# 1. TSBF-CIAT STRATEGY

## A. Research for development strategy of TSBF-CIAT

The 2005-2010 TSBF-CIAT strategy is aligned with the **Millennium Development goal:** "to help create an expanded vision of development that vigorously promotes human development as the key to sustaining social and economic progress in all countries, and recognizes the importance of creating a global partnership for development." The strategy encompasses the **CGIAR's agriculture and environment mission:** "to contribute to food security and poverty alleviation in developing countries through research, partnerships, capacity building and policy support, promoting sustainable agricultural development based on environmental sound management of natural resources." The strategy is also aligned with the CIAT's three research for development challenges: 1) improving management of agroecosystems in the tropics; 2) rural innovation research; and 3) enhancing and sharing the benefits of agrobiodiversity.

TSBF-CIAT's Program has three main goals. These are: (1) to strengthen national and international capacity to manage tropical ecosystems sustainably for human well-being, with a particular focus on soil, biodiversity and primary production; (2) to reduce hunger and poverty in the tropical areas of Africa and Latin America through scientific research leading to new technology and knowledge; and (3) to ensure environmental sustainability through research on the biology and fertility of tropical soils, targeted interventions, building scientific capability and contributions to policy.
TSBF-CIAT utilizes a range of approaches to achieve program goals in collaboration with its partners, with particular emphasis on the following:

***Catalysis:*** Ensuring that partners are kept at the forefront of conceptual and methodological advances by conducting and promoting review, synthesis and dissemination of knowledge. This is done through workshops, training courses and sabbatical and short exchange visits.

***Collaboration*****:** Developing appropriate alliances with institutions across the research, educational and developmental spectrum, including linkages between institutions in the North and South.

***Facilitation*****:** Coordinating actions among partners to achieve progress and success in research. This is done by providing backstopping support in the preparation, submission, implementation and publication of research projects.

***Conviction:*** Demonstrating tangible results by taking policy makers to the fields.

***Internal and external reviews of the program*****:** The Institute's activities and outputs undergo periodic critical reviews to ensure high standards and the achievement of the Institute's mission.

Since its founding in 1984, TSBF has conducted research on the role of biological and organic resources in tropical soil biology and fertility, in order to provide farmers with improved soil management practices to sustainably increase agricultural productivity. In recent years, TSBF-CIAT's research for development approach has been based on an Integrated Soil Fertility Management (ISFM) paradigm. ISFM is a holistic approach to soil fertility research that embraces the full range of driving factors and consequences of soil degradation — biological, physical, chemical, social, economic and political.

However, successful resource management and sustainable agricultural productivity need to go still further, into the realms of markets, health and policies **(Figure 1)**. The central hypothesis is that natural resource management research will have more leverage if the apparent gaps between investment in the natural resource base and income generation can be bridged. Therefore, TSBF-CIAT's strategy proposes to take ISFM an additional step forward, by addressing the full chain of interactions from resources to production systems to markets and polices. Under the new framework, investment in soil fertility management represents a key entry point to agricultural productivity growth, and a necessary condition for obtaining positive net returns to other types of farm investments.

