

CSM  
**BGBD**

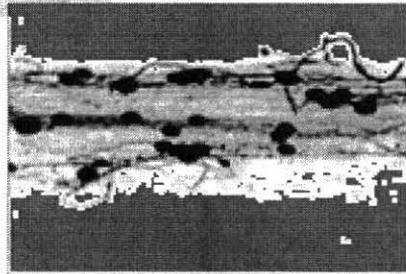
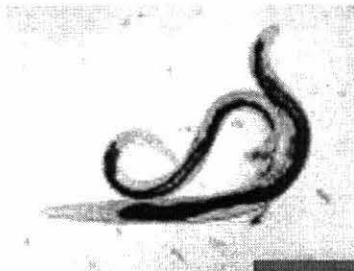
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# TSBF - CIAT

## Conservation and Sustainable Management of Below-Ground Biodiversity

### Annual progress report 2003



220288

Informe Anual

*Implementing the project management structure  
and defining methods for the inventory of BGBD*





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## 1. Introduction to the BGBD project

### Project outline

On August 1, 2002, the project document was signed by Mr. E Ortega, representative of UNEP as co-implementing organization, and Professor Mike Swift, the then director of TSBF, marking the official start of the project "conservation and sustainable management of below-ground biodiversity" with the acronym CSM-BGBD. The project is generally referred to as the BGBD project however.

The BGBD project is, at this moment, the only full sized project dealing with below ground biodiversity within the 'biodiversity' focal area with financial support from the Global Environment Facility (GEF) and implementation support from the United Nations Environment Programme (UNEP). The executing agency is the Tropical Soil Biology and Fertility institute (TSBF), nowadays an institute within the International Centre for Tropical Agriculture (CIAT).

The project's main goal is to generate information and knowledge that can be used to better manage and conserve BGBD in tropical agricultural landscapes in order to maintain agricultural productivity and reduce extensification of agriculture into natural landscapes. The project will build capacity for conservation and sustainable management of BGBD through South-South information exchange and training supported by international institutions.

The major goals of the project are:

1. To develop internationally accepted standard methods for characterizing and evaluating BGBD, including indicators for BGBD loss;
2. To inventory BGBD at sites representing a broad range of globally significant ecosystem and land use types, and to develop a global exchange network for information on BGBD;
3. To identify sustainable and replicable land management practices for BGBD conservation, and to pilot implementation of these practices at demonstration sites in the seven countries;
4. To promote alternative land-use practices that will enhance conservation of BGBD especially through policy advice support systems; and
5. Through the above and other activities, improve the capacity of institutions and stakeholders to conserve and manage BGBD in a sustainable and efficient manner.

The project is implemented through seven country programmes (CP), by a range of stakeholders, including government and other research institutes, plus NGOs. Working groups (WG), each linked to a major output of the project, and representatives from each of the seven country programmes provide scientific and technical inputs into the project while invited scientists from internationally recognized institutions advise the WGs on specialist technical matters.

Overall project supervision is provided by the BGBD Project Advisory Committee (BGBD-PAC). The PAC comprises scientists from each pilot country and also from other international organizations working on the interface between agriculture and environment. The project, being executed under the responsibility of TSBF-CIAT also reports to the Scientific Advisory Committee (SAC) of TSBF-CIAT. The Project Steering Committee (PSC) has overall responsibility for implementation and execution of the project. The PSC includes the Project Coordinator (PC), a GEF representative, the TSBF-CIAT Director and the participating Country Programme Conveners (CPC). The project coordinator and the conveners of each WG constitute the Project Coordinating Committee (PCC). The PC is based at TSBF-CIAT headquarters in Nairobi and is supported for administrative, financial and information management services by the Project Facilitating Staff (PFS).

Stakeholders include an inter-disciplinary team of scientists working in BGBD taxonomy, ecology, economic evaluation and soil management in agricultural, forestry and other ecosystems. They range from field practitioners to decision makers, but all share the goal of raising awareness on BGBD conservation and the potential benefits to agricultural production.

By developing standard inventory and characterization methods for BGBD at the benchmark sites, the project will generate knowledge that will aid studying and understanding the role of BGBD in ecosystem services across a range of diverse ecosystems. This will contribute to the use of soil organisms in conserving the environment, improving ecosystem health and enhancing agricultural productivity, thus contributing to enhanced food security, improved carbon sequestration and conservation of soil genetic resources.

The global information platform developed and maintained by the project will enhance knowledge exchange and create awareness on the importance of BGBD in ecosystem services and enhancing agricultural productivity beyond the seven pilot countries.

Identifying and recommending alternative land-use practices will assist in the management of BGBD, and thereby support soil processes that sustain crop production. Through this, the project will contribute to improving livelihoods of tropical farmers by improving the sustainability of their farming systems, whilst the enhanced environmental services provided by these farming systems will yield benefits to surrounding non-farming communities in towns and cities.

### **Progress in project implementation during its first one-and-a half year**

An initial implementation workshop was held at the Wageningen Agricultural University from August 26 to 30 2002, marking the start of the project. The workshop aimed at developing detailed workplans for implementing outcome 1 and 2 of the project, deciding on procedures to initiate training and awareness programmes and agreeing on financial and administrative arrangement as well as TOR for the advisory committees and other.

Project activities have, however, been slow to get underway, mainly due to changes in the staff and the institutional status that took place in the Executing Agency (EA), TSBF (e.g. incorporation into CIAT and the appointment of a new director) during 2002. It has strengthened the capacity of TSBF to act as EA, but has necessitated substantial work to put coordinating mechanisms in place. The integration of TSBF into CIAT still



demanded much attention in 2003 and it has as such impacted on the project. The new director took office in January and a full time coordinator for the project started his duties on February 3<sup>rd</sup> 2003.

Memoranda of Agreement between TSBF-CIAT and the implementing organisations in the participating countries were signed in the months of November and December of 2002. Funds were in some countries not available until February 2003 and this delay of availability of funding resulted in inactivity in the country teams. There has been a lag period whilst the members reassembled and re-familiarised themselves with the project. The effect of this lag period on getting the project activities started was still very much experienced throughout 2003.

A second global workshop was held in Lampung, Indonesia from February 24 to 28. This workshop can be considered the start of the project, from a practical point of view. The week prior to the global workshop a planning workshop on the economic valuation of BGBD and associated ecological services was held in France, with representatives from each of the countries. At the workshop in Lampung the project management and implementation structure were decided upon. Further, much attention was devoted to discussion of technical issues (site selection, sampling strategy and methods for the inventory) and to planning of project activities.

