Improving Rural Livelihoods:

CIAT's Medium-Term Plan 2005-2007

Submitted to the Board of Trustees
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Centro Internacional de Agricultura Tropical
International Center for Tropical Agriculture

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CIAT Medium Term Plan

2005-2007

Draft Summary and Overview

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A. Introduction, Context, and Program Discussion 2004 Update

CIAT has progressed steadily along its planned course as indicated to the Interim Science Council of the CGIAR in its 2004-2006 Medium Term Plan submitted in September 2003.

In the December 2003 meeting of the CIAT Board of Trustees, it was decided to simplify the project structure by withdrawing the Confronting Global Climate Change Project (PE6) from CIAT's portfolio. While this no longer exists as an operational entity in CIAT's organizational and budgetary structure, the ongoing research in this area continues. Research on carbon cycling in soils continues as part of the CIAT Tropical Soil Biology and Fertility Institute's (TSBF) research on environmental services while research on modeling the potential future impact of climate change on agriculture in the tropics continues within the Land Use Project (PE4).

A Center Commissioned External Review of the Geographic Information Scientific Competency reported to the CIAT Board of Trustees in December 2003. Based on their recommendations, the research plan of the Land Use Project (PE4) is in the course of revision and a new project log frame and plan will be implemented in 2005.

The research of TSBF and the CIAT Soils Project (PE2) has now been fully integrated to take advantage of synergies between soils research in Africa and Latin America. A new common log frame has been developed and is being implemented in 2004. It is more a synthesis of what had been two separate but similar approaches to soils research rather than a radical break or a new strategy. It is presented in more detail in the project description below.

The Rural Innovation Institute (RII) is likewise now fully operational. RII operates principally through the projects on Agroenterprises Development (SN1), Participatory Research (SN3), and Information and Communications for Rural Communities (SN4). The RII does not appear as a separate budgetary unit apart from the research and budgets of the three constitutive projects.

Three Challenge Programs are now fully operational. For the HarvestPlus Biofortification Challenge Program, research on improving the nutrient content of beans and cassava has been funded and is now being implemented in the Genetic Resources-Biotechnology (SB2), Bean Improvement (IP1), and Cassava Improvement (IP3) projects while the Impact Assessment (BP1) and Land Use (PE4) projects are also executing research on behalf of HarvestPlus. These activities are included as part of the research plans and budgets of the respective projects.

For the Generation Genetic Resources Challenge Program, research has been commissioned and is now being implemented in the Genetic Resources-Biotechnology (SB2), Bean improvement (IP1), Cassava improvement (IP3) and Rice Improvement (IP4) projects. Again this work is included as part of the research plans and budgets of the respective projects.

For the Water Challenge Program several CIAT projects are now implementing research funded by the CP. These include Land Use (PE4), TSBF (PE2), Communities and Watersheds (PE3), Rice (IP4), Beans (IP1) and Impact Assessment (BP1). This work too is fully integrated into the workplans and budgets of the respective projects. Funding is continuing to be sought for research approved by the CP but not yet supported due to resource shortfalls.

B. Highlights for the 2005 Research Portfolio

Several ongoing changes with implications for 2005 were discussed in the previous section. No additional major or strategic changes for the project portfolio are currently planned for 2005. However, two important efforts are going on to enhance collaboration and synergies across projects- three cross project challenges and regional strategies. CIAT scientists, Management, and the Board of Trustees all agree that while the existing project structure is useful as operational entities for budgeting and implementing research as well as articulating with a diversity of stakeholder interests, nonetheless there are major development challenges that are best tackled through an integrated cross project approach. Thus, three cross project working groups have continued in 2004 and are expected to continue in 2005. These development challenges are for the time being seen as platforms to enhance cross project coordination rather than as structural entities in the organization or budget. Moreover, they are seen as new opportunities to forge new external alliances with partners.

Sharing the Benefits of Agrobiodiversity: Enabling farmers and societies in the tropics to access the benefits of agricultural biodiversity in a changing technical and institutional context is a major opportunity. For example, the International Treaty on Plant Genetic Resources for Food and Agriculture, which will come into effect June 29, 2004, will substantially change access to genetic resources. At the same time, the World Bank is making substantial investments in the CIAT gene bank as part of its Global Public Goods program. CIAT is focusing its work on sharing the benefits of agrobiodiversity in the first instance mainly but not exclusively in Latin America and the Caribbean. This work in currently envisioned as focusing on (1) building technical capacity in Latin America for safe deployment of transgenic crops and (2) conserving and insuring the sustainable use of neo-tropical wild relatives of crops through an integrated understanding of functional diversity. Important partners that are engaging with CIAT in this include: EMBRAPA (Brasil), Instituto von Humboldt (Colombia), University of Costa Rica, CIBIOGEM (Mexico), CONABIO (Mexico), INBio (Costa Rica), Smithsonian Institute (USA) and Cornell University (USA).

Recovering Degraded Lands: In order to enhance the livelihoods of small farmers and to maintain ecosystems health, it is essential to restore degraded agricultural lands. This requires the generation of technical, institutional and policy innovations. CIAT will make its main effort in reversing land degradation in partnerships with national agricultural research systems, NGOs and government policy makers. This work will produce new combinations of agricultural technologies, ex ante assessments of technology and policy alternatives, and decision criteria including indicators. Subsidiary efforts will be made in reducing ongoing degradation and preventing potential degradation from occurring. This work draws on multiple stress-adapted germplasm including beans, cassava, rice and tropical forages, as well as on soils, watersheds and landscape management and rural innovation.

