

# Ethnoecological surveys in indigenous areas in the Brazilian Amazon: A preliminary methodology



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## BACKGROUND

### 'Levantamentos etno-ambientais' e etnoecologia na Amazônia

This document presents a practical methodology for a programme of ethno-environmental surveys to be undertaken in demarcated indigenous areas in Brazilian Amazonia by teams of specialists and indigenous people contracted by PPTAL. For the purposes of this programme, 'ethno-environmental' and 'ethnoecological' surveys will be regarded as synonymous, and the term ethnoecology will be used to describe the range of information these surveys aim to cover.

*Ethnoecology can be defined as indigenous perceptions of 'natural' divisions in the biological world and soil-plant-animal-human relationships. These cognitively defined ecological characteristics do not exist in isolation; thus, ethnoecology must also deal with the perceptions of interrelationships between 'natural divisions' (Posey, 1983)<sup>1</sup>. These perceptions form a framework for personal interactions with the natural environment. As Frake (1962)<sup>1</sup> indicates, the purpose of ethnoecological investigation is to "describe the environment as the people themselves construe it according to the categories of their ethnoscience". Often, there is a high correlation between folk perceptions of biological reality and Western scientific classification systems (Hunn, 1975)<sup>1</sup>.....*

Frechione et al. (1989)<sup>1</sup>

Balée (1994)<sup>2</sup> argues for the use of the term 'historical ecology' to describe essentially the same field:

*Historical ecology is more than a methodological improvement over cultural ecology, cognitive anthropology, and certain list-orientated approaches common to economic botany and medical botany. I have found rather, that it is a powerful paradigm for comprehending interrelationships between Amazonian environments and associated indigenous societies, because it focuses on the interpenetration of culture and the environment rather than on the adaptation of human beings to the environment.*

Regardless of whether one chooses to refer to this subject as ethnoecology or as historical ecology, the main point is that the study of these man-environment interrelationships is complex, and demands a 'holistic' interdisciplinary approach. In the Amazonian context there is considerable variation in the practical relationships between indigenous peoples and their environment, just as there is in their perceptions and understanding of it. The extent to which the ethnoecology of these peoples is known and understood outside the communities themselves also varies greatly. Some groups (e.g. the Ka'apor and the Kayapo) have undergone long and detailed studies, and could now reasonably be said to be fairly well 'known', although even in these cases there is doubtless still a great deal more to be learned and understood. Meanwhile there are many others peoples about whose ethnoecology almost nothing of significance has been recorded.

The variability of the relationships between indigenous peoples and their environment in the Amazon stems partly from the diversity of that environment. Contrary to many peoples' perceptions of the region as one large expanse of homogeneous lowland forest, Amazonia is

<sup>1</sup> Frechione, J., D.A. Posey & L.F. da Silva, 1989. The perception of ecological zones and natural resources in the Brazilian Amazon: an ethnoecology of Lake Coari. *Advances in Economic Botany* 7: 260-282.

<sup>2</sup> Balée, W., 1994. *Footprints of the forest. Ka'apor ethnobotany - the historical ecology of plant utilization by an Amazonian people*. Columbia University Press, New York.

a complex mosaic of *terra firme* forests, tree savannas, grasslands, palm swamps, various types of white-sand *caatinga* woodland, flooded *igapó* and *várzea* forests, secondary vegetation and other anthropogenic habitats. Within each of these habitats, species composition and diversity varies greatly from one region to another. Furthermore, superimposed upon this variability is the diversity of the cultures of the indigenous peoples who inhabit the Amazon, incorporating five principal language groups (Tupi, Guarani, Gê, Carib, Arawak) as well as a number of isolated tongues.

A fundamental point to observe is that the ethnoecology of any indigenous people is not a static phenomenon, and never has been. On the contrary, the peoples of Amazonia are notable for their adaptability and for their willingness to learn new uses for their natural resources. Thus, on a practical level at least, their relationships with their environment have been evolving since they first came to the Amazon basin. Historically, change will have been stimulated by environmental modifications, man-made or otherwise, and by migrations into new environments. In addition, the orally transmitted 'resource base' of ethnobiological information and the 'genetic resource base' of cultivated plants or stock animals will have undergone a continual process of evolution, as new discoveries were made and new information, materials or species were exchanged with neighbouring peoples.

More recently, however, the stimuli for change have become more numerous and much more demanding. Contact with the 'outside world' (i.e. national society) has brought many of the indigenous peoples of the Amazon into situations which have dramatically altered their environments and/ or their relationships with them. These include, among others:

- % **Development projects.** These projects, which have included the construction of hydroelectric dams, highways, military bases, etc., have resulted in loss of land and resources and in environmental degradation (e.g. the acidification of rivers) and social change (e.g. though the opening up of their area to settlers).
- % **Land loss.** Many groups have lost access to significant proportions of their traditional territory (if not all), and consequently to the resources within them. Land has been lost to ranchers, loggers, development projects, mining operations, settlers, etc.
- % **Land invasion.** Indigenous peoples have found themselves sharing their land with invaders (e.g. garimpeiros, smallholders, loggers, 'extractivists', etc.). As well as causing health, social and environmental problems, this has also resulted in increased competition for natural resources.
- % **Epidemics.** These have eliminated or massively reduced many Amazonian indigenous peoples, opening up land for the expansion of neighbouring groups. In many cases these epidemics have eliminated the majority of the old people in the communities, bringing about irreversible loss of traditional knowledge. In some cases they have led to the establishment of major health support programmes, which have themselves had secondary effects on the environment. Epidemics of introduced diseases have in some cases stimulated indigenous peoples to experiment with (and discover) new medicinal plants.
- % **Demographic change.** The population declines precipitated by epidemics have significantly altered the pressure on natural resources, and in some cases they have resulted in a shrinkage of the area in actual use. Conversely, subsequent population expansions, which have in some cases followed the establishment of healthcare operations, are resulting in increasing population pressure.
- % **Migration/ translocation.** Some groups have migrated in order to escape from adverse pressures and threats, or to take advantage of land which has become available (see above), and thus have found themselves in environments slightly or significantly different from those which they are used to. This has necessitated 'ethnoecological adaptation'.

In other cases, e.g. in the Xingu park, groups have been actively transported from one area to another by FUNAI.

- % **Sedentarisation.** In many cases, increased contact with Brazilian society and increased dependence on healthcare or on manufactured goods has resulted in indigenous groups abandoning or reducing their traditional seasonal migrations (trekking), and/ or establishing permanent settlements. The increased long-term pressure on the natural resources around a settled community may result in changes in subsistence strategies (e.g. increased reliance on horticulture), in natural resource management practices and in choice of useful species.
- % **Technological development.** The introduction of new technology has had a significant effect on peoples' relationships with their environment. The introduction of effective cutting tools (initially axes and machetes; latterly chain saws), for example, has made cutting of hardwood trees relatively easy. As a result, horticultural practices have changed (since it becomes easier to clear land)<sup>3</sup>, wood has been taken from large hardwood species which would not previously be felled, and in some cases trees have been felled for their fruits when previously they would have been climbed. The introduction of firearms and monofilament nets have changed hunting and fishing practices and efficiency, and the introduction of motorised transport (e.g. outboard engines) has increased the viable radius of resource exploitation.
- % **Species introductions.** Although in some cases the introduction of a new species may be insignificant, in others the impact on the environment and the way in which it is used can be very significant. This is the case for cattle (whose maintenance generally requires the periodic felling of large areas of forest), and for certain 'invasive' species which, once established, can take over an area and cause dramatic changes in availabilities of native species.
- % **Commercial development.** Many Amazonian indigenous communities are now involved in trade to some degree. Generally this involves exploitation of the natural resources in their land (ranging from commercial extraction of timber to small-scale production of sustainably harvested non-timber forest products or artesanato). This can have a significant impact on the way in which they utilise and manage their resources.

It may be asked why it is important that the ethnoecology of demarcated indigenous areas should be documented? Why not just demarcate the areas and leave their inhabitants to get on with their own lives? What benefits could possibly lie in these surveys for indigenous peoples? The answers lie precisely in the forces of change outlined above. If the circumstances in which these people are living were stable and unaltered, then the only people to benefit from these surveys would be ourselves. From them we would enrich our understanding of the natural resources of Amazonia, drawing on the extraordinary wealth of knowledge which its indigenous peoples have accumulated over time.

Circumstances, however, are not stable and unaltered, and many of the indigenous peoples of the Brazilian Amazon now find themselves in situations dramatically different from those in which their antecedents lived. They are in the process of adapting to those changes, many of which have come upon them with such rapidity that there has been little time to comprehend their implications. Even within the context of PPTAL/ FUNAI's demarcation initiative it would be extremely naive to imagine that change and development of this nature will not continue, and that the indigenous peoples of the Amazon will not continue to experience the consequences of other peoples' greed and ignorance.

An understanding of the ethnoecology of these peoples can help us to orientate communities in the development of initiatives which will mitigate some of the effects of change on their lands, natural resources, and livelihoods.

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<sup>3</sup> This may result in different habitats becoming the most desirable for cultivation.

## 'Gestão' em áreas indígenas

Rather than wasting effort on semantic or philosophical discussions of what 'gestão' is, what its role in indigenous areas should be, and of how it may differ from 'manejo', it would be better to focus discussion on the practical realities of the communities whose lands are undergoing the demarcation process. Many indigenous communities are, as discussed above, adapting to changes which have affected both their environment and the way in which they use it. Some are now actively seeking sources of income to support the new needs of their communities (manufactured goods, health, education). Others are seeking means of adapting their lifestyles and subsistence to suit their altered circumstances. Many are seeking means of mitigating the threats to their lands and resources from outside forces.