The implementation of the project structure, both at country level and at the global coordination level, has taken time. The staff of the coordinating office was expanded with a secretary as of May 1<sup>st</sup> and the project information manager (PIM) took up his duties as of November 1<sup>st</sup>, 2003. In the countries the project teams had to be partly re-established and project structure implemented. National planning workshops were held in each of the countries and sometime separate workshops were held to discuss methods for inventory. In some countries training activities were organised in preparation of the fieldwork. The project coordinator has visited each of the countries to support project implementation (apart from Indonesia). These visits generally served several purposes: to revive the country programmes by meeting with the project members and visiting representatives of the implementing to get confirmation of their commitment to the project, to support project implementation by discussing the project structure and associated administrative and financial affairs, planning of project activities and discussing technical issues related to site selection and methods.

Project organisation has been established and project structure implemented at different pace in the countries. This has impacted on the functioning of the working groups that operate across countries. It has, for example, impacted on the discussions related to the development of standard methods. In the original planning it was envisaged that standard methods would be devised prior to the start of the field work, aiming at September 2003. This proved not to be possible, partly also because of lack of communication mentioned earlier. In the mean time countries were urged to start field activities and to consider this as a pilot phase, rather than to postpone these. In most countries a start with the inventory had been made by the end of 2003 or early 2004. A few countries had already decided before then to start field work, irrespective of the issue of standard methods not having been resolved. Where the delay in the provision of standard methods for inventory of BGBD caused some countries to postpone the start of the inventory exercise, it did not withhold the larger number of the countries to proceed with preparatory

activities related to site characterisation, land use mapping or community involvement.

Given the problem with communication within the project, the communication infrastructure was placed high on the agenda of the PIM. The development of a project brochure and publishing of the first newsletter also featured prominently on that agenda. Both items were presented in the first months of 2004.

## 2. Description and analysis of events

### 2.1 Achievements regarding project objectives and purpose

The status of the activities and achievements, as far as the purpose and the goal of the project are concerned, is described in the table below. It provides a summary of what is being described in more detail in the next sections. Description of outputs and milestones achieved and the status of the activities is based on the output and milestones and logframe as defined in the "Monitoring and Evaluation" document (tables 2 and 3 thereof respectively)

**Table 1 Achievements relating to purpose and goal of the project**

Project intervention strategy	Key performance indicator	Status of the activities and achievements
<p>Development objective (Project Goal)</p> <p>Conservation and sustainable management of below-ground biodiversity is enhanced.</p>	<p>By the end of the project, BGBD conservation practices identified, tested and implemented.</p> <p>Capacity to manage and conserve BGBD improved</p>	<p>Land use inventory has not been concluded and information on current conservation practices within benchmark areas is not available for baseline data as yet. Some information (more in <i>general</i>) on current practices and knowledge on conservation of BGBD will be provided by the BGBD reviews that are nearly completed in most countries.</p> <p>Training and capacity building needs are identified as far as technical training to project teams is concerned</p> <p>Some technical training given in countries has contributed to improved capacity.</p> <p>Sensitization workshop in most countries has contributed to increased awareness under farmer communities.</p>
<p>Immediate Objective</p> <p>BGBD conserved and sustainably managed in globally significant forest ecosystems in seven tropical</p>	<p>Increased BGBD and improved ecosystem functions demonstrated in sites under improved management.</p> <p>Alternative strategies for land management promoted and/or adopted by stakeholders across a range of scales from</p>	<p>Not applicable at this moment of time. Baseline with respect to status of the ecological processes and environmental health will be linked to the demonstration plots to be established during the second phase of the project.</p> <p>Inventory to establish the current status of the BGBD is presently under way.</p> <p>Methods for inventory of BGBD has been agreed and documented. A start has been made with the international information exchange network.</p>

Project intervention strategy	Key performance indicator	Status of the activities and achievements
countries.	the farm to the nation. Global methodology and database for BGBD developed and utilised.	

## 2.2. Internationally accepted standard methods for the characterization and evaluation of BGBD

Most of the methods for the inventory and evaluation of BGBD that have been selected by now are well-known and well established. See for example Anderson & Ingram (1993) in "Tropical Soil Biology and Fertility: A handbook of methods" and Swift and Bignell (2001) in "ASB Lecture note 6B". The ASB Lecture note 6B provides standard methods for assessment of soil biodiversity and in particular macrofauna, nematodes, rhizobia and mycorrhizas.

Although these are known methods, they have not been applied and tested in each of the countries. Moreover there are new techniques that have been developed over the last years that need to be considered and incorporated in the protocols, and that not all country teams are familiar with. Result on testing of the proposed methods will be presented in September 2004. The selection of methods is a milestone that has been achieved (see table below).

At the Lampung global workshop a number of functional groups of soil organisms were defined, like "macrofauna" as the soil engineers. For all of these 'broad' functional groups methods for inventory are available, see for example the ASB Lecture Notes 6B. Methods for inventory of some of these groups are not contentious issues and will require only settlement of minor issues. However, in Lampung it was decided to adopt a systematic sampling grid, rather than the transect sampling generally described in literature, and this does have implications for the sampling protocols. Thus, where the methods for sample collection in it self are not disputed, the protocols need to be adapted and tested in the field.

At Lampung we did not consider measures for assessing diversity directly, using molecular techniques. Rather, the discussion on this topic was consigned to a workshop on molecular techniques that was held from September 27th to October 3<sup>rd</sup>, 2003 at Cali, Colombia. However, the issue of the use of molecular techniques was not resolved and will need further discussion.

The methods for economic valuation of BGBD were discussed at the workshop held in Quissac, France in February 2003. Here the decision was taken to apply methods and techniques, as know to environmental economics, in assessing Direct Economic Value, Indirect Economic Value, Option Value and Existence Value. Guidelines and protocols for assessing these values to BGBD are very complex and far from clear, and will require investigative research. Countries will conduct case studies.