Learning to Innovate: With the accelerating pressures of economic globalization, population growth and climate change, traditional indigenous knowledge systems cannot always suffice to ensure successful coping among poor rural communities in the tropics. New knowledge networks

for the rural poor are an essential element in order to enable them to identify new opportunities, learn how to seize these opportunities, and share their experiences with other similar communities who are also eager to do the same. This cross project challenge is consciously organizing itself as a community of practice to bring together from all CIAT projects the best thinking and experiences on these issues. Currently it is not envisioned as a structural entity but expects rather to work through other CIAT projects, especially those of the Rural Innovation Institute but also including the related enabling rural innovation group in Africa. As specific proposal ideas are further developed, partners from NGOs, community based organizations, and national research systems are being engaged.

The other major element for cross project integration is through regional strategies, under the leadership of full time regional coordinators in Africa and Asia and through a center wide effort in CIAT's home region of Latin America. In Asia, for example, CIAT has scientists in the region working on cassava, forages, rural innovation-agroenterprises, soils and land use. While work is carried on as part of the research program of the CIAT projects, within the region the scientists work as a team in support of a cross project institutional commitment to a regional strategy. Partnerships are an important element in regional strategies, and in Asia partnerships with Laos, Thailand, and Vietnam have to be particularly acknowledged as well as key partnerships with JIRCAS of Japan and ILRI. Similar highlights could be presented for Africa and Latin America and the Caribbean.

C. Measures of Progress:

No major changes in project targets, milestones, or desired outputs to be mentioned beyond the inclusion of specific targets for 2007 indicated in the project descriptions of each project.

D. Collaboration:

Some new collaboration is described above through participation in the CG Challenge Programs and the internal cross project development challenges.

E. Costing Projects:

Financial developments are reported separately in other presentations to the Audit and the Executive and Finance Committees.

F. Center Staffing:

Center staffing is analyzed by scientific competency on the agenda of the Program Committee.

G. Financial Indicators:

Financial developments are reported separately in other presentations to the Audit and the Executive and Finance Committees.

Appendix I

Project Description and

Log Frames for 2005-2007

PROJECT SB-2: CONSERVATION AND USE OF TROPICAL GENETIC RESOURCES

PROJECT DESCRIPTION

Objective: To conserve the FAO Designated Collections and employ modern biotechnology to identify and use genetic diversity for broadening the genetic base and increasing the productivity of mandated and selected non-mandate crops.

Outputs:

1. Improved characterization of the genetic diversity of wild and cultivated species and associated organisms.
2. Genes and gene combinations used to broaden the genetic base.
3. Increase efficiency of breeding program using genomics tools
4. Mandate crops conserved, multiplied and distributed as per international standards.
5. Germplasm available, restored, and safely duplicated.
6. Designated Collections made socially relevant.
7. NARS strengthened for conservation and use of Neotropical plant genetic resources.
8. Conservation of Designated Collections linked with on-farm conservation efforts and protected areas.

Milestones:

2005 Efficient transformation system devolved for cassava. Bean with high iron and zinc tested and transferred to CIAT Africa program for bioavailability testing. Survey of cassava germplasm for beta carotene. SNP markers developed for bean and implemented for MAS. Targeted sequencing of cassava genome. Isogenic of QTL in rice developed and tested. Gene expression studies. Technology transfer for rapid propagation system to NARS. Testing of Ac/DS population for gene identification.

2006 Scaling up of marker assited selection and transformation established for rice, bean and cassava. High through put screening for selected tropical fruits initiated. Marker assisted selected for multiple traits implemented in beans, rice and cassava. Target genes for drougt identified and tested in beans. High iron and zinc bean lines developed through markers assisted selection released for field testing. Beta carotene cassava tested in Colombia, Brazil and selected countires in Africa.

2007 Data mining (SNIPs) in *ex situ/ in situ* collections of wild relatives of beans, cassava and forages for genes of economic importance (drought, starch). Field testing for transformed cassava. Gene flow studies diffused to NARS. Upgrading Plan completed. Safety duplicates at CIMMYT and CIP. Biofortified bean and cassava varieties in field testing. Methods for rapid multiplication of tropical fruit germplasm diffused to NARS. Genes for drought resistance in beans and cassava compared.

Users: CIAT and NARS partners (public and private) involved in germplasm conservation and crop genetic improvement and agrobiodiversity conservation; AROs from DCs and LDCs, using CIAT technologies.

Collaborators: IARCs (IPGRI through the Systemwide Genetic Resources Program, CIP, and IITA through root and tuber crop research, IFPRI through biofortification proposal and CATIE); NARS (CORPOICA, ICA, EMBRAPA, IDEA, INIAA, INIFAP, UCR, INIAs); USDA; AROs (IRD, CIRAD, Danforth Center, CAMBIA, NCGR, and universities—Cornell, Yale, Clemson, Kansas State, Bath, Hannover, Rutgers, Ghent, Gembloux); biodiversity institutions (I. von Humboldt, CONABIO, INBio, SINCHI, Smithsonian); corporations and private organizations.

CGIAR system linkages: Saving Biodiversity (40%); Enhancement & Breeding (55%); Training (4%); Information (1%).