### **Some objectives:**

- To promote activities that bring long-term economic benefits to many of the people.*
- To emancipate indigenous peoples from debt-bondage and to replace servitude by economic self-reliance.*
- To give power to indigenous groups by showing them how to gain control of their own marketing needs.*
- To support rational use of indigenous resources without endangering the environment or traditional resource management.*
- To protect indigenous resources from encroachment.*
- To guard against social disintegration by encouraging communal forms of production and marketing.*

Beauclerk *et al.* (1988)<sup>4</sup>

It is important to remember that the process of demarcation is intended to empower indigenous peoples with enforceable dominion over their own lands. Thus any process of 'gestao' which accompanies or arises from this demarcation process must be driven by the indigenous peoples themselves, with the eventual aim of promoting or re-establishing auto-sustentação. The days of paternalismo should by now be past, and it is essential that any new initiatives should focus on capacity building and empowerment rather than on provision of limited-term 'aid'.

Whereas indigenous peoples generally have a much more profound understanding of the ecology of their environment and its natural resources than anybody else does, in many cases they do not yet have a clear picture of how those resources can be marketed or of how they can be managed to accommodate a different lifestyle. There is nonetheless a wealth of experience, technology and information in existence which could, if directed properly, help them to achieve these goals.

There are various *caveats* which should be emphasised here. The first is that any 'development' process which takes place in indigenous lands should be undertaken at the initiative of the indigenous peoples, by them, and because they genuinely need them, rather than because they have been convinced that they do.<sup>5</sup> The second is that any such project must be realistic, sustainable, and very carefully thought out in advance<sup>6</sup>. A poorly conceived and inadequately executed project is often worse than no project at all, arousing

<sup>4</sup> Beauclerk, J., J. Narby & J. Townsend, 1988. *Indigenous peoples. A fieldguide for development.* Development Guidelines No. 2. Oxfam, Oxford.

<sup>5</sup> It is not uncommon for workers in indigenous areas to stimulate projects because of their own interest in them rather than because of the communities' interest.

<sup>6</sup> In other words, it must continue to provide benefits long after any start-up capital has gone. Any new technology which is introduced must be accompanied by training, and must be provided at an appropriate level.

unrealistic expectations and in the worst cases causing cultural and/ or environmental disruption or degradation. Regrettably, however, the world is full of development projects which have gone wrong, and very often this has been because they were poorly thought out, because they did not involve the recipient communities sufficiently, and because the circumstances in which they were established were insufficiently researched and understood.

## Objectives

The purpose of the surveys outlined here will be to provide a detailed analysis of the ethnoecology, or ethnic/ environmental interface, in the indigenous areas demarcated under the *Projeto Integrado de Proteção às Terras Indígenas da Amazônia Legal* (PPTAL). It is now widely accepted that any consideration of the environment and natural resources in an indigenous area - or indeed in the context of any human society - is of very limited practical relevance unless considered in its social and cultural context, and the design of this methodology reflects that realisation.

The body of information resulting from these surveys will constitute an important resource for the future activities of PPTAL, whose objectives include:<sup>7</sup>

- ❖ Realizar, simultaneamente à identificação/ delimitação das terras indígenas, o levantamento das suas condições ambientais e de elementos que possam viabilizar projetos de auto-sustentação.
- ❖ Implementar ações visando ao equilíbrio ambiental das áreas indígenas, possibilitando a auto-sustentação da sua população.

The survey results will provide an essential resource for the forthcoming PD/I (Projetos Demonstrativas Indigenas) initiative, which is currently under development within the *Programa Piloto para a Proteção das Florestas Tropicais do Brasil* (PPG-7). This initiative, which will operate along similar lines to the existing PD/A scheme, will provide capital and technical support for development of appropriate projects by indigenous communities. Knowledge of the environment in indigenous areas, and understanding of its relationship with and perception by the communities concerned, will facilitate orientation of applicants by PD/I personnel and help with evaluation and development of the projects put forward for funding.

## Available resources - limitations of the surveys

The financial resources available for undertaking the ethnoecological surveys within this programme are limited (\$300,000). As a consequence, it will not be possible to conduct separate surveys in each of the demarcated areas. It has therefore been decided [PPTAL] that the surveys should be conducted in 'complexes' of around 7-8 demarcated indigenous areas each, and that the methodology outlined in this document should be developed accordingly.

The inherent limitations and weaknesses of this approach are evident, and it is important that the survey methodology and results should be considered within the context of these limitations:

- Agglomerations (complexes) of indigenous areas, however carefully chosen, are intrinsically artificial and as such will inevitably contain cultural and environmental discontinuities which will limit the relevance of the results to any particular area.
- The time which the survey team will be able to spend in any one area and with any one indigenous group will be small, as a result of which some of the data collected will inevitably be superficial in nature.

<sup>7</sup> *Programa Piloto para a Proteção das Florestas Tropicais do Brasil*. Livro das Secretarias Técnicas. MMA, Brasília. Outubro 1997.



- What may appear to constitute a logical 'complex' to the Advisory Committee may not be seen as an appropriate unit by the indigenous communities, particularly where traditional rivalries exist between the groups in a region. This may cause practical and political difficulties for the survey team.
- The limited amount of time which can be spent by the survey teams with each indigenous group will leave little opportunity for technology transfer and capacitation in survey techniques.

## PROJECT STRUCTURE

### Overview

An ethnoecological survey of a single indigenous area, backed by adequate financial resources, could potentially provide a very detailed ('micro-level'), quantitative picture of natural resource availability, and of the group's interactions with and perceptions of the environment. This would be expected to include, for example, detailed mapping of resources (geo-referenced) and the production of reasonably comprehensive species-level data on plant and animal use, etc.

More general surveys of the type outlined in this methodology, with more limited resources available to them, must inevitably address the various elements of an ethnoecological survey at a more 'macro' (qualitative) level. Thus, for example, whereas the ethnobotanical component of a 'micro-level' study may provide very detailed lists of plant species, their common names, uses, habitat associations and any other information pertaining to them, a 'macro-level' study will perforce focus on the broader vegetation types in the area, providing detailed information only on the more culturally, socially, politically or economically important species.

Although ethnoecology is a very broad field, for practical reasons the focus of the surveys should be maintained on the aspects which are of most relevance to the future of the indigenous peoples within the complexes.

### Key points

- These surveys are intended to furnish a functional information resource useful to non-specialists and to the indigenous communities concerned. They should therefore be maintained at a practical level, with minimal reference to or inclusion of irrelevant or scarcely relevant academic theories and hypotheses. All results should be presented in a clear and graphic form.
- Indigenous peoples should be included at all stages of the survey process.
- The survey results must be comparable. It is therefore important that the structure outlined in this methodology is adhered to as closely as possible, and that the results are presented in a coherent manner.

### Phase 1 - Assembly of an Advisory Committee

In order to make planning decisions before the contracting of survey teams, to identify core information resources, and to select the teams themselves, an Advisory Committee will be established at the beginning of the project (assembled by PPTAL). This will be made up of recognised experts with wide experience in the fields of Amazonian natural resources, anthropology and indigenous issues, as well as representatives of indigenous communities, PPTAL and FUNAI. The Advisory Committee will also be responsible for decisions on the allocation of funds.

## Phase 2 - Identification of 'complexes' of indigenous areas

The identification of the most appropriate complexes of indigenous areas is a fundamental part of this project, upon which the validity and applicability of the survey results will heavily depend. If the complexes are excessively heterogeneous then the relevance and applicability of the results will be severely limited. Identification of appropriate complexes will be carried out by the project Advisory Committee, where possible in consultation with indigenous representatives. This will be achieved by classifying each of the demarcated areas according to the following criteria:

- Environmental factors
  - ✦ major habitat or vegetation types dominant in the area<sup>8</sup>
  - ✦ other significant environmental divisions (highlands/ lowlands, blackwater/ whitewater, etc.)
- Cultural and linguistic factors
  - ✦ language family
  - ✦ traditional inter-tribal relationships
  - ✦ Religion and beliefs
- Other cultural/ lifestyle characteristics
  - ✦ primary means of subsistence (e.g. fishing, hunting, horticulture)
  - ✦ degree of sedentarisation (sedentary; semi-nomadic; nomadic)
  - ✦ degree of integration into national society/ economy
- Geographical factors
  - ✦ proximity of other demarcated areas; 'natural' geographical groupings

Based on these data, the areas will be grouped in the most appropriate manner. The most important factors to consider in this process are the environmental and linguistic/ cultural characteristics. Geographical proximity, whilst facilitating the work of the survey teams, is secondary. In Roraima, for example, the Wai-Wai and the Jacamim areas are very close geographically, and could conveniently be surveyed together by one team. However, A.I. Jacamim is inhabited by the Wapixana, a savanna-dwelling group with an Arawak language, and A.I. Wai-Wai is occupied by the Wai-Wai, a forest-dwelling group with a Carib language, and as such their inclusion in the same complex would clearly be unsuitable.

