ecologia de Campo (PPG-ECO/INPA), Ecologia da Floresta Amazônica (PDBFF/PPG-ECO/INPA) and Ecologia de Dossel (PPG-EMRN/UFAC). CENBAM will cover travel expenses of students and teachers, including centers that still do not have graduate programs.

(5) training on RAPELD techniques for technicians will be also offered, in accordance with demands of regional hubs.

(6) training in RAPELD techniques and their applications to activities related to environmental impact assessment, and biodiversity monitoring will be organized for technical staff of environmental agencies (IBAMA, SEMA-AC, SEF-AC etc.)

(7) courses in statistics, sampling design, basic and multivariate statistics, usage of software R, population and community ecology, scientific communication, bioprospection techniques, molecular biology techniques will be offered to graduate and undergraduate teachers, aiming to restructure the class contents offered in each regional hub, and to promote the integration of research in RAPELD sites.

(8) the course on Amazonian forest fragmentation, offered annually by PDBFF to undergraduate students in Manaus and other parts of Brazil, will be offered twice in regional hubs, to facilitate participation of local undergraduate students.

(9) two workshops onspatial distributions models and of forest structure parameters will be organized for teachers, graduate students, researchers and technicians using GIS.

The products expected after 3 years are as follows

(1) training of 300 local people in providing services to biodiversity research projects

(2) at least 60 masters and 20 doctoral students with ongoing or concluded theses;

(3) minimum increase in 50% of publication output of graduate programs;

(4) creation or ongoing process of creation of two new graduate courses (graduate course in Ecology, doctoral level, at UFAC, and graduate course in Zoology at UFMT-Sinop)

(5) creation or updating/restructuring of at least 25 graduate and/or undergraduate disciplines at the regional centers;

(6) at least three training courses given to technicians of environmental agencies.

e) Details of the mechanisms to transfer knowledge gained to society, using instruments beyond scientific publications, especially scientific-education programs and extension

Our group has extensive experience in public education through a variety of media (see sections H and O). This includes books, websites, articles in magazines, and stands for use in fairs and gatherings, such as the annual Brazilian school science fairs. In 2008 we will distribute 5000 CDs with ebooks, videos and information on research undertaken in the Amazon's first LTER site in Reserva Ducke. A video of calling frogs produced by our group is one of the most popular attractions in INPA's nocturnal house stand. The methodological innovations introduced by the PPBio Program and their impact on biodiversity research in the Amazon were published in a special edition of Scientific American Brazil (Braga-Neto et al. 2008).

One of the most successful formats we have developed in recent years involves identification guides. These color books of the highest quality are used by professional scientists, but are written in language accessible to the general public, and the introductory sections, which occupy up to half the book are sufficiently complete for high school students to use in school projects. One of the major limitations in attracting Amazonian students to biodiversity studies has been the lack of guides in Portuguese or Spanish, and the high cost of the existing books. By producing large numbers of books in each issue, which are for donation rather than sale, we are able to reduce the cost to less than R$25.00 per copy. We are thus able to place these books in almost all Amazonian school and university libraries. Books are in both Portuguese and English for use by tourist guides. The books are also available for free as ebooks from our web site, and the PDF versions allow inclusion of other audio-visual material, such as video clips of frogs calling. Examples of such books are available on the INPA web site (http://ppbio.inpa.gov.br/Eng/guias/). Guides to ferns and species of Marantaceae are in the final stages of production.

During the first 3 years, CENBAM will produce at least 13 new guides on ants, fishes, large mammals, snakes, scorpions, fungi, Zingiberales plants, spiders, pseudoscorpionids, Diplura, Ephemeroptera, Leptophlebiidae and Isoptera. It is the aim of CENBAM to produce e-books or hardcopy versions for all of the biological groups being inventoried in each of the regional centers. Other opportunities are available for educational activities that will be defined by each regional center, each of which includes municipal education secretariats.

Graduate students will be involved in extension activities as part of their curricular activities. These activities will focus on interaction with schoolchildren, through the organization of fairs, science projects, talks, debates, field excursions, campaigns and other activities related to Amazonian biodiversity assessment and conservation. These activities will be carried out at schools or communities in the area of field sampling sites in the Manaus region and at the regional hubs. Both sides will benefit, as graduate students will exercise the ability to transmit scintific contents in a form and language which are accessible to the general public, and children and teenagers will be informed about and stimulated to think about biodiversity-related topics.

Talks about bioprospection will be given in all communities involved in plant samplings, both to give local people information about how these studies are carried out and what benefits can be expected from these studies, and to stimulate local people to participate in training courses offered by CENBAM or other organizations. Where research results are sufficient and significant, regional symposia or fairs will be organized, to make the information visible to the scientific community and general public at regional centers.

In order to make research results and general information about genetics available to the general public, CENBAM will support three kinds of events, which have already been successfully carried out by INPA in recent years, and which can be replicated at each regional center. **Science Circuit** is a permanent exposition of informative material, in printed (posters, folders) and digital (internet, image, sound) formats held at the Adolpho Ducke Botanical Garden, in Manaus, transmitting information about how genetic studies are carried out, and highlighting controverse issues, such as transgenic crops, cloning, loss of genetic variability, etc. **Educational Game Workshop Piradados** is an activity in which schoolchildren and highschool students learn about Amazonian fishes and genetic related topics through a game. **Educational Workshop on DNA Extraction** is also an activity in which schoolchildren and highschool students, in which DNA extraction exercises are carried out using houshold products like detergents, salt and alcohol as reaction ingredients.

f) Details, when pertinent, of the mechanisms to transfer knowledge to the private sector or to formulate public policies

The CENBAM structure revolves around the participation of users in defining regional goals (see sections I and T). Decision makers, such as IBAMA, ICMBIO, State Environmental Secretariats and State Forestry Departments, participate on local committees, so they are involved from the beginning of studies and have a direct interest in the results. Identification of targets and development of protocols for environmental impact studies will be carried out in collaboration with IBAMA-DILIC, forestry companies, and others with a direct interest in the products, which may be drafts of environmental legislation or official guidelines for monitoring.

The results obtained by line of inquiry 3 will be available through the construction of thematic maps synthetisizing the advances of knowledge to decision makers and other stakeholders in biodiversity that might find it useful. The maps, linked with short technical reports, will be available to local committees such as IBAMA and ICMBio, State environmental and forest product secretariats. Maps will show carbon stocks and forest structure statistics, as well as identify sensitive areas for forest-hydrology relationships that might be affected by global climate change. These products are extremely important for land use planning and monitoring, and also to estimate

carbon emissions from deforestation to the atmosphere. Maps will be available in different scales: (i) to support local councils and settlements needs, including conservation units, with high spatial resolution and (ii) to Brazilian Amazon less detailed scenarios (1-5 Km cells).

A social technology to be disseminated through CENBAN is the raising of stingless bees, by means of the installation of stingless bee hives in rural Amazonian communities. The bee geneticists at CENBAM have already made studies for management improvement, including genetic improvement of native bees, which have increased the production of colonies and therefore increased the production of honey. These actions preserve the diversity and variability of cultivated and native plant species.

The genetic information for the dengue vector (Aedes) and its etiological agent (the virus) will be made available to governmental health-care agencies. The genetic information on cultivated plants will be made available to agriculture governmental and non-governmental agencies. The genetic information on vertebrates will be made available to the environmental protection governmental and non-governmental agencies.

g) Detailed description of the group proposing the institute with the qualification of the researchers. The team should have at least eight persons with the doctoral level, whose names should be given in the body of the project, with indication of coordinator and vice-coordinator.

The members of the group proposing the center have been working individually and in collaboration on Amazonian biodiversity studies and development of educational facilities in the Amazon for decades. Most of the participants from the Manaus region are part of the CNPq research group "Conservation and Management of the Amazonian Biota: Ecological Basis for Rational Development of the Region" that was formed in 1992 and developed the RAPELD sampling strategy (Magnusson et al. 2005). The leader and vice-leader of this proposal are the coordinator and vice coordinator of that group. The core group has been supplemented in recent years as a result of larger-scale activities conducted under the auspices of PPG7, CTHidro, PRONEX, PELD, PPBio, PDBFF, PIME, CASADINHO, PROCAD and other funding programs (see section O).

The coordinator of this proposal, Dr **William Ernest Magnusson**, has been a researcher with the Instituto Nacional de Pesquisas da Amazônia since 1979. He has a CNPq scholarship level 1A, has published 151 papers on a wide range of taxa, and has a special interest in multidisciplinary sampling designs (Magnusson et al. 2005, 2008a, 2008b). He was the major professor for 26 masters students and 17 doctoral students. He is an author of a statistics book published in English (Magnusson & Mourão 2006) and Portuguese (Magnusson & Mourão 2006), which is used in many graduate courses in Brazil. He is certified as a wildlife biologist by the Wildlife Society, is on the editorial committees of several major journals, and is a member of the IUCN Crocodile Specialist Group. He is the Adjunct Coordinator for the Western Amazonian Executive Hub of the Program for Biodiversity Research (PPBio).

The vice-coordinator, Dr **Regina Luizão**, is a specialist in soil biology and has been an INPA researcher since 1980, with 22 papers published on soil ecology and the effects of habitat fragmentation on biodiversity, and was the major professor for 11 masters students and 1 doctoral student. She has coordinated the Biological Dynamics of Forest Fragments Project, a joint program between INPA and the Smithsonian Tropical Research Institute (STRI) since 2003. She coordinated

the INPA Graduate Program in Ecology between 1995 and 1999, leading to its classification as level 5 (first excelence level) by CAPES, the organism that coordinates higher education in Brazil. She also coordinated the LBA training program between 2003 and 2007, when she was responsible for 46 RHAE scholarships.

Dr **Marcos Silveira** has been a professor at the Federal University of Acre since 1992, and will be a member of the Executive Committee of CENBAM. He has published widely on the flora of Acre, and coordinated several multi-institutional research programs. He coordinated the UFAC Graduate Program in Ecology between 2003 and 2005. He is the coordinator of the Acre Hub of the Program for Biodiversity Research (PPBio).

Dr **Marcos Vital** has been a professor at the Federal University of Roraima since 1993, and will be a member of the Executive Committee of CENBAM. He is a specialist in environmental microbiology, soil and water quality, and coordinates the multidisciplinary graduate program in Natural Resources since 2001.

Dr **Angelo Gilberto Manzatto** has been a professor at the Federal University of Rondônia since 2005 and will be a member of the Executive Committee of CENBAM. He is a specialist in quantitative ecology of plants.

Dr **Fabiano Cesarino** has been a researcher at Instituto de Pesquisas Científicas e Tecnológicas do Estado do Amapá (IEPA) since 2000. He will be a member of the Executive Committee of CENBAM. He is a specialist in seed and seedling ecology.

Dr **Domingos Rodrigues** has been a professor at the Federal University of Mato Grosso, Sinop Campus, since 2006, and will be a member of the Executive Committee of CENBAM. He is a specialist in amphibian ecology, with 18 published articles. He is developing a proposal for a graduate program in zoology based at the Sinop Campus, which has been created in 2006 to promote higher education and research in a region at the northwestern limit between the mechanized agriculture expansion area and the largest extension of remnant primary Amazonian rainforest. He is a member of the governing council of the Mato Grosso Hub of the Program for Biodiversity Research (PPBio).

Dr **Albertina Lima** has been a researcher at INPA since 1989. She is a specialist in vertebrate ecology. She was coordinator of the INPA graduate program in Ecology between 2004 and 2006. She has coordinated several international research projects involving researchers from other Amazonian countries. She holds a CNPq Scholarship level 1C and has published 64 papers on a range of taxa, with a main focus on amphibian ecology and biogeography. She was the major professor for 17 masters students and 3 doctoral students.

Dr **Elizabeth Franklin** has been a researcher at INPA since 1984. She is a specialist in entomology and coordinated the INPA graduate program in Entomology between 1996-1998 and 2000-2004. She has published 27 papers on mite taxonomy and ecology and on economically efficient methods of entomological survey. She was the major professor for 9 masters students and 1 doctoral students. She is the Coordinator of Biological Inventories for the Western Amazonian Executive Hub of the Program for Biodiversity Research (PPBio).

O Dr. **Márcio Luíz de Oliveira** has been a researcher at INPA since 2002. He is a specialist in plant-bee interactions, and bee taxonomy, biogeography and ecology, with 15 papers published on these subjects. Currently he is the head of the Department of Entomology at INPA, and teaches at the graduate program in Entomology, having been the main advisor for two masters students.

Dr **Cecília Nuñes** has been a researcher at INPA since 2003, and is a specialist in phytochemistry. She has published 18 papers on many topics related to biological prospecting and lodged two requests for patents. She teaches at the graduate programs in Biotechnology and Natural Resources of the State University of Amazonas, and in Biotechnology at the Federal University of Amazonas where she has tutored five masters students. She has been elected a pro tempore member of the Brazilian Academy of Sciences (northern section) and received the FINEP prize for northern Brazil in 2007. She is the Coordinator of Theme Research for the Western Amazonian Executive Hub of the Program for Biodiversity Research (PPBio).

Dra **Izeni Farias** is an Associate Professor at Universidade Federal do Amazonas giving graduate and undergraduate courses in molecular evolution, phylogenetics, conservation and population genetics since 1990. She has a CNPq Scholarship level 2, and has published over 40 articles on phylogenetic systematics, phylogeography, population and conservation genetics of Amazon basin vertebrates, and has contributed to the translation of the book "A Primer of Conservation Genetics" by Frankham, Ballou and Briscoe into Portuguese. She coordinates three CNPq projects and advices and co-advices numerous graduate and undergraduate students. She has a genetics laboratory (www.evoamazon.net) with all molecular and computer equipment necessary to perform molecularly focused biodiversity analyses. She is also the curator of the tissue collection at the University, and is on the editorial board of Acta Amazonica.

Dr **Flávia Costa** has been a reseearcher at INPA since 2000. She currently holds a scholarship from the Fundação Djalma Batista and recently obtained first place in the selection process for professor at the Federal University of Amazonas. She has published 18 papers on a range of topics related to plant ecology and coordinated the INPA graduate program in Botany between 2006 and 2007. She teaches at the INPA's graduate programs in Ecology and Botany, and has been the main advisor to 11 masters students and one doctoral student. She has been elected a pro tempore member of the Brazilian Academy of Sciences (northern section) 2007.

Dr. **Jorge I. Rebelo Porto** has been a researcher at INPA since 1987. He has published 27 articles on genetics, genomics and mutagenesis. He was head of the Department of Aquatic Biology between 1999 and 2001 and head of the Department of Graduate Programs between 2004 and 2008. He coordinated INPA's team in the Brazilian Genome Netwok, and in the Amazonian Genome Netwok. He teaches at the graduate program in Genetics and Evolutionary Biology and was the major professor for 3 masters and 2 doctoral students. He participated in the development of technological products, including the register of two biotechnological patents.

Dr **Charles Roland Clement** has been a researcher at INPA since 1977. He is a specialist in genetic resources with 82 published papers, 8 books and 74 chapters on native Amazonian fruit crop development, crop genetic resources use and conservation, and origin and domestication of neotropical crops. He has a CNPq scholarship, level 1D. He is the curator of the field germplasm collections at INPA. He is a core professor in the Genetics, Conservation and Evolutionary Biology, and Biotechnology post-graduate programs, and a collaborating professor in the Plant Genetic Resources, Agriculture in the Humid Tropics, and Botany programs, was the major professor for 6 masters and 2 doctoral students, and is currently major professor for 1 masters and 3 doctoral students.

Dr **Claudia Keller** has been a researcher at INPA since 2000. She is a specialist in vertebrate ecology and ecotoxicology. She has 21 published papers and has been the main advisor for six masters students. She coordinates an international research project with Spain and coordinates the graduate program in Ecology since 2006.

h) Specify activities to be undertaken by the members of the team, informing previous experience in activities of research and development, as well as a description of work activities in networks

1. Kyara Formiga de Aquino

   Graduated in Biological Sciences by the Universidade Federal do Amazonas (1999) and Master in Biologia de Água Doce e Pesca Interior by the Instituto Nacional de Pesquisa da Amazônia (INPA) (2004). Currently is an INPA researcher and has experience in animal genetics, mostly in themes: migratory catfish, population genetics and popularization of the science. She will be responsible for the fish genetics studies in all the regional nuclei and for the results publication in non-scientific magazines for the general public.

2. Jacqueline da Silva Batista

   Graduated in Biological Sciences by the Universidade Federal do Amazonas (UFAM) (1999) and Master in Biologia de Água Doce e Pesca Interior by the Instituto Nacional de Pesquisa da Amazônia (INPA) (2001). Currently is a student of PhD program in genetics of INPA, technologist level II at INPA and collaborator researcher in UFAM. Has experience in animal genetics and conservation of migratory catfish of Amazônia. She is a member of the Brazilian Society of Genetics and will be responsible for the catfish genetics studies in all the regional nuclei.

3. Maria Nazareth Ferreira da Silva

   Graduated in Biological Sciences at the Universidade de Brasília (UnB) (1985) and PhD in Zoology by the University of Califonia, Berkeley (EUA) (1995). Currently is main researcher of Instituto Nacional de Pesquisas da Amazônia (INPA) and curator of the Mammal Collection of INPA. Has experience in genetics, mostly in philogenetic systematic, philogeography, philogenetics and origin and diversification of mammals (Rodentia and marsupial) of Amazônia. She will be responsible for the mammal genetics studies and coordinate the collected material in all the regional nuclei.

4. Manoela Lima de Oliveira Borges

   Graduated in Biological Sciences by the Universidade Estadual de Santa Cruz (UESC) (2003) and Master in Ecology by the Instituto Nacional de Pesquisas da Amazônia (INPA) (2007). Since april 2007 holds a scholarship of the Programa de Pesquisa em Biodiversidade – PPBio and is one of the managers of the Mammal Collection of INPA. Has experience in community ecology, conservation of small mammals and forest fragmentation. She will perform small mammals inventory in collaboration with regional nuclei and will provide training in the collection and preparation of small mammals for students and local people in regional nuclei.

5. Carla Gomes Bantel

   Graduated in Biological Sciences by the Universidade Estadual de Londrina (2002) and master in Ecology by the Instituto Nacional de Pesquisas da Amazônia (INPA) (2006). Currently is a researcher in the Mammal Collection of INPA and in the Evolution and Animal Genetics Lab in the Universidade Federal do Amazonas (UFAM). Has experience in biogeography, mostly philogeography, morphology and systematics of small mammals and Amazonian diversity theories. She will perform inventories of small mammals in collaboration of regional nuclei and will train students to collect and to prepare material for the collection.

6. Cláudia Regina Silva

   Graduated in Biological Sciences for Universidade Estadual de Londrina (UEL) (1996), where she acquire bachelor title with the inventory of non-flying small mammal fauna in the atlantic rainforest (Municipality of Piracicaba - Brazil). Master by Universidade de São Paulo in

2001, where she compared community attributes of non-flying small mammals in the Atlantic Rainforest fragments. Recently teach and research ecology, systematic and biogeography of mammals, as well as act at curator of fauna collection of Amapá, in the Instituto de Pesquisas Científicas e Tecnológicas do Estado do Amapá (IEPA). She will perform small mammal inventory in the regional nuclei in collaboration with small mammal group at INPA, as well as she will offer training in collection and preparation of small mammals for scientific collections.

7. Paulo Sérgio Bernarde

   Graduated in Biological Science for Universidade Estadual de Londrina (UEL) (1996), master in Zoology by Universidade Federal do Paraná and PhD in Biological Sciences (Zoology) by Universidade Estadual Paulista Júlio de Mesquita Filho (UNESP) (2004). Recently is a resercher at Universidade Federal do Acre (Floresta Campus - municipality of Cruzeiro do Sul - AC), collaborator teacher in the postgraduate course in Ecology and Natural Resources of Universidade Federal do Acre (UFAC). Expert in zoology, with emphasis in herpetofauna (amphibians, lizards and snakes). He will perform herpetofaunal inventories in regional nuclei in collaboration with INPA and will participate of the results divulgation for non-specialist people.

8. José Leonardo Padilha

   Biology student of Universidade Federal do Acre (Floresta Campus - municipality of Cruzeiro do Sul - AC), where he actually study ecology of small mammals. He will participate of inventories in regional nuclei, as well as in the results divulgation for non-specialist people.

9. Cleiton Fantin

   Graduated by Universidade Estadual de Londrina (UEL) (2002), Master in Genetic and Molecular Biology by UEL (2004) and PhD in Biotechnology by Universidade Federal do Amazonas (UFAM). Recently act as a researcher at UFAM and as a teacher in Universidade do Estado do Amazonas (UEA). Expert in genetic, with emphasis in Animal Genetics, where he act in themes: Podocnemis, paternity and microsatellite. He will perform genetics studies of turtles in regional nuclei.

10. Doriane P. Rodrigues

    Graduated in Biological Science by the UFAM (1998) and master in Biological Science (Molecular Biology) by Universidade de Brasília (UnB) (2001) and PhD in Biotechnology by UFAM (2006). Recently act as adjunct teacher level I at UFAM. Expert in Genetic, with emphasis on Genetic Resources. Your main research areas are: genetic analysis, biotechnology, molecular markers, pupunha and molecular biology. She will perform genetic studies in collaboration of regional nuclei.

11. Michelly de Cristo Araújo

    Graduated in Biological Sciences by Universidade Federal do Pará (2004) and master in biotechnology by UFAM (2008). Expert in genetic, with emphasis in plant molecular biology, act mainly with molecular markers and genetic analysis of neotropical palm Pupunha. Colaborate with projects developed by Dr. Charles Clement (INPA) and Dra. Doriane Rodrigues (UFAM). She will perform genetic studies in regional nuclei.

12. Gislene Carvalho-Zilse

    Obtained your PhD in Genetic by Universidade de São Paulo / Ribeirão Preto campus (2001). Coordinator of Bee Research Group (GPA - INPA) since 2001, where she studies the biology, genetics and management of Brazilian bees, with emphasis on the Amazon species, trying to develop breed techniques for commercial purposes and management of it natural populations. She will be responsible for studies in bee ecology and the transmission of knowledge for the society.

13. Vera Scarpassa

    Graduated in Biological Sciences by UNESP (1983), master and PhD in Biological Science

(Entomology) by INPA. Performed two post-doc courses, one at Vermont University, VT - USA (1999) and other at New York State Department of Health, Albany, NY, USA (2002-2003). Recently is researcher at INPA. Expert in genetic and biology of Neotropical mosquitoes, with emphasis on population genetic and evolution of Malaria mosquito vector (*Anopheles nuneztovari, Anopheles darlingi, Anopheles oswaldoi* e outras) and Dengue (*Aedes aegypti* e *Aedes albopictus*). Coordinate de Postgraduate Program in Genetic, Conservation and Evolutionary Biology of INPA. She will be responsible genetic studies of invertebrates in regional nuclei.

14. Joel da Silva Cordeiro

    Bachelor in Biological Science with emphasis on Biochemistry and Molecular Genetic by Universidade Federal de Roraima (UFRR). Expert in biochemistry, with emphasis on molecular biology, acting mainly on the following themes: molecular biology of Dengue sorotipes (RT-PCR), cell culture C6/36, Recently is master student in Postgraduate Program in Genetic, Conservation and Evolutionary Biology of INPA. He will perform genetic and molecular biology studies, as well as will act in training of students of regional nuclei and knowledge transmission for society.
15. Carlos Gustavo Nunes da Silva

    Graduated in agronomy by Universidade Federal de Uberlândia (UFU) and master in Biological Science (entomology) by INPA. Obtained your PhD in Biotechnology by UFAM / Düsseldorf University, German. Act in research about expression/genetic regulation of eukaryotic and biotechnology with emphasis in insects and arthropods. He will perform genetic studies in regional nuclei.

16. Beatriz Ronchi Teles

    Graduated in Biological science by Pontifícia Universidade Católica do Rio Grande do Sul (PUC - RS) (1978), master in Biological Science (Entomology) by INPA (1985) and PhD in Biological Science (Entomology) by INPA (2000). Recently is Full Researcher level III of INPA, coordinator of postgraduate program in Entomology, INPA. Expert in Zoology and Agronomy, with emphasis in entomology, insect control and fruit-fly (Tephritidae, Anastrepha). She will be responsible for insect ecology studies and for the knowledge transferring for the society.

17. Pierre Alexandre dos Santos

    Graduated in Pharmacy biochemistry from the Universidade Federal de Goias (1997), master's degree in Pharmaceutical Sciences from the Universidade de Sao Paulo (2000) and Ph.D. in Pharmaceutical Sciences from the University of Sao Paulo (2004). Today is fellowship of the INPA. He has experience in the field of chemistry, with emphasis on Organic Chemistry. Acting mainly on the following themes: Lychnophoriopsis candelabrum flavonoids, mass spectrometry, derived from acid cafeolquínico, HPLC-ESI-MS/MS and CLAE-IES-EM/EM. He will conduct studies of bioprospecting in regional nuclei.

18. Orlando Libório Pereira Júnior

    He degree in Engineering Wood Industry Operational from the Universidade de Tecnologia do Amazonas (1979), degree in chemistry from UFAM (1986), specialization and Masters in Chemistry of Natural Products by the UFAM(1992). He is currently a researcher at the INPA. He has experience in the field of chemistry, with emphasis on Chemistry of Natural Products., Acting mainly on the following themes: phytochemical, chromatographic fractionation biomonitorado, antioxidant activity, bioativas Amazonian plants and identification / structural elucidation of molecules. He will conduct studies of bioprospecting in regional nuclei.