CIAT project linkages: *Inputs to SB-2:* Germplasm accessions from the gene bank project. Segregating populations from crop productivity projects. Characterized insect and pathogen strains and populations from crop protection projects. GIS services from the Land Use Project. *Outputs from SB-2:* Management of Designated Collections (gene banks); genetic and molecular techniques for the gene bank, crop productivity, and soils (microbial) projects. Identified genes and gene combinations for crop productivity and protection projects. Propagation and conservation methods and techniques for gene banks and crop productivity projects. Interspecific hybrids and transgenic stocks for crop productivity and IPM projects.

CIAT: SB-2 PROJECT LOG FRAME (2005-2007)

PROJECT: CONSERVATION AND USE OF TROPICAL GENETIC RESOURCES
PROJECT MANAGER: JOE TOHME

Narrative Summary	Measurable Indicators	Means of Verification	Important Assumptions
Goal To contribute to the sustainable increase of productivity and quality of mandated and other priority crops, and the conservation of agrobiodiversity in tropical countries.	CIAT scientists and partners using biotechnology information and tools in crop research. Genetic stocks available to key CIAT partners.	CIAT and NARS publications. Statistics on agriculture and biodiversity.	
Purpose To conserve the genetic diversity and ensure that characterized agrobiodiversity, improved crop genetic stocks, and modern molecular and cellular methods and tools are used by CIAT and NARS scientists for improving, using, and conserving crop genetic resources.	Information on diversity of wild and cultivated species. Mapped economic genes and gene complexes. Improved genetic stocks, lines, and populations.	Publications, reports, and project proposals.	Pro-active participation of CIAT and NARS agricultural scientists and biologists.
Output 1 Genomes characterized of wild and cultivated species of mandated and nonmandated crops and of associated organisms.	Molecular information on diversity of mandated and nonmandated crops species, and related organisms. Bioinformatic techniques implemented. QTLs for yield component in rice, for nutrition traits in beans and cassava, and for nitrification and Al tolerance in *Brachiaria*.	Publications, reports, and project proposals. Germplasm. Availability of a laboratory information management system (LIMS).	Availability of up-to-date genomics equipment, and operational funding.
Output 2 Genomes modified: genes and gene combinations used to broaden the genetic base of mandated and nonmandated crops.	Transgenic lines of rice and advances in cassava, beans, *Brachiaria*, and other crops. Cloned genes for iron, zinc and drought traits Cloned genes and preparation of gene constructs. Information on new transformation and tissue culture techniques.	Publications, reports, and project proposals. Germplasm.	IPR management to access genes and gene promoters. Biosafety regulations in place.
Output 3 Collaboration with public- and private-sector partners enhanced.	CIAT partners in LDCs using information and genetic stocks. New partnerships with private sector.	Publications. Training courses and workshops. Project proposals.	Government and industry support national biotech initiatives.
Narrative Summary	**Measurable Indicators**	**Means of Verification**	**Important Assumptions**
Output 4 Mandated crops conserved and multiplied as per international standards.	Germination rates for long-stored materials. Cost per accession/year, compared with other gene banks.	Visits to GRU substations and conservation facilities.	Absence of uncontrolled diseases. Quarantine greenhouse space available at different altitudes.
Output 5 Germplasm available, restored, and safely duplicated.	Number of germplasm requests received and satisfied annually. Users received germplasm and data. Users asked for novel germplasm and data.	Visits to multiplication plots. Reports on requests and delivery. Number of core collections multiplied and shipped.	Agreement with CIAT holds. CIAT becomes partner to the Treaty.
Output 6 Designated Collections made socially relevant.	Landrace diversity restored to farmers. Farmers use new varieties. Breeders use novel genes.	Germplasm catalogs. Plant variety registration logs. National catalogs.	International collecting possible. Quarantine matters cleared.
Output 7 Strengthen NARS for conservation and use of Neotropical plant genetic resources.	NARS germplasm collections conserved. Number of trainees trained at CIAT. Number of universities and NARS using training materials.	Country questionnaires. Courses registered. Distribution and sales of training materials.	NARS and networks willing to cooperate.
Output 8 Conservation of Designated Collections linked with on-farm conservation efforts and protected areas.	Number of case studies and pilot *in situ* conservation projects.	Project documentation.	NARS interested in conservation efforts. Farmers interested in conservation efforts.

PROJECT IP-1: BEAN IMPROVEMENT FOR THE TROPICS

PROJECT DESCRIPTION

Objective: To increase bean productivity through enhanced access and utilization of improved cultivars and management practices in partnership with NARS, regional networks, and farmers.

Outputs:

1. Higher and stable bean production with less dependency on inputs such as pesticides, fertilizers, and water.
2. Integration of traditional and advanced (e.g., marker-assisted selection) crop-improvement techniques and farmer-participatory research approaches to facilitate rapid adoption of improved bean cultivars.
3. Institutional and organizational capacities of NARS, regional, and community organizations strengthened.
4. Increased access and adoption rates of bean based technologies through NARS, networks and farmers.

Gains: Improved varieties occupy 40% of bean area in Latin America and 15% in African network countries by 2005. Productivity and food security stabilized for poor rural and urban consumers in restricted areas. Pesticide use cut 20% in selected areas, reducing hazards to environment and health. Farmers growing new cultivars increase income from marketing beans by 10%-50%. Public and private researchers have access to beans with multiple-stress resistance and greater nutritional value. Research capacity strengthened through regional networks.

Milestones:

2005 Lines resistant to BCMV, BCMNV, stem maggot , root rots, CBB, anthracnose and angular leaf spot available to partners in Africa. Drought tolerant lines validated with partners. Lines tolerant to low nitrogen and low pH developed. *Pythium* root rot pathogen in Eastern Africa characterized and distribution established. ALS and *Pythium* resistance genes characterized. Progeny from marker-assisted selection for P-efficiency made available to partners.