## Phase 3 - Preparation of core information resources

In order to minimise repetition of effort and time-wasting, information resources which are likely to be required by *all* of the survey teams will be identified by the Advisory Committee and located (or where possible acquired) *before* the beginning of the surveys. These will include the following:

- ☞ Satellite imagery and aerial photographs (INPE, LANDSAT, SIVAM)<sup>9</sup>
- ☞ Topographic maps - small and large scale
- ☞ Climate data (e.g. DNAEE)
- ☞ RADAM surveys, reports and maps
- ☞ IBGE data and maps
- ☞ Other resource maps for Amazonia (soils, geology, vegetation, mineral resources, mineral concessions, etc.)
- ☞ Field identification manuals for fauna and flora in Amazonia
- ☞ Other general surveys/ theses/ books on natural resources and natural resource use in Amazonia

<sup>8</sup> These may include, for example, humid forest; seasonal forest; montane forest; dry savanna; wet savanna; floodplain.

<sup>9</sup> Expense may be a limiting factor in the acquisition of these images.

Large-scale *base maps* will be prepared for each of the complexes, based on the maps produced during the demarcation process. Resources and time permitting (which they will probably not be), these should be geo-referenced and digitalised on GIS (Geographic Information System), such that the spatially referenced data collected by the surveys can eventually be incorporated and integrated<sup>10</sup>. These base maps will serve as standard for all project survey outputs.

#### **Phase 4 - Selection of consultants**

Identification and selection of consultants for the survey teams will be conducted by the Advisory Committee. Each team will consist of two appropriately qualified contracted specialists (one in natural resources and one in anthropology), at least three indigenous representatives from the area under study, and one FUNAI representative. This will provide a multi-disciplinary, multi-cultural approach and will contribute towards capacity-building and uptake of the survey results within both FUNAI and the host communities. Ideally, in order to facilitate balanced collection of information, these teams should be of mixed sex. The following characteristics should be sought among the specialist candidates:

- At least five years field experience in Brazilian Amazonia; preferably more; ideally in the area (and/ or with the communities) to be studied.
- Graduates in their appropriate disciplines; preferably with a Masters degrees; ideally with PhDs.<sup>11</sup>
- Sound practical experience of participative survey techniques.
- Fluent Portuguese and preferably some knowledge of the indigenous language(s) spoken in the study area.
- Demonstrable experience in working to deadlines and producing succinct and comprehensible reports and publications.
- Experience in working with indigenous peoples in Brazilian Amazonia.
- Ability to commit three months continuous time to undertaking the survey.
- Experience in working in multi-disciplinary teams.

The natural resources specialist should be able to demonstrate a broad knowledge and understanding of the Amazonian environment, including flora, fauna, soils, management, environmental threats, etc. It is essential that this person should also have at least some experience of working with Amazonian indigenous peoples. Preferably this person should also have experience in ethnobiological or ethnoecological research, i.e. the study of the relationship between indigenous peoples and their environment and natural resources, as well as in basic practical mapping techniques.

The anthropologist/ indigenous specialist should, if possible, have prior experience of working with at least one of the indigenous groups in the study area, and should also have a reasonable understanding of the Amazonian environment.

#### **Phase 5 - The surveys**

Each survey will be conducted by the survey team over a continuous period of three months. The surveys will be carried out in three main stages:

- 2 Stage I - Background research
- 2 Stage II - Field research

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<sup>10</sup> See the notes on mapping in 'Techniques and approaches in the field'.

<sup>11</sup> In cases where the experience and expertise of the candidate is clearly of sufficient relevance, duration and quality, then this should be considered as substituting for post-graduate degrees.

## 2 Stage III - Consolidation of results and preparation of outputs

See *Survey Methodology* for details.

### **Phase 6 - General Discussion**

When all of the ethnoecological surveys have been carried out, and all of the reports have been submitted to PPTAL/ FUNAI and the indigenous communities involved in the surveys, a two day seminar will be held in Manaus. This will be organised by the Advisory Committee and attended by all the the survey teams, representatives of all the indigenous communities involved in the survey, representatives of PPTAL, FUNAI and PD/I, and by the Committee itself.

The meeting will include presentation and discussion of the results of all of the ethnoecological surveys undertaken by the project, and discussion of how these results should be used and what their wider implications are for 'gestão' in indigenous areas in the Brazilian Amazon.

## SURVEY METHODOLOGY

Each survey will be conducted by the survey team over a continuous period of three months. The surveys will be carried out in three main stages:

- 2 Stage I - Background research
- 2 Stage II - Field research
- 2 Stage III - Consolidation of results and preparation of outputs

### Stage I - Background research and preparation

Background research and project preparation will be carried out by the specialist consultants, with the participation of the FUNAI representative assigned to the team. At least part of this work will be carried out in Brasília, where the 'core' information resources will be available. Support, including office accommodation, will be provided for these specialists by PPTAL and FUNAI while in Brasília.

#### Activities

- Establishment of initial contact with representatives of all of the indigenous communities in the area to be surveyed (for practical and financial reasons this may have to be carried out by a third party in remoter regions); explanation of the nature and purpose of the survey, and preliminary planning for the workshops to be held during the field phase.
- Accumulation of all relevant information on the area (complex) to be surveyed and its peoples. This will involve literature surveys as well as establishment of contact with other specialists with relevant experience in the region. Sources of information (over and above those available from the 'core information resources') will include the following:
  - ❖ Academic journals
  - ❖ Books, PhD and Masters theses, case studies
  - ❖ Project reports
  - ❖ Environmental Impact Assessments
  - ❖ Reports produced during the demarcation process
  - ❖ Missionary archives
  - ❖ NGOs operating in the study area
  - ❖ Government organisations (federal, state and municipal) who have worked or are working in the study area (including IBAMA, FUNAI, PPTAL, etc.).
  - ❖ Specialists and bibliographic material from museums, universities and other research institutions (e.g. INPA, MPEG, etc.) who have worked in the area.
- Preparation of a preliminary document on the ethnoecology of the region, based on the background material accumulated.<sup>12</sup>
- Familiarisation with the accepted orthographies used for transcribing the languages of each of the indigenous groups represented in the area.
- Identification of priority areas and topics for field study, and development of a detailed, structured survey plan.
- Accumulation of materials for fieldwork:
  - ❖ Base maps

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<sup>12</sup> The quality of the existing material will vary considerably. In commercial environmental impact assessments, for example, it is not uncommon for lists of species to be generated from other surveys (e.g. from lists of tree species recorded elsewhere in 'similar' vegetation), without any field data to support them. The consultants will therefore need to assess the validity of any data before incorporating it in the survey. This validation is inevitably based to some degree on subjective judgement. Useful indicators include: experience and reputation of the workers, context in which the study was carried out, time spent in the field, citation of specimens (in the case of biological work), etc.

- ❖ Satellite images and aerial photographs
- ❖ Materials for workshop (flip charts, stationery, etc.)
- ❖ Interview structure
- ❖ Pre-prepared data sheets (planilhas)
- ❖ Resource maps for the complex (vegetation, soils, etc.)
- ❖ Equipment (GPS, collecting equipment, photographic equipment, audio recording equipment, etc.)
- ❖ Field identification guides
- ❖ Lists of the most important plant and animal species in region (together with common names and indigenous names where possible)

### Scope

The level of information which can be gained from background research will vary considerably from one complex to another, depending upon the quantity of research that has been conducted in the area. The division of time between the background research and field research should therefore be adjusted accordingly. In any case, a minimum of six weeks should be spent in the field. However, if there is little existing information it may be judged by the survey team (in consultation with the Advisory Committee) that this period should be extended at the expense of the background research.

Background research should cover as many of the subjects, issues and questions outlined below (*Breakdown of the survey*) as possible. Although there will inevitably be overlap between the information which can be gleaned from fieldwork and from documentary sources, there are certain elements of the survey which cannot realistically be covered in the field. For example, the historical background to the survey will have to be put together largely from existing data. Likewise it will be impossible during a single visit to gather valid information on climate or on mineral deposits, etc. It is therefore particularly important that these elements are covered in the background study. To draw attention to these sections, they have been marked in the *Breakdown* with ☐ bullet points.

## Stage II - Field research

### ***Techniques and approaches in the field***

These surveys are specifically designed to be inter-disciplinary and multi-cultural, allowing the survey team to incorporate environmental and anthropological research and to mix the perspectives of trained scientists with those of indigenous peoples from each of the groups represented in the area. This should provide a reasonably balanced picture of the ethnoecology of the region. However, for this to be the case it is important that the team works together *as a unit* in the field, rather than separating to pursue their own agendas.

The specific methodology and techniques suitable for each field survey will depend to some extent upon the nature of the particular 'complex' under study. The size and numbers of the indigenous areas within it, for example, will affect the degree to which the team will be able to make representative field observations, and levels of literacy and fluency in Portuguese will influence decisions over the use of questionnaires, etc. In a complex in which there is substantial inter-group variation in Portuguese language ability and literacy, participatory discussions involving all parties will inevitably be made more difficult, and workshops structures will need to be adjusted accordingly.

In other words, survey teams will need to maintain a pragmatic attitude to methodology, maintaining a focus on the broad practical objectives of the study.