19. Pedro Eduardo Almeida da Silva

    He degree in pharmacy from the Universidade Católica de Pelotas (1981), degree in biochemistry from the Universidade Católica de Pelotas(1982), Master in Science (Microbiology) by the Universidade Federal do Rio de Janeiro(1997), Doctor of Medicine - University of Zaragoza -- Spain (2001) revalidado Federal University of Rio de Janeiro (2001) and Doctor of Science

(Microbiology). He currently is associate professor level I at Universidade Federal de Rio Grande, ministering classes of Medical Microbiology, Molecular Biology, Micobacteriologia, zoonoses, Methodology and the search for Bioethics courses of undergraduate and graduate broadly and strict sense. It was one of the authors of the proposal for creation (2002) of the specialization course in Infectious Agents Parasitarios and was its first coordinator (2003-2005). Also, it was one of the authors of the project for creation of the master program Health Sciences (2004) was the first coordinator of the program of post-graduate Health Sciences of FURG (2005-2008). Currently held as CAPES fellowship, post-doctoral training at the Institute for Tropical Medicine in Antwerp - Belgium. Run of research projects in the following subjects: New methods of diagnosis, evaluation of new antimicrobials, genotyping and fitness related to Mycobacterium tuberculosis, non-tuberculous mycobacterial and Helicobacter pylori. He will conduct studies of bioprospecting in regional nuclei.

20. Ana Cristina da Silva Pinto

She doctorate in Biotechnology by the UFAM (2008), Bachelor degree in chemistry at the UFAM (2000) and Masters in Chemistry of Natural Products by the UFAM (2002). He has experience in Chemistry, working mainly on the following topics with emphasis on Chemistry of Natural Products, chemical synthesis, semi-synthetic derivatives of 4-nerolidilcatecol and dilapiol, evaluation of activities of biological substances and synthetic derivatives (insecticide and larvicidal into Aedes aegypti , Artemia franciscana, and anti-antimalarica) and organic chemistry. She will conduct studies of bioprospection in regional nuclei.

21. Lucia Kiyoko Ozaki Yuyama

Lucia Kiyoko Ozaki Yuyama completed the doctorate in Food Science [SP-Capital] the Universidade de São Paulo in 1993. He is currently a researcher Holder III of the INPA. It published 50 articles in specialized journals and 182 work in annals of events. It has 5 chapters of books and 1 book published. Participated the development of 120 biotech products. Participated of 29 events in Brazil. Orientou 19 dissertations and Masters co-guided 5, also has directed 28 works of basic scientific research in the areas of Nutrition, Food Science and Technology, and Chemistry. 6 He received awards and / or tributes. Currently 4 coordinates research projects. It operates in the area of Nutrition, with emphasis on Biochemistry of Nutrition. In his professional activities interacted with 244 employees in co-authorship of scientific papers. She will be responsible for studies of bioprospecting in regional nuclei.

22. Jaime Paiva Lopes Aguiar

Concluded the specialization of Food Science and the Institute of Nutricion de Centro America Y Panama in 1983. He is currently a researcher Holder of the INPA. Published over 50 articles in specialized journals and 150 work in annals of events. It has 4 chapters of books published. It has 6 products and other technological 5 items of technical production. She participated in several events in Brazil. Advice several studies of scientific initiation and completion of course work in the areas of nutrition, agriculture and science and technology of food. Currently participates in various projects of research. It operates in the area of Science and Technology of Food, with emphasis on Nutritional Value of Food. In his professional activities interacted with 153 employees in co-authorship of scientific papers. In its curriculum Lattes the terms most frequently in the context of the scientific, technological and artistic and cultural are: pre-school, minerals, cubiu, açaí, regional food, fruits of the Amazon, diet, proximate composition, pupunha and chemical composition. Conduct studies of bioprospecting in regional centers and will be responsible for the dissemination of research to society.

23. Kaoru Yuyama

Has degree in Agronomic Engineering at the Universidade Estadual Paulista Julio de Mesquita Filho (1976), Master by Universidade Federal de Pelotas (1981) and doctorate in agronomy (Crop Production) by the Universidade Estadual Paulista Julio de Mesquita Filho (1991). She is currently Professor of INPA and member of the editorial board Acta Amazonica. He has

experience in agriculture, with emphasis on Fitotecnia. Acting mainly on the following themes: Glycine max, Development, Analysis of growth, morphology of the plant, Option Cultivation and Productivity. He will conduct studies of bioprospecting in regional nuclei.

24. Helyde Albuquerque Marinho

Has degree in Pharmacy and Biochemistry by the UFAM(1974), specializing in Clinical analysis by the UFAM(1976), Master in Science of Food for the UFAM(1989) and doctorate in Public Health from the Universidade de São Paulo(2000). She is currently Professor of INPA, Professor of the University Paulista, reviewer of the journal "Review of Nutrition", reviewer of the journal "Journal of Nutrition" and "Metabolism / Journal of Nutrition and Metabolism", as well as professor and tutor of the Master's Course in UFAM. She has experience in the field of nutrition, with emphasis on Nutritional Analysis of Population. Acting mainly in the following subjects: the vitamin, Hypovitaminosis A deficiency of Vitamin A, Pre-school, Nutrition Assessment. Will conduct studies of bioprospecting in regional nuclei.

25. Fernando Hélio Alencar

Has graduated in Pharmacy Biochemistry from UFAM(1973), graduated in Medicine from the UFAM (1976), specializing in gastroenterology by the Pontifícia Universidade Católica do Rio de Janeiro (1978), specializing in Medicine by Labour Universidade Gama Filho(1978), Master in Gastroenterology by the Pontifícia Universidade Católica of Rio de Janeiro (1979) and doctorate in Human Nutrition Metabolism In the Universidade Estadual Paulista Julio de Mesquita(1989). He currently is responsible by the Nutrition Lab at the INPA and official of the UFAM. He has experience in the field of nutrition, with emphasis on Nutritional Analysis of Population. Acting mainly on the following themes: Nutritional status, pre-school. Will conduct studies of bioprospecting in regional clusters and dissemination of research to society.

26. Carlos Cleomir de Souza Pinheiro

Has a graduate degree in Biological Sciences by UFAM (1983) and Masters in Biotechnology and Natural Resources from the UEA(2005). He is currently a professor of government of the State of Amazonas and researcher at the INPA. He has experience in the area of Pharmacology and Chemistry of Natural Products, with emphasis on pharmacology, acting mainly in the following subjects: Medicinal Plants of Pharmacology and plants, Chemistry of Natural Products, Plants with Activity Inseticida, Validation of medicinal plants. Will conduct studies of bioprospecting in regional clusters and dissemination of research to society.

27. Lisandro Juno Soares Vieira

Holds a Bachelor's degree in Biological Sciences (Genetics mode) by the Universidade Federal do Rio Grande do Norte, a Masters and Ph.D. in Ecology and Natural Resources at the Postgraduate Program in Ecology and Natural Resources of Universidade Federal de São Carlos. Today is adjunct teacher at Universidade Federal do Acre, where he coordinates since January 2006, the Postgraduate Program in Ecology and Management of Natural Resources. It has experience in supervision of students in basic scientific research and the Masters. Their search is concentrated in ecology of fish and other aquatic organisms. It has also acted in several activities in support of the Government of the State of Acre on issues relating to water resources and aquatic ecology. The researcher coordinate various research projects, among which can be highlighted the PROCAD New Frontiers in partnership with the Postgraduate Program in Ecology, Continental Water Environments at the State University of Maringa. Will conduct studies of ecology of fish in regional nuclei.

28. Luciene Zagalo de Oliveira

Possui graduação em Ciências Biológicas pela Universidade Federal do Amapá (2007). Atualmente

é mestranda do curso de Pós-graduação em Agronomia (Genética e Melhoramento de Plantas) da Universidade Estadual Paulista Júlio de Mesquita Filho- Faculdade de Ciências agrárias e Veterinárias UNESP-FCAV e bolsista do CNPq. Tem experiência na área de Biologia (botânica), atuando principalmente nos seguintes temas: genética e melhoramento de plantas, morfologia externa vegetal, frutos, sementes e ilustração botânica. Realizará estudos de genética de plantas nos núcleos regionais.

29. Lucilia Dias Pacobahyba
    Conclui a graduação em Ciências Biológicas pela Universidade Federal de Pernambuco (1988), mestrado em Criptógamos Ficologia pela Universidade Federal de Pernambuco (1992) e doutorado em Ecologia e Recursos Naturais pela Universidade Federal de São Carlos (2002). Atualmente é professora adjunto III da Universidade Federal de Roraima. Tem experiência na área de Botânica, com ênfase em Taxonomia de Criptógamos, atuando principalmente nos seguintes temas: células algais, Cinética de mineralização, consumo de oxigênio, Ecologia de macrofitas e Taxonomia de fitoplancton. Realizará estudo de ecologia de organismos aquáticos nos núcleos regionais.

30. Takeshi Matsuura

    possui graduação em Farmácia com habilitação em Análises Clínicas pela Universidade Federal do Amazonas (1992 e 1993), especialização em Biotecnologia pela Universidade Federal do Amazonas (1996), mestrado em Ciências Farmacêuticas pela Universidade Federal de Pernambuco (1998) e doutorado em Ciência de Alimentos pela Universidade Estadual de Campinas (2004). Atualmente é Professor Adjunto I da Universidade Federal do Amazonas. Tem experiência na área de Microbiologia, com ênfase em Screening de microrganismos produtores de compostos bioativos, atuando principalmente nos seguintes temas: actinomicetos, atividade antimicrobiana, biodiversidade bacteriana da amazônia e endofíticos. Realizará estudos de bioprospecção nos núcleos regionais e divulgação das pesquisas para a sociedade.

31. Debora Pignatari Drucker
    tem experiência com o desenvolvimento de pesquisas em ecologia e meio ambiente e foi bolsista por dois anos do Programa de Pesquisa em Biodiversidade - PPBio Amazônia Ocidental para gerenciar de dados de inventários. Atualmente é aluna de doutorado em Ambiente e Sociedade pelo NEPAM/UNICAMP, desenvolvendo pesquisa em métodos de integração de dados de biodiversidade vinculada ao Programa Biota-Fapesp. Colaborará com a implantação do sistema de informação em biodiversidade, no treinamento de pesquisadores e estudantes para a documentação de metadados em EML, na promoção da interação com o Programa Biota-Fapesp e na elaboração de artigos científicos e de divulgação sobre pesquisa em métodos de integração de dados de biodiversidade em diferentes escalas espaciais e níveis de organização.

32. Sylvain JM Desmouliére
    possui graduação em Fisiologia Vegetal - Universidade Montpellier II - França (1992), mestrado em Geografia das Zonas Tropicais - Universidade Bordeaux III - França (1996) e doutorado em Etnobiologia Biogeografia - Museo National de Histoia Natural de Paris (2001). Atualmente é pesquisador associado do SIGlab no Instituto Nacional de Pesquisas da Amazônia. Tem experiência na área de Geografia, com ênfase em Geografia da Amazônia, atuando principalmente nos seguintes temas:organização de Base de Dados Relacional Espacial a partir de dados heterogêneos, interface entre base de dados espacial e navegador geográfico tipo googleearth, disponibilização de dados para usuários com demandas diversificadas, gestão compartilhada de dados geograficos com SGBD espacial, Interface PostgreSQL-PostGIS/webmapping, linguagem SQL espacial
    Desempenhará atividades similares às pesquisas do projeto FAPEAM que coordena sobre Produtos Florestais Não Madeireiros, ou seja, recuperação de dados, limpeza, organização e sistematização. Colaborará com a instalação da estrutura de base de dados proposta por de By et al. (2008). Atua em:

33. Felipe dos Santos Costa
possui graduação em Tecnologia em Desenvolvimento de Software pelo Centro Federal de Educação Tecnológica do Amazonas (2006) e atualmente é mestrando em Engenharia da Computação com ênfase em Geomática na Universidade do Estado do Rio de Janeiro e desenvolve seu projeto no laboratório de Geoprocessamento (SIGLAB) no Instituto Nacional de Pesquisas da Amazônia. Tem experiência na área de Ciência da Computação, com ênfase em Banco de Dados, atuando principalmente nos seguintes temas: sig, software livre, webmapping e webservices.

34. Rolf de By
Dr. Rolf A. de By supervisionará a implantação do sistema de informação em biodiversidade, elaborará soluções para os desafios técnicos de instalação da estrutura de base de dados proposta e indicará ferramentas de gestão. Lecionará um curso sobre Gestão de Dados Geográficos em Base de Dados Relacionais espaciais. Elaborará artigos científicos sobre o sistema de informação em biodiversidade e promoverá a interação com o ITC. Dr. de By tem experiência com sistemas de informação em biodiversidade e coordena um grupo de pesquisas em infraestrutura de dados espaciais em sua Instituição de origem. Além disso, participa ativamente de atividades educacionais e participou da elaboração de dois livros amplamente utilizados nos cursos de pos-graduaçãodo ITC: “Princípios de Sensioramento Remoto” e “Princípios de Sistemas de Informação Geográfica”.

35. Sergio Marques de Souza
Graduou-se em Ciências Biológicas pela Universidade de São Paulo em 2003 e obteve o título de Mestre em Ecologia pelo Instituto Nacional de Pesquisas da Amazônia, em 2007. Seu principal interesse acadêmico reside na evolução e na diversificação de lagartos em florestas neotropicais, principalmente na Floresta Amazônica, que resultam em estudos de biogeografia, padrões de distribuição geográfica e taxonomia. Entre os lagartos, seu principal interesse é na família Gymnophthalmidae, popularmente conhecidos como Microteídeos. Também possui experiência nos efeitos da fragmentação de habitats em comunidades de pequenos mamíferos de Mata Atlântica e médios mamíferos (Dasyprocta leporina) na Amazônia Central. Será responsável pela logística de trabalhos de campo e integração do banco de dados.

36. Flávia Fonseca Pezzini
possui graduação em Ciências Biológicas pela Universidade Federal de Minas Gerais (2005), mestrado em Ecologia (Conservação e Manejo da Vida Silvestre) pela Universidade Federal de Minas Gerais (2008). Tem experiência na área de ecologia vegetal, atuando principalmente nos seguintes temas: fenologia, dispersão e germinação de sementes, potencial e sucesso reprodutivo. Atualmente é bolsista do Programa de Pesquisa em Biodiversidade - PPBio Amazônia Ocidental para gerenciar de dados de inventários. Será responsável pela integração do banco de dados e realizará treinamentos de pesquisadores e estudantes nessa área.

37. Alexandre Vasconcelos
Possui graduação em Ciências Biológicas pela Universidade Federal da Paraíba (1997), mestrado (1999) e doutorado (2003) em Ciências Biológicas (Zoologia) pela Universidade Federal da Paraíba. Atualmente é professor adjunto da Universidade Federal do Rio Grande do Norte. Está credenciado nos Programas de Pós-Graduação em Ecologia-UFRN (Mestrado e Doutorado) e Ciências Biológicas-UFRN (Mestrado). Tem experiência na área de ecologia de comunidades de invertebrados terrestres, atuando principalmente nos seguintes temas: Biodiversidade, Conservação, Biomassa, Comportamento, Caatinga e Mata Atlântica. Será responsável pela identificação de Isoptera.

38. Ana Lucia Tourinho
Possui mestrado em Ciências Biológicas (Zoologia) pela Universidade Federal do Rio de Janeiro, doutorado em Ciencias Biológicas (Ecologia) pelo Instituto Nacional de Pesquisas da Amazônia, e atualmente é pós-doutoranda da última instituição. É pesquisadora coloboradora do Laboratório de Aracnologia do Museu Nacional/UFRJ e pesquisadora da Coleção Aracnológica do Instituto

Nacional de Pesquisas da Amazônia. Atua nas áreas de Zoologia e Ecologia de aracnídeos, com ênfase em curadoria e gerenciamento de coleções científicas, Taxonomia, Sistemática, Biogeografia, Diversidade e Biologia Evolutiva de Arachnida. Responsável pelos cursos de Aranhas e Opiliões.

39. Andre do Amaral Nogueira
atualmente cursando o doutorado no INPA, possui mestrado em Ciências Biológicas (Zoologia) pela USP (2005). Tem experiência na área de Zoologia e Ecologia, com ênfase no estudo de comunidades de aracnídeos. Os principais temas de interesse estão relacionados à: estruturação de comunidades, aranhas, gradientes altitudinais e fragmentação florestal. Responsável pelos cursos de Aranhas e Opiliões.

40. Anelise Maria Regiani
Possui graduação em Química Bacharelado pela Universidade de São Paulo (1994), mestrado em Química (Físico-Química) pela Universidade de São Paulo (1997) e doutorado em Química (Físico-Química) pela Universidade de São Paulo (2000). Atualmente é professor adjunto da Universidade Federal do Acre. É coordenadora do Grupo de Pesquisa em Química de Produtos Florestais, desenvolvendo projetos na área de novos materiais (biodiesel e biopolímeros). Também atua na área de ensino de química orientando trabalhos de conclusão de curso e coordenando projetos de extensão para divulgação de ciência e tecnologia. Será responsável pela divulgação das pesquisas para a sociedade.

41. Carlos Eduardo Freitas Lemos
possui graduação em Oceanologia pelo Fundação Universidade Federal do Rio Grande (1983) , especialização em Adminstração e Planejamento dos Recursos do Mar pela Universidade Federal do Rio Grande do Sul (1984) e mestrado em Oceanografia pela Universidade Federal de Pernambuco (1993). Atualmente é Professor efetivo da Universidade Federal de Roraima, Aluno do Instituto Nacional de Pesquisas da Amazônia e Consultor Técnico para Licenciamento Ambiental da Fundação Estadual do Meio Ambiente Ciência e Tecnologia de Roraima. Tem experiência na área de Zoologia, com ênfase em Zoologia Aplicada. Atuando principalmente nos seguintes temas: ictiologia, Roraima, Rio Cotingo. Realizará estudos de ecologia de peixes nos núcleos regionais.

42. Carlos Henrique Franciscon
Possui graduação em Licenciatura Curta em Matemática (1983) e Licenciatura Plena em Biologia pela Universidade Federal de Uberlândia (1985). Mestrado em Ciências Biológicas (Botânica) pelo Instituto Nacional de Pesquisas da Amazônia (1993). Tem experiência na área de Botânica, tendo sido professor de diversas disciplinas da área por mais de 20 anos em várias universidades e faculdades. Projetos de pesquisa com ênfase em morfologia externa e taxonomia de vegetais superiores, inventários florísticos, inventários florestais e zoneamento econômico ecológico. Atualmente é servidor do Ministério de Ciência e Tecnologia, Curador do Herbário INPA, Gerente substituto do Programa de Coleções e Acervos Científicos, Vice-coordenador do Componente Coleções e Gerente Administrativo do Programa de Pesquisas em Biodiversidade (PPBio/MCT/INPA) lotado no Instituto Nacional de Pesquisas da Amazônia, em Manaus. Curadoria do Herbário. Será responsável pela identificação de espécies botânicas e pela gestão das coleções.
43. Daniel Reis Maiolino de Mendonca
possui graduação em Curso Superior de Tecnologia em Meio Ambiente pelo Centro de Educação Tecnológica do Rio Grande do Norte (2004) e graduação em Ciências Biológicas pela Universidade Federal do Rio Grande do Norte (2006). Tem experiência na área de Entomologia, com ênfase em Ecologia. Atualmente realizando Mestrado em Entomologia no Instituto Nacional de Pesquisas da Amazônia - INPA. Auxiliar nos cursos e guias de Isoptera/Insecta. Realizará estudos de ecologia de insetos.

44. Evandson José dos Anjos Silva
possui graduação em Ciências Biológicas pela Universidade Federal de Mato Grosso (1993),

mestrado em Ecologia e Conservação da Biodiversidade pela Universidade Federal de Mato Grosso (1999), e doutorado em Entomologia pela Universidade de São Paulo (2006). Atualmente, é professor adjunto da Universidade do Estado de Mato Grosso, professor colaborador junto ao programa de mestrado em Ecologia e Conservação da Biodiversidade da Universidade Federal de Mato Grosso, e professor colaborador junto ao programa de mestrado em Ecologia e Conservação da Universidade do Estado de Mato Grosso, no campus de Nova Xavantina. É o responsável técnico pelo Protocolo 1 - Moscas e Abelhas - do Programa de Pesquisa em Biodiversidade da Amazônia Meridional - PPBio/NURAM, projeto vinculado ao Museu Paraense Emílio Goeldi e financiado pelo Ministério da Ciência e Tecnologia - MCT. Tem experiência na área de Zoologia, com ênfase em Zoologia, atuando principalmente nos seguintes temas: abelhas das orquídeas, Euglossini, Taxonomia, Sistemática e Ecologia. Especialista em abelhas. Realizara estudos sobe ecologia de abelhas.

45. Fernando Pedroni
    Fez Bacharelado em Ciências Biológicas pela Universidade Estadual de Campinas (1990), mestrado em Ciências Biológicas área de Biologia Vegetal (Ecologia Vegetal) pela Universidade Estadual de Campinas (1993) e doutorado em Biologia Vegetal (Ecologia Vegetal) pela Universidade Estadual de Campinas (2001). Atuou durante cinco anos como Professor na Graduação e Pós-graduação na Universidade Federal de Uberlândia e atualmente é Professor titular da Universidade Federal de Mato Grosso. Tem experiência na área de Ecologia, com ênfase em Ecologia de Ecossistemas, atuando principalmente nos seguintes temas: dispersão e predação de sementes, frugivoria, fenologia, estrutura e dinâmica de populações e comunidade de plantas, fitossociologia. Realizará estudo de ecologia da vegetação.

46. Ingrid Torres de Macedo
    licenciada em Ciências Biológicas pela UFAM (1999) e concluiu o mestrado em Ecologia no INPA em 2004. Atualmente é técnica do Instituto Nacional de Pesquisas da Amazônia, onde atua no Programa de Coleções e Acervos Científicos desde 1999 como gerente das Coleções de Aves e Mamíferos, preparadora (taxidermista) e vice-curadora da Coleção de Aves (2006). Também é professora de Biologia do ensino médio pela Secretaria de Educação do Estado do Amazonas. Sua experiência, produção científica e técnica estão relacionadas com as seguintes áreas: Aves, Amazônia, Curadoria de Coleções Zoológicas e Taxidermia. Será responsável pela gestão das coleções.

47. Ise de Goreth Silva
    possui graduação em Ciências Biológicas pela Universidade Federal do Maranhão (1986) , especialização em Limnologia e Manejo de Represas pela Universidade de São Paulo (1987) e mestrado em Botânica pela Universidade Federal Rural de Pernambuco (1992) . Atualmente é Professora Assistente IV da Universidade Federal de Roraima. Tem experiência na área de Ecologia , com ênfase em Limnologia - Taxonomia e ecologia de microalgas. Atuando principalmente nos seguintes temas: biomassa, Estuario, Fitoplancton, Produção Primária. Realizará estudos de ecologia de ambientes aquáticos.

48. Jaime de Liege Gama Neto
    possui graduação em Licenciatura Plena em Ciências Biológicas pela Universidade Federal do Amazonas (2001) e mestrado em Ciências Biológicas (Entomologia) pelo Instituto Nacional de Pesquisas da Amazônia (2004). Atualmente é professor de Biologia (nível superior) da Universidade Estadual de Roraima - UERR - e Biólogo da Secretaria de Estado da Saúde do Governo Roraima, exercendo a função de Coordenador do Programa de Controle das Leishmanioses. Tem experiência na área de Epidemiologia e Zoologia, com ênfase em entomologia e saúde pública, atuando principalmente nos seguintes temas: epidemiologia, leishmania, amazônia, Manaus, flebotomíneo e Roraima. Realizará estudos de entomologia nos núcleo regionais.

49. Jorge Luiz Pereira de Souza

possui graduação em Engenharia Agronômica pela Universidade Federal Rural do Rio de Janeiro (2002) e mestrado em Ciências Biológicas (Entomologia) pelo Instituto Nacional de Pesquisas da Amazônia (2005) . Atualmente é Estudante - Doutorado do Instituto Nacional de Pesquisas da Amazônia. Atuando principalmente nos seguintes temas: Amazônia, Biodiversidade, Esforço Amostral, Formigas. Será responsável pelos cursos e confecção dos guias de Formicidade.