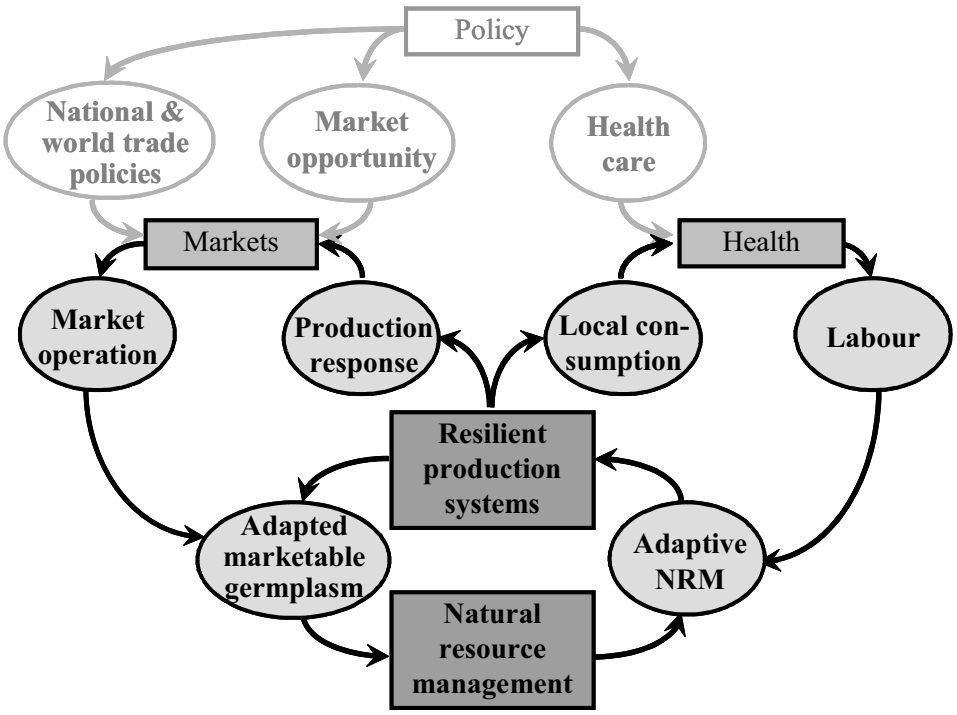


**Figure 1.** Conceptual framework of the TSBF-CIAT strategy. Topics in bold indicate the driving forces to be addressed by the proposed strategy; topics in shaded lighter gray are driving forces beyond the control of the Program.

TSBF-CIAT will pursue the following three major objectives under its strategy:

- to improve the livelihoods of people reliant on agriculture by developing profitable, socially-acceptable and resilient agricultural production systems based on ISFM;
- to develop sustainable land management (SLM) practices in tropical areas while reversing land degradation; and
- to build the human and social capital of all TSBF-CIAT stakeholders for research and management on the sustainable use of tropical soils.

To achieve these objectives, TSBF-CIAT's work is organized into five major outputs:

1. Biophysical and socioeconomic processes understood, principles, concepts and methods developed for protecting and improving the health and fertility of soils;
2. Economically viable and environmentally sound soil, water, and nutrient management practices developed and tested by applying and integrating knowledge of biophysical, socio-cultural and economic processes;
3. Partnerships and tools developed and capacity enhanced of all stakeholders for improving the health and fertility of soils;
4. Improved rural livelihoods through sustainable, profitable, diverse and intensive agricultural production systems;
5. Options for sustainable land management (SLM) for social profitability developed, with special emphasis on reversing land degradation.

Each of these outputs has specific output targets for each year to contribute towards output level outcomes and output level impacts. The outcomes and impacts are accomplished through six major thrusts:

1. Improving fertilizer efficiency and developing soil and water management practices;
2. Improved germplasm as an entry point for managing soil fertility;
3. Managing the genetic resources of soil for enhanced productivity and plant health;
4. Understanding farm level social dynamics;
5. Linking farmers to markets, nutrition, and health;
6. NRM strategies to move from plot to landscape scales; and
7. Strengthening scientific and institutional capacity of partners for integrated soil fertility management.

TSBF-CIAT's strategy has a major focus on developing and extending technologies that support sustainable intensification of cropping systems, especially in the dry and moist savanna, hillside, and forest and forest margin agro-ecological zones (AEZs) in Africa. In these AEZs, poverty, population growth and a rising demand for food is driving expansion of cropped area into increasingly marginal lands and/or remnant forest zones. Under these circumstances, sustainable intensification of agriculture on already cultivated land represents the most promising solution to achieving food security and protecting against natural resource degradation, the ultimate goals of TSBF-CIAT's work.

As a relatively small research institute, it is important that TSBF-CIAT position itself appropriately on the research-development continuum. TSBF-CIAT's primary role and comparative advantage is in conducting international public goods research on ISFM in farming systems where soil degradation undermines local livelihoods and market opportunities. However, while TSBF-CIAT will focus primarily on strategic research, it is also ready to support technology dissemination and development activities with partners via regional networks and global projects. TSBF-CIAT will continue research on below-ground biodiversity as a means of beneficially managing soil biology, through the GEF-UNEP funded global project on below-ground biodiversity (BGBD) which has successfully completed its Phase I and is about to start its Phase II activities.