**Data collection** - It should not be necessary to discuss here in detail the basic approaches and behaviour which are necessary for conducting fieldwork among other cultures, given that

one of the most important factors for the selection of consultants is their previous experience in working with Amazonian indigenous people. However, some basic points follow:

- % It is important to choose questions with care. For example, wherever possible one should avoid phrasing questions so that they can be answered by 'yes' or 'no', as there may be a tendency to reply in the affirmative regardless of the context.
- % Some information may be specific to men or to women, and it may be difficult for members of the opposite sex to gain access to that information<sup>13</sup>.
- % It is generally necessary for the researcher to fit his or her studies in with the 'rhythm' of activities in a community, and as such it is important that research plans include a strong element of flexibility.
- % It is important that the specialist consultant is able to avoid the temptation to project his or her own perceptions, assumptions and interpretations onto those of the people with whom he or she is working. This requires respect for the beliefs and ideas of those communities.
- % It is important that wherever possible information should be collected from the people regarded by their communities as *specialists*<sup>14</sup> in particular aspects of indigenous knowledge and resource use.
- % The names<sup>15</sup> of all participants and all sources of information should be recorded.
- % Feedback should be provided to the indigenous communities throughout the surveys.
- % Care should be taken not to interfere with the existing leadership structure of the communities through the allocation of responsibilities and coordinating roles. This requires an understanding of the leadership system prior to commencement of research.

It is recommended that a combination of participatory workshop techniques and open-ended semi-structured interviews<sup>16</sup> should be used as the primary means of data collection. In complexes where there is a sufficiently high level of literacy it may be possible to supplement these by the use of questionnaires, thus broadening the information base.

**Participatory techniques** - These techniques, such as PRA and RRA, have been developed specifically in order to facilitate rapid appraisal of the type demanded by this project.

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<sup>13</sup> This is one of the reasons for choosing a mixed survey team.

<sup>14</sup> Degrees of specialisation vary. Among some peoples, certain aspects of traditional knowledge (e.g. of medicinal plants) can be quite restricted.

<sup>15</sup> This is, of course, complicated in some Amazonian societies, where real names may be perjorative and used only by third parties. However, in most groups a 'substitute' Brazilian name is now used.

<sup>16</sup> These interviews loosely follow the structure outlined in the *Breakdown*, but not to the point of cutting out information which lies outside the scope of that structure. The researchers should: a) find a balance between a curiosity that appeals to the group and one that arouses suspicion; b) reflect on peoples' comments on specific situations and try to gauge their reactions without constantly asking questions; c) develop techniques for initiating open-ended discussions.

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### **Participatory techniques**

*Local people are full participants in the study rather than being merely the objects of investigation. They take part in the design of the study, data collection, analysis of the findings and discussions of how the results can be applied for the benefit of the community. The outsiders come from a variety of academic backgrounds, ensuring a multidisciplinary perspective. The relationship between all participants - locals and outsiders - is egalitarian, avoiding the hierarchical or top-down approach common to much research.*

*The techniques can be carried out in a short time and do not require expensive tools because participants are seeking a sketch of local conditions rather than an in-depth study. A small group of local people is selected to be interviewed in a semi-structured way. A wide range of topics may be covered in a preliminary way, allowing a comprehensive view of how the community works as a whole. Measurements are qualitative rather than quantitative and few statistical tools are used in the interpretation of the results. The emphasis is on highly visual techniques that community members carry out amongst themselves, often in collaboration with outside researchers - sketching maps to show local classification of ecological zones, creating pie-charts that represent the amount of time that people dedicate to various productive activities or drawing calendars which show seasonal fluctuations in climate, to give just a few examples. The analysis of the data is carried out in the community, which allows participants to modify their methods on the spot and to fill any data which are missing after initial fieldwork. Often the participants pass through successive rounds of data gathering and analysis, which allows them to refine their techniques during the course of the exercise.*

Martin, 1995<sup>17</sup>

**Species identification** - For accurate collection of information on plant and animal species it is usually necessary to make voucher specimens for identification for anything but the most easily recognised and well known species. Although this is standard procedure for ecological, botanical, zoological and ethnobiological research, in the context of these ethnoecological surveys the collecting of large quantities of material is inappropriate. Specimen collection and identification are both time-consuming and laborious tasks, and there would not be sufficient time available. It is therefore recommended that a minimal amount of collecting equipment should be carried by the team, and that it should be used only to make specimens of species attributed with particular economic, cultural or ecological importance and requiring confirmation of identification.

Identification of certain animal and plant groups (e.g. mammals, birds, fishes) can be facilitated by the use of illustrated field guides. With a combination of reliable informants and well-illustrated guides it may, for example, be possible to make very rapid lists of the animals present and/ or used within an area. The limitations of this technique lie partly with the difficulty which many people may have in recognising drawings and photographs if they are unused to working with them, and partly with peoples' tendency to give confirmatory responses to questions regardless of the context (showing somebody a picture is, in this context, a question of sorts). However, some measure of the reliability of this information can be gained by recording whether or not (or how often) species are said to occur in the area when it is known that they do not, i.e. by cross-checking.

**Common names** - It is important that the common names of the principal species, places, vegetation types, unidades de paisagem, etc., are recorded in all of the dialects or languages

<sup>17</sup> Martin, G.J., 1995. *Ethnobotany. A methods manual*. Chapman & Hall, London.



spoken in the area (using the accepted orthographies), as well as in 'Portuguese'.<sup>18</sup> If previous studies have recorded common names of plants and animals, then pre-prepared lists of these names can provide a useful means of identifying key species in the field. However, considerable care must be taken when using common names for species-level identification, since it is not uncommon for them to refer to more than one species<sup>19</sup>. Alternatively, one species may have more than one common name, even within a single village. In a multi-cultural context (i.e. working in a complex where more than one indigenous language is spoken), the use of common names may lead to confusion during group discussions. Thus, if widely used 'Portuguese' names are known, it would be best to work with these.

**Language** - It has already been specified in the description of the consultants' required experience that at least the ethnologist/ anthropologist should have previous experience of working with the peoples in the demarcated areas concerned. If this is the case then it may also be that they speak the indigenous languages of the 'complexes' which they are surveying. Nevertheless it is highly likely that in many cases it will not be possible to find consultants who speak these languages. In such cases it is extremely important that provisions are made *in advance* of the fieldwork for the identification of 'informants' and workshop participants who speak good Portuguese. Unfortunately in many cases the older community members, who will often be in the best position to provide much of the information sought by the survey, may prove to be the least able Portuguese speakers. In these cases it will be necessary to arrange for the presence of bilingual translators (who may be younger members of the same communities).

**Mapping** - As has already been discussed, maps provide an essential means of collecting macro-scale data and presenting it in an accessible and comprehensible form. However, for maps to be useful in the context of these surveys it is important that the indigenous communities understand how they work<sup>20</sup>, and that the maps which are used refer to features in the landscape which the people recognise. These may be different from those usually used to define the layout of a map (e.g. topography, drainage, etc.), and may include features such as sites of historical importance (e.g. places where something happened), sites of mythical or ritual importance, sites associated with particular resources, waterfalls, abandoned villages, hunting trails, etc. Although these may not all be of direct relevance to the subject of the survey, it is nonetheless important that they are included if the maps are to be widely comprehensible. The level of detail and scale at which resources and environmental features are mapped will be determined by the time available - it is more useful to produce low-resolution maps of the whole area than high-resolution maps of a small part of it.

All maps will be based on the standard *base maps* produced during Phase 3 of the project (see above). Although (if possible) these maps will have been adjusted for use in a future GIS system, these surveys do not have sufficient time and resources available to produce comprehensive GIS data. However, the use of satellite imagery and aerial photographs can nonetheless be very useful, both for identifying key features and locations which may be recognised by the indigenous communities, and for assessing the extent and spatial distribution of clearly identifiable habitats and vegetation types<sup>21</sup>. Large-scale prints of these

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<sup>18</sup> Nomes vulgares in the Amazon, widely used among Portuguese speakers, are in many cases derived from Tupi and other indigenous languages.

<sup>19</sup> The species to which they refer may not even be closely related.

<sup>20</sup> People who are not used to working with paper and pens may be happier drawing maps in the ground with sticks, and using stones etc. to mark sites and features.

<sup>21</sup> This will certainly be possible at the grossest level, e.g. for defining the boundaries between forest and savanna or pasture. The extent to which it will help in the detection of more subtle vegetational

images should therefore be taken to the field and used as tools during the workshops and fieldwork.

'Rapid indigenous ground-truthing' of aerial photographs or satellite images should, if possible, be carried out during the field phase. In other words, each of the clearly identifiable habitats and vegetation types should be visited with, and classified by, the indigenous people according to their 'system'. At the same time the environmental specialist will carry out a parallel ground truthing according to 'scientific' classification systems. It may also be useful to arrange an overflight of the area<sup>22</sup>.

GPS (global positioning system) can provide a useful tool for accurate mapping, but there are practical problems associated with its use in these surveys. The first problem is the difficulty in getting a 'fix' of your position in dense vegetation (particularly tropical forest), and although this can be overcome by the use of extendable aerials this is a time-consuming process. Time is the second restraint: to geo-reference all of the information collected during these surveys would take up time which could more usefully be devoted to other activities. Lastly, even if it were possible to collect all these data, they would only be useful if they could be plotted on a rectified map, which will probably not be available. Thus, although it is recommended that survey teams should carry GPS equipment, this should only be used for geo-referencing sites of particular importance, and for ground-truthing satellite images where appropriate<sup>23</sup>. These GPS data, although not important for basic mapping purposes, will nonetheless provide a useful means of relocating important sites in the future<sup>24</sup>.