50. Jose Wellington de Morais
    Formado em Engenharia Agronômica pela Universidade Federal Rural do Semi-Árido (1981), mestrado em Ciências Biológicas (Entomologia) pelo Instituto Nacional de Pesquisas da Amazônia (1985) e doutorado em Entomologia pela Universidade de São Paulo (1995). Fez treinamento no Centre Technique de Forestier Tropical/CTFT e Centre Technique de Bois/CTB (Universidade de Bourgogne) em Paris, França (11/1987 a 01/1988). Bolsista DAAD/CAPES para doutorado sandwich em Plön, Alemanha (Max-Planck Institut fúr Limnologia). Atualmente é pesquisador titular do INPA, Assessor da FAPESP e professor credenciado no curso de Entomologia do INPA. Foi coordenador de Pesquisa da Coordenação de Pesquisas em Produtos Florestais/CPPF (1996 a 1997) e da Coordenação de Pesquisas em Entomologia/CPEN (2005 e 2006) e atual vice-coordenador. Publicou 28 artigos em periódicos especializados, 4 capítulos de livros, 1 cartilha para produtores rurais, 71 resumos em congressos e seminários. Orientou 9 alunos de iniciação científica, 5 alunos de mestrado, 1 de doutorado (co-orientador), 5 bolsistas ITI, DTI, 4 alunos de mestrado em andamento e um de PIBIC.Tem experiência na área de Entomologia/ecologia, atuando principalmente nos seguintes temas: fauna de invertebrados do solo, fenologia de artrópodos de áreas inundáveis, terra firme e outros ecossistemas florestais da Amazônia. Será responsável pelos cursos e guias de Isoptera/Insecta

51. Juliana de Souza Araújo
    possui graduação em Ciências Biológicas pela Universidade de Brasília (2004). Atualmente é estudante do Instituto Nacional de Pesquisas da Amazônia. Tem experiência na área de Ecologia e Entomologia, atuando principalmente nos seguintes temas: insecta e scorpiones. Será responsável pelos cursos e Guias de escorpiões/Arachnida

52. Larissa Cavalheiro
    Possui bacharelado em Ciências Biológicas pela Universidade Estadual Paulista Júlio de Mesquita Filho (2001) e mestrado em Ciências Biológicas (Biologia Vegetal) pela Universidade Estadual Paulista Júlio de Mesquita Filho (2004). Atualmente é Professora Assitente nível 1 da Universidade Federal de Mato Grosso, campus de Sinop. Tem experiência na área de Botânica, com ênfase em Taxonomia e Morfologia Vegetal, atuando principalmente nos seguintes temas: Taxonomia de fanerógamas e Morfologia externa das plantas. Será responsável pela identificação das espécies vegetais nos núcleos regionais.

53. Lucélia Nobre Carvalho
    Possui graduação em Ciências Biológicas pela Universidade Federal de Uberlândia (1997) e mestrado em Ecologia e Conservação pela Universidade Federal de Mato Grosso do Sul (2001). Concluiu o doutorado no Instituto Nacional de Pesquisas da Amazônia estudando ecologia e comportamento de peixes de riachos amazônicos. Atualmente é professora da Universidade Federal de Mato Grosso, campus de Sinop. Tem experiência na área de Ecologia, com ênfase em Ictiologia, atuando principalmente nos seguintes temas: comportamento animal, história natural e ecologia de comunidades. Será responsável pelos estudos de ecologia de peixes nos núcleos regionais.

54. Marcos André de Carvalho
    possui graduação em Ciências Habilitação Em Biologia pela Escola Superior de Agricultura e Ciências de Machado (1986), mestrado em Ecologia e Conservação da Biodiversidade pela Universidade Federal de Mato Grosso (1996) e doutorado em Biociências (Zoologia) pela Pontifícia Universidade Católica do Rio Grande do Sul (2006). Atualmente é professor Adjunto da Universidade Federal de Mato Grosso. Tem experiência na área de Zoologia, com ênfase em

Conservação das Espécies Animais, Acidentes por Animais Peçonhentos, História Natural de Serpentes, atuando principalmente nos seguintes temas: Cerrado, Pantanal Matogrossense, Acidentes ofídicos e escorpiônicos, zonas urbanas. Será responsável por estudos de ecologia de animais peçonhentos e transmissão de conhecimento para a sociedade.

55. Maria Claudete V. dos Passos
possui mestrado em Ciências Biológicas (Entomologia) pelo Instituto Nacional de Pesquisas da Amazônia (2001). Tem experiência na área de Biologia Geral. Atuando principalmente nos seguintes temas: Thyrsopelma guianense, Bioecologia de vetores, Estádios larvais, Simuliidae. Realizara estudos de ecologia de insetos e participará de projetos de transmissão de conhecimento para a sociedade.

56. Maria de Fatima Figueiredo Melo
Graduada em Zootecnia pela Universidade Federal Rural de Pernambuco (1983) e mestrado em Botânica pela Universidade Federal Rural de Pernambuco (2000). Atualmente é pesquisadora do Instituto Nacional de Pesquisas da Amazônia e curadora da carpotada do INPA. Tem experiência na área de Botânica, com ênfase em Taxonomia de vegetais superiores e morfologia de sementes e plântulas de espécies florestais da Amazônia. Será responsável pela curadoria da coleção de frutos.

57. Maria Rosélia Marques Lopes
Possui graduação em Ciências Habilitação Biologia pela Universidade Federal do Acre (1980), mestrado em Ciências Biológicas (Botânica) pela Universidade de São Paulo (1992) e doutorado em Ciências Biológicas (Botânica) pela Universidade de São Paulo (2000). Atualmente é Professora Associada da Universidade Federal do Acre. Tem experiência na área de Botânica (Taxonomia de Microalgas Continentais) e Limnologia, atuando principalmente nos seguintes temas: estado do Acre, ecologia e taxonomia do fitoplâncton, limnologia de ecossistemas lênticos e lóticos. Realizará estudos relacionados a organismos aquáticos.

58. Mariluce Messias
Possui graduação em Ciências Biológicas pela Universidade Estadual de Campinas (1990), mestrado em Ciencias Biologicas (Zoologia) pela Universidade Estadual Paulista Júlio de Mesquita Filho (1995) e doutorado em Ciencias Biologicas (Zoologia) pela Universidade Estadual Paulista Júlio de Mesquita Filho (2002). Atualmente é professor adjunto da Fundação Universidade Federal de Rondônia, líder grupo de pesquisa cnpq - LABIEV da Fundação Universidade Federal de Rondônia, profes. do pg em desenvolvimento regional mam da Fundação Universidade Federal de Rondônia e chefia de departamento de biologia da Fundação Universidade Federal de Rondônia. Tem experiência na área de Ecologia, com ênfase em Ecologia, atuando principalmente nos seguintes temas: Rondônia, primatas, Amazônia, zoogeografia e levantamento. Realizará estudos relacionados a ecologia de mamíferos nos núcleos regionais.

59. Mario Cohn-Haft
possui graduação em Biologia pela Dartmouth College (1983) , mestrado em Ecology Evolution And Organismal Biology pela Tulane University (1995) , doutorado em Zoology pela Louisiana State University (2000) e pos-doutorado pelo Instituto Nacional de Pesquisas da Amazônia (2002) . Atualmente é Pesquisador adjunto do Instituto Nacional de Pesquisas da Amazônia e Membro de corpo editorial da Cotinga. Tem experiência na área de Ecologia, com ênfase em Ecologia e Biologia Evolutiva Tropical. Será responsável por estudos de ecologia de aves nos núcleos regionais.

60. Nair Otaviano Aguiar
possui graduação em Licenciatura em Ciências Biológicas pela Universidade Federal do Amazonas (1982) , mestrado em Ciências Biológicas (Entomologia) pelo Instituto Nacional de Pesquisas da Amazônia (1990) e doutorado em Ciências Biológicas (Entomologia) pelo Instituto Nacional de Pesquisas da Amazônia (2000) . Atualmente é Professora Associada da Universidade Federal do

Amazonas. Tem experiência na área de Zoologia , com ênfase em Aracnologia. Atuando principalmente nos seguintes temas: Pseudoscorpionida, Arachnida. Responsável pelos cursos e guias de pseudoecorpiões/Arachnida

61. Nelson Consolin Filho
    Possui graduação em Química pela Universidade Estadual de Maringá (1995), mestrado em Química Ambiental pela Universidade Estadual de Maringá (1997) e doutorado em Ciências e Engenharia de Materiais pela Universidade de São Paulo (2003). Terminou 2 pós doutorados (pesticidas e cianobactérias) financiados pela FAPESP. Tem experiência na área de Química, com ênfase em Química Ambiental, atuando principalmente nos seguintes temas: sensor, poli o-etoxianilina, pesticidas, self assembly e adsorção. Áreas de Atuação Geral: Ciências Exatas e da Terra; Engenharia Sanitária e Ciências Ambientais. Específica: Química, Ciências e Engenharia de Materiais, Matemática, Técnicas Gerais de Laboratório, Sistemas de Instrumentação, Espectroscopia, Química, Educação Ambiental, Limnologia, Recursos Hídricos e Qualidade de Água, Nanotecnologia, Polímeros Condutores etc.. Atualmente é Professor Adjunto I da Universidade Federal do Acre (UFAC) em regime de Dedicação Exclusiva. Realizará estudos de bioprospecção nos núcleos regionais.

62. Paulo Estefano Dineli Bobrowiec
    Possui graduação em Ciências Biológicas pela Universidade Federal de Uberlândia, mestrado em Ecologia e doutorado em Genética, Conservação e Biologia Evolutiva, ambos pelo Instituto Nacional de Pesquisas da Amazônia. Tem experiência na área de ecologia, com ênfase em ecologia de morcegos, atuando principalmente nos seguintes temas: estrutura da comunidade de morcegos, estratégia de forrageio em morcegos frugívoros e hematófagos, quiropterofilia, Amazônia. Realizara estudo de ecologia de morcegos nos núcleos regionais.

63. Rafael Arruda
    possui graduação em Ciência Biológicas Licenciatura e Bacharelado pela Universidade Federal de Mato Grosso do Sul (2001) e mestrado em Ecologia e Conservação de Recursos Naturais pela Universidade Federal de Uberlândia (2004). Atualmente é aluno de doutorado do Instituto Nacional de Pesquisas da Amazônia, membro da Association for Tropical Biology and Conservation e membro da Sociedade Botânica do Brasil. Tem experiência na área de Ecologia, com ênfase em Ecologia Vegetal, bem como desenvolve trabalhos em Ecologia Animal e Interações Vertebrados-Planta. Realizará estudos de ecologia vegetal nos núcleos regionais.

64. Regiane Saturnino
    possui graduação em Ciências Biológicas pela Universidade Federal de Mato Grosso do Sul (2004) e mestrado em Ecologia pelo Instituto Nacional de Pesquisas da Amazônia. Tem experiência na área de Ecologia, com ênfase em Ecologia de Comunidades, atuando principalmente nos seguintes temas: ecologia de aranhas, fragmentação de florestas, coleções biológicas, gerenciamento e processamento de dados em coleções. Responsável pelos cursos de Aranhas e Opiliões.

65. Reginaldo Assêncio Machado
    Possui graduação em Bacharelado e Licenciatura em Ciências Biológicas pela Universidade Estadual de Londrina (1996) e doutorado em Zoologia pela Universidade Federal do Paraná (2004). Atualmente é professor adjunto da Universidade Federal do Acre, Campus Floresta e credenciado no Curso de Pós-Graduação em Ecologia e Manejo de Recursos Naturais da UFAC, Rio Branco, AC. Tem experiência em estudos ecológicos com foco em herpetologia, atuando principalmente nos seguintes temas: ecologia de anfíbios, distribuição espaço-temporal, biologia da conservação. Também desenvolveu vários trabalhos ambientais com foco em anfíbios e répteis. Realizará estudos de levantamento e ecologia da herpetofauna nos núcleos regionais.

66. Rogério Antonio Sartori
    possui graduação em Química pela Universidade Estadual de Maringá (1995), mestrado em

Química (Físico-Química) pela Universidade de São Paulo (1998) e doutorado em Química (Físico-Química) pela Universidade de São Paulo (2004). Atualmente é professor adjunto da Universidade Federal do Acre. Tem experiência na área de Química, com ênfase em Eletroquímica, atuando hoje principalmente nos seguintes temas: ensino de química, biodiesel, produtos naturais, energia. Realizará estudos de bioprospecção e transmissão do conhecimento para a sociedade.

67. Sílvio José Reis da Silva
    Possui graduação em Licenciatura Plena Em Ciências Biológicas pela Universidade Federal de Roraima (1994), mestrado em Ciências Biológicas (Entomologia) pelo Instituto Nacional de Pesquisas da Amazônia - INPA (1998) e doutorado em Ciências Biológicas (Entomologia) também pelo INPA (2005). Atualmente é chefe da Div. de Est. e Pesquisas Amazônicas da Fundação Estadual do Meio Ambiente, Ciência e Tecnologia de Roraima, professor de biologia da Universidade Estadual de Roraima. Tem experiência na área de Zoologia, com ênfase em Entomologia e Apicultura, atuando principalmente nos seguintes temas: biologia e manejo de abelhas Apis mellifera, plantas melíferas, palinologia apícola e biodiversidade de abelhas de Roraima. É curador de insetos do MIRR. Será responsável pela coleção de insetos.

68. Carlos Peres
    Graduado em Agronomia Tropical (Universidade Federal Rural da Amazônia - 1983) e em Ciências Biológicas (Universidade Federal do Pará - 1983); Mestrado em Forest Ecology And Conservation - University of Florida (1986) e PhD em Tropical Ecology and Conservation - University of Cambridge (1991). Atualmente é Reader (Full Professor) - University of East Anglia, Norwich, UK. Tem vasta experiência na área de Ecologia Tropical, com ênfase em Ecologia Aplicada, atuando principalmente nos seguintes temas: manejo de recursos naturais em florestas tropicais, ecologia tropical e conservação, amazônia, ecologia de população, ecologia de comunidades de vertebrados, ecologia comportamental de vertebrados em florestas tropicais, e socio-economia de uso de recursos naturais. Dr Peres will supervise students, help plan surveys of mammals and produce a guide to the species of médium and large mammals registered in line transects.

69. José Fragoso
    possui graduação em Biology pela Trend University (1983) , mestrado em Ecology pela University of Toronto (1987) e doutorado em Program for Studies in Tropical Conservation pela University of Florida (1994) . Atualmente é Associate Professor da University Of Hawaii. Tem experiência na área de Ecologia , com ênfase em Ecologia Aplicada. Dr Fragoso will supervise students, help plan surveys of mammals and produce a guide to the species of médium and large mammals registered in line transects, as well as producing plans for indigenous monitoring of their game resources.

70. Tamí Mott
    possui graduação em Licenciatura em Ciências Biológicas pela Universidade Estadual Paulista Júlio De Mesquita Filho (UNESP-Campus de São José do Rio Preto, 1995) e doutorado em Biologia Integrativa pela Universidade da Califórnia, Berkeley, Estados Unidos (2006). Atualmente é bolsita PRODOC/CAPES sendo professora colaboradora do Programa de Pós-Graduação em Ecologia e Conservação da Biodiversidade na Universidade Federal do Mato Grosso.Tem experiência na área de sistemática molecular, filogeografia e modelagem de distribuição potencial de espécies, com ênfase a herpetofauna, atuando principalmente nos seguintes temas: sistemática e conservação das anfisbênias e cecílias neotropicais.
    Será responsável pelo levantamento da herpetofauna e ministrará o curso de Introdução ao SIG e modelagem de distribuição de espécies.

71. Fernando Zagury Vaz de Mello
    Possui graduação em Agronomia pela Universidade Federal de Viçosa (2001), mestrado em Entomologia pela Universidade Federal de Lavras (2003) e doutorado em Sistemática pelo Instituto de Ecología, A.C. (Xalapa, México, 2007). É professor adjunto no Departamento de Biologia e Zoologia da Universidade Federal de Mato Grosso (Instituto de Biociências). É membro do corpo

editorial das revistas Academia Insecta e Checklist e é ou foi revisor de dezoito revistas científicas nacionais e internacionais. Tem 29 artigos científicos publicados ou aceitos em revistas indexadas, 9 capítulos de livros e edição de um livro publicado; mais de 50 trabalhos publicados em anais de eventos, e mais de 70 ítens de produção técnica. Tem experiência de pesquisa nas áreas de Biologia Geral: Sistemática, e Zoologia: Taxonomia dos Grupos Recentes, atuando principalmente em temas relacionados à taxonomia, sistemática, biogeografia, faunística e biodiversidade de insetos coleópteros da superfamília Scarabaeoidea; e de ensino nas áreas de Biogeografia, Biologia Evolutiva, Sistemática, e Zoologia de Invertebrados.
Será responsável pelo curso de técnicas de coleta, identificação e de monitoramento de invertebrados terrestres e pelo levantamento da coleopterofauna nos módulos da Fazenda Continental - MT.

72. Thiago Junqueira Izzo
Possui graduação em Ciências Biológicas pela Universidade Estadual Paulista de São José do Rio Preto (1998), mestrado (2002) e doutorado (2005) em Ecologia pelo Instituto Nacional de Pesquisas da Amazônia, e pós-doutorado pela Universidade da Florida (2007-EUA). Desde 2007 é professor colaborador na pós-graduação em Ecologia e em entomologia no INPA. Sendo bolsista de fixação de doutores na Amazônia (CT-Amazônia/CNPq). Tem experiência nas áreas de ecologia evolutiva e de comunidades, estudando principalmente os seguintes temas: mecanismos evolutivos para a manutenção da estabilidade de relações mutualísticas e mecanismos para a manutenção da biodiversidade em comunidades de formigas. Será responsável pelo levantamento de formigas nos módulos da Fazenda Continental – MT e pelo curso de Bioestatística.

73. Larissa Cavalheiro da Silva
Possui graduação em Ciências Biológicas pela Universidade Estadual Paulista UNESP - campus de São José do Rio Preto(2002), mestrado em Biologia Vegetal (Taxonomia de Fanerógamas) pelo Instituto Nacional de Pesquisas da Universidade Estadual Paulista UNESP - campus de Rio Claro (2004). Atualmente é Professora Assistente Nível I na Universidade Federal de Mato Grosso UFMT - campus de Sinop. Tem experiência na área de Botânica, com ênfase em Morfologia externa das plantas e Taxonomia Vegetal atuando principalmente nos seguintes temas: Amazônia, sistemática vegetal,levantamento florístico. Será responsável pelo levantamento botânico nos módulos da fazenda Continental - MT.

74. Rogério Vieira Rossi
possui graduação em Ciências Biológicas pela Faculdade de Filosofia Ciências e Letras de Ribeirão Preto - USP (1995), mestrado e doutorado em Ciências Biológicas, área de concentração Zoologia, pelo Instituto de Biociências da Universidade de São Paulo (2000 e 2005, respectivamente). Atualmente é bolsista recém-doutor no Museu Paraense Emílio Goeldi, e professor credenciado no programa de pós-graduação em Zoologia do convênio UFPA/MPEG. Tem experiência na área de Zoologia, com ênfase em Taxonomia dos Grupos Recentes, atuando principalmente nos seguintes temas: sistemática, diversidade, mamíferos neotropicais.
Será responsável pelo levantamento de pequenos mamíferos nos módulos da Fazenda Continental – MT e pelo curso de técnicas de coleta, identificação e de monitoramento de vertebrados (mamíferos).

75. Lucélia Nobre Carvalho
Graduou-se em Ciências Biológicas em 1997 pela Universidade Federal de Uberlândia desenvolvendo estudos de comportamento e manipulações experimentais em laboratório com peixes neotropicais. Obteve seu mestrado em Ecologia e Conservação pela Universidade Federal de Mato Grosso do Sul (2001) pesquisando a ecologia trófica e as interações entre ectoparasitos e as piranhas do Sul do Pantanal. No ano de 2008 concluiu seu doutorado pelo Instituto Nacional de Pesquisas da Amazônia (INPA) onde estudou a história natural e ecologia de peixes de riachos amazônicos. Atualmente é professora da Universidade Federal de Mato Grosso, campus de Sinop. Tem experiência principalmente nos seguintes temas: comportamento animal, história natural e

ecologia de comunidades com ênfase em peixes de riachos de àgua doce. É colaboradora do Projeto Igarapés desde 2004 (www.igarapes.bio.br).
Realizará o levantamento e acompanhamento da ictiofauna e entomofauna aquática em aproximadamente 20 corpos d'água nos módulos e proximidades.

76. Marliton R. Barreto
Graduado em Ciências Biológicas pela Universidade Federal de Sergipe (1994), mestrado em Entomologia pela Universidade Federal de Viçosa (1997) e doutorado em Ciências Biológicas (Entomologia) pela Universidade Federal do Paraná (2005). Atualmente é professor da Universidade Federal do Mato Grosso, Campus de Sinop. Tem experiência na área de Controle biológico, com ênfase em Biologia de Insetos, Patologia de Insetos, atuando principalmente nos seguintes temas: Entomologia agrícola, controle biológico, Biologia de Curculionidae, Bacillus thuringiensis e lagartas desfolhadoras.
Será responsável pelo levantamento da coleopterofauna nos módulos da Fazenda Continental - MT. E pelo curso de técnicas de coleta, identificação e de monitoramento de invertebrados terrestres

77. Fernando Pedroni
possui graduação em Ciências Biológicas pela UNICAMP (1991) mestrado em Ciências Biológicas(Biologia Vegetal) pela UNICAMP (1993) e doutorado em Biologia Vegetal (Ecologia) pela UNICAMP (2001). Atualmente é professor Adjunto da UFMT. Tem experiência na área de Ecologia, com ênfase em Dinâmica de comunidades de plantas incluindo Fenologia; Frugivoria predação e dispersão de sementes atuando nos seguintes temas: Frutos aves e mamíferos; biologia da dispersão de sementes no domínio do cerrado.Será responsável pela organização, informatização e consolidação do Herbário da UFMT - campus Barra do Garças.

78. Marcos André de Carvalho
possui graduação em Ciências Habilitação Em Biologia pela Escola Superior de Agricultura e Ciências de Machado (1986), mestrado em Ecologia e Conservação da Biodiversidade pela Universidade Federal de Mato Grosso (1996) e doutorado em Biociências (Zoologia) pela Pontifícia Universidade Católica do Rio Grande do Sul (2006). Atualmente é professor Adjunto da Universidade Federal de Mato Grosso. Tem experiência na área de Zoologia, com ênfase em Conservação das Espécies Animais, Acidentes por Animais Peçonhentos, História Natural de Serpentes, atuando principalmente nos seguintes temas: Cerrado, Pantanal Matogrossense, Acidentes ofídicos e escorpiônico, zonas urbanas.Será responsável pelo levantamento dos aracnídeos nos módulos da Fazenda Continental - MT.

79. Evandson José dos Anjos
possui graduação em Ciências Biológicas pela Universidade Federal de Mato Grosso (1993), mestrado em Ecologia e Conservação da Biodiversidade pela Universidade Federal de Mato Grosso (1999), e doutorado em Entomologia pela Universidade de São Paulo (2006). Atualmente, é professor adjunto da Universidade do Estado de Mato Grosso, professor colaborador junto ao programa de mestrado em Ecologia e Conservação da Biodiversidade da Universidade Federal de Mato Grosso, e professor colaborador junto ao programa de mestrado em Ecologia e Conservação da Universidade do Estado de Mato Grosso, no campus de Nova Xavantina. É o responsável técnico pelo Protocolo 1 - Moscas e Abelhas - do Programa de Pesquisa em Biodiversidade da Amazônia Meridional - PPBio/NURAM, projeto vinculado ao Museu Paraense Emílio Goeldi e financiado pelo Ministério da Ciência e Tecnologia - MCT. Tem experiência na área de Zoologia, com ênfase em Zoologia, atuando principalmente nos seguintes temas: abelhas das orquídeas, Euglossini, Taxonomia, Sistemática e Ecologia. Será responsável pelo levantamento da fauna de abelhas nativas.

80. Dalci Maurício Miranda de Oliveira
possui graduação em Ciencias Biologicas pela Universidade Federal de Mato Grosso (1980), mestrado em Ecologia e Conservação da Biodiversidade pela Universidade Federal de Mato Grosso

(1997) e doutorado em Ciencias Biológicas (Ecologia) pelo Instituto Nacional de Pesquisa da Amazonia (2006). Atualmente é Professor Adjunto I da Universidade Federal de Mato Grosso. Tem experiência na área de Ecologia, com ênfase em Ornitologia, atuando principalmente nos seguintes temas: conservação de aves, aves aquáticas, pantanal, aves piscivoras e aves e ecoturismo. Será responsável pelo levantamento da Avifauna nos módulos da Fazenda Continental - MT.

81. Alexandre Cunha Ribeiro
Bacharel em Ciências Biológicas pela Faculdade de Filosofia Ciências e Letras de Ribeirão Preto da Universidade de São Paulo (2003). Doutor em Zoologia pelo Instituto de Biociências da Universidade Estadual Paulista Júlio de Mesquita Filho, campus de Botucatu (2007). Pós-Doutorado no Museu de Zoologia da USP onde foi bolsista da FAPESP. Atualmente é Professor Adjunto do departamento de Biologia e Zoologia da Universidade Federal de Mato Grosso (UFMT-Cuiabá). Atua na área de Zoologia, com ênfase em Ictiologia, onde se dedica principalmente ao estudo da taxonomia, filogenia e biogeografia de peixes de água doce Neotropicais, recentes e fósseis . Têm se dedicado ao estudo da inter-relação entre a história geológica do continente sul-americano, padrões de distribuição e filogenia de peixes Neotropicais na reconstrução de cenários biogeográficos. Será responsável pelo levantamento e acompanhamento da ictiofauna e entomofauna aquática em aproximadamente 20 corpos d'água nos módulos e proximidades.

82. Marcelo Henrique O. Pinheiro
possui graduação em Ciências Biológicas (Licenciatura e Bacharelado) pela Universidade Federal de São Carlos (1988), mestrado em Biologia Vegetal pela Universidade Estadual de Campinas (2000) e doutorado em Ciências Biológicas (Biologia Vegetal) pela Universidade Estadual Paulista Júlio de Mesquita Filho (2006). Atualmente é docente da Universidade Federal de Mato Grosso, atuando no campus de Sinop. Tem experiência na área de Botânica, com ênfase em comunidades vegetais: florística, fitossociologia, fitogeografia e conservação. Será responsável pelo levantamento botânico nos módulos da fazenda Continental – MT, pela identificação botânica das espécies e organização da coleção de referência.