**Table 2: Outputs and milestones achieved for outcome 1: internationally accepted standard methods for characterisation and evaluation of BGBD, including a set of indicators for BGBD loss**

Project Components		Outputs (O) and Milestones (M)	Level of actual achievement
Outcome 1.1. Standardized methods	M	Methods selected (mm: 09; yr: 01)	Completed
	M	Methods tested (mm: 12; yr: 01)	In progress
	O	Methods documented (mm: 03; yr: 02)	Methods are described but not yet released
Outcome 1.2. Indicators agreed and tested	M	Indicators BGBD loss agreed (mm: 03; yr: 02)	Planned for 2004
	M	Indicators BGBD loss tested (mm: 12; yr: 02)	By end of phase 1
	O	Validated indicators for BGBD loss (mm: 12; yr: 02)	By the end of phase 1
Outcome 1.3. Tools for the economic valuation of BGBD	M	Economic valuation workshop (mm: 02; yr: 01)	Completed
	M	Tools tested in case study (mm: 01; yr: 02)	Case study to start in 2004
	O	Tools evaluated and documented (mm: 12; yr: 02)	By end of phase 1

**Table 3: Status of activities and achievements per component 1 of the project**

Project intervention strategy	Key performance indicator	Status of the activities and achievements
1.1. Select, standardize and test methodologies for characterising BGBD	Methods for sampling and inventorying BGBD proven applicable in various ecological conditions Methods for characterising BGBD at farm and landscape levels available and documented	Standard methods for inventorying BGBD have been discussed and proposed. These are proven methods; experimental methods are included in the programme as <i>optional</i> and for experimental purposes. Testing of the methods will mainly refer to the proposed protocols, rather than to the techniques involved.
1.2 Identify Key indicators for	Methods for evaluation and indicators for BGBD loss are utilised internationally. Importance of BGBD for	Indicators will partly result from analyses of the BGBD inventory data and therefore not foreseen before 2005. In so far indicators are related to the

BGBD loss	different ecological function established	functional properties this will be considered in the second phase of the project
1.3. Develop methods for evaluating economic benefits of BGBD	Guidelines for economic valuation of BGBD and its functions agreed upon and accepted	Basic approach and methods to be adopted in valuation of BGBD have been established (in adopting techniques and methods as applied in environmental economics).

### 2.3. Inventory and evaluation of BGBD in benchmark sites and a global information exchange network for BGBD.

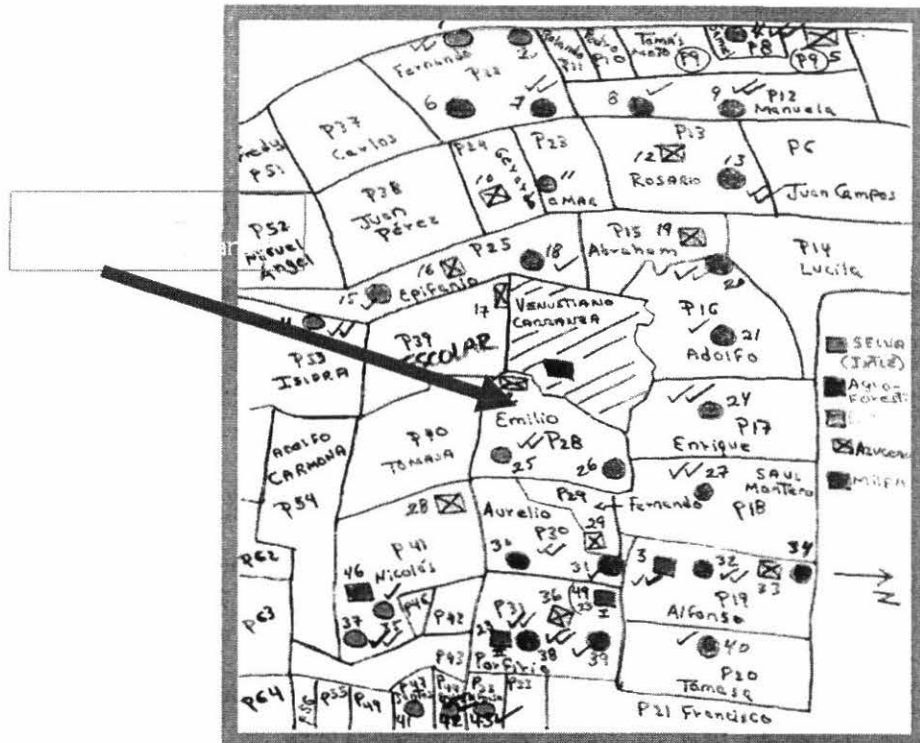
The inventory of land use, soils, etc. in the benchmark sites has been initiated and is progressing in a number of countries. Annex 2 presents the land use map of the Benjamin Constant benchmark area in the Amazons, Brazil, as an example of a result obtained from interpretation of satellite imagery. In a few countries the inventory of benchmark sites still has to start. In many countries these activities are linked to the design of the sampling scheme. In Brazil, for example, a reconnaissance soil survey is carried out in preparation for layout of the sampling windows. In some countries use is made of aerial photos to define the location of the sampling windows. In many countries descriptive materials (and maps) of the benchmark sites are available, but often the data is too general for the purpose of our study and requires additional efforts. For example, given the small and fragmented land use patterns in many of the benchmark sites (e.g. Brazil, Uganda, Côte d'Ivoire) existing land use maps do not provide the spatial detail needed for designing the sampling schemes. High resolution satellite imagery or aerial photos that would provide the spatial detail are often not available. As a consequence country teams have relied on direct observation in the field to locate sampling frames and comprehensive documents or geographical databases on the benchmark sites was given less of a priority.

In each country the benchmark sites have been visited and reconnaissance data have been gathered. As such there is a clear idea of the range of land use intensities represented in the area. A definition of land use intensity and standard method for assessment of land use intensity is still asked for and will be given priority in 2004.

By establishing sampling frames in all benchmark the milestone for outcome 2 has been achieved.