2006 Nutritional quality traits incorporated into high-yielding, stress-tolerant cultivars. Heat tolerance incorporated into climbing beans. Lines tolerant to low nitrogen, phosphorus and acid soil complex available to partners in Africa. Method to quantify *Pythium* and Fusarium root rot pathogens in soil validated. Improved varieties to reach about 3 million people in Africa.

2007 An IPM system for whiteflies on snap beans has been adopted in major bean producing areas of the Andean zone. Gene combinations to manage major bean diseases and insect pests determined and deployed in improved varieties. Climbing beans adopted in at least 10 countries in Africa. Farmers growing new bean varieties realize a 10% increase in income from marketing beans.

Users: Small farmers in tropical America and Africa (mainly women) will obtain higher and more stable yields. Poor consumers, especially women and children, will benefit from low-cost protein and micronutrients. The environment and community at large will benefit from reduced pesticide and fertilizer use. Food legume researchers will access an enhanced knowledge base and germplasm.

Collaborators: *Regional networks*: ASARECA, SACCAR, AfNet, ECABREN and SABRN (Africa); SIGTTA (Central America). *NARS:* CORPOICA (Colombia), EMBRAPA (Brazil), INIA (Peru), INIAP (Ecuador), SEA/IDIAF (Dominican Republic), UAGRM/CIFP (Bolivia). *Germplasm improvement:* NARS and farmers by FPR and PPB. *IPDM:* ICRAF, CIMMYT, IITA, CIP, TSBFI, partners in the systemwide IPM program and African Highland Initiative (AHI). *Training in breeding and IPM:* Bean/Cowpea CRSP and ICIPE. *Diffusing technology:* NGOs, churches, relief and governmental agencies, and entrepreneurs. *International institutions:* CATIE and EAP-Zamorano (Central America), universities and other institutions in Australia, Belgium, Canada, France, Netherlands, Spain, Switzerland, UK, and USA. *Gene tagging*: CRSP and USDA.

CGIAR system linkages: Enhancement & Breeding (75%); Crop Production Systems (10%); Protecting the Environment (5%); Networks (5%); Training (4%); Information (1%).

CIAT project linkages: Germplasm (SB-1 / SB-2); IPM (PE-1), nutrient & water-use efficiency (PE-2), climate change (PE-6), communities & watersheds (PE-3), participatory research (SN-3), impact (BP-1).

CIAT: IP-1 PROJECT LOG FRAME (2005-2007)

PROJECT: BEAN IMPROVEMENT FOR THE TROPICS
Project Manager: STEPHEN BEEBE

Narrative Summary	Measurable Indicators	Means of Verification	Important Assumptions
Goal To obtain a lasting increase in food availability and income for the poor through improved bean productivity.	Increased bean production, and better income distribution and nutrition with improved cultivars and management practices.	National production statistics.	Adoption continues at rates at least comparable with those in the past.
Purpose To increase bean productivity through enhanced access and utilization of improved cultivars and management practices in partnership with NARS, regional networks, and farmers.	Improved cultivars and/or ICM used by NARS, and farmers in 40% of Latin America and 15% of African network countries by year 2005. Farmers increase bean income by 10%. Regional networks devolved to local management, with CIAT as a research partner.	Reports of NARS and regional networks. Adoption survey reports. Publications. CIAT reports. End-of-project and evaluation reports.	Core researchers and budgets maintained. Continued donor support to regional networks. Resources in challenge programs accessed. Regional bodies and national governments continue to give priority to bean production.
Output 1 Improved, small-seeded, bean germplasm resistant to major biotic and abiotic stresses with greater nutritional and market value.	Improved germplasm available to NARS, regional networks, and farmers, with drought tolerance and disease resistance.	Reports from NARS and regional networks. Annual reports. Publications.	Continued donor support to the African networks, LAC and CIAT. Continued input of (CIAT) breeders, molecular geneticist, and plant nutritionist.
Output 2 Improved, large-seeded, bean germplasm resistant to major biotic and abiotic stresses with greater nutritional and market value.	Improved germplasm available to NARS, regional networks, and farmers, combining better yield with disease resistance.	Reports from NARS and regional networks. Annual reports. Publications.	Continued donor support to African networks, LAC and CIAT. Input of breeder and molecular geneticist.
Output 3 Strategies developed for managing diseases and pests in bean-based cropping systems.	IPM strategies for white fly, thrips, leafminers, and BSM developed and enter diffusion phase. Pathogen distribution maps developed for ALS, anthracnose, Pythium and Fusarium root rots. Gene combinations to control insects and pathogens (ALS, BGMV) determined.	Reports from NARS and regional networks. Annual reports. Publications.	Continued input of pathologist, entomologist, and virologist. Continued donor support to whitefly IPM project.
Output 4 Improved cultivars and management practices developed, evaluated and widely disseminated in partnership with NARS, regional networks, NGOs, and farmers.	Improved bean varieties disseminated to about 3 million people, with increased productivity, lower dependence on inputs and lower costs. Nutritional value of beans increased. Climbing beans adopted, 10 African countries. Improved ICM practices adopted in 5 countries by 10% of farmers by 2005.	Trials on experiment stations and on farms. National statistics. Publications.	Continued donor support. Active collaboration with all partners involved, including farmers.
Output 5 Strengthened institutional, organizational and collaborative capacity of NARS and sub-regional networks in Africa	Regional and national specialists increasingly backstop NARIs and NGOs. NARIs partners apply new techniques for breeding, IDPM and INM. Products of research and extension increasingly derived from cross-country and network collaboration.	Reports from NARS, regional networks and PABRA. Annual Reports. PABRA reports,	Continued donor support. NARES scientists remain stable in their position. Partners commit resources to and incorporate innovative approaches

PROJECT IP-3: IMPROVED CASSAVA FOR THE DEVELOPING WORLD

PROJECT DESCRIPTION

Objective: To develop germplasm, methods and tools for increased productivity and value of the cassava crop that will result in increased income and development of rural communities involved in cassava growth and processing.