83. Maryland Sanchez Lacerda
possui graduação em Ciências Biológicas pela Universidade Federal de Uberlândia (1989) mestrado em Ciências Biológicas(Biologia Vegetal) pela UNESP – Rio Claro (1994) e doutorado em Biologia Vegetal (Ecologia) pela UNICAMP (2001). Atualmente é professor Adjunto da UFMT e Curadora da Unidade ICLMA do Herbário Central UFMT Tem experiência na área de Ecologia, com ênfase em estudos de vegetação e suas relações com ambiente físico; fenologia e dinâmica de comunidades de plantas atuando nos seguintes temas: Composição, estrutura e fenologia das formações florestais e savânicas no domínio do Cerrado. Será responsável pela organização, informatização e consolidação do Herbário da UFMT - campus Barra do Garças.

84. Rafael Arruda
possui graduação em Ciência Biológicas Licenciatura e Bacharelado pela Universidade Federal de Mato Grosso do Sul (2001) e mestrado em Ecologia e Conservação de Recursos Naturais pela Universidade Federal de Uberlândia (2004). Atualmente é aluno de doutorado do Instituto Nacional de Pesquisas da Amazônia, membro da Association for Tropical Biology and Conservation e membro da Sociedade Botânica do Brasil. Tem experiência na área de Ecologia, com ênfase em Ecologia Vegetal, bem como desenvolve trabalhos em Ecologia Animal e Interações Vertebrados-Planta. Será responsável pela coleta de dados sobre a estrutura da vegetação nos módulos da Fazenda Continental – MT e pelo levantamento botânico nos módulos da fazenda Continental - MT.

85. Hedinaldo N. Lima
Possui graduação em Agronomia pela Universidade Federal do Amazonas (1989), mestrado em Agronomia (Solos e Nutrição de Plantas) pela Universidade Federal de Lavras (1994) e doutorado em Agronomia (Solos e Nutrição de Plantas) pela Universidade Federal de Viçosa (2001). Atualmente é professor adjunto da Universidade Federal do Amazonas. Tem experiência na área de

Agronomia, com ênfase em Ciência do Solo, atuando principalmente nos seguintes temas: Solos e Ambientes da Amazônia, Adubação e Nutrição de Espécies Florestais da Amazônia. Será responsável pela análise de solos.

86. Diana P. R. Ahumada
Possui graduação em Biologia Aplicada - Universidad Militar Nueva Granada (2008), atuando principalmente nos seguintes temas: biologia, ecologia, neurociências, bioquímica. Realizará projetos de transmissão do conhecimento para a sociedade.

87. Tomaz L. Gualberto
Possui graduação em licenciatura em ciências biológicas pela Fundação Universidade do Amazonas (1998) e mestrado em Ciências Biológicas (Entomologia) pelo Instituto Nacional de Pesquisas da Amazônia (2003). Atualmente é técnico de laboratório da Fundação Universidade do Amazonas. Tem experiência na área de Zoologia, com ênfase em Zoologia. Será responsável por estudos entomológicos.

88. Thierry Gasnier
Possui graduação em Ciências Biológicas pela Universidade de São Paulo (1987), mestrado em Biologia Tropical e Recursos Naturais (Ecologia) pelo Instituto Nacional de Pesquisas da Amazônia (1992) e doutorado em Ciências Biológicas (Entomologia) pelo Instituto Nacional de Pesquisas da Amazônia (1996). É professor adjunto da Universidade Federal do Amazonas desde 1998. Tem experiência na área de Biologia/ Ecologia, atuando principalmente nos seguintes temas: a) pesquisa: ecologia de répteis e aracnídeos; b) Ensino: ecologia geral e da Amazônia, epistemologia para biologia, comunicação científica, estatística e desenho experimental. Foi Coordenador dos Cursos de Ciências Naturais e de Ciências Biológicas entre 1999 e 2005. Coordenou a reestruturação curricular de 2003 do Curso de Ciências Biológicas. É Coordenador do INTERTROPI, programa de intercâmbio entre a UFAM, a UENF e universidades de Porto Rico (CAPES/ FIPSE). É membro do Comitê Assessor do INEP/MEC para a área de Biologia. Será responsável pelo treinamento de estudantes e pesquisadores..

89. Fernando Mendonça
Possui graduação em Ciências Biológicas - Bacharelado e Licenciatura pela Universidade Estadual de Maringá (1999) e mestrado em Biologia (Ecologia) pelo Instituto Nacional de Pesquisas da Amazônia (2002).Atualmente é Doutorando em Ecologia pelo Programa de pós-graduação do Instituto Nacional de Pesquisas da Amazônia. Tem experiência na área de Ecologia, com ênfase em Ecologia de Comunidades, atuando principalmente nos seguintes temas: Diversidade beta, Estrutura de comunidades, Ictiofauna de riachos, Avaliação de Impactos Ambientais. Há 8 anos vem estudando os mecanismos ecológicos e impactos antrópicos que influenciam a diversidade de peixes nos riachos de terra firme localizados na floresta amazônica, com especial atenção para regiões ainda sem levantamentos ou com potencial risco de impacto ambiental. Será responsável por estudos da ictiofauna.

90. Antonio C. Webber
Possui graduação em Licenciatura Em Ciências Biológicas pela Universidade Estadual Paulista Júlio de Mesquita Filho (1977), mestrado em Ciências Biológicas (Botânica) pelo Instituto Nacional de Pesquisas da Amazônia (1981) e doutorado em Ciências Biológicas (Botânica) pelo Instituto Nacional de Pesquisas da Amazônia (1996). Atualmente é Professor Associado I da Universidade Federal do Amazonas, Colaborador do Instituto Nacional de Pesquisas da Amazônia e Membro de corpo editorial da Acta Amazonica. Tem experiência na área de Botânica, com ênfase em Biologia Reprodutiva. Atuando principalmente nos seguintes temas: biologia floral, polinização, fenologia, Annonaceae. Será responsável por estudos da ictiofauna botânicos.

91. Manoela Lima de Oliveira Borges
Formada em Ciências Biológicas com ênfase em Ecologia pela Universidade Estadual de Santa

Cruz em 2003. Concluiu o mestrado em Ecologia pelo Instituto Nacional de Pesquisas da Amazônia em março de 2007. Desde abril de 2007 até o presente momento é bolsista da Coleção de Mamíferos do INPA pelo Programa de Pesquisa em Biodiversidade - PPBio, onde desempenha atividades de Curadoria. Tem experiência na área de Ecologia de Comunidades, com ênfase em Ecologia Aplicada e Biologia da conservação de pequenos mamíferos e fragmentação florestal.

92. Maria Nazareth Ferreira da Silva
possui graduação em Ciências Biológicas pela Universidade de Brasília (1984) e doutorado em Zoologia pela Universidade da California, Berkeley (1995). Atualmente é pesquisadora titular A - III e Curadora da Coleção de Mamíferos do Instituto Nacional de Pesquisas da Amazônia. Tem experiência na área de sistemática de mamíferos amazônicos, com ênfase em roedores e marsupiais, atuando principalmente nos seguintes temas: filogenese e filogeografia, envolvendo estudos da morfologia, morfometria, divergência molecular e biogeografia historica.

93. Lisandro Juno
Lisandro Juno Soares Vieira, Bacharel em Ciências Biológicas (modalidade Genética) pela Universidade Federal do Rio Grande do Norte, é mestre e o doutor em Ecologia e Recursos Naturais pelo Programa de Pós-Graduação em Ecologia e Recursos Naturais da UFSCar. Atualmente é Prof. Ajunto da Universidade Federal do Acre, onde coordena desde janeiro de 2006 o Programa de Pós-Graduação em Ecologia e Manejo de Recursos Naturais. Possui experiência na orientação de alunos de iniciação científica e de mestrado. Suas pesquisas estão concentradas em ecologia de peixes e outros organismos aquáticos. Também tem atuado em diversas atividades de apoio ao Governo do Estado do Acre em questões relativas a recursos hídricos e ecologia aquática. O pesquisador coordena vários projetos de pesquisa, dentre os quais pode ser destacado o PROCAD Novas Fronteiras em parceria com o Programa de Pós-Graduação em Ecologia de Ambientes Aquáticos Continentais da Universidade Estadual de Maringá.

94. Sara Melo
Possui graduação em Engenharia de Pesca pela Universidade Federal do Amazonas (2004). Tem experiência na área de Recursos Pesqueiros e Engenharia de Pesca, com ênfase em Manejo e Conservação de Recursos Pesqueiros de Águas Interiores, atuando principalmente nos seguintes temas: Biologia pesqueira e Pesca de Potamotrigonídeos.

95. Roselia Marques
Possui graduação em Ciências Habilitação Biologia pela Universidade Federal do Acre (1980), mestrado em Ciências Biológicas (Botânica) pela Universidade de São Paulo (1992) e doutorado em Ciências Biológicas (Botânica) pela Universidade de São Paulo (2000). Atualmente é Professora Associada da Universidade Federal do Acre. Tem experiência na área de Botânica (Taxonomia de Microalgas Continentais) e Limnologia, atuando principalmente nos seguintes temas: estado do Acre, ecologia e taxonomia do fitoplâncton, limnologia de ecossistemas lênticos e lóticos.

96. Tammya F. Pantoja
Possui graduação em Ciências Biológicas Bacharelado pela Universidade Federal do Amapá (2004) e mestrado em Agronomia (Genética e Melhoramento de Plantas) pela Universidade Estadual Paulista Júlio de Mesquita Filho (2007). Tem experiência na área de Botânica, com ênfase em Fisiologia de Sementes, principalmente de espécies florestais tropicais da Amazônia, obtida durante a graduação, atuando principalmente nos seguintes temas: germinação, temperatura e dormência. Possui também experiência em Genética Quantitativa e Vegetal obtida durante na execução do projeto de mestrado, principalmente no que concerne ao uso de análise exploratória de dados (estatísitca multivariada).

97. Luciene Zagalo de Oliveira
Possui graduação em Ciências Biológicas pela Universidade Federal do Amapá (2007). Atualmente é mestranda do curso de Pós-graduação em Agronomia (Genética e Melhoramento de Plantas) da

Universidade Estadual Paulista Júlio de Mesquita Filho- Faculdade de Ciências agrárias e Veterinárias UNESP-FCAV. Tem experiência na área de Biologia (botânica), atuando principalmente nos seguintes temas: genética e melhoramento de plantas, morfologia externa vegetal, frutos, sementes e ilustração botânica.

98. Marcio Leite Marinho
Atualmente é Chefe da Unidade de Pub. Científicas do Instituto de Pesquisas Científicas e Tecnológicas do Estado do Amapá. Tem experiência na área de Ciência da Computação , com ênfase em Sistemas de Computação.

99. Wendel de Lima Neri
possui curso-tecnico-profissionalizante pela Escola Janary Gentil Nunes Fundação Bradesco (1998) . Atualmente é Chef. da Unid. Informação Mídia Eletrônica do Instituto de Pesquisas Científicas e Tecnológicas do Estado do Amapá. Tem experiência na área de Ciência da Computação , com ênfase em Metodologia e Técnicas da Computação.

100. Jose Maria Thomaz Menezes
possui graduação em Agronomia pela Universidade Federal do Amazonas (1983) , mestrado em Agronomia (Genética e Melhoramento de Plantas) pela Universidade Estadual Paulista Júlio de Mesquita Filho (1990) e doutorado em Agronomia (Produção Vegetal) pela Universidade Estadual Paulista Júlio de Mesquita Filho (2003) . Atualmente é Pesquisador do Instituto Nacional de Pesquisas da Amazônia e Conveniado da Universidade Federal de Rondônia. Tem experiência na área de Agronomia , com ênfase em Agroecologia. Atuando principalmente nos seguintes temas: Agrossilvicultura, Consórcios arbóreos, Pesquisa participativa.

101. Carolina Doria
possui graduação em Ciências Biológicas pela Universidade Estadual de Londrina (1991), mestrado em Ecologia de Ambientes Aquáticos Continentais pela Universidade Estadual de Maringá (1994) e doutorado em Desenvolvimento Sustentável do Trópico Úmido pela Universidade Federal do Pará (2004). Atualmente é adjunto 2 da Universidade Federal de Rondônia, - Iheringia. Série Zoologia e - Acta Scientiarum (UEM) . Tem experiência na área de Zoologia, com ênfase em Zoologia, atuando principalmente nos seguintes temas: ictiofauna, ordenamento pesqueiro, ecoturismo, reserva extrativista e pesca

102. Alexandre de Almeida e Silva
possui graduação em Ciências Biológicas (1995), mestrado (1999) e doutorado (2004) em Entomologia pela Universidade de São Paulo. Atualmente é professor do Depto de Biologia da Universidade Federal de Rondônia e colaborador do Instituto de Pesquisa em Patologias Tropicais. Tem experiência na área de Entomologia, com ênfase embiologia e ecologia.

103. Renita Frigeri
Mestrado em Fisiologia Vegetal (Ciências Agrárias) pela UniversidadeFederal de Viçosa, UFV (1998) e doutorado em Biologia Vegetal pela Universidade Estadual de Campinas, UNICAMP (2007). Atualmente é professora adjunta e chefe do Departamento do curso de Ciências Biológicas, além de coordenadora do Laboratório de Fisiologia Vegetal da Universidade Federal de Rondônia, UNIR. Tem experiência na área de Fisiologia Vegetal, com ênfase em Ecofisiologia, atuando principalmente nos seguintes temas: sementes, dormência, germinação, plântulas, crescimento, razão raiz:parte aérea, amido, fisiologia e conservação de espécies nativas.

104. Mariluce Messias
Possui graduação em Ciências Biológicas pela Universidade Estadual de Campinas (1990), mestrado em Ciencias Biologicas (Zoologia) pela Universidade Estadual Paulista Júlio de Mesquita Filho (1995) e doutorado em Ciencias Biologicas (Zoologia) pela Universidade Estadual Paulista Júlio de Mesquita Filho (2002). Atualmente é professor adjunto da Fundação Universidade Federal

de Rondônia, líder grupo de pesquisa cnpq - LABIEV da Fundação Universidade Federal de Rondônia, profes. do pg em desenvolvimento regional mam da Fundação Universidade Federal de Rondônia e chefia de departamento de biologia da Fundação Universidade Federal de Rondônia. Tem experiência na área de Ecologia, com ênfase em Ecologia, atuando principalmente nos seguintes temas: Rondônia, primatas, Amazônia, zoogeografia e levantamento.

105.Claudia Regina Silva

Graduada em Ciências Biológicas pela Universidade Estadual de Londrina (1996), adquirindo o título de bacharel com o trabalho de levantamento da fauna de mamíferos não voadores em floresta semidecídua na região de Piracicaba, SP. Defendeu o mestrado, pela Universidade de São Paulo, em 2001. No mestrado comparou riqueza e diversidade de espécies de mamíferos não-voadores em remanescentes de Floresta Atlântica e entorno. Tem experiência na área de Zoologia, com ênfase em Ecologia, atuando principalmente nos seguintes temas: estudos com a fauna de mamíferos, inventários de diversidade, uso sustentável do ambiente, aspectos da caça de subsistência e levantamentos de biodiversidade participativo. Nos últimos anos atua, em pesquisa e orientação, nas áreas de ecologia, sistemática e biogeografia de mamíferos, bem como na coleta, curadoria e conservação do acervo da fauna de mamíferos na Coleção Fauna do Amapá do Instituto de Pesquisas Científicas e Tecnológicas do Estado do Amapá.

106.Albanita de Jesus R. da Silva

Possui graduação em Ciências Biológicas pela Universidade Federal de Pernambuco (1982) e mestrado em Mestrado Criptógamos pela Universidade Federal de Pernambuco (1989). Atualmente é professor titular da Universidade Federal de Roraima. Tem experiência na área de Botânica , com ênfase em Taxonomia Vegetal. Atuando principalmente nos seguintes temas: Pteridófita, Taxonomia, Ecologia, Esquizeaceae, Anemia.

107.Roseanie de Lyra Santiago

Possui graduação em Licenciatura Plena Em Ciências Biológicas pela Universidade Católica de Pernambuco (1988) , Especialização em briófitas e pteridófitas pela UFPE(1992), mestrado em Criptógamos pela Universidade Federal de Pernambuco (1997). Atualmente é professora Adjunto da Universidade Federal de Roraima. Tem experiência na área de Botânica, com ênfase em taxonomia e ecologia de briófitas, atuando principalmente nos seguintes temas: Brioflora da amazônia, bioindicação de poluição e iniciação científica.

108.Lucilia Dias Pacobahyba

Conclui a graduação em Ciências Biológicas pela Universidade Federal de Pernambuco (1988), mestrado em Criptógamos Ficologia pela Universidade Federal de Pernambuco (1992) e doutorado em Ecologia e Recursos Naturais pela Universidade Federal de São Carlos (2002). Atualmente sou professora adjunto III da Universidade Federal de Roraima. Tem experiência na área de Botânica, com ênfase em Taxonomia de Criptógamos, atuando principalmente nos seguintes temas: células algais, Cinética de mineralização, consumo de oxigênio, Ecologia de macrofitas e Taxonomia de fitoplancton.

109.Ise de Goreth Silva

possui graduação em Ciências Biológicas pela Universidade Federal do Maranhão (1986) , especialização em Limnologia e Manejo de Represas pela Universidade de São Paulo (1987) e mestrado em Botânica pela Universidade Federal Rural de Pernambuco (1992) . Atualmente é Professora Assistente IV da Universidade Federal de Roraima. Tem experiência na área de Ecologia , com ênfase em Limnologia – Taxonomia e ecologia de microalgas. Atuando principalmente nos seguintes temas: biomassa, Estuario, Fitoplancton, Produção Primária.

110.Silvana Túlio Fortes

Bacharel em Ciências Biológicas pela Universidade Federal de Santa Catarina (1986), mestre em Biologia de Fungos pela Universidade Federal de Pernambuco (1993) e doutora em Biologia

Parasitária - Micologia pela Fundação Oswaldo Cruz (2001). Docente da Universidade Federal de Roraima há 15 anos, coordena o Laboratório de Micologia desde 2002 com estudos sobre ecologia de fungos de interesse médico em Roraima, em especial leveduras do complexo Cryptococcus neoformans, fungos queratinofílicos e fungos potencialmente toxigênicos. Recentemente iniciou estudo sobre diversidade de fungos mitospóricos nos solos de savana. Desde 2004 coordena o Laboratório de Ensino de Biologia e orienta a produção de modelos tridimensionais e jogos pedagógicos para o ensino de ciências e biologia. Atualmente compõe a equipe que coordena a implantação do Programa Institucional de Bolsas de Iniciação à Docência na UFRR.

111. Vânia G. Lezan Kowalczuk
possui graduação em Ciências Biológicas pela Universidade Federal do Paraná (1991), mestrado em Zoologia pela Universidade Federal do Paraná (1994) e doutorado em Zoologia pela Universidade Federal do Paraná (2000). Atualmente é professor adjunto da Universidade Federal de Roraima. Tem experiência na área de Zoologia e Limnologia, ministrando aulas no curso de Ciências Biológicas e no programa de Pós-Graduação em Recursos Naturais. Atua principalmente nos seguintes temas: ecologia de ecossistemas de águas continentais, ecologia de invertebrados aquáticos.

112. Paulo Emílio Kaminski
possui graduação em Licenciatura Plena em Ciências Biológicas pela Universidade Federal do Rio Grande do Sul (1995) e mestrado em Zootecnia pela Universidade Federal do Rio Grande do Sul (1998). Atualmente é pesquisador b da Empresa Brasileira de Pesquisa Agropecuária. Tem experiência na área de Agronomia, com ênfase em Agronomia, atuando principalmente nos seguintes temas: diversidade, leucaena, solos ácidos, fenologia e amazônia.

113. Wilson Spironello
Possui graduação em Ecologia pela Universidade Estadual Paulista Júlio de Mesquita Filho (1979) e doutorado em Biology - University of Cambridge (1999). Atualmente é pesquisador do Instituto Nacional de Pesquisas da Amazônia, atuando principalmente nos seguintes temas: conservação e manejo, nas áreas de ecologia de interações, com enfoque em espécies árboreas de interesse comercial e de ecologia de mamíferos, principalmente primatas.

114. Fabricio Baccaro
possui graduação em Ciencias Biológicas (Licenciatura em 2004) e graduação em Adimistração de Empresas (Bacharelado em 1998) ambos pela Universidade Estadual de Londrina e mestrado em Ciências Biológicas (Entomologia) pelo Instituto Nacional de Pesquisas da Amazônia (2006). Atualmente é Gerente de Pesquisa de Campo - PPBio/INPA do Ministério da Ciência e Tecnologia, desenvolvendo além de pesquisas científicas atividades de gerência e coordenação. Tem experiência na área de Zoologia, com ênfase em Entomologia e Ecologia, atuando principalmente nos seguintes temas: Ecologia de comunidades, Dominância, Formigas.

115. Ricardo Braga-Neto
Possui interesse em diversidade e conservação de fungos tropicais. Biólogo formado pelo Instituto de Biociências da Universidade de São Paulo (IB-USP), desenvolveu seu mestrado em ecologia pelo Instituto Nacional de Pesquisas da Amazônia (INPA), onde é atualmente bolsista do Departamento de Ecologia. Sua linha de pesquisa foca o estudo de comunidades de fungos, em especial padrões de distribuição espacial e temporal de fungos decompositiores de serrapilheira na Amazônia. Seus trabalhos têm visado contribuir para o entendimento dos padrões de distribuição espacial da diversidade de fungos em florestas de terra-firme, incluindo o delineamento de protocolos de amostragem, produção de guias e divulgação científica. Trabalhou também com ecologia de pequenos mamíferos em paisagens fragmentadas na Mata Atlântica. Tem experiência na área de Ecologia, atuando principalmente nos seguintes temas: ecologia de comunidades, padrões de distribuição, diversidade beta e biologia da conservação. Realizará inventário de fungos nos núcleo regionais.

116.Gabriela Zuquim

possui graduação em Ciências Biológicas pela Universidade de São Paulo (2003) e mestrado em Ecologia de Florestas Tropicais pelo Instituto Nacional de Pesquisas da Amazônia (2006). Atualmente é bolsista PCI do CNPq/INPA e aluna do Instituto Nacional de Pesquisas da Amazônia. Está realizando projeto de guia de identificação de ptridófitas e inventário de herbáceas na Reserva Biológica do Uatumã, AM. Tem experiência na área de Ecologia, com ênfase em Ecologia de Comunidades, atuando principalmente nos seguintes temas: pteridófitas, Amazônia, fatores edáficos e padrões de diversidade.

Realizará inventários de pteridófitas nos núcleos regionais.

117.Dr. Scott Saleska

Dr. Scott Saleska is Assistant Professor of Ecology & Evolutionary Biology at the University of Arizona, and is U.S. Director of the Amazon-PIRE program, an international partnership for research and education in the Amazon of Brazil. He is an ecosystem ecologist whose research focuses on climate-vegetation interactions, using methods that integrate forest plots and measurements of vegetation dynamics, eddy covariance, remote sensing, and modeling. He has conducted research on Amazon forests since 1999, and is currently leading projects to integrate data from a network of eddy flux towers from the LBA project in Brazil with remote sensing and modeling, and to use remotely sensed measurements of vegetation structure (via LIDAR sensors) to provide information about landscape scale disturbance patterns and forest carbon balance in the central Amazon basin. He will be responsible for advising and training students, planning research activities in our seven LTER sites to integrate biometric (forest structure and biomass), composition and environmental data on models at community and ecosystem level, and, finally, for collaborating in the upscaling and integration with others initiatives (e.g. LBA tower data).

118.MSc. Juliana Schietti de Almeida

Possui graduação em Licenciatura e Bacharelado em Ciências Biológicas pela Universidade Estadual de Londrina (2001) e mestrado em Ecologia pelo Instituto Nacional de Pesquisas da Amazônia (2005). Atualmente é bolsista DTI do Laboratório de Geoprocessamento e Análises Espaciais (SigLab) do Instituto Nacional de Pesquisas da Amazônia. Tem experiência na área de Ecologia de Ecossistemas, com ênfase em análises espaciais, atuando principalmente nos seguintes temas: distribuição espacial de biomassa e diversidade de árvores na Amazônia brasileira e avaliação do uso de dados topográficos de sensoriamento remoto (SRTM) para modelagem ambiental na Amazônia. Será responsável pela modelagem espacial de estoques de carbono e pela modelagem preditiva da biomassa florestal em função de variáveis ambientais (clima e hidrologia).

119.Dra. Françoise Yoko Ishida

Graduação em Ciências Biológicas pela Universidade Federal do Pará (1995), mestrado em Agronomia (Fisiologia Vegetal) pela Universidade Federal de Lavras (1998) e doutorado pela Universidade de São Paulo (2007). Trabalhou como assistente de pesquisa III do Instituto de Pesquisa Ambiental da Amazônia por 5 anos. Atuou ativamente em projetos do LBA. Experiência na área de Ecofisiologia, com ênfase em Ecologia Aplicada, atuando principalmente nos seguintes temas: florestas tropicais, isótopos estáveis, florestas secundarias, mudanças climáticas, mudanças no uso da terra, ciclo de carbono. Colabora atualmente com o projeto TROBIT (http://www.geog.leeds.ac.uk/research/trobit/courses/) desde fevereiro de 2007. Será responsável pelas análises de isótopos de carbono.