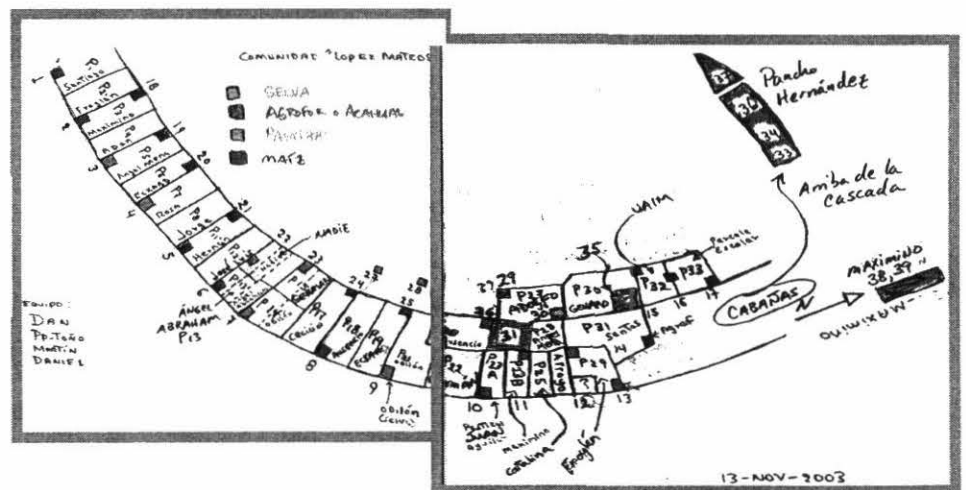
As mentioned, the survey of BGBD has started in 2003 (or early 2004) in a number of countries: Mexico, Brazil, Uganda, Kenya and Indonesia. These surveys are generally still in preliminary stages, referring to test sampling and familiarizing surveyors with the proposed methods for inventory. In particular cases very preliminary results have been presented.

Fig. 1 Sampling scheme at Venustiano Carranza

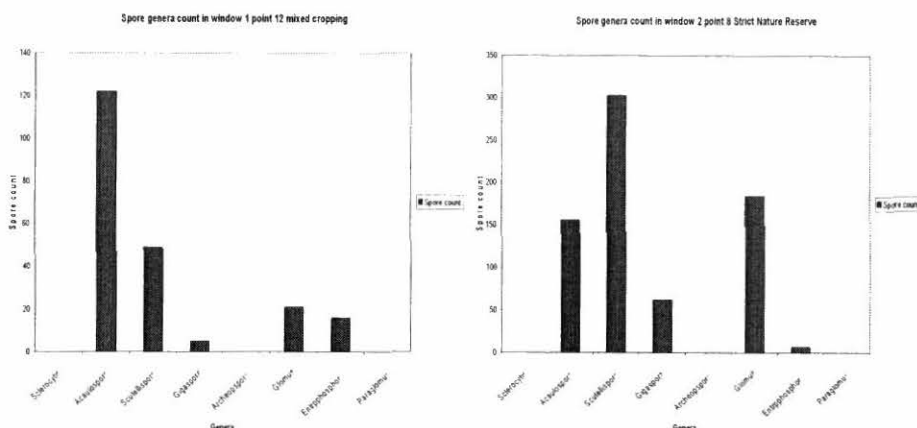


**Examples of sampling schemes.** The fixed grid sampling approach adopted at the Lampung workshop had to be adjusted according to the particular topographic conditions and configuration of the landscape in the benchmark areas. Above and below are examples of the sampling schemes adopted in the Mexican benchmark area

Fig 2. Layout of the sampling scheme at Lopez Mateos



**Preliminary result from Uganda (for illustrative purposes).** The figures below give the spore count for different genera of mycorrhiza. The genera most represented are *Acaulospora*, *Scutellispora* and *Glomus*. Note the difference in relative frequency between the sample representing mixed cropping system (left) and the sample taken in the forest (right). Note also difference in total counts (scale in the left figure goes from 0 to 140, whereas the scale in the right figure goes from 0 – 350).



The work on the global information exchange network has taken a start with the appointment of the Project Information Manager (PIM). Given the communication problems experienced within the project, setting up a communication infrastructure was given a first priority. The work on the project brochure and project newsletter should be seen in this light as well. The brochure and the first newsletter have been presented in January and February 2004 respectively. The work on a WEB based communication platform for the project is in progress. In the mean time use is made of the CIAT WEB site to communicate information on the project to project participants and other interested parties.

**Table 4: Outputs and milestones achieved for outcome 2: Inventory of BGBD**

Project Components		Outputs (O) and Milestones (M)	Level of actual achievement
Outcome 2.1 Benchmark areas and sample areas mapped and documented	O	Interpretation of satellite imagery or aerial photos finalized and land use mapped (mm: 09; yr: 01)	In progress, to be finalized by September 2004
	O	Geographical database containing data on soils land use etc, established (mm: 12; yr: 01)	Data gathered in most countries but not compiled into one comprehensive document or DB yet.
Outcome 2.2. Inventory of BGBD	M	Sampling frames established (mm: 08; yr: 01)	Completed

	M	Inventory of at least one of the benchmark area per country concluded (mm: 04; yr: 02)	Started in five of the seven countries
	M	Field data analysed and reported (mm: 08; yr: 02)	Planned for the second year
	O	Data on inventory included in national and global database (mm: 10; yr: 02)	Databases to be developed in 2004
Outcome 2.3. Global Information Exchange Network	M	Network for information exchange established (mm: 10; yr: 01)	In progress. Listserve established early 2004
	M	Data base design completed and implemented (mm: 03; yr: 02)	Planned for 2004
	O	Database fully operable; data content accessible (mm: 8; yr 02)	To be finalized towards the end of phase 1

Table 5: Status of activities and achievements per component 2 of the project

Project intervention strategy	Key performance indicator	Status of the activities and achievements
2.1. Land use mapping of benchmark areas	Digital database for each benchmark area established Information on land use intensities available	Data on, for example, soils, climate and other has been gathered for a number of benchmark areas. Comprehensive reports are expected now by July 2004 (revised workplan). Interpretation of satellite imagery has resulted in a land use map for the Brazilian benchmark area (see annex 3). In other countries retrieval of imagery is still being considered for detailed land use mapping.  Farm surveys are underway in a number of countries. Data is partially available. Comprehensive reports are planned to be submitted by October 2004 the latest (according to revised workplan).
2.2. Apply agreed methods for BGBD characterisation for full range of land use intensities	Information of BGBD loss in relation to land use intensity available	Sampling locations have been defined in each of the benchmarks areas. Field survey completed in three sampling windows in Mexico; underway in Indonesia and Uganda, has started recently in Kenya and Brazil and to start soon in India and Côte d'Ivoire.
2.3. Ecosystem health in Benchmark area in relation to BGBD evaluated	Ecosystem health in relation to BGBD assessed in benchmark areas	The baseline for ecosystem health is to be established still as are the methods for doing so. Activities planned for later during phase 1 and phase 2. A task force is established to address the issue.