Outputs:

1. Genetic base of cassava and related Manihot species evaluated and available for cassava improvement.
2. Genetic stocks improved gene pools developed and transferred to national programs.
3. Collaboration with other institutions.
4. Maintenance and evaluation of germplasm bank in the field, greenhouses and/or *in vitro*.
5. Breeding for insect and other arthropods resistance and development of alternative methods for their control.
6. Disease resistance in cassava.
7. Development and use of biotechnology tools for cassava improvement.
8. Knowledge of cassava genetics. New breeding approaches.

Gains: The rural populations in Africa, Asia and Latin America and the Caribbean benefit by increased productivity, enhanced value of the products produced, and flexibility by the availability of different processing alternatives for cassava.

Milestones:

2005 The first "trapiche yuquero" begins full production of cassava flour. Other alternative uses in the process of scaling up. New molecular markers developed for different traits such as resistance to white flies, leaf retention, and high dry matter content.

2006 The first hybrids from parental lines with some degree of inbreeding produced. First results from the newly developed protocol for the production of doubled-haploids. Markers assisted selection fully incorporated in the cassava breeding project.

2007 Numerous hybrids from parental lines with degrees of inbreeding produced. Protocol for the production of doubled haploids routinely applied to extracting inbreds. Marker assisted selection for breeding disease and pest resistance extended to cover root quality traits. Traits of agronomic interest in wild *Manihot* species identified. Inter-specific crosses with wild *Manihot* species identified. Inter-speciic crosses with *Manihot* species produced to exploit above traits. Additional resistance to white flies idenfied in cassava.

Users: Immediate beneficiaries are farmers growing cassava as a cash crop or for subsistence farming. Close beneficiaries are processing industries related to cassava (for animal feed, for processed food, for starch or derived products).

Collaborators: IITA and IFPRI (CG Centers), NARs in Asia (particularly in Thailand, Vietnam, China, India and Indonesia) and Latin America (particularly Brazil, Colombia, Cuba, Haiti and Venezuela), CLAYUCA, and private sector involved in cassava processing.

CGIAR system linkages: IITA cassava breeding (5%); Biofortification Initiative (25%); Training (15%); Information (15%); Networks (20%); Organization and Management (10%). Participates in the Global Cassava Strategy (10%).

CIAT: IP-3 PROJECT LOG FRAME (2005-2007)

PROJECT: IMPROVED CASSAVA FOR THE DEVELOPING WORLD
PROJECT MANAGER: HERNÁN CEBALLOS

Narrative Summary	Measurable Indicators	Means of Verification	Important Assumptions
Goal To improve the livelihoods of rural populations in Latin America, Africa and Asia by increasing cassava productivity, while protecting the environment and enhancing the value of products derived from this crop.	Increased productivity of cassava clones. Widened uses for cassava. Increasing the area planted to the crop.	National statistics of different countries where projects have been implemented. Recognition of private sector (processing)	
Purpose To develop methods and tools that will make the genetic improvement of cassava more efficient and to identify valuable germplasm for the breeding project. Eventually a technology package involving germplasm, cultural practices and processing alternatives will be made available to rural communities.	By the end of year 2006, the project has consolidated the technology packages for alternative industrial uses of cassava as well as strengthened the reliability and sustainability of the crop as a source of food security for subsistence farming.	Reports and project documents of our partner institutions. Reports from the processing sector. Scientific publications	Political and institutional support for sustainable rural and agricultural development at the reference sites and targeted countries is maintained. Natural disasters and civil strife do not impede progress toward contributing to the project's goal. Absence of drastic changes in the price of maize as a commodity that greatly affects cassava competitiveness.
Output 1 Genetic base of cassava and related Manihot species evaluated and available for cassava improvement.	Evaluation of genetic diversity for carotene and key minerals content in roots and foliage. Evaluation of genetic diversity for starch quality and properties in cassava roots. Evaluation of the effect of carotene content in reducing post-harvest physiological deterioration.	Articles published. Annual reports and project proposals. Clones developed to take advantage of findings from this output.	Natural disasters or civil strife do not impede progress toward achieving the project's goal. Cassava germplasm bank is maintained in the field.