120.Armando Muniz Calouro

possui graduação em Ecologia pela Universidade Estadual Paulista Júlio de Mesquita Filho (1990), mestrado em Ecologia pela Universidade de Brasília (1995) e doutorado em Ecologia e Recursos Naturais pela Universidade Federal de São Carlos (2005). Atualmente é professor assistente da Universidade Federal do Acre. Tem experiência na área de Ecologia, com ênfase em Biologia da Con-

servação, atuando principalmente nos seguintes temas: monitoramento de fauna em áreas sob manejo florestal; ecologia de primatas e morcegos; avaliação ecológica rápida de mastofauna; manejo participativo de caça de subsistência com índios e seringueiros no Estado do Acre.

121. Francisco Felipe Xavier Filho
Atualmente é técnico na área de Entomologia funcionário do Instituto Nacional de Pesquisas da Amazônia – INPA.

122. Klilton Barbosa da Costa
possui graduação em Agronomia pela Universidade Federal do Amazonas (1996) e Mestrado em Ciências Biológicas (Entomologia) pelo Instituto Nacional de Pesquisas da Amazônia (2004). Atualmente é aluno pós-graduação do Instituto Nacional de Pesquisas da Amazônia cusando o Doutoramento com Produtividade de Mel e Pólen de espécie de meliponíneo amazônico (Scaptotrigona polysticta Moure, 1950) também conhecida como abelha canudo o jandaíra boca de cera. Tem experiência na área de Morfologia, com ênfase em estruturas internas de Meliponina amazônicos, atuando principalmente nos seguintes temas: Túbulos de Malpighi, Gânglios Nervosos Abdominais, Aparelho Reprodutor de Meliponíneos.

123. Maria de Fátima Ferreira da Costa Pinto
possui graduação em Ciências Biológicas (Bacharelado Ênfase Em Genética) pela Universidade Estadual do Sudoeste da Bahia (2004) e grau de mestre em Genética, Conservação e Biologia Evolutiva pelo Instituto Nacional de Pesquisas da Amazônia/INPA e colaboradora de projetos do laboratório de genética molecular de abelhas da Universidade Estadual do Sudoeste da Bahia (UESB) e do Grupo de Pesquisas em Abelhas do Instituto Nacional de Pesquisas da Amazônia (INPA). Tem experiência na área de Genética, com ênfase em Genética Animal, atuando principalmente nos seguintes temas: DNA, Marcador molecular (RAPD, microssatélites, SSCP), genética de populações, Abelhas sem ferrão (meliponas).

124. Tânia Margarete Sanaiotti
possui graduação em Biologia pela Universidade Estadual Paulista Júlio de Mesquita Filho (1982), mestrado em Biologia Tropical e Recursos Naturais Ecologia pelo Instituto Nacional de Pesquisas da Amazônia (1987) e doutorado em Biological and Molecular Sciences - University Of Stirling (1996). Desde 1987 é pesquisador titular do Instituto Nacional de Pesquisas da Amazônia e é anillhadora, carga horária: 0, regime:parcial do Instituto Brasileiro do Meio Ambiente e dos Recursos Naturais Renováveis. Tem experiência na área de Ecologia de plantas e vertebrados, com ênfase em Ecologia de Savanas Amazônicas, atuando principalmente nos seguintes temas: savana, aves, gavião-real, Amazônia. Líder do Grupo de Pesquisa "Fitogegrafia da Amazônia"

i) Mecanisms that will be used to promote interactions between research groups participating in the project and with other research groups, including those not consolidated (national cooperation).

The entire structure of CENBAM is devoted to promoting interactions among research groups, both consolidated and in formation. Integration will be done at the planning stage so that data or material collected by one group can be used by all others. The principal mechanism will be joint decisions about reseach projects made by the Administrative Council after consultation with councils of regional hubs. The Administrative Council will meet at least once each semestre in a different regional center to evaluate progress and suggest new directions for research. The results of these meetings, and all research programs will be posted on the web so that all participants are aware of all activities at all times. The Administrative Council has members from all of the

principal lines of investigation and regional centers, and will invite ad hoc members to contribute on specialist topics.

The RAPELD system of data collection was designed to permit integrated analysis of data from a variety of biodiversity-related disciplines. Standardized methodology allows inclusion of consolidating groups in association with training. Local graduate students are the key to consolidating research lines in remote areas, and all the research activities of CENBAM are closely linked to training at all levels. It will be the responsibility of the members of the Administrative Council to liaise with councils of regional hubs to identify needs of emergent groups and integrate them in projects with researchers with more experience.

Collaborative scientific production will promoted through workshops for analysis of aggregate data, in which the more experienced researchers will interact with students and less-experienced researchers to carry out analyses and write papers that would not be possible for individual researchers working alone. These workshops will also be important for integrated anlyses of data collected in multiple sites.

j) Interaction with highly competent groups in the international arena (international cooperation)

International cooperation in CENBAM will initially extend activities already in operation. Elaboration of formal agreements with an institute that is still in the proposal stage within the short time allowed by the call for proposals is not viable, but most activities indicated in this section should become part of formal agreements in the next phase of CENBAM. Initially, only interchange with individual researchers that have a high degree of competence in specific areas will be financed. There are many sources of funding for international cooperation and CENBAM generally will be a catalyst rather than a funding source for such activities.

Institutions involved in CENBAM are already cooperating in international agreements related to biodiversity. For instance, the Federal University of Acre has a cooperative agreement with the University of Florida (USA) to support research and teaching in relation to extractive industries. INPA has an agreement with the Smithsonian Tropical Research Institution (STRI) in relation to the PDBFF and CTFS plots, and STRI support is important for several of the courses proposed here. Dr Adolfo Amezquita, of the Universidad de los Andes (Colombia) is one of the world's most respected specialists in evolution and bioacoustics and will be involved in research and teaching in association with regional hubs. Dr Thomas Hrbeck, who is responsible for the genetics laboratory in the Universidad Nacional de Puerto Rico and Dr. Andrew Crawford (STRI and Universidad de los Andes) will collaborate on the design of genetic studies and co-supervise graduate students. Dr Carlos Peres of the University of East Anglia (UK) is one of the leading experts on the effects of hunting and other pressures on biodiversity and will participate in planning of studies of medium and large mammals, and co-supervise graduate students. Dr José Fragoso of the University of California (USA) developed one of the most successful studies of the impacts of indigenous peoples on their game resources in Guyana, and will collaborate with CENBAM in developing similar studies in Brazil.

Dr. Scott Saleska, from the University of Arizona, will cooperate in project design and implementation in line of inquiry 3. He is U.S. Director of the Amazon-PIRE program, an international partnership for research and education in the Brazilian Amazon. He is a specialist in climate-vegetation interactions, using methods that integrate forest plots and measurements of

vegetation dynamics, eddy covariance, remote sensing, and modeling. He is currently leading projects to integrate data from a network of eddy flux towers from the LBA project in Brazil with remote sensing and modeling, and to use remotely sensed measurements of vegetation structure (via LIDAR sensors) to provide information about landscape scale disturbance patterns and forest carbon balance in the central Amazon basin. In CENBAM, he will be responsible for the integration of biometric (forest structure and biomass), composition and environmental data on models at community and ecosystem level for seven LTER sites, as well as for upscaling and data integration with others initiatives (e.g. LBA tower data).

Dr Cecilia Nuñez has an ongoing cooperation with the group of Drs François Bailleul e Sevser Sahpaz, Université de Lille 2 (France), with which she will develop methods to isolate Rubiaceae alkaloids and make tests for vascular relaxing, vascular activity, antioxidant activity and a model of osteoarthritis for plant extracts and isolated substances, to ascertain their activity. After learning the techniques, these will be implemented at INPA and researchers from the regional nuclei will have access to the facilities, in order to increase the number of extracts that can be tested.

One of the major problems with international cooperation in Amazonia has been the lack of qualified Brazilian counterparts in most parts of Amazonia, leading to questions of possible exploitation and sovereignty issues. Except in the case of some of the more developed regions, such as near Manaus and Belém, most international-cooperation studies involved questions, methods, and collecting sites largely determined by the interests of the foreign counterpart. CENBAM with its network of LTER sites, laboratories and researchers will allow much more effective insertion of international collaboration in all Amazonian regions, and maximize scientific exchange from each project.

Despite the deficiencies outlined in the previous paragraph, the research and teaching capabilities in the Brazilian Amazon are generally greater than those in the Amazonian regions of neighbouring countries. Most of the universities involved in this proposal train graduate students from other Amazonian countries. For instance, since 1996, INPA graduate courses included 35 masters and 13 doctoral students from five Amazonian countries and other countries in South and Central America. CENBAM will support biodiversity training of students from those countries as part of its general training of graduate students. However, effective management of the Amazon will require integrated actions by all Amazonian countries. This was one of the major conclusions of the last meeting of the Amazonian Cooperation Treaty in Loja (Ecuador) in 2007. CENBAM will promote integration between Brazil and other Amazonian countries by including representatives of higher-education institutions in meetings of the Administrative Council, and familiarize them with activities in Brazilian LTER sites.

k) Definition of the specific tasks of each participating entity, emphaticizing the points of integration

The global organization of the Institute is given in section T, and involves collaboration outside the formal structure of the institute. Here we will concentrate on the ways each entity collaborates towards specific goals within and between the prinicipal lines of investigation.

Initially, Line of Inquiry 1 – Integration will be coordinated principally by INPA. However, it will be the responsibility of researchers of lead organizations in each state (UFAM, UFAC, UNIR, UFRR, UERR, IEPA, UFMT) to identify local needs, and to disseminate effective models to other organizations in their region. These organizations will define lines of inquiry and research projects

through their participation in the Adminstrative Council of CENBAM. These activities will be reinforced by international cooperation with the International Institute for Geo-information Science & Earth Observation – ITC (The Netherlands).

The objective of CENBAM is to install the capacity for effective research in each region. In this sense, the major institutions in each state (INPA, UFAM, UFAC, UNIR, UFRR, UERR, IEPA, UFMT) are all lead instituions for each of the principal lines of inquiry. However, some organizations will have special responsibility for particular projects, and will be responsible for transfer of knowledge gained to other hubs. For instance, in Line of Inquiry 2 – Development of Monitoring and Evaluation Techniques, the State Secretariate for the Environment of Acre (SEMA-AC) and the Forest Secrectariat of Acre (SEF-AC) will have a primary role in defining biodiversity targets and the evaluation of economically viable techniques for monitoring targets. MPEG has the lead researchers in the use of biodiversity information in land-use selection algorithms. This line of research is required for surveys, collections and identifications undertaken within other lines of inquiry.

All organizations (INPA, UFAM, UFAC, SEMA-AC, SEF-AC, UNIR, UFRR, UERR, IEPA, UFMT) will be involved in establishment of LTER sites for monitoring ecosystem processes. However, some of these are far more advanced, and therefore more capable of defining methods and training other researchers in some areas. For instance, IEPA and UFAC have been engaged in hydrological studies with LBA, and researchers associated with INPA-RR and UFRR have started studies of forest necromass and below-ground fine-root biomass in savannas.

Most organizations involved (INPA, UFAM, UFAC, UNIR, UFRR, UERR, IEPA, UFMT) maintain biological collections (Line of Research 5) and are actively involved in biological surveys, studies of the biology of target species, and evaluation of species involved in extractive industries (Line of Research 4). Therefore, they are capable of identifying regional gaps. Although the principal capacity for these activities is concentrated in Manaus and Belém, particular groups, such as mammals (UNIR), plants (UFAC), and fish (UFAC, UNIR) have strong groups in the regional hubs. These will be reinforced with international collaboration from the University of East Anglia and the University of California.

Genetic studies (Line of Investigation 6) are dependent on material from surveys and museum collections, which are undertaken by all regional hubs (INPA, UFAM, UFAC, UNIR, UFRR, UERR, IEPA, UFMT). However, infrastructure costs, especially for DNA analyses are still too high to permit installation of equipment for all genetic analyses in all regions. Therefore, the most expensive genetic analyses will be undertaken in collaboration with the centers with capacity that can be brought up to or maintained at international standard at reasonable cost (INPA, UFAM and possibly UFRR). Other centers will have their laboratories equiped for at least storing and purification of material that can be transported to other laboratories. Planning and analysis in genetic studies will be reinforced by international cooperation with the University of California and the Universidad Nacional de Puerto Rico.

Bioprospecting studies (Line of Investigation 7) depend on collection, identification and genetic characterization from other lines of investigation to be undertaken by most participating organizations (INPA, UFAM, UFAC, SEMA-AC, SEF-AC, UNIR, UFRR, UERR, IEPA, UFMT). Purification of extracts and preliminary screening for biological activiy can be done by several participating organizations, such as INPA and IEPA, and some of these can also test for specific activities, such as antibacterial and antifungal (UFAM), antimalarial (INPA) and anti leishmaniosis (UFPA). However, some testing is currently more effectively concentrated in institutions outside Amazonia, such as testing chemicals active against tuberculosis (FURG).

The central laboratories in Manaus, at INPA and UFAM, have been building their infrastructure and updating their equipment over the last two decades to work with modern molecular genetic techniques. At INPA, the Thematic Molecular Biology Laboratory was organized to centralize this effort, and has a DNA sequencer and supporting equipment. This is the primary laboratory associated with INPA's Genetics, Conservation and Evolutionary Biology post-graduate program. It will also serve as the primary laboratory for INPA researchers participating in this proposal and will be able to handle much of the routine analyses demanded by the regional nuclei. It also interacts strongly with the Bioprospecting team at INPA and in this proposal. Several INPA researchers have smaller laboratories to do molecular marker analysis, without the sophistication of the sequencer, and these laboratories will receive support to meet proposal and regional nuclei demands.

The professors at UFAM participating in this proposal have three laboratories, the largest associated with the UFAM/INPA Biotechnology post-graduate program. This laboratory contains a sequencer and full support equipment. It was the primary laboratory responsible for leading the network of institutions that sequenced the *Chromobacterium violaceum* genome, and leads the guaraná (*Paullinia cupana*) functional genome network. The small animals group has an expanding Animal Genetics Laboratory with a new sequencer and most support equipment, requiring modest amounts of equipment. The newly organized Applied Evolution Laboratory has equipment to molecular marker analyses, without sequencer backup, and is in need of expansion. This laboratory will lead the economic plant analyses, both for the Manaus team and for demands from the regional nuclei. Most researchers and professors associated with these three laboratories participate in both the Biotechnology and Genetics post-graduate programs mentioned here, and will serve as major professors for masters and doctoral candidates from the regional nuclei.

The Animal Evolution and Genetics Laboratory at the University of Puerto Rico - Rio Piedras has a significant history of collaboration with the Animal Genetics Laboratory at UFAM, via collaboration between Tomas Hrbek and Izeni Farias. The laboratory in Puerto Rico has considerable equipment not available yet in Manaus and will permit some analyses that may be necessary to refine unclear analytical results obtained here. The University of Puerto Rico also accepts qualified Brazilian post-graduate candidates, offering additional options for training.

l) Comparative analysis between the present situation and the situation aspired to, showing unequivocably the benefits of the project

Apart from the lack of qualified researchers, the principal problem with scientific activities in the Brazilian Amazon is that they are largely driven by external demands. While it is important that Amazonian researchers recognize these demands, it is also important to expand the system based on regional needs and capabilities so that benefits are integrated into local production systems, guaranteeing the sustainability of the system, and relevance for Amazonian conservation and development. The concentration of lead organizations of Amazonian proposals for this edital in Manaus and Belém is a reflection of the imbalance between capacity and demand. The principal objective of CENBAM will be to integrate and expand the scientific capability in Amazônia so that there are qualified researchers in all regional centers to participate competitively for national and international support. The present situation is that biodiversity research in the Amazon is limited by the availability of qualified researchers in most regions. The situation we aspire to is that within 5 or 10 years research will be limited by available funding and not by lack of qualified researchers to

receive that funding. More specific advances are given below in relation to each of the major lines of investigation and teaching activities.

Line of inquiry 1 – Integration

The restricted amount of research conducted in the Brazilian Amazon has little visibility. Most researchers do not publish, so their work remains unknown. However, even when they do publish, the summary data usually are of little use to other workers wishing to expand the research. Therefore, much of the research is repetitive, the same data being collected by each research group. Such a situation was understandable 20 years ago when data management was largely a matter of pens and paper. The digital revolution and the World-Wide Web has made it possible for researchers to access and exchange data on a scale never before possible. However, detailed public-access scientific data bases are essentially limited to a few large-scale initiatives such as LBA and TEAM, and a few sites of the PPBio LTER system.

The situation that we aspire to in the long term is the integration and exchange of data between most researchers in the Brazilian Amazon. That is data collected in all regional centers will be deposited in public-access data bases. This applies to data from collections, biological surveys, ecological and other studies. Where data cannot be made available for legal reasons, metadata will allow other researchers to know exactly what was done and where. Formats will be compatible with search engines so that queries, summary maps, etc. can be generated by interested parties, including management organizations, politicians and the general public. In the short term (3 years), all data from the hundreds of studies generated by CENBAM will be made available on the web.

Presently, knowledge production chains in the Amazon are limited by the human and laboratory resources in each regional center. By integrating research and teaching of regional centers, extra finance will only need to be sort for resources not available within the Amazon, increasing the effectiveness of constituent organizations. The situation aspired to is that research decisions, including those applying to Manaus, will be made collaboratively by representatives of all regional centers.

The same considerations apply to graduate (masters and doctoral) programs. Presently graduate and undergraduate programs attempt to conduct their activities autonomously, and often integration is difficult even within the same city because competition among programs impedes collaborative projects originating in any of the higher-education institutions. Existing progams, such as Casadinho and PROCAD involve only a few universities at any one time. The situation aspired to is that most programs will exchange professors, experiênce and resources to optimize teaching activities.

The mean productivity of docentes involved in graduate teaching in Amazonian universities is less than 0.1 publication in CAPES level A journals or books, and less than 10% of theses result in publications. Our objective is to increase the mean publication rate of docentes involved in the graduate programs involved in CENBAM to 1 publication in CAPES level A per year (which will allow many of them to qualify as CNPq grant researchers), and >50% of the theses produced in the program published in the short term and >90% in the long term.

Line of inquiry 2 - Standardized Impact Assessment

Today there are no standardized methods of impact assessment and monitoring of large public works, such as dams, highways and ports. The same applies to impacts caused by private industry, such as mining and forestry. Instructions in public notices calling for tenders to evaluate biodiversity-related impacts are generic and reports cannot be used to determine levels of impact or

the societal costs of such impacts. As there are no specific targets for evaluation and monitoring, it is not possible to determine what criteria will be used to approve or not approve the works. Forestry certification is much heralded as a method to ensure ecologically and sociologically sustainable forestry, but current guidelines do not even require monitoring of non-timber forest resources.

There is no coordination among organizations responsible for licensing works at State and Federal levels, or even within those levels, so each impact is evaluated independently as those the effects are not additive and synergistic, instead of on a landscape basis. Forestry certification is undertaken independent of studies in parks and reserves that could serve as controls for impacted areas. Results of each study are filed only within the organization that contracts the study and there are no general standards for data or metadata, so it is imposssible to effectively integrate studies even when data are available.

The situation aspired to in 3 years is that organizations such as IBAMA-DILIC, State Environmental Agencies, and agencies responsible for forestry licensing and certification will have acceptable normative instrucitions (INs) that will have specific targets and spatially and temporally standardized methodology to obtain data, publicly available data bases with data and metadata suitable for integration with data from other sources.

Line of inquiry 3 - Ecosystem Processes

Although plots to estimate above-ground arboreal biomas (AGAB) are distributed throughout the basin (e.g. RAINFOR plots), these have nos standardized methodology for measuring local ecosystem processes. Presently there are only four LTER sites with integrated monitoring of ecosystem processes and biodiversity necessary to develop models of biomass stocks and fluctuations in relation to topographic models. To date, above-ground carbon stocks have been evaluated in only one of those, principally for lack of information on identities of marked trees in other sites. SRTM data are available for the whole of the Amazon basin, but information to relate topographic information to watertable measurements are available for only one small site, so that the software program developed (HAND) may be wildly innacurate for other areas. LIDAR technology may allow much better estimates of forest strucure and biomass, but airborne LIDAR data has only been collected in three LTER sites, and only one of those has an integrated design permitting integration of remote sensing, edaphic and biodiversity data at the mesoscale.

The situation aspired to in 3-5 years is to have a network of at least 20 LTER sites across the basin with integrated data on biodiversity, topography, edaphic variables, water-table dynamics, and estimates of AGAB that will allow evaluation and monitoring of carbon stocks, evaluation of effects of climate on water table dynamics, and calibration of sophisticated methods, such as ground LIDAR and HAND, against on ground measurements made by local people.

Line of inquiry 4 - Biological Surveys

The present situation is that there is only one official CNPq LTER site in the Brazilian Amazon. There are no published cross-site studies for any CNPq LTER sites in Brazil, and no standardized methodology that could permit such comparisons. Within the Amazon basin, public-access data bases are available for only four PPBio-LTER sites, and they are reasonably complete only for Reserva Ducke. The effects of edaphic, topographic and vegetation variables on a large number of taxa using standardized methodology have been undertaken only in Reserva Ducke. Illustrated identification guides in Portuguese to specific Amazonian localities to taxa other than woody plants are available only for Reserva Ducke (guides to frogs and lizards) and the Uatumã Biological Reserve (guides to ferns and plants of the family Marantaceae). Digital guides to morfospecies available on the web are availble only for a small number of groups from Reserva Ducke. All these sites are clustered around Manaus.

The situation aspired to in 3-5 years is to have standardized surveys of at least 10 different biological groups in each of 30 Amazonian LTER sites to permit cross-site comparisons and evaluate geographic covariation among biological groups. The effects of edaphic, topographic and vegetation variables on at least 10 taxa using standardized methodology will be available for at least 20 LTER sites. Illustrated field guides will be available in both paper and digital forms for at least 7 biological groups and guides to at least 10 other taxa will be in production. Digital guides to species and morfospecies will be available on the web to allow cross-site comparisons of at least 20 groups.

Line of inquiry 5 - Biological Collections

The present situation is that only INPA and Museu Paraense Emílio Goeldi are acredited as fiel depositários na Amazônia. Most collections outside Belém and Manaus are precarious ICMBIO does not recognize them for deposit of specimens collected under license. Few collections outside Manaus and Belém allow digital access to information, and only a few botanical collections are available through the web via Brahms online. The public and management agencies has essentially no access to information in condensed form, such as maps of specimen localities.

The situation we aspire to is to have collections of most biological groups in all regional centers that ICMBIO recognizes as of suficient quality for deposit of material from biological inventories. All collections should have digital access (3 years), and information for most will be available online (5 years), with easy acces by the public.

Line of inquiry 6 - Genetics

To date, no species of plants of Amazonian origin with agricultural potential have been genotyped adequately, although various species have been partially analyzed, such as peach palm, cupuaçu and mahogany. Numerous animal species have been partially analyzed, although always with important geographic gaps. There is little information on the relationship between genetic diversity and species diversity within Amazonia, and integrated genetic studies using several taxa from the same sites distributed across the basin have not been undertaken. Most biological surveys, especially those associated with environmental impact statements, do not include provisions for the collection of material for genetic studies, and there are few adequate tissue banks to support future studies. Fewer than 10 species from the Brazilian Amazon have partial sequence data deposited in GENBANK and only one species has been completely sequenced (Chromobacterium violaceum). The laboratory capacity of regional centers is limited both by lack of equipment and associations with other laboratories capable of more specialized analyses.

The situation we aspire to in 3-5 years is to have at least five more species with agricultural potential genetically characterized, with all sequence data deposited in GENBANK. We aspire to have 10 animal species phylogeographically analyzed, with sequence data deposited in GENBANK also. All biological surveys in Amazonian LTER sites will include collection of genetic material where appropriate. Laboratories in all participating regional centers will be integrated with other Amazonian laboratories to make the best use of material collected.

Line of inquiry 7 - Bioprospection

Integrated biological surveys and collection of material for bioprospection has been undertaken only in the Uatumã Biological Reserve and most collections are concentrated near Manaus. Few, if any, taxonomists and ecologists colleting data in biological surveys or monitoring LTER sites have any conception of the potential value of the material they collect for bioprospecting, and they do not collect the material in such a way that it can be made available to specialized laboratories. Therefore laboratories have to collect there own material, duplicating effort

and not making the best use of existing taxonomic expertise. Requests for patents are concentrated in the organizations located in Manaus and Belém.

The situation we aspire to is biological surveys by taxonomists and ecologists that provide material for bioprospection laboratories, regional laboratories capable of obtaining extracts that can be sent to specialized laboratories, and a network of specialized laboratories, both within and outside the Amazon, that can screen extracts for a wide range of uses. The number of patents requested from organizations associated with CENBAM should at least triple in the next 3 years.

m) Budget

The budget by line of inquiry shows how the resources will be shared between all partners and how it will be used. Because, most of the activities will be developed in cooperation among seven regional centers, integrated activities were showed only once and grouped in the line of inquiry with greater affinity. The final table (consolidated budget) shows the totals by item of expenditure and scholarships costs.