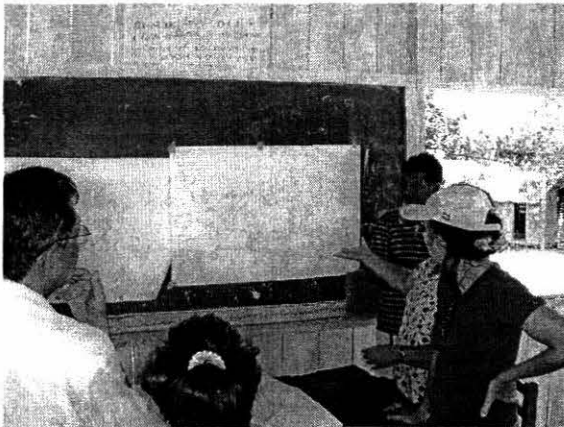


<p>2.4. Information on BGBD in relation to land use freely available</p>	<p>Databases and information systems utilised by stakeholders and others nationally and internationally</p>	<p>Work on the global database initiated during the annual meeting in February 2004.</p>
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**2.4. Sustainable and replicable management practices for BGBD conservation**

Milestones and outputs related to sustainable management practices for BGBD conservation are all expected to be realized during the second year of the project or during the second phase. The development or design of management practices is aimed to be done with the participation of the farmer communities. Farmer participation and community involvement are therefore to be addressed under this outcome.

In a number of countries like Mexico, Brazil and Kenya communities have been approached actively to seek active involvement of these communities in the project. This so far has been in the form of workshop or meetings with community representatives.



**Community involvement.** Above are illustrations of community meetings in the Brazilian benchmark area. The project here is able to build on experience and results obtained from earlier community projects, of which the maps drawn by the communities themselves are an example. Maps are an effective tool in the communication with the local communities

The outputs and milestones defined in the "Monitoring and Evaluation" document related to this project outcome all refer to the establishment of the demonstration sites, which is an activity planned for the second phase of the project. Work done on community involvement and farmers participation, i.e. introducing the project, getting the perception and knowledge of the farmers on belowground biodiversity and their function is not reflected in the outcomes and project activities as described in the logframe, apart from the assessment of local resource management practices.

**Table 6: Status of activities and achievements per component 3 of the project: sustainable and replicable management practices for BGBD conservation.**

Project intervention strategy	Key performance indicator	Status of the activities and achievements
3.1. Information on management option made available from which to select management options	Information on management options compiled and made available to each of the countries for selection  Selected management practices documented	Surveys (community, farm and land use) have started in some countries. In Mexico baseline information on present land use and management practices has been established and documented through workshops with the communities involved. In other countries this is in progress

## 2.5. Recommendation of alternative land use practices and advisory support system

The policy advisory system is part of the anticipated output under this outcome of the project. Outcomes and milestone are expected to be obtained during the second phase of the project. Awareness raising activities and establishing strategic links with other programmes and initiatives both at the national and international level are also part of this component of the project. Within that context the participation in the Convention on Biological Diversity – Fourth workshop on Sustainable use of Biological Diversity, 6-8 May, Addis Ababa, should be placed. The aim in general is to get more specific attention for the below-ground component in recommendations and resolutions regarding biodiversity.

The ASB programme (Alternatives to Slash and Burn) is a strategic partner to the project, amongst other because of their involvement in the Millennium Ecosystem Assessment that offers interesting opportunities for links with the BGBD project. The BGBD project coordinator attending the 12<sup>th</sup> ASB Global Steering Group Meeting as representative TSBF-CIAT\_CIAT, served to strengthen those links.

The BGBD project was further represented at the International Workshop Agricultural Biodiversity and Sustainable Development 23-25 Oct 2003, Nairobi, Kenya and at the EcoAgriculture Partners meeting November 6, Nairobi.

In a number of countries the project has been launched officially, generally coinciding with the national planning workshop, to attract media attention. Also the global workshops are generally covered on either TV or radio (local

or national), as was the case with the 2<sup>nd</sup> Global Workshop. The project has obtained recognition and support from the mother institute by recognising BGBD as an important focal area, as shown by the project featuring prominently in the annual report of CIAT: *CIAT in Perspective 2002-2003 – Innovation Africa*.

The outputs defined for this project component are all related to the analysis of the policy environment and policy negotiations at national and global levels, which are generally planned for the second phase of the project and will therefore not be reported on in table form.

## **2.5. Improved capacity of to implement conservation and management of BGBD**

In 2003, two workshops were held that combined both training and planning components. The workshop in France, though primarily intended for planning purposes, clearly had a training component to it. There were delegates from each of the countries, many of whom proved not to have particular experience with applying environmental economics. The workshop was as such a very useful introduction to the subject and will undoubtedly be followed by others. At the workshop it was decided to conduct to case studies in each of the countries. One case study will relate to economic benefits derived from nitrogen fixation by legume nodulating bacteria. The subject of the second case study will be determined later. Apart from investigating economic benefits these case studies serve to train the country teams at the same time.

From the September 27<sup>th</sup> to the 3<sup>rd</sup> of October a training workshop was held in Cali, Colombia on the use of molecular techniques. Each country team had delegated their expert to the workshop. Focus was on one particular technique: a method known as “terminal restriction fragment length polymorphism” (T-RFLP). The workshop addressed all stages in the analysis from the soil sampling to the data analyses and will be of benefit also if other molecular techniques are to be considered. One representative from each country was invited. Planning for the use of molecular techniques within the BGBD project as well as the use of standard methods for inventory of BGBD was being discussed as well.

In various countries training workshop were held on particular topics to train and refresh project participants on methods and techniques. For example, in Kenya a training course on GIS was organised in November 2003, in which 5 members participated. In Uganda a training workshop on Arbuscular Mycorrhizae was conducted from January 12 to January 16, 2004, with 11 participants.