**Photography** - Photographs can be very useful in making the results of an ethnoecological survey more user-friendly, particularly for the non-specialist. It is difficult, for example, to gain a mental picture of the vegetation units within an area from a verbal description alone, and a good photograph can spare the need for a great many words. There are, however, potential problems associated with excessive reliance on photography. The first is that if something goes wrong with the equipment it can let a researcher down badly, and as such there is no substitute for good field notes in terms of reliability. The second is that reliable identification of animals and plants (particularly the latter) from photographs is often impossible. The third is that some indigenous peoples may be offended or alarmed by being photographed (or, particularly, by having their children photographed) for cultural/ spiritual reasons. These concerns should of course be respected.

**Property rights** - Some aspects of the information collected during the survey may be potentially valuable to other parties. This is particularly the case for information pertaining to medicinal plants. All such data must be handled in a responsible manner which protects the intellectual property rights of the indigenous peoples concerned and conforms with the Convention on Biodiversity.

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changes will depend partly on the quality and resolution of the images and partly on the nature of those changes.

<sup>22</sup> Overflights, although useful, present various problems. The first is cost, which could potentially be circumvented if collaborating organisations (e.g. FUNAI) were to make their aeroplanes available. The second is that some indigenous peoples may be unwilling to fly if they have not done so before. The third is that it may be hard to fit representatives of all the indigenous areas in the complex, as well as the specialists, into one plane.

<sup>23</sup> Again, for GPS data to be of use for accurate ground-truthing of satellite images then those images will need to be rectified in advance, which is a costly and time-consuming process.

<sup>24</sup> Future (quantitative) surveys of particular resources may place a greater reliance on global positioning.

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### ***The field agenda - workshops and site visits***

One of the principal means of data collection during the surveys will be group discussion. To this end a workshop of  $\pm 5$  days will be held by the team in the survey area at the beginning of each field survey, and a shorter workshop ( $\pm 2$  days) at the end. These workshops will be held at locations determined in advance (in consultation with the communities), and attended by representatives of every indigenous group within the 'complex'. Representatives should include both men and women from every group<sup>25</sup>, chosen by the community leaders for their experience and knowledge. If possible these representatives should be reasonably fluent Portuguese speakers. Where possible it would also be useful if these workshops were attended by representatives of local indigenous organisations, and of any governmental or non-governmental organisations working in the complex.

The first workshop, as well as providing an important preliminary means of data collection, will help to establish working relationships with the communities and provide community members with an opportunity for input into the research agenda.

The outline<sup>26</sup> of the workshop should therefore be roughly as follows:

- 2 Self-introductions for all attendees
- 2 Introduction to and explanation of the study
- 2 Discussion of the agenda of the workshop, and techniques to be used
- 2 Map introduction - familiarisation with mapping concepts, map interpretation, basic mapping techniques; presentation and adaptation of base maps, etc.<sup>27</sup>
- 2 Systematic discussions and interviews
- 2 Identification of priorities
- 2 Planning of a field research agenda and itinerary

Following the workshop, the survey team will visit and collect data from each of the indigenous areas within the complex, focusing on the priority areas and issues defined during the workshop. This will include conducting interviews within the indigenous communities, ground-truthing vegetation types, observing management practices, etc.

The second workshop, held at the end of the field phase, will provide a forum for discussion of the results and preliminary interpretations. This will provide rapid feedback of the outcome of the survey to the communities, while providing them with an opportunity to point out and correct errors in the data, or inaccurate generalisations made in the preliminary analysis of the results.

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<sup>25</sup> Even though women are involved in the workshops, it may be found that they are unwilling to assert their opinions in the presence of the men. If this is the case, the workshop may need to be restructured so as to solve the problem.

<sup>26</sup> The agenda of these workshops, as with all of the activities undertaken in the field, cannot be rigid, and this is only an outline. It is very important that not only the methodology but also the personnel involved in undertaking the surveys maintain high levels of adaptability and flexibility throughout the study, as is the case in any work involving indigenous communities.

<sup>27</sup> Use of maps is a very important part of the data collection process, but unless the workshop participants have a clear understanding of the maps which are in use, and of how to work with them (see above), then there will be serious risk of error in the data. It is therefore worth investing time at the beginning of the workshop in ensuring that everybody has sufficient understanding of the process.

## Stage III - Consolidation of results and preparation of outputs

The results of each survey, incorporating background and field data, will be analysed and presented in standard output form during the last two weeks of the survey period. This may require a limited amount of additional research of published materials and/ or consultation of specialists.<sup>28</sup>

### Outputs - Some important notes

- 📖 Data from these surveys will remain the property of PPTAL/FUNAI, and will not be used as the basis for research publications by the specialists contracted by the project<sup>29</sup>.
- 📖 The primary output of each survey will be a full and detailed report on the ethnoecology of the complex in question. Data (results) will be presented in a format conforming as closely as possible to the categories outlined in the *Breakdown* below.
- 📖 All written reports will be submitted to the Advisory Committee both in hard copy and in electronic format. Electronic files should be submitted as Microsoft Word documents. Final reports must be submitted within four months of the start of the survey.
- 📖 All supporting materials, including original maps, data sheets and questionnaires produced during fieldwork, will be presented to the Advisory Committee together with the report.
- 📖 Copies of all reports and maps resulting from the surveys will be sent to each of the indigenous communities as soon as they have been accepted by the Advisory Committee.
- 📖 Financial reporting for the survey (expenses) will not be submitted as part of the report, but as separate documents.

### Report format

- + Introduction
- + Methodology
- + Results (as outlined in the *Breakdown* below)
- + Discussion<sup>30</sup> (including a discussion of the potential for development of commercial exploitation of natural resources by the indigenous communities in the complex, drawing on experience from other areas and projects in Amazonia)
- + Recommendations (possibly including recommendations for further studies<sup>31</sup>)
- + Complete bibliography of material cited or consulted by the survey team, and of any other material relevant to the ethnoecology of the region
- + Appendices:
  - Maps
  - Species lists
  - Other detailed data (e.g. climatic)
  - Itinerary and cronograma detalhado de trabalho
  - Lista de participantes
  - Miscellaneous

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<sup>28</sup> This may be necessary, for example, in order to make preliminary recommendations on commercially exploitable natural resources.

<sup>29</sup> This will reduce the temptation to follow an alternative research agenda.

<sup>30</sup> The limitations and biases of the study (i.e. short time in the field, season of visit, heterogeneity of the complex, etc.) must be borne in mind when interpreting and discussing the results.

<sup>31</sup> Ideally these further studies would be conducted by the indigenous groups themselves, with support from PPTAL where necessary, and they they should be designed accordingly.

## BREAKDOWN OF THE SURVEY

The following breakdown outlines the subjects which should be addressed by each survey during the preliminary collection of background information, during fieldwork [with the communities], and in the presentation of the results of the survey. However, this is NOT intended as a series of questions which should be asked of the indigenous communities in the area. Rather it is a series of questions which the survey team should be able to answer [about all of the communities within the 'complex'] at the end of the survey!

### Background

This section of the survey, crucially important in placing the more detailed survey results in their proper context, should provide information on at least the following:

- ☞ Definition and geographical location of the complex [MAP]
- ☞ Rationale behind the composition of the complex
- ☞ Introduction to the indigenous peoples living in the complex
  - ✦ Languages
  - ✦ Ethnology
  - ✦ Demography (historical and contemporary)
  - ✦ Inter-tribal or inter-community relationships (historical and contemporary)
  - ✦ History of occupation of the area (e.g. migrations, translocations etc.)
  - ✦ History of contact (e.g. with FUNAI, missionaries, settlers, garimpeiros etc.), and associated phenomena (e.g. epidemics, land loss, involvement in commerce, significant alterations in lifestyle, etc.)
- ☞ Background to the demarcation of the areas in the complex
- ☞ Introduction to the environment (climate, vegetation, soils, fauna, etc.) of the region
- ☞ Description of the social and environmental conditions around (outside) the demarcated areas in the complex, including development projects
- ☞ History of prior research in the area

The following sections incorporate questions to be answered by data collected both in the field and in preparatory background research. Those marked with ☞ will primarily be answered by background research.

### Climate

- ☞ What are the principal climatic characteristics of the area (e.g. rainfall, temperature and seasonal variations thereof)?
- ◆ What climatic (seasonal) variations are perceived by the indigenous peoples, if any?
- ◆ If the indigenous people recognise seasonal changes, how do these correlate to the monthly calendar, and to annual rainfall and temperature fluctuations?
- ◆ What indicators are seen to announce them (e.g. water levels, animal behaviour, fruiting or flowering of plants, ripening of crops, etc.)?

### Geomorphology and 'Unidades de paisagem'

- ◆ Which are the main 'unidades de paisagem'<sup>32</sup> recognised in the area by the indigenous groups, and where are they found? [MAP]
- ◆ What are their defining characteristics?

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<sup>32</sup> This is a very loose term. Although these units may include geomorphological features such as cliffs, hills, beaches, rock outcrops, valleys, etc., they will probably also include features which are discussed elsewhere in this *Breakdown* (e.g. water bodies, vegetation types, etc.).

- ◆ To what do these units correspond in geomorphological or ecological terms?
- ☞ What major topographic variations, if any, are found within the area (e.g. mountainous areas, lowlands etc.)? [MAP]
- ◆ What topographic variations, if any, are perceived by the indigenous people?
- ◆ If such variations are recognised, are any identifiable factors used to define them?
- ◆ How do these relate to altitudinal changes?
- ◆ What properties, if any, are associated with specific unidades de paisagem and topographic units (e.g. traditional use, occupation, resource availability, historical or spiritual associations, disease risks, etc.)?