Line of Inquiry 1 - Integration of Lines of Inquiry

Expenditure itens	Manaus	RC Acre	RC Amapá	RC Mato Grosso	RC Rondônia	RC Roraima	RC Santarém	Justification
a) Supplies and materials	5.000,00							Undergraduate and graduate courses.
e.1) Travel/transportation	22.285,71	22.285,71	22.285,71	22.285,71	22.285,71	22.285,71	22.285,71	Promote integration between regional centers and lines of inquiry (biannual meetings); participation of teachers and students (Regional Centers) in undergraduate and graduate courses (air tickets).
e.2) Daily costs	5.468,57	5.468,57	5.468,57	5.468,57	5.468,57	5.468,57	5.468,57	Promote integration between regional centers and lines of inquiry (biannual meetings); participation of teachers and students (Regional Centers) in undergraduate and graduate courses.
f) Events/meetings/worshops	100.000,00							CENBAN meeting (third year).
g) Infrastructure	388.080,00							Construction of CENBAN headquarters at Inpa, Manaus: 252 metres building
Capital								
a) Equipment and capital expenditures	31.500,00							Workstation and computers for host the integrated database and web site.
Total expenditure itens	520.834,29	27.754,29	27.754,29	27.754,29	27.754,29	27.754,29	27.754,29	
Total Capital	31.500,00							
Total	**552.334,29**	**27.754,29**	**27.754,29**	**27.754,29**	**27.754,29**	**27.754,29**	**27.754,29**	

Line of Inquiry 2 – Development of standardized methods of short- and long-term biodiversity surveys and monitoring

Expenditure itens	Manaus	RC Acre	RC Amapá	RC Mato Grosso	RC Rondônia	RC Roraima	RC Santarém	Justification
a) Supplies and materials	4.500,00							Undergraduate and graduate courses.
e.1) Travel/transportation		3.700,00	3.700,00	3.700,00	3.700,00	3.700,00	3.700,00	Participation of researchers and students (Regional Centers) in monitoring and public policies definition workshops.
e.2) Daily costs		2.455,00	2.455,00	2.455,00	2.455,00	2.455,00	2.455,00	Participation of researchers and students (Regional Centers) in monitoring and public policies definition workshops.
f) Events/meetings/worshops	100.000,00							Workshops for environmental agencies technicians and researchers about sampling designs and biodiversity monitoring.
Total expenditure itens	104.500,00	6.155,00	6.155,00	6.155,00	6.155,00	6.155,00	6.155,00	
Total Capital								
Total	**104.500,00**	**6.155,00**	**6.155,00**	**6.155,00**	**6.155,00**	**6.155,00**	**6.155,00**	

Line of Inquiry 3 – Evaluation of carbon stocks and hydrological resources in long-term ecological research sites across the basin

Expenditure itens	Manaus	RC Acre	RC Amapá	RC Mato Grosso	RC Rondônia	RC Roraima	RC Santarém	Justification
b.1) Personnel Services	73.500,00	31.500,00	31.500,00	31.500,00	63.000,00	84.000,00	84.000,00	Field expenditure with vegetation structure evaluation. The others costs (Supplies and materials and transportation) are grouped in **line of inquiry 4**)
Capital								
a) Equipment and capital expenditures	25.335,00							LIDAR (Light Detection and Ranging) sensor for vegetation structure measures + GoBook Tablet PC (waterproof PC).
Total expenditure itens	73.500,00	31.500,00	31.500,00	31.500,00	63.000,00	84.000,00	84.000,00	
Total Capital	25.335,00							
Total	**98.835,00**	**31.500,00**	**31.500,00**	**31.500,00**	**63.000,00**	**84.000,00**	**84.000,00**	

Line of Inquiry 4 – Basin-wide studies of biodiversity and the ecological factors that affect it

Expenditure itens	Manaus	RC Acre	RC Amapá	RC Mato Grosso	RC Rondônia	RC Roraima	RC Santarém	Justification
a) Supplies and materials	14.200,00	21.561,06	23.000,00	26.600,00	34.390,00	23.980,00	13.570,00	Field activities. Parataxonomists courses integrated with **line of inquiry and 7** and field materials necessary used in **line of inquiry 3.**
b.1) Personnel Services	10.890,00	18.803,33	15.500,00	27.230,80	38.020,20	19.670,00	11.000,00	Field assistants for training parataxonomists (parataxonomists courses) integrated with **line of inquiry 7**.
b.2) Contractual Services	5.600,00	6.789,00	3.000,00	2.400,00	5.980,00	6.780,00		Topography service.
e.1) Travel/transportation	17.430,00	17.459,18	15.000,00	14.120,00	18.430,00	14.150,00	6.000,00	Researchers, students and technicians transportation through PELD sites for sampling and training courses (**integrated with line of inquiry 3 and 7**).
e.2) Daily costs	4.780,00	7.780,00	4.980,00	9.760,00	9.450,00	8.530,00	3.890,00	Coordination activities of field courses (Specialists and parataxonomists) **integrated with line of inquiry 7**.
Capital								
a) Equipment and capital expenditures	110.000,00	110.000,00	5.000,00	110.000,00	32.230,00	28.970,00	8.670,00	Pick-up 4x4 to field activities (BR-319 - Humaitá, Acre and Mato Grosso) and sampling equipment.
Total expenditure itens	52.900,00	72.392,57	61.480,00	80.110,80	106.270,20	73.110,00	34.460,00	
Total Capital	110.000,00	110.000,00	5.000,00	110.000,00	32.230,00	28.970,00	8.670,00	
Total	**162.900,00**	**182.392,57**	**66.480,00**	**190.110,80**	**138.500,20**	**102.080,00**	**43.130,00**	

Line of Inquiry 5 – Restructuring and modernization of Amazonian biological collections

Expenditure itens	Manaus	RC Acre	RC Amapá	RC Mato Grosso	RC Rondônia	RC Roraima	RC Santarém	Justification
a) Supplies and materials	31.300,00							Taxonomy field courses (botany and zoology) for graduate and post-graduate students, teachers and researchers from Regional Centers; non-academic activities detailed in **line of inquiry 6**.
b.1) Personnel Services	7.500,00							Field assistants for taxonomy field courses (botany and zoology).
e.1) Travel/transportation	10.000,00	6.000,00	6.000,00	5.000,00	5.000,00	6.000,00	5.000,00	Participation of teachers, researchers and students (Regional Centers) in Taxonomy field courses (botany and zoology).
e.2) Daily costs	10.600,00	4.000,00	4.000,00	4.000,00	4.000,00	4.000,00	4.000,00	Participation of teachers, researchers and students (Regional Centers) in Taxonomy field courses (botany and zoology).
g) Infrastructure		231.000,00	15.400,00	308.000,00	92.400,00	369.600,00		Construction or expansion of Regional Center's Biological Collections (zoology, microbiology and botany).
Total expenditure itens	59.400,00	241.000,00	25.400,00	317.000,00	101.400,00	379.600,00	9.000,00	
Total Capital								
Total	**59.400,00**	**241.000,00**	**25.400,00**	**317.000,00**	**101.400,00**	**379.600,00**	**9.000,00**	

Line of Inquiry 6 – Genetics applied to biodiversity

Expenditure itens	Manaus	RC Acre	RC Amapá	RC Mato Grosso	RC Rondônia	RC Roraima	RC Santarém	Justification
a) Supplies and materials	5.000,00	2.000,00	2.000,00	2.000,00	2.000,00	2.000,00	2.000,00	Non-academic activities (knowledge transfer).
b.1) Personnel Services	5.000,00	1.000,00	1.000,00	1.000,00	1.000,00	1.000,00	1.000,00	Installation and equipments maintenance necessary for execution of research.
b.2) Contractual Services	215.000,00	2.500,00	2.500,00	2.500,00	2.500,00	2.500,00	2.500,00	Installation and equipments maintenance necessary for execution of research.
e.1) Travel/transportation	6.000,00	3.000,00	3.000,00	3.000,00	3.000,00	3.000,00	3.000,00	Travels necessary to training Regional Center's researchers in non-academic activities; participation of researchers and students (Regional Centers) in research stages.
e.2) Daily costs	5.000,00	2.000,00	2.000,00	2.000,00	2.000,00	2.000,00	2.000,00	Daily costs necessary to training Regional Center's researchers in non-academic activities; participation of researchers and students (Regional Centers) in research stages.
Capital								
a) Equipment and capital expenditures	211.900,00	27.800,00	21.257,00	25.816,00	28.987,53	17.222,80	20.616,67	Equipments for modernization and expansion of the productive chain at Regional Centers.
Total expenditure itens	236.000,00	10.500,00	10.500,00	10.500,00	10.500,00	10.500,00	10.500,00	
Total Capital	211.900,00	27.800,00	21.257,00	25.816,00	28.987,53	17.222,80	20.616,67	
Total	**447.900,00**	**38.300,00**	**31.757,00**	**36.316,00**	**39.487,53**	**27.722,80**	**31.116,67**	

Line of Inquiry 7 – Bioprospection for nutraceutics, phytocosmetics, phytoinsecticides and phytofarmaceuticals

Expenditure itens	Manaus	RC Acre	RC Amapá	RC Mato Grosso	RC Rondônia	RC Roraima	RC Santarém	Justification
a) Supplies and materials		1.000,00	1.000,00	1.000,00	1.000,00	1.000,00	1.000,00	Supplies and materials required to environmental producing chain diagnosis
b.1) Personnel Services		1.500,00	1.500,00	1.500,00	1.500,00	1.500,00	1.500,00	Field assistants for environmental producing chain diagnosis
b.2) Contractual Services	16.000,00	1.000,00	1.000,00	1.000,00	1.000,00	1.000,00	1.000,00	Installation and equipments maintenance.
e.1) Travel/transportation		2.000,00	2.000,00	2.000,00	2.000,00	2.000,00	2.000,00	Travels necessary to environmental producing chain diagnosis.
Capital								
a) Equipment and capital expenditures	443.195,00	18.000,00	5.200,00	67.000,00	10.000,00	5.700,00	17.650,00	Equipment needed to match the production chain of biological material from Regional Centers
Total expenditure itens	16.000,00	5.500,00	5.500,00	5.500,00	5.500,00	5.500,00	5.500,00	
Total Capital	443.195,00	18.000,00	5.200,00	67.000,00	10.000,00	5.700,00	17.650,00	
Total	**459.195,00**	**23.500,00**	**10.700,00**	**72.500,00**	**15.500,00**	**11.200,00**	**23.150,00**	

Consolidated budget

Expenditure itens	Year 1	Year 2	Year 3	Total
a) Supplies and materials	66.330,32	88.440,42	66.330,32	221.101,06
b.1) Personnel Services[##]	170.284,30	227.045,73	170.284,30	567.614,33
b.2) Contractual Services**	199.575,70	266.100,94	199.575,70	665.252,35
d) Other costs	0,00	0,00	0,00	0,00
e.1) Travel/transportation	107.936,75	143.915,67	107.936,75	359.789,18
e.2) Daily costs	46.134,00	61.512,00	46.134,00	153.780,00
f) Events/meetings/worshops	60.000,00	80.000,00	60.000,00	200.000,00
g) Infrastructure	421.344,00	561.792,00	421.344,00	1.404.480,00
Scholarships	448.644,36	448.644,36	448.644,36	1.345.933,08
Capital				
a) Equipment and capital expenditures	414.615,00	552.820,00	414.615,00	1.382.050,00
Destination of 30% of the total value for subsequent decisions of the Institute Committee	810.000,00	1.080.000,00	810.000,00	2.700.000,00
Total expenditure itens	2.330.249,44	2.957.451,13	2.330.249,44	7.617.950,00
Total Capital	414.615,00	552.820,00	414.615,00	1.382.050,00
Total	**2.744.864,43**	**3.510.271,13**	**2.744.864,43**	**9.000.000,00**

[##] The services mentioned in this expenditure item not formalize employment with the CNPq or other donor of this call for proposal.

** According to this call for proposal, the expenditure item "Contractual Services" includes 5% (five percent) of the proposed values (except costs with Scholarships) for operational and administrative expenses, according to the Brazilian Federal Law of Innovation No. 10,973.

Parallel to this proposal we are requesting to FAPEAM (Amazonas State Research Foundation) four management fellowships, a category not included in this call for proposal. These people will work with CENBAM coordinators and participate in the formation of new Regional Centers within the State of Amazonas (Humaitá and São Gabriel da Cachoeira).

n) Explanation, when appropriate, of the potential to generate patents, prototypes e technological products, of mechanisms for transfer of the technologia developed and institucional support for this activity

The line of inquiry “Bioprospection for nutricional products, phytocosmetics, vegetable insecticides and plant pharmaceuticals" has great potential to generate patents and products. INPA has a Department of Intellectual Property - DPIN, which will assist all members of the team in the bureaucratic procedures for obtaining patents and products. Other participating organizations also have their own departments of intellectual property. This is the most developed part of the knowledge-production chain.

o) relação dos projetos financiados nos últimos 5 anos (vigentes ou encerrados) envolvendo os componentes da equipe, incluindo títulos, valores, vigência e agências financiadoras, indicando de que forma se relacionam com a presente solicitação

We do not list how these proposals relate individually to the current project because they are all obviously directly linked to the theme and were part of the pilot projects that provided proof of concept for all of the activities listed in this proposal.

1. **Dr William Ernest Magnusson,**

Title of the project: Subsidies for management of micro-basins in the Amazon: studies integrated into Ducke Reserve and the National Park of Viruá. Coordinator
Funding agency: CNPq
Tipo de auxilio: MCT / CNPq CT-HIDRO - 044/2006
Value: R$ 110.363,84
Period: 2006- atual
Instituição: INPA

Title of the project: Biomass, structure and vegetation composition of the Uatumã Biological Reserve – Central Amazon. Coordinator.
Funding agency: CNPq
Tipo de auxílio:MCT/CNPq/PPG7 Nº 048/2005
Value: R$ 69.000,00
Period: 2007 - 2009
Instituição: INPA

Title of the project: Sustainable development through the alligator’s productive chain (Melanosuchus niger e Caiman crocodilus) in the subsidiary area of Mamirauá Reserve, Fonte Boa municipality, AM. Coodinator.
Funding agency: CNPq
Tipo de auxílio: Edital MCT/CNPq/CT-INFRA/SEAP-PR nº 16/06
Value: R$ 59.5484,37
Period: 28/08/2006 -2008
Instituição: INPA

Title of the project: Research network: Conservation and management of the Amazon biota: Ecological bases for the region’s rational development. Coordinator

Funding agency: INPA
Tipo de auxílio: Projeto Interno
Value: R$ 28.532,00
Period: abril/2008 a abril/2010
Instituição: INPA

Title of the project: Temporal variation in the ichthyofauna of terra firme creeks, Ducke Reserve, Central Amazon.
Funding agency: O Boticário
Tipo de auxílio: 0692/2005
Value: R$ 18.935,88
Period: Setembro/2005 duração 48 meses
Instituição: INPA

Title of the project: Planning the biodiversity survey and monitoring the ecosystems process
Funding agency: CNPq/FAPEAM - PRONEX
Tipo de auxílio: Edital CNPq/FAPEAM/ PRONEX - 016/2006
Value: R$ 150.000,00 Banco Bradesco, R$ 200.000,00 Banco do Brasil
Period: Novembro/2007 duração 48 meses
Instituição: INPA

Title of the project: Ecological bases for the sustainable development and the Amazon conservation.
Funding agency: Projeto Interno INPA
Tipo de auxílio: nº 05.70
Value: R$ 51.600,00
Period: janeiro/2006 duração 24 meses
Instituição: INPA

Title of the project: Amazon biodiversity assessment: bases for the regions' sustainable development.
Funding agency: CNPq
Tipo de auxílio: Edital MCT/CNPq 02/2006
Value: R$ 49.500,00
Period: outubro/2006 - outubro/2008
Instituição: INPA

Title of the project: Biomass, structure and vegetation composition of the Uatumã Biological Reserve – Central Amazon. Coodinator.
Funding agency: CNPq
Tipo de auxílio: MCT/CNPq/PPG7 Nº 048/2005
Value: R$ 105.458,69
Period: janeiro/2006 duração 30 meses
Instituição: INPA

Title of the project: Inventory component, PPBio, Executive nuclei of the Western Amazon.
Funding agency: CNPq
Tipo de auxílio: Edital MCT/CNPq 57/2005- Apoio Técnico, Bolsas de apoio técnico – AT/NM e AT/NS
Value: R$ 18.792,14
Period: agosto/2006 duração 24 meses
Instituição: INPA

Title of the project: Amazon Biodiversity: distribution, biomass, conservation and uses.
Funding agency: CNPq

Tipo de auxílio: Edital Universal
Value: R$ 99.929,90
Period: novembro/2003 duração 24 meses
Instituição: INPA

Title of the project: Assessment and monitoring of natural resources and the climate change effects: a proposal to standardized and integrated studies into the Amazon (PPG-Ecologia/INPA, PPG-EMRN/UFAC, PRONAT / UFRR, PPG-SER/INPE)
Coordenador: William Magnusson
Financiador: CAPES/PROCAD Nacional
Value: R$ 250.000,00
Period: 2008-2012

Title of the project: Proposal for equipment financing for the Laboratory of Ecology and Biodiversity - LEBio (PPG-Ecologia/INPA)
Coordenador: William Magnusson
Financiador: CAPES/PRO-EQUIPAMENTOS
Value: R$ 83.700,00
Period: 2007-2008

2. **Dr Regina Luizão**

Title of the project: Arbuscular mycorrhizal fungi: diversity, abundance and distribution along a topographical gradient in a pristine rainforest in central Amazonia.
Processo: 477493/2006-8
Funding agency: CNPq
Tipo de auxílio: Universal no. 02/2006
Value: R$31.000,00
Period: 03/2005 a 09/2008
Instituição: INPA

Title of the project: Ecological leadership for the Amazon: empowering society through science Dr. Regina Luizão (em parceria com William Laurance e Thomas Lovejoy)
Funding agency: Marisla Foundation
Tipo de auxílio: Auxílio à pesquisa
Value: US$ 140.000,00
Period: 10/2004 a 09/2008
Instituição: INPA

Title of the project: Strategic Research and Protected-Area Management in Central Amazonia. Dr. Regina Luizão (em parceria com William Laurance e Thomas Lovejoy)
Funding agency: Blue Moon Fundation
Tipo de auxílio: Auxílio à pesquisa
Value: US$100.000
Period: 01/01/2007 a 31/12/2008
Instituição: INPA

Title of the project: Training program of the Large Scale Biosphere-Atmosphere Experiment in Amazonia (LBA). Proc. No. 68.0051/2003-1
Funding agency: CNPq
Tipo de auxílio: Projetos Especiais/ Auxilio
Value: R$ 1.164.317,28
Period: 05/ 2003/ 2006

Instituição: INPA

3. **Dr Albertina Lima**

Title of the project: Effects of topography, soil and vegetation structure and composition on the distribution and dynamics of populations and communities of amphibian, reptiles and understory palms.
Funding agency: CNPq
Tipo de auxílio: PNOPG # 550651
Value: R$ 45.000,00
Period: 2002 a 2004
Instituição: INPA

Title of the project: Apprentice biologists: understanding and appreciating the Amazon Biodiversity.
Funding agency: FAPEAM
Tipo de auxílio: financeiro
Value: R$ 27.314,68
Period: 2003 a 2004
Instituição: INPA

Title of the project: Assessment of the Potential of abiotic factors as indicators of the diversity of frogs in an area of Central Amazon: Subsidies for the integrated conservation of species
Funding agency: CNPq
Tipo de auxílio: # 471453/03 -0
Value: R$ 20.000,00
Period: 2003 a 2004
Instituição: INPA

Title of the project: Seed dispersal and the community of dispersers in anthropogenic landscapes in the Brazilian Amazonia
Funding agency: Fundação Nacional de Ciências do Estados Unidos – Projeto de cooperação com a Univ. Estadual de Delaware, Depart. de Agricultura e Recursos Naturais, USA – CNPq/Exedição Cientifica # CMC-032/03
Tipo de auxílio: financeiro
Value: $ 20.000,00
Period: 2004 a 2006
Instituição: INPA

Title of the project: Evolutive factors related to the morphologic, bioacoustic and molecular diversity of Epipedobates (Allobates) femoralis (Anura, Dendrobatidae).
Funding agency: Fundação Nacional de Ciências da Áustria - Projeto de cooperação com a Univ. Viena, Áustria - CNPq/Expedição Científica # CMC 092/02
Tipo de auxílio: financeiro
Value: 2003 a 2004
Period: : € 150.000,00
Instituição: INPA

Title of the project: Environmental studies on the Madeira river, cachoeira de Santo Antonio – Abunã (Rôndonia): Herpetofauna inventory.
Funding agency: FURNAS
Tipo de auxílio: financeiro
Value: R$ 150.000,00
Period: 2003-2004
Instituição: INPA

Title of the project: Diversity and ecology of *Colostethus marchesianus* (Dendrobatidae, Anura) complex: the importance of the great Amazonian Rivers as biogeographic barriers.
Funding agency: CNPq # 460233/00-9
Tipo de auxílio: financeiro
Value: R$ 18.431,00
Period: 2001 a 2002
Instituição: INPA

Title of the project: Infrastructure for the Postgraduate Program in Ecology: Conservation and Management of Amazon environments
Coordenador: Albertina Lima
Financiador: FAPEAM/INFRA
Valor: R$ 500.000,00
Duração: 2006-2009

4. **Dr Flávia Costa**

Title of the project: Beta diversity of understory herbs in central Amazonia as a subsidy for the Conservation Planning
Funding agency: FAPEAM,
Tipo de auxílio: financeiro
Value: R$25.000,00
Period: 2007 - Atual
Instituição: INPA

Title of the project: Diversity and distribution of palm trees (Arecaceae) in relation to environmental gradients along the BR 319, interfluvium Purus-Madeira, AM.
Funding agency: Fundaçao O Boticário
Tipo de auxílio: financeiro
Value: R$ 13.000,00
Period: 2006 - 2007
Instituição: INPA

Title of the project: Effects of fragmentation on terrestrial understory herbs
Funding agency: INPA/Smithsonian,
Tipo de auxílio: financeiro
Value: R$ 5.000,00
Period: 2004 - 2005
Instituição: INPA

Title of the project: Beta diversity of the vegetation community along the interfluvium Purus-Madeira in order to determine the target areas to conservation.
Funding agency: FAPEAM
Tipo de auxílio: financeiro
Value: R$ 50.000,00
Period: 2004 - 2007
Instituição: INPA

Title of the project: Training in floristic inventory in Amazonia
Funding agency: FAPEAM,
Tipo de auxílio: financeiro
Value: R$ 10.000,00
Period: 2004 - 2005

Instituição: INPA

Title of the project: Spatial distribution pattern of Marantaceae in terra-firme forest in central Amazonia
Funding agency: INPA/PDBFF/Smithsonian
Tipo de auxílio: financeiro
Value: R$ 2.500,00
Period: 2006-2007
Instituição: INPA

Title of the project: Beta diversity of pteridophyte assemblages in a terra-firme Forest in Central Amazonia
Funding agency: INPA/PDBFF/Smithsonian
Tipo de auxílio: financeiro
Value: R$ 10.000,00
Period: 2004-2005
Instituição: INPA

Title of the project: Distribution and conservation of pteridophyte in Central Amazonia
Funding agency: Fundação O Boticário
Tipo de auxílio: Financeiro
Value:R$ 7.500,00
Period: 2004-2005
Instituição: INPA

5. **Dr Marcelo Menin**

Title of the project: Biological diversity in Central Amazonia: subsidy for integrated surveys.
Funding agency: CNPq 470375/2006-0
Tipo de auxílio: Auxílio Pesquisa / Individual
Value: 34.700,00
Period: fev/2007 a fev/2009
Instituição: Universidade Federal do Amazonas

Title of the project: Herpetofauna associated with aquatic environments in Central Amazonia: subsidy for the identification of bioindicator species.
Funding agency: CNPq 555268/2006-3
Tipo de auxílio: Auxílio Pesquisa / Individual
Value: 71.000,00
Period: nov/2007 a nov/2009
Instituição: Universidade Federal do Amazonas

6. **Dr. Jorge Ivan Rebelo Porto**

Title of the project: Consolidation of the Center of excellence in biotechnology of INPA: teaching and research in western Amazonia
Funding agency: FINEP
Tipo de auxílio: Infraestrutura
Value: R$ 500.000,00
Period:2006-2009
Instituição: INPA

Title of the project: Brazilian Genome Project – National network of DNA sequencing Coordenador Institucional.