Table 7, Outputs and milestones achieved for outcome 5: Capacity building

Project Components		Outputs (O) and Milestones (M)	Level of actual achievement
Outcome 5.1. Selective training courses	M	Specialist in country training activities in soil biology conducted (mm: 12; yr 01)	In-country training conducted in some countries (soil biology for sociologist and economists, July, Côte d'Ivoire; GIS training courses in Indonesia and Kenya; AM training workshop in Uganda; workshops on methods in various countries)
	M	Specialist training activities in special techniques and methods (south-south and north-south)	First training workshops conducted
Outcome 5.2. Students selected	O	Research themes identified and proposals written (mm 02; yr 02)	Research themes at national level in most countries identified
	M	Students selected (mm: 04; yr: 02)	In majority of countries students are selected
Outcome 5.3. Awareness raising	O	Poster and leaflets distributed, sensitisation workshop conducted (phase one and phase two of the project)	Brochure, and newsletter published; sensitization workshop held in most countries, news coverage obtained in most countries
	O	Policy documents	Planned for phase 2

Table 8, Status of activities and achievements per component 5 of the project: Improved capacity of relevant stakeholders

Project intervention strategy	Key indicator	performance	Status of the activities and achievements
5.1. Capacity enhanced in disciplines identified as lacking in cooperating countries	BGBD research and management capacity institutionalized in scientific institutions in participating countries.  Capacity of farmers, extensionists and NGOs to interpret and apply information on BGBD improved		Training and capacity building needs from the country teams have been assessed. Some training provided at global level (viz. economic valuation and application of molecular techniques) Training at national level on specific themes (soil biology for social scientist, training on arbuscular mycorrhiza and on GIS for example)  Baseline with respect to capacity of local stakeholders assessed in some countries through workshops with local communities.

Project intervention strategy	Key performance indicator	Status of the activities and achievements
5.2. Enhanced awareness and knowledge of BGBD and its functions among stakeholders from farmers to national planners	<p>Knowledge of soil biota and its management disseminated to farmers, extensionists, NGOs and lower governments</p> <p>Decision makers utilise soil biodiversity information in national and regional plans</p>	The project brochure and first newsletter of the project have been issued. In some countries brochures and leaflets have been published targeting national audience and especially public at the benchmark areas. Development of training material underway in some of the countries.

### 3. Plans and prospects for year two.

#### 3.1 Planned activities for 2004

##### Standard methods

Testing and documenting of standard methods will be finalized in 2004. This will include the sampling protocol, processing and handling and analysis (identification). Functional groups have been selected whose inventory is mandatory and for which standard methods are provided. The inventory of a number of functional groups have been indicated optional and will be done depending on the capacity and skills available. In all cases an element of evaluation of the methods will be included in the study and experience from the various countries will be synthesised at the global level.

A start will have been made in 2004 with the testing of indicators, but will not be concluded until the year thereafter. In some countries molecular techniques will be applied to look at microbial diversity as an indicator for soil biodiversity. In other countries the use of indicator species will be investigated, based on the data obtained from the inventory. Countries will develop their own plans with regard to activities in this field for 2004.

As far as the economic valuation of BGBD resources is concerned a start with case studies will be made in 2004, for which the countries will submit proposals to the coordinating office.

##### Inventory of BGBD and global information exchange network

Interpretation of aerial photos or satellite imagery will be finalized and results presented in the form of a land use map. The data will be combined with other geographical thematic data to create a comprehensive GIS database of the benchmark area still within the first half of 2004.

In 2004 the inventory of BGBD will be the major activity in each of the countries. At least the inventory of one of the benchmark areas in each of the countries will have been concluded and reported on, though we may not have reached the stage in which all data and information are already included in the national and global data bases by the end of the year.



Information on the BGBD project can be found on the CIAT WEB site in the pages of the TSBF Institute ([http://www.ciat.cgiar.org/tsbf\\_institute/](http://www.ciat.cgiar.org/tsbf_institute/)). The project will operate its own WEB site (to be established during the first half of the year 2004) that will include a communication platform for the project and working group members. Testing and evaluation of these facilities will be done still before the first half year ends. In 2004 still a second newsletters will be published (also through the internet). The work on the database will start with the annual meeting in February, where the requirements and objectives will be discussed from there the database design will be worked on such that we have fully operational information system by the end of the year.

### **Sustainable and replicable management practices for BGBD conservation**

The collection of socio-economic baseline data will continue in those countries where it has already started and in others it will start. Socio-economic data in this context refers to farming system, land management practices, land use, ownership structure and other and might even include social organisation. This will evolve into a diagnostic that will address the ecological and economic viability of the systems identified from which opportunities and entry points for improved management of BGBD can be identified. Based on this information development of the demonstration sites for the year thereafter will be under taken.

### **Recommendation of alternative land use practices and advisory support system**

The above mentioned activities are all suppose to contribute to the recommendation of alternative land use practices. However, no specific activities (like policy analyses) related to this output are foreseen for this year.

### **Improved capacity of to implement conservation and management of BGBD**

This year training will be provided in each of the countries in methods for the inventory of the various groups of soil organism and especially in identifying these organisms. The emphasis of these training courses will vary depending on the needs of the particular countries. The emphasis may be on the methods for sample collection and identification of soil organisms at the level of functional groups in one country whereas in the other country emphasis might be on identification at family or species level if relevant. Also the emphasis on particular functional groups for training might vary between countries. Use will be made of the expertise available within the BGBD team and facilities and opportunities that exist within the countries themselves or regions that they are part of.

Training and support will also be provided with respect to data analyses. This may refer to the various aspect of processing and analyses of the data, whether to the derivation of diversity indices, processing and analyses of the socio-economic baseline data or to methods for analysis of spatial distribution patterns. The latter, being more specific, will be framed as a particular research component.

### 3.2. Constraints and opportunities.

#### Logistical (number and location of benchmark areas)

In general the benchmark areas are located in remote areas and are difficult access. In all but one country two or three benchmark areas were selected, with benchmark areas located at large distances from each other, further complicating logistic support. In all countries the above situation poses a complicating factor in transporting and accommodating of staff as well as in analysing of samples, for which in some countries requires local infrastructure to be set up (in order to be able to analyse samples within a certain time frame).

The above might easily have consequences for delivering planned outputs, the volume of work and finances. Confronted with the organisational and logistic difficulties, countries had already phased the activities between their benchmark areas. The inventory has started or will start in one benchmark area and a number of countries have indicated to probably reduce their number of benchmark areas (most likely Mexico and Uganda). Other countries may follow. Whether to discard or postponed inventory to later phase depends of the significance of the benchmark area (in terms representation of important eco-regions). In case of Mexico where the Calakmul benchmark area is the only benchmark areas representing drier conditions, this decision will be taken later in the year.

#### Communication

Communication has been a problem, causing delay in project implementation. This has been most noticeable in the definition of standard methods for the inventory of BGBD that suffered from lack of feed-back from the working group members in the various country teams. At the same time it seems that communication regarding the methods has not reached the persons concerned in the country teams.

In some countries communication is hampered by lack of facilities (due to limited number of computers available or limited internet access). Part of the problem is related to the sheer number of people involved in the project. However, there are also organisational and attitudinal dimensions to this problem which may, in turn, be related to time constraints because people are heavily committed to other project and activities.

