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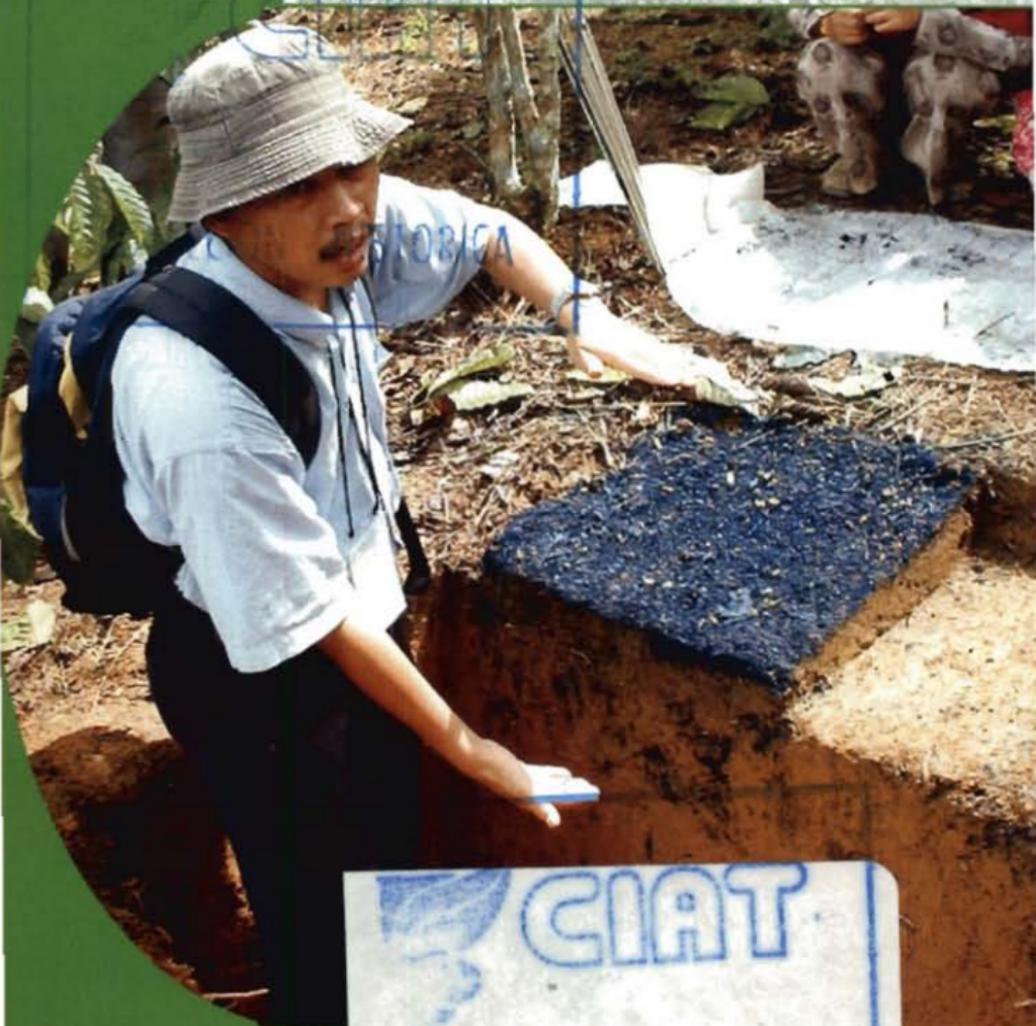
CIAT

Centro Internacional de Agricultura Tropical
International Center for Tropical Agriculture

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Conservation and Sustainable Management of Below-Ground Biodiversity (CSM-BGBD Project)



A project executed by TSBF-CIAT

UNIDAD DE FORMACION Y DOCUMENTACION

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UNEP



GEF

Institute of CIAT (TSBF-CIAT), with co-financing from the Global Environment Facility (GEF), and implementation support from the United Nations Environment Programme (UNEP). The GEF is contributing more than US dollars 9 million of the total budget of US dollars 16.5 million.

The BGBD project is being implemented in seven tropical countries namely: Brazil, Cote d'Ivoire, India, Indonesia, Kenya, Mexico, and Uganda. In each country, project sites have been selected to represent a broad range of ecosystem types with global significance, ranging from Amazonian lowlands to Himalayan highlands and containing as wide a range of tropical soil biodiversity as possible.