## Water resources

- ☞ Where are the principal water bodies in the area (rivers, igarapés, lakes)? [MAP]
- ☞ Are the rivers classified as 'black water', 'white water' or 'clear water'?
- ◆ Which water bodies, if any, dry up during the dry season?
- ◆ Which, if any, are used for navigation?
- ◆ For how much of the year are they navigable?
- ◆ Which, if any, are used for fishing?
- ◆ What other activities are associated with water bodies?
- ◆ Are water resources a limiting factor for particular activities or for settlement within any part of the area?
- ◆ Are water bodies important in the choice of location of villages?
- ◆ Does the area contain self-contained catchments, and if not are there any real or perceived threats to the water supply (e.g. pollution, deforestation)?
- ◆ What water management practices are used in the area, if any?

## Geology and soils

- ☞ What are the main rock and soil types and their distribution in the area? [MAP]
- ◆ Is there *terra preto de índio* in the area? Where is it found? What are its origins perceived to be?
- ☞ Where, according to soil science, should be the most fertile parts of the area?
- ◆ How do the indigenous people classify their rocks and soils, if they do?
- ◆ What soils are regarded as most suitable for horticulture/agriculture?
- ◆ Are there problems with soil erosion in the area? If so then where, and in association with what practices or topographic features?
- ◆ What soil management practices are used in the area, if any (e.g. burning, composting, soil erosion control, etc.)?
- ◆ Are there any 'indicator' species of plants which are recognised as being associated with soils suitable for growing particular crops?

## Minerals

- ☞ What are the principal mineral deposits identified in the area, and where do they occur? [MAP]
- ☞ Which mining companies 'own' the rights to these minerals?
- ◆ Have these deposits been exploited by outsiders, on a formal basis (mining companies) or on an informal basis (garimpeiros)?
- ◆ If so then what, where and by whom?
- ◆ Have they been exploited by the indigenous communities?
- ◆ If exploitation has occurred, what have been (or might have been) the environmental and social consequences (e.g. soil erosion, forest clearing, mercury pollution, disturbance of game, disruption of water courses, etc.)?
- ◆ If mineral exploitation has taken place or is taking place, what (if anything) has been the return for the indigenous communities (financial or other).

## Vegetation

- ◆ What are the principal natural vegetation units existing in the area as defined by the indigenous peoples living there, and where do they occur? [MAP]
- ☞ What are the principal natural vegetation units existing in the area as defined by vegetation scientists, and where do they occur? [MAP]
- ◆ What is the correlation between them?<sup>33</sup>
- ◆ What anthropogenic vegetation categories are recognised?<sup>34</sup>
- ☞ What are the principal botanical components of these vegetation types (i.e. what is their species makeup, including dominant species if present)<sup>35</sup>?
- ◆ What are their structural characteristics (e.g. stature, density, stratification, etc.)?
- ◆ How does the distribution of these vegetation types correlate with variations in environmental conditions, or with other factors?
- ☞ How widely distributed are these vegetation types in Amazonia, and how well known are they?
- ◆ Have any 'exotic' (introduced) plant species now become significant elements of the local flora?
- ◆ What threatened, rare or endemic species are known to occur in the area?
- ◆ If so, then what are they? Has their introduction judged to have been beneficial or detrimental?

## Fauna

- ☞ What animals are known to occur in the area?<sup>36</sup>
- ◆ What vegetation formations or environments, if any, are these species particularly associated with?
- ◆ Have any 'exotic' (introduced) animal species become significant elements of the local fauna?
- ◆ If so then what, and is their introduction judged to have been beneficial or detrimental?
- ◆ Have any animal species disappeared from the area in living memory, or become noticeably scarcer?
- ◆ What is thought to have brought this about?
- ◆ What threatened, rare or endemic species are known to occur in the area?

## Settlement, spatial occupation and demography

- ☞ What are the populations of each of the indigenous groups in the complex?
- ☞ Are these populations rising or falling?
- ◆ Do the people live in communal (multi-family) houses, villages of family houses, or scattered family units?
- ◆ How are they distributed spatially (i.e. where are their villages and how many live in each)? [MAP]
- ◆ Where are abandoned villages located in the area; when were they abandoned? [MAP]

<sup>33</sup> This may not be easy to determine, since the criteria by which the indigenous peoples have classified their vegetation may differ considerably from those used by the vegetation scientists.

<sup>34</sup> Some indigenous peoples of Amazonia recognise distinct stages of ecological succession after a cultivated area has been abandoned.

<sup>35</sup> Although detailed botanical surveys may not have been conducted in the indigenous areas concerned, and such a survey cannot be conducted within the confines of the present project, useful data may nonetheless be available from surveys carried out in the region in the same vegetation formations.

<sup>36</sup> Although detailed zoological surveys may not have been conducted in the indigenous areas concerned, and such a survey cannot be conducted within the confines of the present project, useful data may nonetheless be available from surveys carried out in the region in the same vegetation formations.

- ◆ Do communities, families or individuals undertake seasonal migrations within (or outside) the area, and if so how far, how long for, and where to?
- ◆ Are hunting/ collecting camps kept for seasonal or periodic use, and if so where are they located, when are they used, and what are activities associated with them? [MAP]
- ◆ If the population is distributed unevenly over the area, what are the reasons for this (historical, resource distribution, etc.)?
- ◆ Are there areas which are never visited?
- ◆ How long do villages or families traditionally remain in one place, and how far do they tend to move?
- ◆ What tends to be the stimulus for such a move (e.g. shortage of game, shortage of cultivable land, shortage of other resources, etc.)?
- ◆ Are these practices changing (e.g. sedentarização), and if so then what are perceived to be the main stimuli for these changes?

### **Natural resource distribution, exploitation and ownership**

- ◆ Which categories of resource exploitation are perceived as most important in supporting livelihoods of the indigenous communities?
- ◆ Which parts of the indigenous areas in the complex are most used for natural resource exploitation of the following types? [MAP]
  - ✦ Fishing
  - ✦ Hunting
  - ✦ Collecting of plant products for subsistence
  - ✦ Collection of plant products for market
  - ✦ Other
- ◆ Which habitats/vegetation types/ unidades de paisagem are most used for natural resource exploitation of the types outlined above?
- ◆ Which environments, if any, are perceived by indigenous peoples as most important for overall livelihood support?
- ◆ Which environments are most used in terms of numbers of species exploited?
- ◆ Are any areas regarded as 'faunal refuges'?
- ◆ Are any 'ilhas de recursos' recognised (e.g. seringais, castanhais, etc.)? If so then where and what are they, and how are they exploited? [MAP]
- ◆ How far do hunting, fishing and gathering expeditions travel, and for how long?
- ◆ How far do seasonal 'trekking' expeditions travel, and for how long?
- ◆ What means of transport are used to access resources in the area?
- ◆ Are fallow swidden clearings visited after abandonment?
- ◆ If so, how frequently, for how many years, and what is collected from them?
- ◆ Are any of the natural resources in the areas 'owned' by particular individuals, families or communities?
- ◆ If so, how does the ownership system operate?

### **Seasonality and the calendar**

- ◆ Do recognised 'calendars' of seasonal activities and events exist?
- ◆ If not, can they be constructed?
  - ✦ What are the principal natural 'markers' which are seen as defining the passing of the year (e.g. stellar or lunar events, climatic changes, fluctuations in river levels, behaviour of plants and animals, etc.)?
  - ✦ How do seasonal activities (such as hunting of animals, gathering of plants, planting or harvesting of crops, population movements, enactment of rituals or festivals, etc.) and seasonal events (such as the appearance of particular resources) relate to each other temporally, and how do they correlate with this sequence of markers to form a basic 'calendar'?
  - ✦ Can this 'calendar' be correlated with the monthly calendar?



## Agriculture and husbandry

### Plants

- ♦ What are the main crop plants cultivated in the area?
- ♦ Where are they grown (e.g. roças, dooryard gardens, etc.)?
- ♦ Which are the most important species grown for food?
- ♦ How many cultivars of the most important food crops are grown by each group?
- ♦ How important are crop plants in the diets of the peoples in the area?
- ♦ Does importance of crop plants vary seasonally, and if so then how?
- ♦ What is the average size of a roça (per family)?
- ♦ How many years can a garden be cultivated before it is abandoned?
- ♦ What is the ownership system for the roças (family, community, etc.)?
- ♦ Up to how far are the roças situated from the villages?
- ♦ What criteria are used for selecting sites for cultivation?
- ♦ What techniques are used for preparation of gardens/ fields (clearing, felling, burning)?
- ♦ When is clearing, burning, planting and harvesting carried out, and by whom?
- ♦ Is all of the produce for domestic consumption, or is some sold?
- ♦ What crops are grown for sale, if any, and how much is sold?
- ♦ Do the crops ever fail, and if so how often and what are perceived to be the causes?
- ♦ Are there any problems with pests, and if so then what?
- ♦ What species are cultivated for purposes other than for food? What for?

### Animals

- ♦ What livestock is kept (including honey bees)? Where?
- ♦ Who owns the livestock? How much (average per family)?
- ♦ How are the animals fed?
- ♦ Does the livestock need to be moved seasonally?
- ♦ What land management practices are associated with keeping these animals (e.g. creation and maintenance of pasture, etc.).
- ♦ Are there any problems with pests or predation, and if so then what?
- ♦ How important is livestock in providing meat for the diet?
- ♦ What other significant products are produced from livestock?
- ♦ Are any livestock products sold, and if so then what?

