

2. PROJECT DESCRIPTION AND LOGFRAME

PROJECT PE-2: INTEGRATED SOIL FERTILITY MANAGEMENT IN THE TROPICS

Objectives: To support the livelihoods of people reliant on agriculture by developing profitable, socially-acceptable and resilient agricultural production systems based on Integrated Soil Fertility Management (ISFM); to develop Sustainable Land Management (SLM) in tropical areas through the restoration of degraded lands; and to build the human and social capital of all TSBF-CIAT stakeholders for research and management on the sustainable use of tropical soils.

Outputs:

1. Biophysical and socioeconomic processes understood, principles and concepts 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 and socioeconomic processes.
3. Partnerships developed and capacity enhanced for improving the health and fertility of soils of all stakeholders.
4. Improved rural livelihoods through profitable, diverse and intensive agricultural production systems.
5. Sustainable land management for social profitability developed, with special emphasis on reversing land degradation.

Gains: NARES, NGOs, IARCs, ARIs and private sector working together, in partnership with farmers on ISFM, in key research sites in the hillsides, savannas and forest margins of Africa and Latin America. Soil-quality indicators to monitor and evaluate soil health are published and used by farmers and extension workers. Guidelines are widely disseminated for selecting and managing productive and resource-use-efficient crop, forage and fruit components in land use systems (notably Quesungual/agroforestry, cereal- legumes/livestock and banana and cassava systems). Decision-support systems for identifying profitable options to manage organic and mineral inputs, crop residues, and green manure for sustained agricultural production and for controlling erosion are disseminated and used by farmers, NGO's and NARES. Capacity of NARS for integrated soil fertility and below ground biodiversity (BGBD) management is strengthened through regional (AfNET in Africa; MIS in Central America) and global (BGBD) partnerships. Rural poor farmers benefit from adoption of improved food systems that result in increased agricultural productivity, higher income, and environmental protection.

Milestones:

- 2005 AfNet, MIS, SARNET and BGBD Networks restructured and strengthened Decision support tools made available to identify more productive, and profitable and resilient smallholder farm production strategies. Documentation and analysis of farmers' perceptions, preferences, economics and information flow pathways and use of local knowledge within research to extension linkages. Role of social differentiation in the creation and maintenance of soil fertility analyzed.
- 2006 Indicators of soil health and fertility at plot and farm scales identified. Decision support framework for ISFM developed and made available to stakeholders in at least 2 benchmark countries. Cereal-legumes and livestock systems, with nutrient use efficiency as entry point, tested and adapted to farmer circumstances. Quesungual and other related agroforestry systems, with water conservation as entry point, including crop diversification strategies, tested and

adapted to farmer circumstances. Increased farm income and production in at least 10 pilot sites in at least 6 countries.

2007 Indicators of soil quality used for farmer's decision making in hillsides, forest margins and savanna agroecosystems. Banana and cassava based systems, with the relation between pest, diseases and ISFM as entry point, tested and adapted to farmer circumstances. Identification, characterization, restoration and monitoring of degraded lands available for at least 2 countries. Decision-making tools available for managing soil fertility and productivity on smallholder farms. Farmers adopting improved system components, including crops and soil management technologies. Strategies developed for demonstrating improved BGBD management and for establishing farmer experimentation. Economic evaluation/valorization of ecosystem services for trade-off analysis and policy recommendations quantified for the different farming systems and land use.

Users: Principally small-scale crop-livestock farmers and extension workers, NGO's and NARES in tropical agroecosystems of sub-Saharan Africa, Latin America and South-east Asia.

Collaborators: **NARS:** KARI (Kenya), NARO (Uganda), ITRA (Togo), INRAB (Benin), SRI (Ghana), IER (Mali), IAR (Nigeria), INRAN (Niger), INERA (Burkina Faso); CORPOICA (Colombia), EMBRAPA (Brazil), INTA (Nicaragua), DICTA (Honduras); **ARIs:** CIMMYT, ILRI, CIP, IFDC, ICRAF, IITA, ICRISAT, IRD (France), ETHZ (Switzerland), JIRCAS (Japan); **Universities:** Nacional (Colombia), UNA (Nicaragua), UNA and EAP Zamorano (Honduras), Uberlandia (Brasil), Nairobi (Kenya), Kenyatta (Kenya), Makerere (Uganda), Zimbabwe (Zimbabwe), Sokoine (Tanzania), Universidade Federal de Lavras (Brazil) Jawaharlal Nehru University (India), Universitas Lampung (Indonesia) Université de Cocody (Cote d' Ivoire), Instituto de Ecologia (Mexico), Leuven (Belgium), Paris (France), Bayreuth and Hohenheim (Germany), SLU (Sweden), NAU (Norway), Cornell (USA), Wisconsin-Madison (USA), Ohio State (USA), and Wageningen University and Research Centre (Netherlands). **Regional Consortia:** AFNET, MIS, CONDESAN