We hope to overcome the communication problem partly by providing a proper communication infrastructure that will enable participants to retrieve information without having to rely on direct email contact. Publishing a newsletter (in hard copy and soft copy form) is part of that solution. We will also try to improve management of the communication and information exchange.

Communication becomes very critical where people that are distributed over very distant locations have to work together to achieve common objectives. A more flexible approach to project implementation, giving the country programmes more independence in defining and executing their programme is a more strategic solution to the problem.

## Capacity

The capacity to execute the project at national level and implement proposed methods varies from country to country and even from benchmark area to benchmark area within one country (especially if benchmark areas are operated by different teams). The difference in capacity does not only relate to available expertise, but also to existing infrastructure (lab facilities for example). The availability may be limited because the experts do not exist in the country or they do exist but are committed elsewhere. In some case the availability of students is a problem, which may partly be associated with the popularity of the subject matter.

The difference in capacity between countries and benchmark areas makes it very difficult to harmonize and synchronize activities between countries and benchmark areas. Capacity building is an important objective of the project and it will certainly serve to remediate some of capacity problems experienced. It will not solve the immediate capacity problems in carrying out the BGBD inventory and part of the solution will have to be found from involving and collaborating with institutes and organisations within the country or region and by collaborating between the country programmes.

Partly the solution has to come from allowing the country programmes to run their programmes according to their capacity, which will result in differentiation between the country programmes. At the February 2004 steering committee meeting it was decided however that the country programmes will maintain a common objective as far as the inventory of BGBD is concerned. The countries will adhere to the minimum list of functional groups of soil organisms to inventory. Phasing of the activities may then differ.

## Organisation and management

Project participants are from many different institutions from many different countries. As a consequence the organisation and management structure is complicated and project members have to be managed partly through the organisations they work for. This requires arrangements to be made and special attention be devoted to the communication between the institutes. Management is further complicated by the number of persons and institutions involved in a more advisory capacity to the project.

The integration of TSBF (the executing agency of this project) as an institute of CIAT together with personnel changes within TSBF has had an impact on the project implementation. A newly appointed director, who took office at the beginning of last year, and the appointment of a full-time project coordinator per February 1, 2003, obviously impacted project progress. A project secretary could be appointed only as from May and great effort was taken to appoint a Project Information Manager as early as November 1<sup>st</sup>, 2003. The integration of the TSBF institute into CIAT is a complicated process that involves programmatic adjustments, reorganisation and integration at administrative level and integration in terms of planning and execution of research and development activities. This process has not been finalized yet and certainly will remain exerting its influence in 2004 as well.

A risk assessment for each of the country programmes, conducted during the last steering committee meeting, indicated 'implementation', 'budget',

'reporting' and 'communication' as medium or high risks factors. All these risk factors relate to project management. The other risk factor rated as medium or high was 'work flow', which relates to organisation. Based on the internal evaluation of project progress we will review management on a country by country bases as far as issues identified above (implementation, budget, planning reporting and communication) are concerned. We as part of that review address issues related to organisation and management structure: reviewing roles and responsibilities of collaborating institutes and participants to see how performance can be improved and risks minimized.

### **Complexity of the project**

The complexity of the project in terms of its objectives being pursued and its multi-disciplinary character may be considered an opportunity on the one and a constraint on the other hand. This project serves both research and development goals in the sense that it wants to investigate BGBD in relation to intensity of land use and it wants to promote and develop techniques for the sustainable management and conservation of BGBD. The project aims not only to assess BGBD but also to value it and to involve farmers and communities in the process. As such the project unites people from various disciplinary backgrounds and of varying capacity. The project is further challenged by important developments in the various disciplines over the past years, like in soil micro-biology for example.

### **Link with other projects and initiatives**

The fact that there are seven countries united within this project offers great opportunities. We will start making use of this comparative advantage in organising training activities, in which we will where we try to match demand and supply within the project as a whole. The same principle could also be applied to, for example, the analyses of samples collected within the different countries, where different capacities exist within each country. We will facilitate some kind of virtual market place where demand side and supply side can meet, for countries to organise themselves.

In 2004 we will actively explore opportunities for collaborating with other institutes and organisations outside our own direct network, both at national, regional and global levels. We will further explore further collaboration with programmes/project within CIAT. Special reference should be made in this context to the following programmes/projects: Impact Assessment, Agrobiodiversity and Biotechnology, Integrated Pest & Disease Management, Communities and Watersheds and Land Use

## **4. Conclusions and recommendations**

### **Delay and extension of the first phase of the project**

Activities in the year 2003 have stood in the light of project implementation: establishing the project management and implementation structure, defining standard methods for the inventory of BGBD and making the preparations for the field work to start. Clear progress has been made, though the project has witnessed a late start and further delays with respect to planned activities has occurred for which the reasons have been explained.

Given this situation the project will request for an extension of the first phase of the project with one year, ending in June 2005, in order to comply with its obligations as formulated in the project document. A request to this end will be submitted to UNEP, supported by a revised budget and adjusted plan of work.

### **Differentiation between country programmes**

One of the major lessons learned from last year is that it is extremely difficult to harmonize and synchronise activities between the seven country programmes, given the different conditions and environments under which the country programmes operate. The country programmes will be allowed some latitude in defining and implementing their own programmes, though results have to contribute to the common goals of the project. With respect to the inventory of BGBD a minimum (though still quite extensive) programme has to be carried out using standard methods. With respect to conservation and management countries will define their programme in response to their specific conditions and needs.



## Annex 1. Project outputs

### Books (including special issues of journals)

Fragoso, C. and P. Reyes-Castillo (eds.), 2001. Diversidad ,function y manejo de la biota edafica en México. Acta Zoologica, nueva serie número especial 1, Instituto de Ecología A.C., Xalapa, Mexico.

Ramakrishnan, P.S. K.G. Saxena. K.S. Rao and R.K Maikhuri, (eds), (in press). Soil Biodiversity, Ecological Processes and Landscape Management. Oxford & IBH Publishing Co. Pvt. Ltd., New Delhi, India

### Articles in international refereed journals

Giller *et al.* (in press) Soil Biodiversity in Rapidly Changing Tropical Landscapes: Scaling down and scaling up.

### Newsletters

The BGBD News. BGBD Bi-annual Newsletter of the TSBF-CIAT, Vol1, issue 1, February 2004.