Narrative Summary	Measurable Indicators	Means of Verification	Important Assumptions
Output 2 Genetic stocks improved gene pools developed and transferred to national programs.	Changes in the breeding scheme implemented and their consequences measured. Development of a new product in cassava: lines with varying degree of inbreeding. Resources found for the development of a protocol for the production of doubled-haploids in cassava.. Number of clones for each agro-ecological region with outstanding performance.	Project home page. Annual reports and working documents. Scientific publications. *Shipment of germplasm to* collaborators in different countries.	Natural disasters or civil strife do not impede progress toward achieving the project's goal. Adequate funding for research activities.
Output 3 Collaboration with other institutions.	Continue the consolidation of CLAYUCA. Continue with joint research and collaboration with IITA Continue the support of cassava breeding projects in Asia Training of visiting scientists. *Close interaction with private sector involved in* cassava processing.	Case studies published. Annual reports and working documents. Submission of joint research proposals. Support from private sector	Natural disasters or civil strife do not impede progress toward achieving the project's goal. Willingness of IITA to continue the collaboration we have had.
Output 4 Maintenance and evaluation of germplasm bank in the field, greenhouses and in vitro.	Continue the collection of data for a complete data set from the germplasm bank. Introduction of new germplasm from different countries in the world.	Project proposals and reports. Accessions planted and *maintained in the field.* Introduction of new accessions	Natural disasters or civil strife do not impede progress toward achieving the project's goal.
Output 5 Breeding for insect and other arthropods resistance and development of alternative methods for their control.	Search for molecular marker(s) associated with resistance to white flies. Introgression of .resistance to white flies into breeding stocks. Evaluation of reaction to insects and arthropods in breeding stocks. Development of methods for the biological control of soil insects.	Annual reports and working documents. Scientific publications. Development of commercial products for biological control of pests in cassava.	*Natural disasters or civil strife do not* impede progress toward achieving the project's goal. Adequate funding for research activities.

Narrative Summary	Measurable Indicators	Means of Verification	Important Assumptions
Output 6 Disease resistance in cassava.	Identification of the causal agent of the frog skin disease and modes of transmission. Implementation of the molecular marker associated with resistance to ACMV Identification of germplasm and cultural practices to control root rot in cassava. Identification of parental material resistant to bacterial blight and super-elongation disease.	Annual reports and working documents.. Scientific publications. Training manuals Development of a diagnostic kit for frog skin disease	Natural disasters or civil strife do not impede progress toward achieving the project's goal. Adequate funding for research activities.
Output 7 Development and use of biotechnology tools for cassava improvement.	Development of a protocol for the production of doubled-haploids in cassava. Identification of genes of commercial, environmental or consumer preference value for genetic transformation. Identification of traits of agronomic relevance to be associated with molecular markers for MAS. Collaboration for the development of QTLs of agronomic relevance.	Annual reports and working documents. Scientific publications. Molecular markers identified.	Natural disasters or civil strife do not impede progress toward achieving the project's goal. Adequate funding for research activities.
Output 8 Knowledge of cassava genetics. New breeding approaches.	Evaluation of diallel sets for the coast, acid soil savannas and mid-altitude valley to analyze the inheritance of important traits through quantitative genetic methods. Identification of populations showing interesting segregations for further analysis using molecular markers. Testing of the hypothesis that hybrids from inbred lines are better performing than those produced from non-inbred parents. Cassava breeding based on the use of inbred parents implemented. MAS incorporated in cassava breeding as routine procedure.	Annual reports and working documents. Scientific publications. Training manuals. Inbred parental lines and hybrids produced from them.	Natural disasters or civil strife do not impede progress toward achieving the project's goal. Adequate funding for research activities.

PROJECT IP-4: IMPROVED RICE FOR LATIN AMERICA AND THE CARIBBEAN

Project Description

Objectives: To add to the well being of the rice sector with emphasis on the resource poor rice farmers by increasing genetic diversity and the stability of high yielding varieties. These will require lower inputs which will reduce the production costs, help protect the environment, and make rice locally available at a reasonable price.

Outputs:
1. Enhanced Gene Pools
2. Rice pests and genetics of resistance characterized
3. Education and rice cultivation used as vehicles to alleviate poverty

Gains: Robust high yielding rice varieties requiring lower inputs will be developed. We will provide well-characterized progenitors and advanced materials with an ample genetic base as well as training to our partners. The focus will be on developing the capability to increase the number of desirable traits in varieties. This will lower unit costs giving farmers higher profits as well as maintain rice as an affordable food for the consumers.

Milestones:

2005 Marker aided selection for multiple traits will be initiated. Participatory rice selection and breeding will be releasing new rice varieties for resource poor farmers. Advanced lines with multiple traits from wild species of rice will be tested for national programs for their release as varieties. Interactive training for rice researchers and extension agents will be available through as E-learning tools. Near isogenic lines for blast resistant genes will be used in regional studies to understand the dynamics of the pathogen and develop locally resistant varieties. Using water efficiently in rice systems will be a focus of varietal development and crop management. A new Rice Breeders network with both public and private organizations will be started for regional collaboration.

2006 The effectiveness of MAS as a breeding tool will be evaluated and if it proves cost effective then implemented as a routine activity. More systematic breeding for complex problems such as rice blast as well as simpler characteristics will be the focus of the MAS activities. E-learning activities will be used to join crop and pest management practices and participatory breeding activities. The rice breeder networks will become a major vehicle for breeder's workshops, E-learning, evaluation of CIAT-ION and participatory selection and breeding will lead to the more rapid development and adoption of high yielding rice varieties with good grain quality and multiple stress resistance.

2007 It is expected the SNPs will be the preferred type of molecular marker and additional traits will be incorporated into the breeding program. The use of markers will allow us to develop more populations and eliminated most materials at the F2 stage. RHBV and rice blast will be two of the principal uses of markers. National plans for competitive rice will be encouraged. More emphasis will be given to integrated crop management through the Learning to Innovate initiative. Small framers will be targeted with rice as food security mixed with higher value crops for income.