CGIAR system linkages: Enhancement & Breeding (10%); Crop Production Systems (30%); Protecting the Environment (30%); Saving Biodiversity (10%); Strengthening NARS (20%). Contributes to SSA and Water and Food challenge programs, the Ecoregional Program for Tropical Latin America, the African Highlands Initiative, and the Alternatives to Slash and Burn Systemwide Program.

CIAT project linkages: Multiple stress adapted and improved crop and forage germplasm (IP-1 to IP-6), integrated soil fertility and soil pest and disease management (IP-1, PE-1), local knowledge about soil management and indicators of soil quality at the landscape scale (PE-4), integrated approaches to study multipurpose legumes for soil fertility management and animal nutrition (IP-5), strategies for sustainable land management (PE-3, PE-4), agroenterprise alternatives to improve profitability of soil management options (SN-1), and strengthening NARS and communities via participation (SN-3, Rural Innovation Institute).

PE-2 Project Log Frame (2005-2007)

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Project Manager: Nteranya Sanginga

Narrative Summary	Measurable Indicators	Means Of Verification	Important Assumptions
<p>Goal 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; to reduce hunger and poverty in the tropics through scientific research leading to new technology and knowledge; and to ensure environmental sustainability through research on the biology and fertility of tropical soils, targeted interventions, building scientific capability and contributions to policy.</p>	<p>The principles of sustainable development integrated in country policies and programs. Reversal of the losses of environmental resources, especially loss of soil and below-ground biodiversity. Capacity built in tropical countries for sustainable management of natural resources. Developmental and environmental objectives taken inter-dependently.</p>	<p>National plans, human development and environment reports. Data from international organisations (UNEP, FAO, CG-institutes) that monitor the state of environmental resources. Impact studies, IARC and NARS reports, papers and publications.</p>	<p>Continued government and donor support. Sustained political and financial support for agricultural research and protecting the environment. Linkages maintained among research and development organizations.</p>
<p>Purpose To support the livelihoods of people reliant on agriculture by developing profitable, socially-acceptable and resilient agricultural production systems based on Integrated Soil Fertility Management (ISFM); to develop Sustainable Land Management (SLM) in tropical areas through 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.</p>	<p>By 2015, in at least two countries in each of the major tropical regions where TSBF-CIAT works, the number of rural people in extreme poverty reduced. By 2010, capacity built in at least three partner countries by at least three of the following: - a national level policy or legislative instrument developed by reference to a TSBF output. - all soil-related national institutions linked to TSBF networks with at least 50% of their scientists engaged in TSBF-inspired topics. - extension agencies and/or NGOs take up TSBF outputs to apply in their work programs. - farmers' organisations and/or civil society apply TSBF outputs in their plans and work. By 2008, TSBF-CIAT scientists are leading globally-funded research on at least three topics of key relevance to the international community (as identified in GEF, MDG, MEA, CGIAR mission and goal statements).</p>	<p>Reports of collaborating national and international institutions – in poverty reduction and sustainable development. National agencies surveys, development plans and reports. International agencies mission and goal statements related to TSBF-CIAT annual reports and accounts.</p>	<p>Poverty reduction strategies remain central to human development support and funding. TSBF stakeholders remain engaged with TSBF-CIAT strategic priorities and/or TSBF management continues to adapt and innovate in response to changing priorities. Funding for research on globally-important issues continues.</p>
<p>Output 1 Biophysical and socioeconomic processes understood, principles and concepts developed for protecting and improving the health and fertility of soils.</p>	<p>By 2006, indicators of soil health and fertility at plot, farm and landscape scales identified. By 2008, practical methods for rapid assessment and monitoring of soil resource base status developed. By 2010, decision tools for soil biota, nutrient and water management developed and disseminated to stakeholders.</p>	<p>Annual Reports/ publications. Reviews published. Documents of synthesized results. Detailed Tables published in Annual Report. Decision guides for ISFM developed.</p>	<p>Sufficient operational funds for soil and plant analyses. Literature on constraints available. Farmers continue to participate. Projects SN-1, PE-3 and PE-4 actively participate. Active collaboration with participatory research project (SN-3), RII and NARS.</p>