### Non-commercial use of wild plants (and fungi)

- ♦ What wild plants are used by the people in the area?<sup>37</sup>
  - ✦ Plants for food (including 'famine foods', used in time of scarcity)
  - ✦ Drug and stimulant plants
  - ✦ Plants for hunting and fishing (including weapons, poisons etc.)
  - ✦ Plants for clothing/ body adornment
  - ✦ Plants for construction (including thatch, wooden poles, lashing etc.)
  - ✦ Plants for tools, implements and miscellaneous uses
  - ✦ Medicinal plants
  - ✦ Plants for fuelwood/ charcoal
  - ✦ Plants in ritual, magic and myth
- ♦ How important are wild plants in the diet?
- ♦ How important are the contemporary and historical roles of medicinal plants in their healthcare system?

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<sup>37</sup> A thorough study of this subject would be much too time-consuming for the current survey. If the information does not exist, then it will only be possible to gain a superficial picture of this subject, focusing on the most important species.

- ◆ Is it common practice for trees to be felled for non-timber products (e.g. their fruits), and if so is this a recent development?
- ◆ What other destructive collecting techniques are practised, if any?
- ◆ If these practices have developed recently, what is thought to have stimulated them (e.g. access to more efficient tools) and what effects on resources, if any, are they thought to have had?

### Non-commercial use of wild animals

- ◆ What wild animals are eaten by the people in the area?
  - ✦ Mammals
  - ✦ Birds
  - ✦ Reptiles
  - ✦ Fishes
  - ✦ Insects (directly)
  - ✦ Insects (indirectly, i.e. honey)
  - ✦ Other (e.g. crabs, earthworms, etc.)
- ◆ How important are wild-caught animals in the diet?
- ◆ Which of the above categories are the most important in satisfying the protein requirements of the people?
- ◆ Which are the preferred foods?
- ◆ What animals are used for other purposes?
- ◆ What are the most commonly used hunting techniques (e.g. trapping, bow and arrow, blowgun, shotgun, etc.)?
- ◆ What are the most commonly used fishing techniques (e.g. trapping, nets, line and hook, barbasco, dynamite)?
- ◆ What changes have taken place in hunting and fishing techniques within living memory (e.g. transition from bow and arrow to shotgun, acquisition of nylon monofilament nets, etc.)?
- ◆ What consequences (if any) are these thought to have had?

### Important species

- ◆ What are regarded as the particularly important (key) species of plants and animals amongst those mentioned in the sections above, from the following perspectives?
  - ✦ Species of fundamental cultural importance (e.g. hallucinogenic plants)
  - ✦ Species of fundamental practical importance (e.g. key food sources, construction materials, etc.)
  - ✦ Species of fundamental commercial importance<sup>38</sup>
  - ✦ Species of importance for other reasons<sup>39</sup>
- ◆ What are the important characteristics and properties of these species?
  - ✦ Local names
  - ✦ Habitats in which they are found (and in which they are most abundant)
  - ✦ Locations in which they are found (and in which they are most abundant) [MAP]
  - ✦ Ecology (e.g. relationships with other species)
  - ✦ Seasonal behaviour (breeding, phenology, migration etc.)
  - ✦ Breeding sites
  - ✦ Population dynamics

<sup>38</sup> These may be marketed directly as raw materials, or processed (e.g. as artesanato, etc.).

<sup>39</sup> From the point of view of conservation, it would be useful to collect information on particularly rare, threatened or endemic species occurring in the area. However, it should be understood that these species may not be regarded by the indigenous people as important. Their only importance might be through the potential benefits which could be accrued if financial support were to be given to these communities to ensure their *in situ* conservation, if they were marketable (e.g. mahogany seeds for replanting projects), or if they were to become an attraction for ecotourism.

- ✦ Methods and time of year for capture or collecting
- ✦ Abundance
- ✦ Quantity harvested
- ✦ Distance travelled to harvest them
- ✦ Spiritual/ ritual associations and taboos
- ◆ Does the available supply of any of these species limit the time which a community can remain settled in one place?

### **Ecological understanding and traditional knowledge<sup>40</sup>**

- ◆ What is known by the indigenous peoples about the relationships between animals, plants and their environment?
  - ✦ Plant/animal relationships (predation, pollination, seed dispersal, etc.)
  - ✦ Phenology
- ◆ Are there any elements of their traditional knowledge which are restricted to certain people in the community?
- ◆ If so then what, and to whom?
- ◆ Are there any elements of the indigenous peoples' traditional knowledge which they perceive to be threatened or disappearing?
- ◆ If so, what are thought to be the causes for this?

### **Gender issues**

- ◆ How is labour divided between the sexes in the indigenous groups living within the complex?
- ◆ How is knowledge of the useful properties of plants, animals and other resources divided between the sexes (e.g. of traditional medicines)?
- ◆ How does the division of labour influence the relationships between men and their environment and between women and their environment?
- ◆ How do men's working relationships with the environment differ from those of women?
- ◆ How do men and women's perceptions of their environment differ?
- ◆ Which species, habitats or areas are particularly used by or associated with women?
- ◆ Which species, habitats or areas are particularly used by or associated with men?

### **Spiritual/ ritual associations**

- ◆ Which areas, environments or unidades de paisagem, if any, are attributed with spiritual or ritual associations?
- ◆ What are these associations?
- ◆ Do these associations affect the way in which these areas or environments, or the resources within them, are used?
- ◆ Which species, species groups or life-forms, if any, are attributed with particular spiritual or ritual associations?
- ◆ Do these associations affect the way in which these species are used?
- ◆ What taboos exist on the use of certain species (e.g. animals which cannot be killed or eaten; trees which cannot be felled or used for firewood, etc.)?
- ◆ When do these taboos apply, and to whom?

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<sup>40</sup> Indigenous peoples generally have very sophisticated knowledge of animal behaviour and the ecological relationships between the plants and animals of their environment (e.g. knowledge of which game animals will be found feeding from the fruits of which plants at which time of year). This aspect of their traditional knowledge, which is very important for hunting, is often overlooked by researchers. A detailed investigation of this subject is not appropriate to these surveys. If the information already exists (i.e. has already been recorded by an ethnobiologist) it can provide an important source of background information for management of natural resources in the area. However, if not then any field investigation should focus on species and plant/ animal groups of particular importance (see above).

## Management of land and natural resources

- ◆ What management strategies are consciously practised by the people in the area?
  - ✦ Burning
  - ✦ Land use rotation/ fallow management
  - ✦ Hunting/ fishing rotation
  - ✦ Pest control
  - ✦ Planting (outside areas of cultivation)
  - ✦ Other
- ◆ Where are these practised, in what habitats, when, and by whom?
- ◆ What management strategies are unconsciously practised by the people in the area?<sup>41</sup>

## Commercialisation

- ◆ What needs do the indigenous peoples of the complex currently meet by the commercialisation of their resources (e.g. manufactured goods, fuel, healthcare, education)?
- ◆ What needs do they feel that they might need to meet in this way in the future?
- ◆ How are they currently meeting these needs?
- ◆ Where are the nearest markets, and how are they or could they be accessed?

## Current markets

- ◆ To what extent is commerce currently important in the economies of the indigenous peoples in the complex (in terms of time invested as well as return)?
- ◆ What resources are commercialised (wild and/ or cultivated) in the raw state?
- ◆ What resources are used as raw materials for marketed goods (e.g. artesanato)?
- ◆ Where and when (what times of year) are they collected or produced?
- ◆ How much is produced, where and to whom is it sold, how is it transported, and what income does this generate?
- ◆ Are the prices of these products stable, and if not then how are they changing?
- ◆ How does the ownership system for these resources function; who are the principal beneficiaries?
- ◆ Are all of the communities currently involved?
- ◆ Are both men and women involved, and if so is this with the production of the same or different products?
- ◆ Is production increasing, decreasing or stable?
- ◆ What are perceived to be the limiting factors in the production of these resources (e.g. land, time, abundance, productivity, access to market, etc.)?
- ◆ Does the work involved in the production of these resources interfere with traditional practices in any way, and if so then is this seen as a significant problem?
- ◆ Is there a desire to increase the income from these products or to investigate the possibilities of commercialising other products?

## Potential markets

- ◆ What are perceived to be the most marketable resources in the area, beyond what is already marketed?
- ◆ What equipment/ technology is required for their production?
- ◆ What potentially marketable artesanato is produced by the indigenous peoples in the area?
- ◆ What natural resources are used in the production of these items?
- ☞ What resources are successfully marketed by other peoples in the region (in similar environments and conditions)?

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<sup>41</sup> What are perceived as 'management strategies' by outsiders may not be consciously recognised as such by the indigenous people who practise them.

- ♦ How abundant and how widely distributed are these resources in the area?<sup>42</sup>
- ♦ What might be the limiting factors in their production (e.g. land, time, abundance, productivity, access to market, etc.)?
- ♦ Would the exploitation of these resources be socially and culturally acceptable (taboos, etc.)?
- ♦ What cultural practices might potentially threaten the success of commercial production (e.g. seasonal trekking or other activities which overlap with periods of productivity)?
- ♦ How would the marketing of new products impact on the lives of women?

### **Ecotourism**

- ♦ Is ecotourism taking place within the indigenous areas?

If so, then.....