Key elements of the project

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

Sustainable management of BGBD will enhance the resilience and sustainability of man's productive ecosystems, whilst at the same time conserving soil genetic resources for bioprospecting.

Functions of below-ground biodiversity in the soil system

Soil organisms provide a range of essential ecological services to terrestrial ecosystems, including:

- ⊗ controlling mineral nutrient cycling;
- ⊗ carbon sequestration in soils and reduction of greenhouse gas emissions;
- ⊗ maintaining soil physical structure and water retention capacity;
- ⊗ enhancing nutrient acquisition by plants, especially via mycorrhizal fungi and nitrogen-fixing bacteria; and
- ⊗ maintaining plant health through natural predation and parasitism of plant pathogens and pests.



The CSM-BGBD project: A global initiative

The driving force behind the development of the Conservation and Sustainable Management of Below-Ground Biodiversity (CSM-BGBD) project was the urgent need to slow loss of BGBD and better assess the potential uses of soil biodiversity in ecosystem management and bioprospecting. CSM-BGBD is coordinated by the Tropical Soil Biology and Fertility



What is below-ground biodiversity?

Soil organisms, including bacteria, fungi, protozoa and invertebrates, constitute what is now referred to as Below-Ground Biological Diversity (BGBD). The number of types, and population numbers, of below BGBD is staggering. For example, just one square metre of soil in a temperate forest may contain more than 1000 species of invertebrates, whilst the number and diversity of microbes in just one gram of soil may be even greater. The importance of this diversity is only just being recognized fully through ecological and phylogenetic studies, but in tropical regions where the highest levels of BGBD are found, few detailed studies have been completed.

Why conserve and manage BGBD?



Soil organisms provide essential services for the sustainable functioning of all ecosystems and are important resources for sustainable management of agricultural ecosystems (See box overleaf). Apart from their importance to agriculture, soil organisms, especially fungi and microbes are potential source of pharmaceuticals and chemicals for industry through bioprospecting. For example, the immuno-suppressant drug, cyclosporin, was first isolated from the soil microfungus, *Tolypocladium inflatum*, in a mountain soil sample from Norway.

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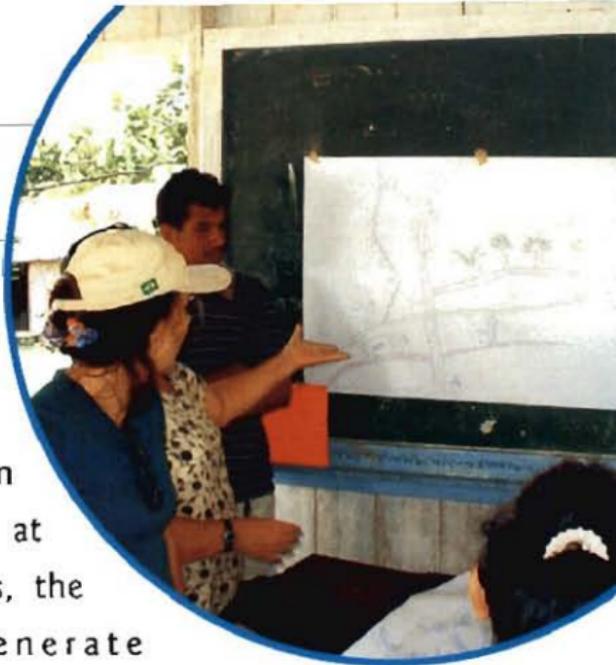
BGBD is dramatically reduced when forests are converted to agricultural land, and when agricultural land use is intensified. This can lead to decreases in agricultural productivity reducing the "resilience" of agricultural systems, making them more vulnerable to adverse climatic events, erosion, pests, disease and other threats.