Users: Rice researchers in Latin America. Ultimate beneficiaries are the LA rice farmers most of whom are small farmers, and the resource poor consumer who are eating rice because it is available and affordable.

Principal Collaborators: France CIRAD, IRD & Genoplante, FLAR, IRRI, WARDA, Japan JIRCAS, Korea RDA, Brazil EMBRAPA, Colombia FEDEARROZ & CORPOICA, Peru INIA, Venezuela INIA & DANAC, Cuba IIA, Nicaragua INTA, Bolivia CIAT Santa Cruz, Chile INIA, Uruguay INIA, Argentina U. Corrientes & U. Tucumán, China, US Universities: KSU, Cornell, Purdue, LSU, U. Arkansas, Texas A&M and Yale.

CGIAR system linkages: Enhancement and Breeding (50%); Protecting the Environment (20%); Saving Biodiversity (15%); Transfer of Technologies (10%); Crop Systems (5%). Linked to IRRI and WARDA.

CIAT project linkages: Germplasm conservation SB-1, genomics SB-2, participatory research SW-3 for upland in hillsides PE-3 and cropping systems SW-2 for the savannahs. Provide improved germplasm to PE-1 and PE-2.

CIAT: IP-4 PROJECT LOG FRAME (2005-2007)

PROJECT: IMPROVED RICE FOR LATIN AMERICA AND THE CARIBBEAN
PROJECT MANAGER: LEE CALVERT

Narrative Summary	Measurable Indicators	Means of Verification	Important Assumptions
Goal Germplasm of beans, cassava, tropical forages, rice, and their wild relatives collected, conserved, enhanced, and made accessible to NARS and other partners.	Sufficient number of accessions (of beans, cassava, and tropical forages), representing genetic diversity, conserved and managed *ex situ*. Strategies and guidelines for *in situ* management of biodiversity of beans, cassava, and tropical forages have been developed and tested with users. Accessible rice germplasm meets NARS' standards in terms of productivity, stability, agronomic traits, and user needs. Techniques and relevant information for more efficient and reliable germplasm improvement are accessible to users.	CIAT's germplasm bank inventories. Partners' technical reports. Annual reports.	
Purpose To increase rice genetic diversity and enhance gene pools for higher, more stable yields with lower unit production costs that reduce prices for consumers and decrease environmental hazards.	Evaluations of yield potential (interspecific, wide, and elite crosses, and recurrent selection). Continued use of improved germplasm by NARS. Monitoring rice production practices and markets. IPM practices in place for stable production and cleaner environment. Rice lines selected with desired gene traits. Potential sources for high levels of biotic and abiotic stress resistance.	Databases. Project, CIAT, and NARS annual reports. Publications. Promotional activities (conferences, training, workshops, and field days).	Stability (internal and external). National policies favor adoption of new technology.
Outputs 1. Rice gene pools enhanced. 2. Rice pests and genetics of resistance characterized. 3. Education and rice cultivation used as vehicles to alleviate poverty.	Pathogen and pest variation and source of resistance identified. IPM strategies. Workshops. Training courses. Farmer surveys.	Project progress report for 2002. Publications. Project progress and workshop reports.	Continued support from CIAT, CIRAD, and FLAR. Continued adequate funding. Recommendations adopted by NARS and implemented by farmers.

Narrative Summary	Measurable Indicators	Means of Verification	Important Assumptions
Output 1: Enhanced gene pools Rice improvement, using conventional breeding and gene pools and/or populations with recessive male-sterile genes. Evaluation of savanna upland rice lines in Latin American countries. Developing upland rice for smallholders. Advance and evaluate interspecific gene pools. Introgress new plant type genes into LAC's gene pools. Use anther culture and *in vitro* culture to enhance gene pools.	13 rice populations developed with improved tolerance of soil acidity; resistance to blast, RHBV, and *T. orizicolus*; good grain quality; early maturity. Number of field trials planted and lines selected. Populations distributed to NARS for line development. 14 populations developed; 12 populations in process; 4 populations yield tested and/or molecular characterized. Partners: WARDA, CIRAD, EMBRAPA, Cornell U. 433 crosses made; tropical irrigated (226), temperate (155), upland (52). Number of selected lines. Double haploids: interspecific crosses (386), accelerated breeding populations (815), somaclones (3758 in Venezuela; 4440 in Colombia).	Project progress report for 2001. Field visits and evaluations in testing sites. Breeding populations distributed throughout LAC. Breeding populations in storage and field. Best lines and QTLs identified. Double haploids in storage. Publications.	Continued support from CIAT, CIRAD, and FLAR. Adequate funding and timely release of budget. Favorable climate. Continued financial support for anther culture laboratory. Crosses, field support, and operational costs provided by FLAR.
Output 2: Integrated pest and disease Management Characterized interactions of host-plant resistance to rice blast, sheath blight, and grain discoloration. Characterization and use of partial and complete resistance for controlling rice blast. Characterization of interactions within the host plant, rice *hoja blanca* virus, and *T. orizicolus* complex. Foreign genes as novel sources of resistance to rice *hoja blanca* virus and *Rhizoctonia solani*. Characterization of interactions among host plant, *Polymyxa graminis*, and rice stripe necrotic virus causing *entorchamiento*.	Virulence spectrum and genetic structure of rice pathogens. Molecular markers associated and number of resistance genes. Sources of complete, complementary, and partial resistance. Rice lines with diversified resistance to RHBV and *T. orizicolus*. Understanding components of resistance to the RHBV complex. Crop management components developed. Transgenic lines with RHBV-viral genes with reduced symptoms produced and evaluated. Transgenes introgressed into commercial cultivars. Novel genes for multicomponent resistance to rice pathogens used. RSNV and vector complex characterized. Germplasm evaluation methods developed.	Pest and disease resistant varieties released by partners. Collection of rice pathogens. Database of resistance sources. Crosses made among resistance sources. F7 lines with stable blast resistance combining genes Pi-1 and Pi-2. Rice genome map with blast resistance genes mapped. Rice progress report for 2001. Publications. Resistant germplasm selected under artificial conditions.	Rice crosses and populations developed by breeders. Biotechnology Unit identify molecular markers associated with resistance. Continued collaboration with FLAR. Continued adequate funding from Colombia and Rockefeller. Continued support and adequate funding from CIAT, CIRAD, and FLAR. Continued funding from Colombia, Rockefeller, and COLCIENCIAS. Permission for field testing of transgenic plants granted. Continued support and adequate funding.