### Progress reports

BGBD project, 2003. Semi-annual progress report to UNEP and GEF: 31 December 2002. Report submitted 20 March 2003.

BGBD project, 2003. Semi-annual progress report to UNEP and GEF: January 1 – June 30, 2003. Report submitted 1 September 2003.

### Internal reports

BGBD project, 2002. Start-up workshop report, 26-30 August, Wageningen, The Netherlands.

BGBD project, 2003. Global workshop II report, February 24-28, 2003, Sumberjaya, Indonesia

BGBD Brazil, 2003. Relatório do segundo workshop nacional (Report of the second national workshop), Benjamin Constant, 7-10 April, 2003, Brazil

BGBD Côte d'Ivoire, 2003. National start-up workshop report, 26-27 May 2003, Abidjan, Côte d'Ivoire.

BGBD Côte d'Ivoire, 2003. Methods workshop report, 16-17 June 2003, Abidjan, Côte d'Ivoire.

BGBD Indonesia. National Workshop Report, May 30-31, 2003, Bogor Indonesia. By: M. Utomo, F.X. Susilo, I.G. Swibawa and S. Murwani.

BGBD Mexico, 2003. Informe II taller del proyecto "Conservación y manejo sostenible de la biodiversidad bajo del suelo, Agosto 11-13. Instituto de Ecología A.C., Xalapa, Mexico.

BGBD Mexico, 2003. Taller de diagnostico rural participativo ejido Adolfo López Mateos, 24-30 October, 2003, Catemaco, Mexico

BGBD Mexico, 2003. Taller de diagnostico rural participativo ejido San Fernando, 5 -8 November, 2003, Soteapan, Mexico

BGBD Mexico, 2003. Taller de diagnostico rural participativo ejido Venustiano Carranza, 5-8 November, Tatahuicapan, Mexico.

Osgood, D., M. Swift and J. Huising (eds), 2003. Economic Valuation of below ground biodiversity, Report of the Planning workshop, February 18-20, 2003, Quissac, France.

#### **MSc thesis**

Conceição, Ederson Jesus da, 2003. Diversity of Leguminosae nodulating bacteria at three land use systems in Alto Solimões, AM region. Federal University of Lavras, Brazil.

#### **Press releases, journal and newspaper articles, TV coverage and other project documents**

##### Global

- November 28, 2002. Press conference in London. Covered in a wide range of journals across the globe.
- CSM-BGBD project brochure. Released January 2004.

##### National

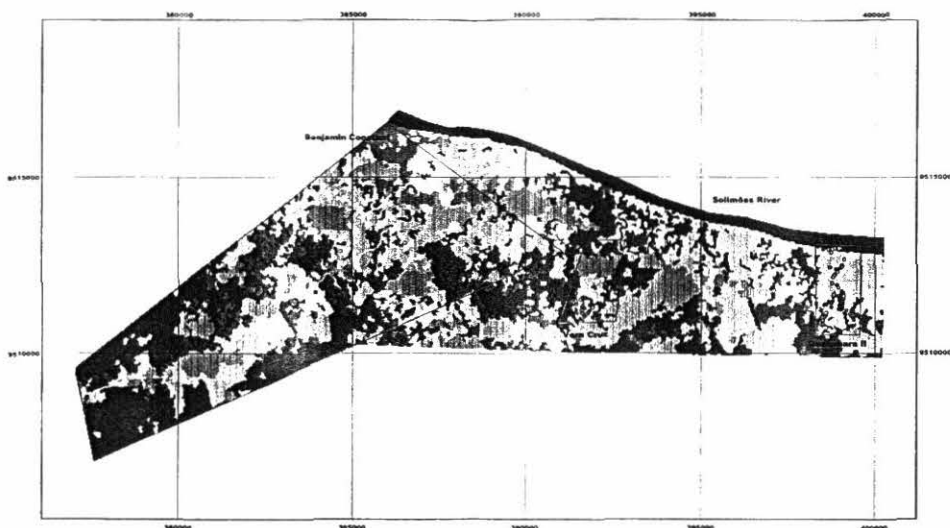
##### **Brazil**

- October, 2002. Interview of Dr. Fatima Moreira published in the UFLA bulletin, Brazil
- November 11, 2002. Interview of Dr. Moreira for UFLA television, Brazil.
- May 2003. Interview of Dr. Sidney Sturmer published in the FURB bulletin, Brazil
- July 2003. Interview of Dr. Fatima Moreira published in the "Ciência e Cultura" (Journal of the Brazilian Society of Science Progress)

##### **Cote d'Ivoire**

- May 27<sup>th</sup>, 2003. Article in "Le Jour" in relation to the start-up workshop held in Abidjan.
- June 3<sup>rd</sup>, 2003. Articles in the daily newspapers "Fraternité-Matin" and "Notre-Voie", in relation to the start-up workshop.
- July 15<sup>th</sup>. Broadcast on national radio of the conference on soil biodiversity

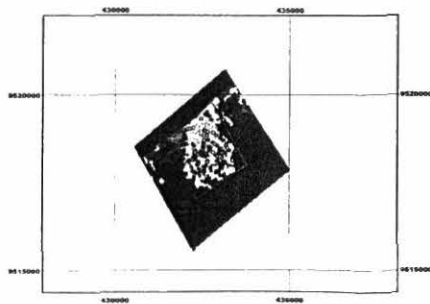
**Annex 2. Land use and land cover map of the Benjamin Constant benchmark area.**



1000 0 1000 2000 3000 4000 Meters

Scale 1:40,000

Grid 90 meters



# Land Use and Land Cover Map

## Below-Ground Biodiversity Project

### Field Survey

- Forest
- Secondary Forest
- Pasture
- Multiple Crop
- Agroforestry

### Land Use and Land Cover

- Forest
  - Secondary Forest - advanced succession
  - Secondary Forest - intermediate succession
  - Multiple Crop
  - Pasture
  - Bare Soil
  - Urban Area
  - Water
  - Cloud or Shadow
- Waterbody  
Road
- Study Areas

The Land Use and Land Cover Map was done by Embrapa Solos based on ETM+ images of Landsat 7 satellite, Bands 1 to 5, and 7 of 16-09-2003.  
The field survey was realized by WPA in August, 20 20, 2003.  
Waterbodies and Roads are from IBGE topographic map 100-10-V-A, in scale 1:250,000, digitized by EMBRAPA.