Narrative Summary	Measurable Indicators	Means Of Verification	Important Assumptions
<p>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.</p>	<p>By 2006, decision support framework for ISFM developed, tested with and made available to stakeholders in at least 2 benchmark countries. By 2008, communities in at least 3 countries demonstrate and test direct or indirect management options that enhance locally important ecosystem services using BGBD. By 2010, local baselines and interviews show that farmers' understanding of soil processes is demonstrably enhanced within community-based experimentation in at least 5 benchmark sites.</p>	<p>Annual Reports/ publications. Scientific publications. Soil and crop management guidelines published. Decision support systems developed. Annual reports.</p>	<p>Sufficient operational funds for soil and plant analyses. Literature on constraints available. Farmers continue to participate. Projects SN-1, PE-3 and PE-4 actively participate. Active collaboration with participatory research project (SN-3), RII and NARS.</p>
<p>Output 3 Partnerships developed and capacity enhanced for improving the health and fertility of soils of all stakeholders.</p>	<p>By 2005, AfNet, MIS, SARNET and BGBD Networks restructured and strengthened. Publications (i.e., journal papers, books, extension materials, policy briefs, etc.), workshops, documentaries, field days implemented by each project. By 2010, tools for dissemination of research knowledge developed by each project. By 2010, appropriate policies and innovative institutional mechanisms developed and promoted.</p>	<p>Annual Reports/ publications. Scientific information (theses, publications, workshop reports, project documents) disseminated to network members and all stakeholders. Network trials planned and implemented with partners. Degree-oriented and on-the-job personnel trained (Farmers, NARS, NGO's).</p>	<p>Continued interest/participation of NARS and ARO partners, and national and international universities. Continued support for collaborative activities e.g. Challenge programs.</p>
<p>Output 4 Improved rural livelihoods through profitable, diverse and intensive agricultural production systems.</p>	<p>By 2006, cereal-legumes and livestock systems, with nutrient use efficiency as an entry point, tested and adapted to farmer circumstances. By 2006, Quesungual and other related agroforestry systems, with water conservation as entry point, including crop diversification strategies, tested and adapted to farmer circumstances. By 2006 increase farm income and production in at least 20 pilot sites in at least 6 countries. By 2007, banana and cassava based systems, with the relation between pest, diseases and ISFM as entry point, including novel cropping sequences, tested and adapted to farmer circumstances. By 2008 improved production systems have triple benefits of food security, income and environmental services. By 2008, farmers are testing and adapting improved production systems in at least 15 sites in 5 countries. By 2010, validated intensive and profitable systems are being demonstrated, promoted by partners and adopted by farmers in 10 countries.</p>	<p>Annual Reports/ publications. Farmer's surveys. Regional/national production statistics. Land use surveys (satellite imagery, rapid rural appraisal).</p>	<p>Land survey data available. Farmers adopt new technologies. Socioeconomic conditions are favorable for achieving impact. Adequate resources available for soils research.</p>
<p>Output 5 Sustainable land management for social profitability developed, with special emphasis on reversing land degradation.</p>	<p>By 2007, identification, characterization and monitoring of degraded lands available for at least 2 regions. By 2008 methods for socioeconomic evaluation/valuation of ecosystem services for trade-off and policy analysis used, at least in 2 humid and 2 sub-humid Agro-ecological zones. By 2010, 30% of partner farmers in pilot sites used SLM options that arrest resource degradation and for increased productivity in comparison with non-treated farms.</p>	<p>Annual Reports/ publications. Farmers surveys. Regional/national production statistics. Land use surveys (satellite imagery, rapid rural appraisal).</p>	<p>Land survey data available. Farmers adopt new technologies. Socioeconomic conditions are favorable for achieving impact. Adequate resources available for land management research.</p>