- ✦ Who is organising it?
- ✦ Who is coming?
- ✦ How many are coming (per year)?
- ✦ At what time of year?
- ✦ What are they coming to see?
- ✦ Where do they stay?
- ✦ How much income do they generate, and who is benefitting from it?
- ✦ Are there any problems associated with ecotourism? If so then what, and for whom?

If not, then.....

- ♦ Is there an interest among the indigenous communities in the possibilities of ecotourism<sup>43</sup>?
- ♦ What attractions might realistically bring ecotourists to the area?
- ♦ How far would people have to come (is there a nearby population centre with a market for ecotourism)?

### **Outsiders**

- ♦ What outsiders, if any, are officially based (permanently or temporarily), in the area (e.g. FUNAI, missionaries, health organisations, ONGs)?
- ♦ What are they doing, how long have they been there, and how long will they stay?
- ♦ What effect has the presence of these people had on the environment and/ or on the indigenous peoples' relationship with the environment?
- ♦ What outsiders visit the area unofficially (e.g. hunters, fishermen, garimpeiros, traders, loggers, seringueiros, etc.)?
- ♦ How many, and how often?
- ♦ What effect has the presence of these people had on the environment and/ or on the indigenous peoples' relationship with the environment?

### **Human impacts on the area**

- ♦ What human impacts on the environment and natural resources of the area are visibly identifiable?
- ♦ What human impacts are recognised by the indigenous peoples as having taken place?
  - ✦ Conversion or degradation of 'primary' habitats

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<sup>42</sup> It will not be possible to make detailed quantitative assessments of these resources and their potential production levels within the timescale of these surveys.

<sup>43</sup> Establishment of ecotourism in indigenous areas is a controversial subject, with much potential for failure as well as for causing cultural and possibly environmental damage. It is not always easy for people who do not have experience of the tourism industry to comprehend the repercussions that it might have. Whether or not ecotourism might constitute a realistic and beneficial activity for an indigenous community will depend very much on individual circumstances, and it is recommended that considerable caution is exercised when raising and discussing this subject.

- ✦ Complete habitat destruction
- ✦ Pollution (mercury, sediments, industrial, agricultural, sewerage, acidification)
- ✦ Altered water levels (e.g. as a result of dams)
- ✦ Burning
- ✦ Flooding (e.g. as a result of road construction)
- ✦ Introduction of invasive species
- ◆ Where did they take place, how, when, what environments were affected, and how extensive are they?
- ◆ Are these processes ongoing?
- ◆ Which of these were caused by the indigenous communities, and which by outsiders?
- ◆ If they are or have been caused by outsiders, then by whom?
- ◆ Which are perceived as beneficial (if any), and which as detrimental?
- ◆ What effects, if any, do they have on the lives of the indigenous peoples (natural resource supply, health, etc.)?
- ◆ Do the indigenous peoples recognise any of the vegetation in their area (apart from the obviously secondary vegetation) as having anthropogenic origins?<sup>44</sup>

## Demarcation

- ◆ Has demarcation had any significant effect on the communities' relationships with their environment?
- ◆ Are there any areas or particular natural resources which they feel have been left out of the demarcated territory?
- ◆ Do these areas, if they exist, hold any important resources which are not available within the demarcated areas?
- ◆ If so, what current or potential effects on their lifestyle and future do they perceive as a result of this omission?

## Disease and the environment

- ◆ What are the major diseases experienced by the peoples in the area?
- ◆ Do any of these diseases restrict access to particular parts of their land at certain times of year?
- ◆ Which, if any, are perceived by the indigenous peoples to be related to identified environmental factors, and if so then what factors?
- ☞ Which of these diseases, if any, are known by epidemiologists to be clearly related to identified environmental factors, and if so then what factors?
- ◆ Does the occurrence of any of these diseases appear to have been affected by changes in management practices or alterations in habitats (e.g. forest clearance, flooding, etc.)?
- ◆ Are there any health problems in the area which are thought to be associated with environmental pollution?

## Carrying capacity<sup>45</sup>

- ☞ What is the maximum number of people thought to have lived in the indigenous areas within the complex?<sup>46</sup>
- ◆ Approximately what proportion of the area of their reserves, and the resources within them, are currently in use?

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<sup>44</sup> These might include, for example, palm forests, Brazil nut forests, liana forests, bamboo forests and certain types of low caatinga vegetation.

<sup>45</sup> Carrying capacity is an artificial concept of debatable validity, and should not be taken literally. In this context the term is used simply as an indication of the approximate population which a particular environment can sustainably support when managed in a particular manner.

<sup>46</sup> Many of the old census data for Amazonian indigenous peoples are highly dubious.

- ☞ What is the maximum number of people per unit area living sustainably elsewhere in environments similar to those in the complex?
- ◆ Are these people exploiting their resources in the same manner, and if not then how does it differ?
- ◆ Do the indigenous peoples feel that their areas could support much larger populations? If so, how much larger?

## Change

- ◆ What processes of change are perceived by the indigenous communities to be taking place in the area?
  - ✦ Change in social customs/ behaviour/ livelihoods (e.g. sedentarisation, greater reliance on commerce, abandonment of traditional practices, etc.)
  - ✦ Political change
  - ✦ Environmental change
  - ✦ Economic change
  - ✦ Demographic change
  - ✦ Changes in resource availability and use
  - ✦ Other types of change
- ◆ Are these processes of change recent or long-term phenomena?
- ◆ What are the perceived consequences of these change processes? (these may be positive or negative)
- ◆ What other change processes are observable within the complex?

## Threats and problems

- ◆ What threats and problems (real or potential) do the indigenous people within the complex recognise as jeopardising their livelihoods and environment?
- ◆ What other threats can be identified?
  - ✦ Fire
  - ✦ Drought
  - ✦ Health problems
  - ✦ Flooding
  - ✦ Environmental damage/pollution
  - ✦ Land invasion
  - ✦ Population pressure
  - ✦ Resource availability
  - ✦ Development projects (roads, airstrips, dams etc.)
  - ✦ Mining or logging operations
  - ✦ Local political pressures/ corruption
  - ✦ Loss of traditional knowledge
- ◆ What measures or tactics are they considering for mitigating these threats?

## Priorities

- ◆ What are the main concerns and priorities of the indigenous peoples in the complex?<sup>47</sup>
- ◆ What would they like to do (or see done) about them?

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<sup>47</sup> These may include concerns about the threats outlined above, or they may be requirements for sources of income, education, healthcare, etc.





## Organisation

- All survey teams will be briefed by the Advisory Committee in Brasília before beginning their work.
- Survey teams will be responsible for making their own travel arrangements.
- Survey teams will be responsible for arranging their own equipment.

## PROJECT FINANCE

### Estimated costs

***Costs will be determined in Brasília according to latest estimates and funding availability***

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Advisory Committee fees (non-FUNAI/ PPTAL personnel) .....	R\$ xxxx
Advisory Committee costs (travel, communications, materials) .....	R\$ xxxx
Acquisition of core information resources .....	R\$ xxxx
Administrative costs .....	R\$ xxxx
<b>Survey team consultancy fees</b>	
Anthropologist .....	R\$ xxxx
Environmentalist .....	R\$ xxxx
Indigenous people .....	R\$ xxxx
Total per survey .....	R\$ xxxx
Total .....	R\$ xxxx
<b>Survey costs</b>	
Travel .....	R\$ xxxx
Subsistence .....	R\$ xxxx
Materials .....	R\$ xxxx
Workshops .....	R\$ xxxx
Total per survey .....	R\$ xxxx
Total .....	R\$ xxxx
<b>Report production and distribution</b>	
Cost per survey .....	R\$ xxxx
Total .....	R\$ xxxx
<b>Workshop costs</b>	
Organisation .....	R\$ xxxx
Travel .....	R\$ xxxx
Subsistence .....	R\$ xxxx
Hire of facilities .....	R\$ xxxx
Total .....	R\$ xxxx

### GRAND TOTAL

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### Contracting

Consultant specialists will be contracted for a fixed fee, plus expenses within an agreed ceiling. The fee will be paid on production of the final outputs to the satisfaction of the Advisory Committee. Expenses will be paid on production of receipts. Indigenous representatives contracted to participate in the survey alongside the specialists will be paid at an agreed daily rate, and their expenses will be reimbursed. Participants in the workshop will have their expenses paid but will not receive other payment.

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## APPENDICES

### Appendix 1: List of acronyms

DNAEE	Departamento Nacional de Águas e Energia Eléctrica
FUNAI	Fundação Nacional de Índio
GIS	Geographical Information System
GPS	Global Positioning System
IBAMA	Instituto Brasileiro do Meio Amdiente
INPA	Instituto Nacional de Pesquisas da Amazônia
INPE	Instituto Nacional de Pesquisas Espaciais
MMA	Ministerio do Meio Ambiente, dos Recursos Hídricos e da Amazônia Legal
MPEG	Museu Paraense Emílio Goeldi
NGO	Non-Governmental Organisation
PD/A	Projetos Demonstrativos/ Tipo A
PD/I	Projetos Demonstrativos/ Tipo I
PPG-7	Programa Piloto para a Proteção das Florestas Tropocais do Brasil.
PPTAL	Projeto Integrado de Proteção às Terras e Populações Indígenas da Amazônia Legal
PRA	Participatory Rural Appraisal
RRA	Rapid Rural Appraisal
SIVAM	Sistema de Vigilância da Amazônia