Funding agency: Conselho Nacional de Desenvolvimento Científico e Tecnológico
Tipo de auxílio: - Auxílio financeiro
Value: 397.000,00
Period:2000-2009
Instituição: INPA

Title of the project: Legal Amazonia network: genomic analysis of *Paullinia cupana:* the guaraná tree.
Funding agency: Governo do Estado do Amazonas - Auxílio financeiro / Conselho Nacional de Desenvolvimento Científico e Tecnológico
Tipo de auxílio: Auxílio financeiro
Value: 100.000,00
Period:2003-2006
Instituição: INPA

7. **Dra Izeni Farias**

Title of the project: Biotechnology applied in the study of the economic important fish populations in Amazonia
Funding agency: Conselho Nacional de Desenvolvimento Científico e Tecnológico
Tipo de auxílio: financeiro
Period: 2006-2010
Instituição:UFAM

Title of the project: Genetics, conservation and management of the aquatic fauna of Amazonian várzea.
Funding agency: Conselho Nacional de Desenvolvimento Científico e Tecnológico
Tipo de auxílio: financeiro
Period: 2006-2008
Instituição: UFAM

Title of the project: Development of microsatellite DNA markers in order to determine the paternity and genetic analysis of Chelonia populations in Amazonia.
Funding agency: Conselho Nacional de Desenvolvimento Científico e Tecnológico
Tipo de auxílio: financeiro
Period: 2006-2008
Instituição: UFAM

Title of the project: Applying the biotechnological methods in the study of the reproduction of pirarucu (Arapaima gigas), an economic important fish to Amazonia.
Funding agency: Conselho Nacional de Desenvolvimento Científico e Tecnológico
Tipo de auxílio: financeiro
Period: 2005-2008
Instituição: UFAM

Title of the project: Creation of the Integrated Center of Studies in Conservation and Management of Water Resources.
Funding agency: Fundacao de Amparo a Pesquisa do Estado do Amazonas
Tipo de auxílio: financeiro
Period: 2005-atual
Instituição: UFAM

Title of the project: Multidisciplinary Assessment to the set up of a lake system management in

order to preserve the pirarucu (Arapaima gigas) in natural environment in the Amazon State.
Funding agency: Fundacao de Amparo a Pesquisa do Estado do Amazonas
Tipo de auxílio: financeiro
Period: 2004-2007
Instituição: UFAM

Title of the project: Assessment of the genetic variability of two species of ornamental fish of the Mamirauá Sustainable Development Reserve: implications for the management and conservation
Funding agency: Instituto de Desenvolvimento Sustentável Mamirauá
Tipo de auxílio: financeiro
Period: 2004-2006
Instituição: UFAM

8. Dr Charles Clement

Title of the project: An origin of pejibaye in southwestern Amazonia?
Funding agency: Conselho Nacional de Desenvolvimento Científico e Tecnológico
Tipo de auxílio: financeiro (CNPq Universal 02/2006)
Value: R$35.000
Period: 2006-atual
Instituição: INPA / UFAM
Equipe: Clement, Charles R. - Coordenador; Rodrigues, Doriane P.; Ferreira, Evandro J.L.; Astolfi-Filho, Spartaco; Araújo, Michelly de Cristo.

Title of the project: Pejibaye - landraces and wild populations
Funding agency: Ministério do Meio Ambiente e da Amazonia Legal
Tipo de auxílio: financeiro (ProBio MMA)
Value: R$137.300
Period: 2004-2006
Instituição: INPA
Equipe: Clement, Charles R. - coordenador; Ferreira, Evandro J.L.; Farias Neto, J.Tome

Title of the project: Genetic diversity and gene flux within and among pejibaye populations in the Yurimaguas area to support the palmheart improvement program.
Funding agency: FAPEAM
Tipo de auxilio: financeiro (PIPT 01/2003)
Value: R$ 40.200
Period: 2003-2006
Instituição: INPA / UFAM
Equipe: Clement, Charles R. - Coordenador; Astolfi-Filho, Spartaco; Rodrigues, Doriane P.

Title of the project: A Core Collection of pejibaye in Brazilian Amazonia.
Funding agency: CNPq
Tipo de auxilio: financeiro (CNPq Universal 01/2002)
Value: R$ 77.100
Period: 2003-2006
Instituição: INPA / UFAM
Equipe: Clement, Charles R. - Coordenador; Astolfi-Filho, S.; Rodrigues, Doriane P.; Araújo, Michelly de Cristo

Title of the project: Enhancing the value of pejibaye genetic resources in Brazilian Amazônia.
Funding agency: CNPq
Tipo de auxilio: financeiro (Programa do Trópico Úmido - PTU/CNPq)

Value: R$ 33.800
Period: 2001-2003
Instituição: INPA / UFAM
Equipe: Clement, Charles R. - Coordenador; Astolfi-Filho, Spartaco; Rodrigues, Doriane P.; Silva, Cirlande C.

Title of the project: Discrimination of pejibaye landraces maintained in the BAG-Pupunha with molecular markers (RAPDs).
Funding agency: Banco da Amazônia, S.A. (BASA)
Tipo de auxilio: financeiro
Value: R$ 47.700
Period: 2000-2002
Instituição: INPA / UFAM
Equipe: Clement, Charles R. - Coordenador; Astolfi-Filho, Spartaco; Rodrigues, Doriane P.; Silva, Cirlande C.

9. Dr Elizabeth Franklin

Projeto: Soil Invertebrate populations and communities in the Adolpho Ducke Reserve.
Função: Coordenadora
Período: 2002-2005
Agência financiadora: PNOPG – CNPq.
Valor: R$ 57.000,00.

Projeto: Mite diversity in commercial orchards in Manaus, Amazonas, with emphasis in the families Tenuipalpidae and Eryophiidae
Função: Coordenadora
Período: 2003-2006
Agência financiadora: PIPT/FAPEAM
Valor: R$ 37.000,00

Projeto: Adolpho Ducke Reserve: an Amazonian model for the biodiversity inventory and characterization
Coordenador: José A. Rafael.
Função: Pesquisadora
Período: 2003-2006
Agência financiadora: EDITAL UNIVERSAL 01/2002/EDITAL/CNPQ 01/2002
Valor: R$ 100.000,00.

Projeto: Soil Arthropods diversity with emphasis in Formicidae, Diplura, Scorpiones, Pseudoscorpionida and Acari Oribatida in the Ducke Reserve, Manaus, AM
Função: Coordenadora
Período: 2008-2010
Agência financiadora: PIPT/FAPEAM
Valor: R$ 24.000,00

10. Dr Marcos Vital

Título: Biotechnology Nuclei
Funding agency:CNPq
Típo de auxílio: CT-Amazonia/FINEP
Value: R$ 2.100,000,00
Period: 2005-2008
Instituição: UFRR

Título: Infrastructure for the development and consolidation of post-graduate degree in Natural Resources, to make available to biotechnology
Funding agency:FINEP
Típo de auxílio: CT-Amazônia/FINEP
Value: R$ 1.200,000,00
Period: 2006-2008
Instituição: UFRR

Título: Center for Studies of Biodiversity
Funding agency:FINEP
Típo de auxílio: CT-Infra/FINEP
Value: R$ 450,000,00;
Period: 2005-2008
Instituição: UFRR

Título: Complementing the structure of research at the Center for Studies of Biodiversity
Funding agency: FINEP
Típo de auxílio: CT-Infra/FINEP
Value: R$ 760.000,00
Period: 2006-2008
Instituição: UFRR

Título: Consolidation of the structure of research and postgraduate of UFRR
Funding agency: FINEP
Típo de auxílio: CT-Infra/FINEP
Value: R$ 460.000,00
Period: 2007-2009
Instituição: UFRR

Título: Ecology and potential of plant resources of the state of Roraima
Funding agency: PQI-CAPES/UFRR/UFRPE/UFPB
Típo de auxílio: financeiro
Value: R$ 330.000,00
Period: 2003-2007
Instituição: UFRR

Título: Genetic prospecting and improvement of fruit plants adapted to soil and climate conditions of Roraima
Funding agency: PQI-CAPES/UFRR/UFV
Típo de auxílio: financeiro
Value: R$ 430.000,00
Period: 2003-2007
Instituição: UFRR

Título: Biotechnological Potential of yeast isolated from soil
Funding agency: CAPES-CNPq
Típo de auxílio: financeiro
Value: R$ 43.000,00
Period: 2003-2007
Instituição: UFRR

Título: Water Resources Monitoring of the State of Roraima - Microbiological Components
Funding agency: MMA-CNPq-CAPES

Típo de auxílio: Auxílio Financeiro
Value: R$ 280.000,00
Period: 2003-2007
Instituição: UFRR

11. Dr Angelo Gilberto Manzatto

Title of the project: Diversity, Structure and Dynamics in 10ha of Permanent Plots of Amazon rainforest in the Upper Madeira River, state of Rondonia, Brazil.
Cargo: Coordenador do projeto
Funding agency: CNPq/Seplad – Processo n. 350243/2005-0
Tipo de auxílio: Auxílio financeiro.
Value: R$ 130.800,00
Period: 2005-2008.
Instituição: Universidade Federal de Rondônia - Lab. de Biogeoquímica Ambiental

Title of the project: Network of academic cooperation for the training of human resources in development and validation of methods relevant to agribusiness, the oil industry, the pharmaceutical industry and the environment.
Cargo: Coordenador do projeto
Funding agency: Capes/Procad 01/2007 – Projeto n. 211/2007.
Tipo de auxílio: Cooperação acadêmica - Apoio a cursos de pós-graduação.
Value: R$ 57.983,24
Period: 2007-2010.
Instituição: Universidade Federal de Rondônia - Lab. de Biogeoquímica Ambiental

Title of the project: Space and multivariate modeling of the georeferenced data bank to the environmental zoning of the sub catchment of the Madeira river.
Cargo: Vice-Coordenador do projeto
Funding agency: MCT/CNPq/PPG7 – Processo n. 556972/2005-8.
Tipo de auxílio: Auxílio financeiro e bolsas.
Value: R$ 142.292,24
Period: 2005-2008.
Instituição: Universidade Federal de Rondônia - Lab. de Biogeoquímica Ambiental

12. Dr Cecília Nunes

Title of the project: New Amazon antioxidants for cosmetics and beverages
Funding agency: FAPEAM
Tipo de auxílio: Auxílio à Pesquisa – Edital Temático
Value: R$ 135.000,00
Period: 2004-2007.
Instituição: INPA

Title of the project: PPBio: Topic component – PPBio-INPA
Funding agency: CNPq/MCT
Tipo de auxílio: Auxílio à Pesquisa
Value: R$ 327.700,00 (2004-2005 divido com o MPEG)
Period: 2004-2007.
Instituição: INPA

Title of the project: Identification, isolation and purification of bioactive substances in control of insects, bacteria and other pests and its economic viability.
Funding agency: CNPq/MCT

Tipo de auxílio: Auxílio à Pesquisa – Edital CT-Agro
Value: R$ 600.000,00
Period: 2008-2010.
Instituição: INPA

13. Dr Marcos Silveira

Título: Mobilizing Taxonomic Experts for Acre - Phase II
Value: R$ 450.000,00
Period: 2007 - 2012
Financiador: Beneficia Foundation

Título: Edge Effects on a remaining forest in south-western Amazon: Acre
Value: R$ 270,000.00
Period: 2006 - 2009
Financiador: CNPq

Título: Natural regeneration of species exploited by logging activity in the state of Acre
Value: R$ 16.000,00
Period: 2006 - 2008
Financiador: CNPq

14. Dr Domingos Rodrigues

Title of the project: Influence of five types of pesticides on the development and survival of four species of tadpoles (Amphibia: Anura) in the Amazon-Mato Grosso.
Funding agency: CNPq
Tipo de auxílio: Financeiro
Value: 19.952,00
Period: 2008-2010

Title of the project: Field Guide to the anurans of the South Pantanal and Surrounding Cerrados.FAPEMAT processo n. 398/07
Funding agency: FAPEMAT e CI do Brasil
Tipo de auxílio: Financeiro
Value: 18.000,00 e 5.000,00
Period: 2007-2008

Title of the project: Influence of biotic and abiotic factors in the temporal and spatial distribution of communities of tadpoles in temporary pound in 64 km2 of terra-firme Forest in Central Amazon
Funding agency: CNPq
Tipo de auxílio: Financeiro (bolsa)
Period: 2003-2006

Title of the project: Assessment of the Potential of abiotic factors as indicators of the diversity of frogs in an area of Central Amazon: Subsidies for the integrated conservation of species
Funding agency: CNPq
Tipo de auxílio: Financeiro
Value: 20.000,00
Period: 2003-2005

15. Dr Fabiano Cesarino.

Título: Development of Research and Exploration of Native Plants for the production of biodiesel

in the state of Amapa
Funding agency: Financiadora de Estudos e Projetos - Auxílio financeiro / Secretaria de Estado de Ciência e Tecnologia do Amazonas - Cooperação / Instituto de Pesquisas Científicas e Tecnológicas do Estado do Amapá - Cooperação / Empresa Brasileira de Pesquisa Agropecuária - Cooperação..
Típo de auxílio: financeiro
Period: 2005-atual
Instituição: IEPA

Título: Seeds and seedlings technology for implementation of agroforestry systems.
Funding agency: Instituto de Pesquisas Científicas e Tecnológicas do Estado do Amapá - Auxílio financeiro
Típo de auxílio: financeiro
Period: 2002-atual
Instituição: IEPA

16. Claudia Keller

Title of the project: Habitat selection, abundance estimates and molecular markers of jaguar, Panthera onca, in fragmented and continuous environments in Brazil and Mexico (international cooperation INPA / Brazil, EB Doñana / Spain and UNAM / Mexico)
Coordenador no Brasil: Claudia Keller
Financiador: Fundación BBVA (Espanha)
Valor: 500.000,00 Euros
Período duração: 2006-2009

Title of the project: Advances in assessment and monitoring of biological diversity: a challenge for the Amazon in an era of global change (PPG-Ecologia/INPA, PPGBIO / UNIFAP)
Coordenadores: Fabiano Cesarino (IEPA/AP) e Claudia Keller (INPA/AM)
Financiador: CAPES/PROCAD-Novas Fronteiras
Valor: R$ 250.000,00
Período duração: 2007-2010

q) Eventual institutional counterpart contributions or other sources for executing the program, such as new constructions, new contracts for scientifiic or administrative personnel for the program, possibility to absorb researchers that graduate within the program, support for administration and mangement, and the waving or partial covering of operational and administrative costs indicated in item 1.8.4.2 of this notice

INPA and all of the contributing organizations are providing administrative support through grants to administration trainees (bolsas de gestão), by scholarships to researchers (PCI), maintenance of field sites without covering use fees, by allocating staff to supervise the interaction with the support foundation, by maintaining and expanding regional offices (buildings and staff) in Acre, Rondônia and Roraima with support of the Ministry of Science and Technology, and by absorbing most of the costs of training and graduate courses. The institutions involved in this proposal have the highest aggregate capability in the region to absorb graduates in biodiversity-related topics. INPA will hire 14 new scientists and technologists this year, all in fields directly related to this proposal.

r) detailed execution schedule of all activities for the first two years, and a summary version for the following three years, including all associated groups and laboratories

FIRST SEMESTER

Line of inquiry 1
Goal 1.1.1.Install the infrastructure needed to integrate information produced by regional centers and configures access and WEB and DBMS servers;
Goal1.1.2. Built the database structure and analyze information type and flux produced by each CENBAM´s line of inquiry.

Line of inquiry 2
Goal 2.1.1. Promote 1 workshop for technicians of environmental agencies and researchers, to define target-groups and sampling designs and monitoring compatibles with logistic and financial limitations of RAP studies;
Goal 2.1.2. Promote 1 course for technicians of environmental agencies to develop the capacity of agencies to deal with data produced by RAP studies.

Line of inquiry 3
Goal 3.1.1. Start vegetation survey to estimate above ground tree biomass and install hydrological monitoring equipment on 5 LTER sites located on threatened regions. Those are the ones located on the areas where deforestation process happens more quickly, in the arc of deforestation, (RO, MT and AC) or on modules next to the roads BR 163 (PA) and BR 319 (AM);
Goal 3.1.2. Offer vegetation biometry, hydrological instrumentation and soil measurements training courses for the 5 LTER coordinators and students which will conduct the field measurements listed on goal 3.1.1;
Goal 3.1.3. Establish and training a field team, composed by local people, who will realize vegetation surveys (trees with dbh > 1 cm measurements), soil surveys and install hydrological monitoring instrumentation for the 5 LTER sites listed on goal 3.1.1;
Goal 3.1.4. Install piezometers and pluviometers and start monitoring of water table level and local precipitation;
Goal 3.1.5. Realize permanent plots trees numeration and measurement at the 5 LTER sites for the above ground tree biomass estimative;
Goal 3.1.6. Soil samples surveying (2 m profiles) at the 5 LTER sites for soil carbon stocks estimative.

Line of inquiry 4
Goal 4.1.1. Implementation of LTER site in Acre (1 grid in “PE Chandless” and 3 modules along BR-225 road between Cruzeiro do Sul and Rio Branco);
Goal 4.1.2. Establish 1 LTER site (3 modules) in State of Mato Grosso, Sinop region;
Goal 4.1.3. Establish 1 LTER site (1 grid) in the State of Amazonas, São Gabriel da Cachoeira region;
Goal 4.1.4. Adequate infra-structure for field research in LTER sites of Rondônia, Amazonas, Mato Grosso, Acre and Amapá States;
Goal 4.1.5. Collect environmental data in LTER sites in the State of Amazonas, Acre, Rondônia e Amapá;
Goal 4.1.6. Start the data collection and training of students on inventories of small mammals, trees and herbs in LTER sites in Rondônia;
Goal 4.1.7. Start the data collection and training of students on inventories of soil fungi in LTER sites in Amapá;
Goal 4.1.8. Start the data collection and training of students on inventories of aquatic invertebrates in LTER sites in Roraima;
Goal 4.1.9. Start the data collection and training of students on inventories of mammals (small, medium and large), herpetofauna, ictiofauna, aquatic invertebrates and arachnida in the grid of

“Fazenda Experimental da UFAM” – LTER site of Amazonas (AM) State;
Goal 4.1.10. Start the data collection and training of students on inventories of entomofauna (terrestrial invertebrates) in grid of Reserva Ducke – AM;
Goal 4.1.11. Start the data collection and training of students on inventories trees in modules along BR 319 – AM;
Goal 4.1.12. Produce a PDF version of the Guide to Ant genera identification in the Amazon;

Goal 4.1.13. Produce a PDF version of the Guide to identification of Scorpions for Manaus region.

Line of inquiry 5

Goal 5.1.1. Adequacy of the infrastructure and management of collections in Acre and Rondônia for maintenance of their collection;

Goal 5.1.2. 10% of the participating collections stored adequately, identified, digitalized and published online;

Goal 5.1.3. Two courses of taxonomic identification produced by students and researchers from regional hubs to accomplish the objectives of goal 5.1.1;

Goal 5.1.4. Two courses about data base to training of people that will digitalize the stocks, necessary to execute activities of goal 5.1.1. These courses will be given by researchers from line of inquiry 1 of this proposal.

Line of inquiry 6

Goal 6.1.1: Restore, modernize and adapt infrastructure of at least 5 genetics laboratories in the regional hubs [Sinop (MT), Rio Branco (AC), Porto Velho (RO), Boa Vista (RR), Macapá (AP)], as well as at the main centers [INPA, UFAM] to permit the genetic analyses of the several biological groups in all research nuclei;
Goal 6.1.2. Organize the analysis of the genetic diversity at population, species and geographic levels for each target group (plants, stingless bees, fish, amphibians, reptiles, turtles, small mammals, disease vectors) collected at the PELD sites of Sinop (MT), Rio Branco (AC), Porto Velho (RO), Manaus (AM) and neighboring areas;
Goal 6.1.3. Organize the training of technicians, undergraduate and postgraduate students, and researchers in genetic tools and analysis necessary to undertake the activities in Goal 6.1.2.

Line of inquiry 7

Goal 7.1.1. Adequate laboratory infrastructure, prepare extracts, provide first analyses of nutrient content and biological/pharmacological evaluations;
Goal 7.1.2. Collect and identify plant parts in an integrated manner with botanical surveys and taxonomic identification of other lines of inquiry that compose this proposal in LTER sites of Rondônia, Acre e Mato Grosso;
Goal 7.1.3. Prepare plant extracts of the samples aiming to produce a “screening” about Amazonian biodiversity;
Goal 7.1.4. Train undergraduate and graduate students, technicians and researchers on necessary tools to develop activities from goal 7.1.3.

SECOND SEMESTER

Line of inquiry 1

Goal 1.2.1. Test database structure functionality with insertion of previous collected data;

Goal 1.2.2. Organize data insertion logistics according with the data volume produced;

Goal 1.2.3. Start client-server web applicative to data insertion and elaborate an intermediary database;

Goal 1.2.4. Realize a workshop with coordinators of all CENBAM´s line of inquiries to evaluate demands and data availability needs by internal and external community.

Goal 1.2.5. Aggregate and organize local scale images of all LTER sites;

Goal 1.2.6. Aggregate and organize geographic layers (raster and vector) at Amazonian scale to be used on maps production and spatial modeling.

Line of inquiry 2

Goal 2.2.1. Test the sampling designs and protocols determined in the workshops in the field - areas under evaluation to the installation of achievements and in LTER sites, aiming to determine its viability.

Goal 2.2.2. One dissertation or thesis about evaluation methods for RAP studies within environmental impacted areas.

Line of inquiry 3

Goal 3.2.1. Training the person who will coordinate the field surveys at Roraima LTER site (tree measurements field team capacity is already installed from previous research activities);
Goal 3.2.2. Start second tree measurements at Roraima LTER sites (the first was conducted by previous research activities) and start hydrological parameters monitoring;
Goal 3.2.3. Start dead trees measurements to estimate necromass at Roraima LTER sites;
Goal 3.2.4. Start tree, shrubs and thin roots (< 20 mm) measurements to above and below ground biomass estimates at 2 savanna modules at Roraima LTER sites.
Goal 3.2.5. Soil samples collection (2 m profile) to soil carbon stocks estimates at LTER sites at Roraima (forest and savannas);
Goal 3.2.6. Biomass stocks and vegetation structure data analysis workshop, thematic maps elaboration and manuscripts elaboration;
Goal 3.2.7. Spatial vegetation and hydrological monitoring database preparation to enter the integrated CENBAM biodiversity information system.

Line of inquiry 4

Goal 4.2.1. Maintenance of field infrastructure in 7 LTER sites.

Goal 4.2.2. Collect environmental data in LTER sites in Mato Grosso, Acre and Amazonas implemented in the first semester (Goals 4.1.1, 4.1.2 and 4.1.3).

Goal 4.2.3. Start the collection of data and training of students in inventories of mammals (large and medium sized, bats), birds, herpetofauna, ictiofauna, aquatic invertebrates, entomofauna, arachnida, herbs, macrophytes and perifíton in LTER site in Acre.
Goal 4.2.4. Start the collection of data and training of students in inventories of mammals, herpetofauna, arachnida and herbs in LTER site in Amapa.
Goal 4.2.5. Start the collection of data and training of students in inventories of birds, herpetofauna, ictiofauna, ants, herbs in LTER site in São Gabriel da Cachoeira – AM.
Goal 4.2.6. Start the collection of data and training of students in inventories of small mammals in the modules of BR319 and in LTER site of REBIO do Uatumã – AM.
Goal 4.2.7. Start the collection of data and training of students in inventories of herpetofauna, ictiofauna, aquatic invertebrates and ants in LTER site in Mato Grosso.
Goal 4.2.8. Start the collection of data and training of students in inventories of mammals (large and medium sized), birds, herpetofauna, ictiofauna, entomofauna and arachnida in LTER site in Rondônia.
Goal 4.2.9. Start the collection of data and training of students in inventories of herbs, macrophytes, perifíton and fungi in LTER site in Roraima.
Goal 4.2.10. Produce a PDF version of the Guide to the identification of Pseudoscorpionida for Manaus region.
Goal 4.2.11. Produce a PDF version of the Guide to the identification of Diplura.

Line of inquiry 5
Goal 5.2.1. Improve infrastructure, management and specimens curation in Roraima and Mato Grosso;

Goal 5.2.2. 20% of participating Institutions' collections stored adequately, identified, digitalized and published online;

Goal 5.2.3. Two courses of taxonomic identification for students and researchers from regional hubs to accomplish goal 5.2.1;

Goal 5.2.4. Two courses about database for training people that will digitize collections information (goal 5.2.1). These courses will be given by researchers from line of inquiry 1.

Line of inquiry 6
Goal 6.2.1. Modernize and update infrastructure at 4 genetic laboratories in Manaus (Thematic Laboratories at UFAM and INPA).
Goal 6.2.2. Genotype with DNA bar codes and other markers the species of target taxonomic groups mentioned above at the PELD sites in Macapá (AP), Sinop (MT), Rio Branco (AC), Viruá and Maracá (RR), Porto Velho (RO), Manaus (AM) and neighboring and intervening areas.
Goal 6.2.3. Train technicians, undergraduate and postgraduate students, and researchers in genetic tools and analysis necessary to undertake the activities in Goal 2.
Goal 6.2.4. Train technicians, undergraduate and postgraduate students, and researchers in techniques to maintain the biological tissue and DNA samples that serve as vouchers for the activities in Goal 2.
Goal 6.2.5. Implement knowledge transference activities (Science Circuit, Piradados educational games workshop, DNA extraction workshop, Internet database, scientific and technological events).
Line of inquiry 7
Goal 7.2.1. Collect and identify plant parts in na integrated manner with botanical surveys and identification of other lines of inquiry that compose this proposal in LTER sites of Roraima, Amapá e Pará (Altamira).

Goal 7.2.2. Prepare plant extracts of the samples aiming to produce a "screening" about Amazonian biodiversity

Goal 7.2.3. Conduct evaluations more complete of nutrient content (vitamin and flavonoids).

Goal 7.2.4. Start the cromatographic fractioning of live extracts.

Goal 7.2.5. Train undergraduate and graduate students, technicians and researchers on necessary tools to develop activities from goal 7.2.3.

THIRD SEMESTER

Line of inquiry 1
Goal 1.3.1. Client-server web applicative to data insertion and intermediary spool database elaborated;

Goal 1.3.2. Best technical options to Web services availability analysis started (according to OGC - Open GIS Consortium standards);

Goal 1.3.3. Analyze demands and make research data available at a geographic navigator similar to GoogleEarth.