Impact of the project

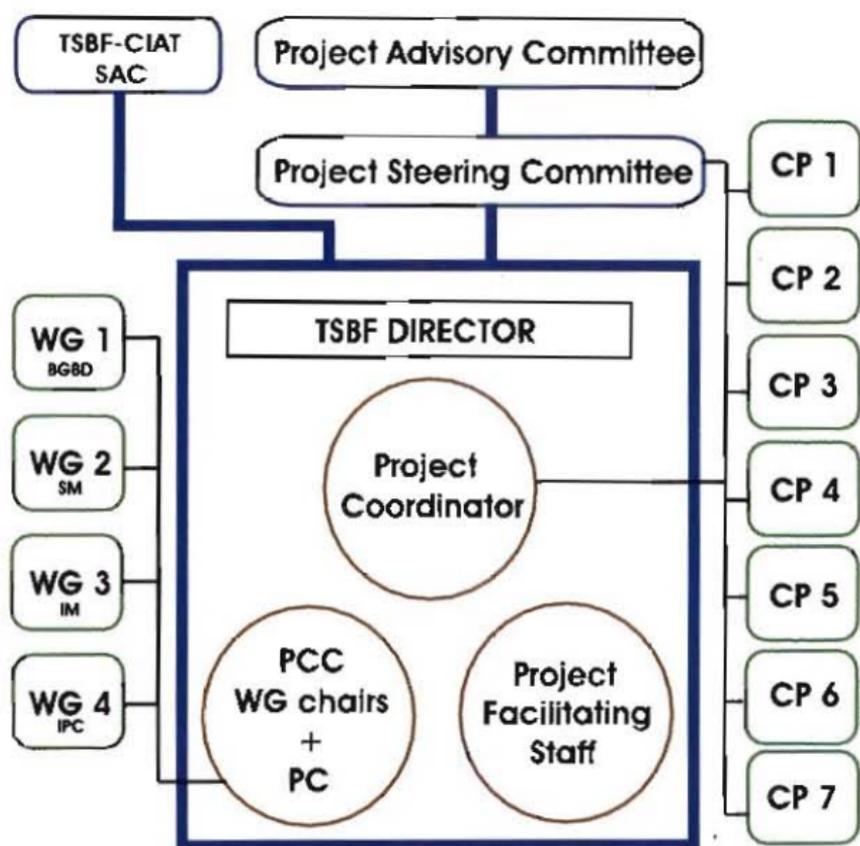
By developing standard inventory and characterization methods for BGBD at the benchmark sites, the project will generate knowledge that will aid studying and understanding the role of BGBD in ecosystem services across a range of diverse ecosystems. This will contribute to the use of soil organisms in 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.



responsible for the overall execution of the project. The PSC includes the Project Coordinator (PC), a GEF representative, the TSBF 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).



Structure of the CSM-BGBD Project

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.

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 through the above and other activities, improve the capacity of institutions and stakeholders to conserve and manage BGBD in a sustainable and efficient manner.

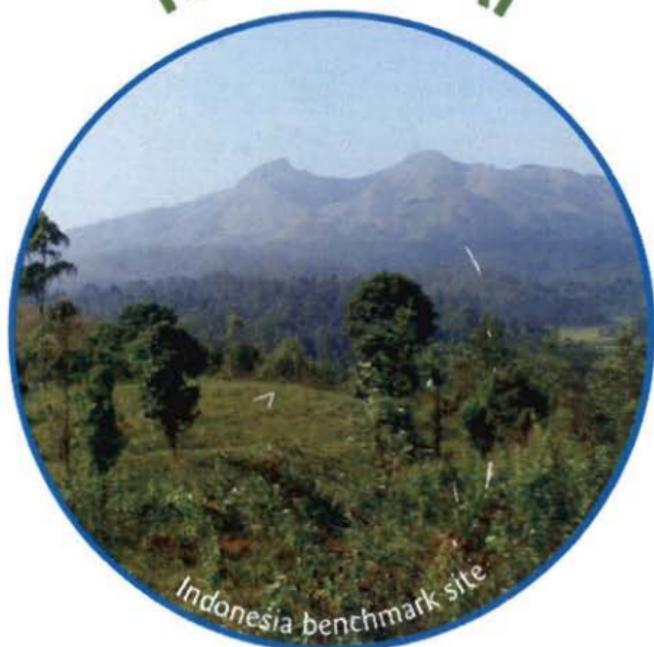
Partnerships and organization of the project

The seven country programmes (CP) of the overall project are implemented by a range of stakeholders, including government, research institutes and 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 also reports to the Scientific Advisory Committee (SAC) of TSBF-CIAT. The Project Steering Committee (PSC) is

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TSBF-CIAT is dedicated to the production of international public goods for the benefit of landusers in the tropics through the application of knowledge generated by research on soil biology.

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