Much of the applied research and dissemination of findings, as well as NARSs capacity building, will be done via the Institute's two partner networks — the African Network for Soil Biology and Fertility (AfNet). TSBF-CIAT also collaborates with the South Asian Regional Network (SARNet) on soil fertility research in that region.

To carry out the work envisioned under the new strategy, the following staff positions will be called for:

**Agrobiophysical scientists:** These include specialists in integrated soil fertility management, soil biota management, soil and water conservation, ecosystem services, microbiology, and plant nutrition and physiology.

**Social scientists** (including agricultural economics): This staff category will be strengthened to permit greater emphasis on the socio-economic aspects of the new research paradigm.

**Coordination:** This includes the Institute Director, coordinators of the AfNet and MIS networks, and the coordinator of the GEF-UNEP Below Ground Biodiversity Project.

**Funding:** The estimated funding required for TSBF-CIAT's work is approximately US$5 6 million per year, for a total budget of about $30 million over the next 5 years.

**B. Organization of the report**

This annual report for 2007 is organized with the following sections. It starts with a brief summary of the strategy of the TSBF-CIAT followed by a brief description of the project and its log frame that includes the 5 outputs, output targets for each output, outcomes and impacts at each output level as described in the CIAT Medium-Term Plan 2008-2010. This is followed with a section on research highlights organized according to the 5 outputs. The full report is organized by 5 major outputs of the project. Each output report contains its rationale, key research questions, highlights of research and specific output targets for the years 2008, 2009 and 2010. For each output target, the published work is reported as abstracts from refereed journal articles that were published in the year 2006. This is followed by the completed and on-going research activities that are related to each output target. Progress towards output level outcomes and output level impacts are summarized at the end of the report for each output. Information on list of staff, list of students, list of partners and list of publications is included in the Annexes section.

**C. Project outputs and their link to strategy**

The project has 5 major outputs. Output 1 (Biophysical and socioeconomic processes understood, principles and concepts developed for protecting and improving the health and fertility of soils) involves research to develop principles and concepts that transcend the classical boundaries of the biophysical sciences and require integration with economics, sociology and anthropology. Integration of local and scientific knowledge to develop integrated "hybrid" knowledge and therefore could increase relevance to an overall strategy for sustainable soil management for improved food security and environmental protection.

Process and integrated knowledge generated from the research activities in output 1 needs to be translated into sustainable soil fertility and land management practices, adapted to the socio-

cultural and economic environment in which these practices will be implemented. Research activities from Output 2 (Economically viable and environmentally sound soil, water, and nutrient management practices developed and tested by applying and integrating knowledge of biophysical and socioeconomic processes) are expected to enhance farmers' capacity to translate best principles for soil, water and land management into practices that are appropriate to their environment and decision aids, condensing that knowledge for dissemination beyond the sites where this knowledge has been generated.

Managing soil fertility for improved livelihoods requires an approach that integrates technical, social, economic and policy issues at multiple scales. To overcome this complexity, research and extension staff needs the capacity to generate and share information that will be relevant to other stakeholders working at different scales (i.e., policy makers, farmers). Thus the research activities in output 3 (Partnerships and tools developed and capacity enhanced of all stakeholders for improving the health and fertility of soils) are founded on building the human and social capital of all TSBF-CIAT stakeholders, research and management on the sustainable use of tropical soils.

Research activities of output 4 (Improved rural livelihoods through sustainable, profitable, diverse and intensive agricultural production systems) address the challenge of intensification and diversification of smallholder agricultural production that is needed to meet the food and income needs of the poor and cannot occur without investment in natural resource management, especially soil fertility.

Investment in improving soil fertility is not constrained by a lack of technical solutions *per se* but is more linked to lack of access to information for improved decision making and analyzing trade-offs, inputs and profitable markets.

Soils play a central role for the provision of ecosystem services such as regulation of water quality and quantity, carbon storage and control of net fluxes of greenhouse gases to the atmosphere. Appropriate soil management could result in enhanced provision of environmental services. The major objective of research activities of output 5 (Options for sustainable land management (SLM) practices for social profitability developed, with special emphasis on reversing land degradation**)** is to restore degraded agroecologies to economic and ecological productivity by generating technology, institutional and policy innovations that restore degraded agricultural lands, enhance ecosystem health and improve livelihoods.