Line of inquiry 2
Goal 2.3.1. Promote 1 workshop for technicians of environmental agencies and researchers, to

define target-groups and sampling designs and monitoring compatibles with logistic and financial limitations of RAP studies
Goal 2.3.2. Promote 1 course for technicians of environmental agencies to develop the capacity of agencies to deal with data produced by RAP studies;

Line of inquiry 3

Goal 3.3.1. Start vegetation survey to above ground tree biomass stocks estimative and equipment installation (piezometers and pluviometers) to hydrological monitoring at Amapá LTER site and at one of the Amazon state LTER sites.
Goal 3.3.2. Start the fourth vegetation survey at one LTER site at the Amazon state, where 3 previous above ground tree biomass stocks estimative were conducted since 2001, to carbon assimilation and lost dynamics monitoring;
Goal 3.3.3. Vegetation biometry, hydrological instrumentation and soil measurements training courses to the 2 LTER coordinators and students which will conduct the field measurements (1) and (2);
Goal 3.3.4. Soil samples surveying (2 m profiles) for soil carbon stocks estimative at the Amapá and Amazonas LTER sites;
Goal 3.3.5. Canopy leaf surveying to isotopic and nutricional composition analysis along BR 319 modules and at an Amazon State LTER site;
Goal 3.3.6. Finish tree measurements on the 5 LTER sites located on threatened regions;
Goal 3.3.7. Water table level and local precipitation monitoring at all LTER sites;
Goal 3.3.8. Spatial vegetation and hydrological monitoring database preparation to enter the integrated CENBAM biodiversity information system.

Line of inquiry 4

Goal 4.3.1. Start the collection of data and training of students in inventories of small mammals and fungi in LTER sites in Acre;
Goal 4.3.2. Start the collection of data and training of students in inventories of small mammals, birds and entomofauna in LTER sites of Mato Grosso;
Goal 4.3.3. Start data collection and training of students in inventories of trees in LTER sites of Roraima, Acre, Amazonas, Amapá, Pará and Mato Grosso;
Goal 4.3.4. Make available on CENBAM website metadata of environmental data and inventories listed on goals 4.1.5 a 4.1.11, realized during first and second semesters;
Goal 4.3.5. Produce a PDF version of the Guide to Fish identification in Reserva Ducke;

Goal 4.3.6. Produce a PDF version of the Guide to Ephemeroptera (Leptophlebiidae) identification in Manaus region.

Line of inquiry 5

Goal 5.3.1. Improve infrastructure, management and specimens curation of AM and AP collections;

Goal 5.3.2. 30% of participating Institutions' collections stored adequately, identified, digitalized and published online;

Goal 5.3.3. Two courses of taxonomic identification for students and researchers to reach goal 5.3.1.;

Goal 5.3.4. Two courses about database for people that will digitize collections information (goal 5.3.1.). These courses will be given by researchers from line of inquiry 1;

Line of inquiry 6

Goal 6.3.1. Maintain infrastructure and equipment at the genetic laboratories.
Goal 6.3.2. Analyze the genetic variability and structure of natural populations of fish, amphibians and reptiles sampled at PELD sites in Amazonia to detect phylogeographic patterns in the species studies;
Goal 6.3.3. Analyze the genetic variability and structure of natural populations of small mammals sampled at PELD sites in Boa Vista (RR), Macapá (AP) and Amazonas.

Goal 6.3.4. Analyze the genetic variability and structure of natural and managed populations of Melipona bees, with emphasis on Melipona compressipes and Melipona seminigra
Goal 6.3.5. Analyze the genetic structure and variability of natural populations of Aedes aegypti and sorotypes of the dengue virus in Amazonas.
Goal 6.3.6. Analyze the genetic structure and variability of cultivated populations of hot pepper (Capsicum chinensis, C. frutescens), biribá (Rollinia mucosa) and other crops to be chosen in agreement with the regional nuclei along the Madeira River (AC and RO nuclei), Negro/Branco Rivers (RR nucleus) and Solimões/Amazonas Rivers (not associated with regional nuclei);
Goal 6.3.7. Provide genetic analysis of species of Orchidaceae, Bromeliaceae, Arecaceae, Araceae, Melastomataceae, Malpighiaceae, Rubiaceae, Leguminosas and Briophytes targeted by bioprospection in PN Viruá and Esec Maracá in Roraima.
Goal 6.3.8. Train technicians, undergraduate and postgraduate students, and researchers in genetic tools and analysis necessary to undertake the activities in Goals 6.3.2 through 6.3.7.
Goal 6.3.9. Train technicians, undergraduate and postgraduate students, and researchers in techniques to maintain the biological tissue and DNA samples that serve as vouchers for the activities in Goals 6.3.2 through 6.3.7.
Goal 6.3.10. Implement knowledge transference activities (Science Circuit, Piradados educational games workshop, DNA extraction workshop, Internet database, scientific and technological events).

Line of inquiry 7

Goal 7.3.1. Evaluate the potential of vegetal extracts previously isolated as cosmetics;

Goal 7.3.2. Start citoxicological evaluation of active extracts on the micro-crustacea *Artemia salina* to select cosmetics and medicines.

Goal 7.3.3. Start evaluation of potential proteolitics, antibiotics, including for Leishmania, and antifungi from vegetal extracts.

Goal 7.3.4. Training students, technicians and researchers for identification of potentials in cosmetics (goal 7.3.1).

Goal 7.3.5. Start an agroecological diagnostic in the productive chain in order to obtain a tipology of etnoconservation processes, understanding traditional knowledge.

FOURTH SEMESTER

Line of inquiry 1

Goal 1.4.1. Best technical options to Web services availability analysis finished (according to OGC - Open GIS Consortium standards).

Goal 1.4.2. Aggregate, organize and make local scale images of all LTER sites available.

Goal 1.4.3. Aggregate, organize and make geographic layers (raster and vectorial) available at Amazonian scale to be used on maps production an spatial modeling.

Goal 1.4.4. Start organizing courses on Ecological Goaldata Language documentation, PostgreSQL/PostGIS and Web Services access.

Line of inquiry 2

Goal 2.4.1. Test on the field the experimental design and protocols defined in the workshops, in areas that were been environmentally evaluated and LTER sites, to determine it viability.

Goal 2.4.2. One thesis or dissertation about the avaliation of RAP metodology in impact áreas.

Goal 2.4.3 Two scientifc publications about metodology avaliation of RAP metodology in impact áreas.

Line of inquiry 3

Goal 3.4.1. Vertical vegetation structure surveying (height and density) with portable LIDAR and canopy leafs collection to nutritional and isotopic composition analysis, which will compared to climatic gradient along BR-319 LTER modules.

Goal 3.4.2. Vegetation structure and hydrological data analysis workshop for the surveys on the 5 LTER sites located on threatened regions.

Goal 3.4.3. Finish necromass measurements at the LTER sites at Roraima.

Goal 3.4.4. Finish trees, shrubs and fine roots measurements at 2 savanna LTER modules at Roraima.

Goal 3.4.5. Water table level and local precipitation monitoring at all LTER sites

Goal 3.4.6. Spatial vegetation and hydrological monitoring database preparation to enter the integrated CENBAM biodiversity information system.

Line of inquiry 4

Goal 4.4.1. Maintenance of field infrastructure of 7 LTER sites.

Goal 4.4.2. Start data collection and student training program in aracnidae inventories in the LTER site of Mato Grosso.

Goal 4.4.3. Make enviromental data collection metadata available in the CENBAM website, as well as the inventories predicted on goals 4.2.2 a 4.2.9.

Goal 4.4.4. To produce an PDF macroscopic fungi guide of Reserva Florestal Adolfo Ducke.

Goal 4.4.5. To produce an PDF Isoptera indentification guide.

Line of inquiry 5

Goal 5.4.1. 40% of the stock of participating collections stored adequately, identified, digitalized and published online;

Goal 5.4.2. Two courses of taxonomic identification involving students and researchers from regional nuclei for reach the objectivies of goal 5.4.1.

Goal 5.4.3. Two courses of digital database for training the people who will digitalize the collection.

Line of inquiry 6

Goal 6.4.1. Maintain infrastructure and equipment at the genetic laboratories.

Goal 6.4.2. Analyze the genetic variability and structure of natural populations of fish, amphibians and reptiles sampled at PELD sites in Amazonia to detect phylogeographic patterns in the species studies;

Goal 6.4.3 Analyze the genetic variability and structure of natural populations of small mammals sampled at PELD sites in Boa Vista (RR), Macapá (AP) and Amazonas;.

Goal 6.4.4. Analyze the genetic variability and structure of natural and managed populations of Melipona bees, with emphasis on Melipona compressipes and Melipona seminigra;

Goal 6.4.5. Analyze the genetic structure and variability of natural populations of Aedes aegypti and sorotypes of the dengue virus in Amazonas;

Goal 6.4.6. Analyze the genetic structure and variability of cultivated populations of hot pepper (Capsicum chinensis, C. frutescens), biribá (Rollinia mucosa) and other crops to be chosen in agreement with the regional nuclei along the Madeira River (AC and RO nuclei), Negro/Branco Rivers (RR nucleus) and Solimões/Amazonas Rivers (not associated with regional nuclei);

Goal 6.4.7. Provide genetic analysis of species of Orchidaceae, Bromeliaceae, Arecaceae, Araceae, Melastomataceae, Malpighiaceae, Rubiaceae, Leguminosas and Briophytes targeted by bioprospection in PN Viruá and Esec Maracá in Roraima;

Goal 6.4.8. Train technicians, undergraduate and postgraduate students, and researchers in genetic tools and analysis necessary to undertake the activities in Goals 6.4.2 through 6.4.7.;

Goal 6.4.9. Train technicians, undergraduate and postgraduate students, and researchers in techniques to maintain the biological tissue and DNA samples that serve as vouchers for the activities in Goals 6.4.2 through 6.4.7.

Goal 6.4.10. : Implement knowledge transference activities (Science Circuit, Piradados educational games workshop, DNA extraction workshop, Internet database, scientific and technological events).

Line of inquiry 7
Goal 7.4.1. Collect plants that shows extracts with biotecnological activity in 6 LTER sites, to obtain material for fractioning and/or botanic identification;

Goal 7.4.2. Start the evaluation of antinflamatory potential of active extracts for the selection of phitocosmetics.

Goal 7.4.3. Training graduate or post-graduate students, technician and researchers in the necessary tools for the development of cosmetic avaliation activities and nutrient level.

Goal 7.4.4. Preparation of three manuscripts.

FIFTH SEMESTER
Line of inquiry 1

Goal 1.5.1. Organize courses on Ecological Metadata Language, PostgreSQL/PostGIS and Web Services accessibility.

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Line of inquiry 2
Goal 2.5.1. Promote a workshop for technicians of environmental agencies and researchers in order to define target groups and sampling/monitoring designs compatible with the logistics and financial limitations of the RAP studies.
Goal 2.5.2. Promote a course for technicians of environmental agencies in order to develop agency capacities in dealing with data generated by RAP samplings
Line of inquiry 3
Goal 3.5.1. Vertical vegetation structure (collected with portable LIDAR) data analysis at the BR 319 LTER modules to relate to climatic variation at regional scale.
Goal 3.5.2. Finish vegetation survey for above-ground tree biomass estimate at Amapá and Amazonas LTER sites.
Goal 3.5.3. Finish tree measurements at the Amazonas LTER site, where monitoring started in 2001;
Goal 3.5.4. Finish tree, shrub and fine roots survey on the 2 savanna modules at the Roraima LTER site;
Goal 3.5.5. Water table level and local rainfall monitoring in all the grids and modules of all LTER sites.
Line of inquiry 4
Goal 4.5.1. Upload inventory metadata of 4.3.1 to 4.3.3 goals to CENBAM website, done during the third and forth semesters.
Goal 4.5.2. Upload at least 14 databases to CENBAM website and finish all the field activities of goals 4.1.5 to 4.1.11.
Goal 4.5.3. Produce a PDF version of the Medium and Large Mammals Guide
Goal 4.5.4. Produce a PDF version of the Adolfo Ducke Reserve's Snake Guide.
Line of inquiry 5
Goal 5.5.1. 50% of material of participating collections stored adequately, identified, digitalized and published online;

Goal 5.5.2. Two courses on taxonomical identification for graduate students and researchers from regional centers;

Goal 5.5.3. Two courses on biological collection database management for curators and collection technicians.

Line of inquiry 6
Goal 6.5.1. Infra-structure maintenance of all genetics laboratories.

Goal 6.5.2. Integrar as análises genéticas efetuadas nos diferentes grupos taxonômicos (plantas, abelhas sem ferrão, peixes, anfíbios, répteis, quelônios e pequenos mamíferos) coletadas nos sítios de pesquisa PELD em Sinop (MT), Rio Branco (AC), Porto Velho (RO),Manaus (AM) e/ou áreas vizinhas e inferir sobre os possíveis padrões e processos evolutivos que ocorreram na Amazônia.
Goal 6.5.3. Treinar alunos de graduação e pós-graduação, técnicos e pesquisadores em análises e ferramentas genéticas necessárias para desenvolver as atividades contidas na goal 6.5.2.
Goal 6.5.3. Manter ações de transferência de conhecimento para a sociedade (Circuito da Ciência, Oficina educativa do jogo Piradados, Oficina educativa de Extração de DNA, Resultados na internet, eventos técnico-científicos).

Line of inquiry 7

Goal 7.5.1. Isolar em maior quantidade as substâncias ativas para avaliação de toxicidade aguda e crônica.

Goal 7.5.2. Coletar partes vegetais de plantas que apresentaram extratos com atividade biotecnológica importante nos sítios PELD para verificar a sazonalidade da composição química necessária para obter produtos padronizados.

Goal 7.5.3. Iniciar a avaliação do potencial inseticida dos extratos vegetais para selecionar candidatos a bioinseticidas.

Goal 7.5.4. Identificação do ambiente ecológico e mapeamento das plantas coletadas e possíveis usos pelos grupos sociais.

Goal 7.5.5. Organizar uma coleção de extratos e óleos essenciais de plantas nativas.

SIXTH SEMESTER

Line of inquiry 1

Goal 1.6.1. Offer courses on Ecological Metadata Language documentation, PostgreSQL/PostGIS and Web Services accessibility.

Goal 1.6.2. Update, aggregate, organize and produce fine-scale images of all LTER sites;

Goal 1.6.3. Update, aggregate, organize and produce geographic layers (raster and vectorial) available at Amazonian scale to be used on map production and spatial models.

Line of inquiry 2

Goal 2.6.1. Two thesis or dissertations about the evaluation of RAP methodology in impact areas.

Goal 2.6.2. Two scientifc publications about evaluation of RAP methodology in impact areas.

Goal 2.6.3. Twenty technicians of enviromental agencies trained for use and result evaluation of RAP studies for monitoring of impact areas.

Line of inquiry 3

Goal 3.6.1. Vegetation structure, carbon estimates and hydrological data analysis workshop for LTER site surveys, manuscript preparation and other products useful to society.
Goal 3.6.2. Analysis of the relation between carbon stocks and vegetation structure variation at local and regional level with global change analysis.
Goal 3.6.3. Make data and metadata available at the integrated biodiversity information system at the CENBAM website.
Goal 3.6.4. Produce maps and related useful products available at CENBAM website
Goal 3.6.5. Water table level and local precipitation monitoring at all LTER sites.

Line of inquiry 4

Goal 4.6.1. . Maintenance of field infrastructure of 7 LTER sites.
Goal 4.6.2. Make inventories data predicted at goal 4.4.2. available in the CENBAM website

Goal 4.6.3. Provide at least 40 database in the CENBAM website and finish the field activities predicted on goals 4.2.2 to 4.2.9 and 4.3.1 to 4.3.3.
Goal 4.6.4. Elaboration of at least 30 scientific international articles published about inventories realized on LTER sites.
Goal 4.6.5. Pelo menos 20 artigos científicos submetidos a revista de padrão internacional sobre os inventários biológicos realizados nos sítios PELD.
Goal 4.6.6. Encerrar o treinamento de ao menos 40 pessoas, entre estudantes de graduação e pós-graduação nas técnicas de inventário biológico do método RAPELD.
Goal 4.6.7. Produzir versão em PDF do Guia de Plantas da ordem Zingiberales da Amazônia Central.
Goal 4.6.8. Produzir versão em PDF do Guia de identificação das espécies de Arachnida da Amazônia (Volume I. Guia de Identificação das Aranhas de Terra-Firme da Amazônia Brasileira)
Goal 4.6.9. Produzir versão em PDF do Guia de identificação das espécies de Arachnida da Amazônia (Volume II. Guia de Identificação das espécies de Opiliões da Amazônia Brasileira)

Line of inquiry 5

Goal 5.6.1. 60% of the stock of participating collections stored adequately, identified, digitalized and published online;

Goal 5.6.2. Dois cursos de identificação taxonômica realizados envolvendo alunos e pesquisadores dos núcleos regionais para atingir os objetivos da goal 5.6.1;

Goal 5.6.3. Dois cursos sobre banco de dados para treinamento do pessoal que irá digitalizar os acervos, necessários para executar as atividades da goal 5.6.1. Esses cursos serão ministrados por pesquisadores da Line of inquiry 1 contidas nesse edital.

Line of inquiry 6

Goal 6.6.1. Manter em funcionamento a infra-estrutura dos laboratórios de genética.
Goal 6.6.2. Identificar o conteúdo informacional dos padrões e processos da diversidade genética de plantas, abelhas sem ferrão, peixes, anfíbios, répteis, quelônios e pequenos mamíferos, úteis passíveis de serem utilizados para subsidiar ações de uso e conservação da Biodiversidade Amazônica.
Goal 6.6.3. Avaliar a eficácia e a eficiência do sistema de treinamento dado aos alunos de graduação e pós-graduação, técnicos e pesquisadores para as análises genéticas e manutenção de bancos de tecido/amostras genéticas que foram necessárias para atingir as goal 6.6.2.
Goal 6.6.3: Avaliar a eficácia e a eficiência das ações de transferência de conhecimento para a sociedade (Circuito da Ciência, Oficina educativa do jogo Piradados, Oficina educativa de Extração de DNA, Resultados na internet, eventos técnico-científicos).

Line of inquiry 7

Goal 7.6.1. Isolar e identificar a estrutura da(s) substâncias ativa(s) com atividade biológica e avaliar o potencial econômico de patentes para cosméticos, fármacos ou bioinseticidas.

Goal 7.6.2. Identificar o nome científico das plantas usadas pelas comunidades a fim de subsidiar a preparação de material de divulgação (livro ou cartilha) e uma cartografia temática dos geótopos.

Goal 7.6.3. Preparação de manuscritos de pelo menos 2 artigos e/ou patentes.

Chronogram for the 4th and 5th years

Semester 7

Consolidation of activities undertaken in the first 3 years and planning for the next funding cycle.

Semester 8

Extension of the demonstration studies to other regional centers in Pará, Tocantins and Maranhão.

Semester 9

Inclusion of other Amazonian countries in network and consolidation of international agreements.

Semester 10

Overall evaluation of the program, its sucesses and weaknesses, expansion of the program with the regional centers assuming the coordination role that INPA had in the initial years.

s) Indication of the Administrative Council of the Institute

The administrative committee should include members to cover all lines of investigation and have wide geographic coverage. We therefore indicate the following members, their general areas of expertise, and the geographic areas in which they reside.

William Magnusson - Research planning, Amazonas.

Marcos Silveira - Botany, Acre.

Marcos Vital - Genetics of microorganisms, Roraima.

Angelo Gilberto Manzatto - Ecology, Rondônia.

Fabiano Cesarino - Phytochemistry, Amapá.

Domingos Rodrigues - Zoology, Mato Grosso.

Cecília Nunes - Bioprospection - Amazonas.

Charles Clement - Agricultural genetics, Amazonas.

Claudia Keller - Graduate education, Amazonas.

We suggest the following international scientists for the advisery board of the project, who have both agreed to participate.

Dr. Thomas Eugene Lovejoy III is chief biodiversity adviser to the president of the World Bank, senior adviser to the president of the United Nations Foundation, and president of the Heinz Center for Science, Economics, and the Environment. He coined the term *biological diversity* in 1980. He is a tropical biologist and conservation biologist, has worked in the Amazon of Brazil since 1965. He received his B.S. and Ph.D. in biology from Yale University. From 1973 to 1987 he directed the conservation program at World Wildlife Fund-U.S., and from 1987 to 1998 he served as Assistant Secretary for Environmental and External Affairs for the Smithsonian Institution in Washington,

D.C., and in 1994 became Counselor to the Secretary for Biodiversity and Environmental Affairs. He is chair of the Yale Institute for Biospheric Studies, and is past president of the American Institute of Biological Sciences, past chairman of the United States Man and Biosphere Program, and past president of the Society for Conservation Biology.

Dr Adam Stow is Lecturer in the Faculty of Science, Macquarie University, Australia. He is uniquely qualified for the advisory board because he is working at the frontiers of many of the lines of inquiry in CENBAM. He has a Diploma of Education and has designed many courses at Macquarie University. He has publications in leading journals on a wide range of topics, such as the the evolution of microbial defenses in native bees, a novel miniaturized essay for antimicrobial prospecting, a technique for DNA recuperation from shark teeth, and conservation genetics of fish, mammals and reptiles.

t) Organizational and functional structure of the Institute

CENBAM is a Thematic Center and a Mobilizing Program, that involves a research and teaching network organized regionally (the Amazon Basin), but with strong ties to other national and international networks. CENBAM is also an integrative center. There is a belief that basic research, such as taxonomy and morfologia, are important for practical applications, such as land-use management and development of new products. However, not all basic research is usable and the notion that any basic research is important because "someone" will use it has not turned out to be true in practice. Likewise, the notion that any research with the potential to generate cash returns for some user is important for regional development has little support. Each line of investigation will always have its peculiarities, and advancement of science is largely based on unexpected results (Doak et al. 2008). Nevertheless, by approximating basic and applied science, all researchers can benefit and the costs of integrated studies are much less than those of independent activities, which generate duplication of effort and do not make efficient use of the available manpower (Magnusson 1999).

CENBAM cannot act as the principal source of finance for any of the lines of research associated with Amazonian biodiversity. A preliminary evaluation of the financial needs for the limited portfolio of demonstration projects associated with this proposal indicated a minimum cost of R$20,000,000.00, just for the research component, without counting labour and most infrastructure costs. Therefore, it is important to take advantage of all infrastructure and sources of funding available. The highest research costs are almost always associated with personnel. Hundreds of millions of reais are spent each year on salaries for Amazonian researchers by federal, state and private universities, as well as by research institutions, such as INPA, MPEG, Instituto Mamirauá and EMBRAPA. The accumulated infrastructure also amounts to hundreds of millions of reais. Staff of universities and research institutions are overloaded with administrative responsibilities, so most of the research is done by masters or doctoral students, who also receive a huge aggregate support in the form of scholarships from funding agencies such as CAPES and CNPq. This investment obviously is not generating as many practical results as it could. It is likely that the mean real cost of a publication or patent by a Brazilian Amazonian researcher is of the order of R$1,000,000.00 or more!

CENBAM does not seek to compete with or replace any of the existing organizations or funding agencies. Rather, it seeks to integrate existing initiatives in efficient regional knowledge-production networks. Much of the activities of the center will be related to diagnosing existing

capacity and gaps. However, other initiatives are already working at smaller scales, and CENBAM will concentrate on integration of regional centers across the basin.

Knowledge is generated by individual researchers who often aggregate into research groups. Ideally, research groups would extend across organizations, but members of most research groups are clustered in a single organization. Recognizing the need for integration of local institutions, the Program for Biodiversity Research (PPBio) of the Ministry of Science and Technology established regional hubs in many Amazonian cities. These hubs integrate various organizations that generate, use or disseminate biodiversity knowledge. PPBio regional hubs exist in Roraima (UFRR, UERR, ICMBIO, EMBRAPA, MIRR, COSEMA/PMBV, INPA), Acre (UFAC, EMBRAPA, ICMBIO, SEF-AC, SEMA-AC, UNINORTE, FUNTEC, INPA), Rondônia (UNIR, EMBRAPA, FSL, SEDAM, SEMA, SIPAM, CRPM, INPA), Mato Grosso (UFMT, UNEMAT), and Amapá (UNIFAP, EMBRAPA, IEPA, INCRA), as well as other hubs not yet integrated into CENBAM. Regional PPBio committees with representatives of each organization make decisions about research needs and management of LTER sites. INPA has regional campi in Roraima, Rondônia and Acre which participate in these committees.

Graduate education is undertaken by universities in each of the regional PPBio hubs, and their activities are supported and, to a limited extent, integrated by CAPES Procad and CNPq Casadinho programs. However, Procad and Casadinho have limited time frames (generally 2-4 years). Integration of graduate programs in local studies is a priority for most PPBio committees. Integration among regional centers will be the priority for CENBAM.

As indicated in the introduction, even with integration of local organizations, most regional centers lack the human resources and laboratory infrastructure to complete functional knowledge-production chains. This is level at which CENBAM will operate. The representatives of CENBAM regional centers come from organizations within PPBio regional hubs that have, or are in the process of founding, graduate programs. They therefore represent both the research and teaching components of the knowledge-production chains. However, their concentration in higher-organization organizations means that they will have liaise with representatives of municipal-education secretariats, ICMBIO and other PPBio hub members more directly involved in public education and extension, to meet the dissemination goals of the CENBAM program.

The members of the CENBAM administrative committee will meet each semester to review results, indicate new research directions, and make budget decisions. They will be responsible for integrating funding opportunities offered by State Science Support Foundations (FAPs), local businesses, and others in CENBAM activities. They will also be responsible for establishing CENBAM offices in each regional center, overseeing the activities of local scholarship holders, maintaining information on local CENBAM activities on the web site, and ensuring that all local data collected with CENBAM support is made available in public-access data bases.

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