Narrative Summary	Measurable Indicators	Means of Verification	Important Assumptions
Output 3: Education and rice cultivation as vehicles to alleviate poverty			
Participatory development of rice for poor communities in marginal areas. FLAR–CIAT collaboration. Collaborator training and information.	Community-based projects. New equipment for small rice systems. Number of scientists trained. Workshops. Published reports of courses. FLAR annual report. Publications and Web pages.	Increased production in marginal areas. Number of communities participating. Rice progress report for 2001. CIAT's Web page.	Special funds continue. Recommendations adopted by farmers.

PROJECT IP5: TROPICAL GRASSES AND LEGUMES: OPTIMIZING GENETIC DIVERSITY FOR MULTIPURPOSE USE

PROJECT DESCRIPTION

Objective: To develop and utilize superior gene pools of grasses and legumes for sustainable agricultural systems in subhumid and humid tropics.

Outputs:

1. Optimized genetic diversity for quality attributes, for host-parasite-symbiont interactions, and for adaptation to edaphic and climatic constraints, for legumes and selected grasses.
2. Selected grasses and a range of herbaceous and woody legumes evaluated with partners, and made available to farmers for livestock production and for soil conservation and improvement.

Gains: Defined genetic diversity in selected grass and legume species for key quality attributes, disease and pest resistance, and environmental adaptation. Known utility in production systems of elite grass and legume germplasm. New grasses and legumes will contribute to increased milk supply to children, cash flow for small livestock and non-livestock farmers, while conserving and enhancing the natural resource base.

Milestones:

2005 Methods and tools available to enhance targeting and adoption of multipurpose forage germplasm in smallholder production systems in Central America.
A new *Brachiaria* hybrid with better adaptation to dry season and with higher seed yield available for release in the dry tropics.

2006 A *Brachiaria* hybrid with resistance to different spittlebug species, with drought tolerance, high forage quality and high seed production available for on- farm testing.

2007 Documented adoption and impact of new Brachiaria hybrids and multipurpose legume species in LAC and in South East Asia.

Users: Governmental, nongovernmental, and farmer organizations throughout the su...d and humid tropics who need additional grass and legume genetic resources with enhanced potential to intensify and sustain productivity of agricultural and livestock systems.

Collaborators: National, governmental, and nongovernmental agricultural research and/or development organizations; SROs (Universities of Hohenheim and Göttingen, CSIRO, JIRCAS, ETHZ); private sector (e.g. Papalotla).

CGIAR system linkages: Enhancement & Breeding (30%); Livestock Production Systems (15%); Protecting the Environment (5%); Saving Biodiversity (40%); Strengthening NARS (10%). Participates in the Systemwide Livestock Program (ILRI) through special projects in Central America.

CIAT project linkages: Genetic resources conserved in the Genetic Resources Unit will be used to develop superior gene pools, using where necessary molecular techniques (SB-2). Selected grasses and legumes will be evaluated in different production systems of LAC, Asia and Africa using participatory methods (SN-3) to target forages (PE-4, SN-2) and to assess their impact (BP-1), and in rural livelihoods and in natural resources conservation (PE-2, PE-3, PE-6).

CIAT: IP-5 PROJECT LOG-FRAME (2005-2007)

PROJECT: TROPICAL GRASSES AND LEGUMES: OPTIMIZING GENETIC DIVERSITY FOR MULTIPURPOSE USE
PROJECT MANAGER: CARLOS E. LASCANO

Narrative Summary	Measurable Indicators	Means of Verification	Important Assumptions
Goal To contribute to the improved welfare of small farmers and urban poor by increasing milk and beef production while conserving and enhancing the natural resource base	• New cultivars of grasses and legumes used by farmers. • Raised productivity of livestock and crops while protecting biodiversity and land in savannas, forest margins and hillsides	Statistics and case studies on socio-economic benefits and natural resource conservation in smallholder livestock farms in the subhumid and humid tropics	Policies are put in place by governments to favor sustainable livestock and forage development in marginal areas occupied by small farmers
Purpose To identify and deliver to farmers superior gene pools of grasses and legumes for sustainable crops-livestock systems in subhumid and humid tropics.	• Demonstrated economical and ecological benefits of multipurpose grasses and legumes to livestock and crop farmers in tropical regions of Latin America, Africa and South East Asia	• Range of genetic variation in desirable plant traits • Performance of forage components in systems	• Support from traditional and nontraditional donors • Effective collaboration: • CIAT's Projects • ARO's, partners and farmers, NGOs
Outputs 1. Grass and legume genotypes with high forage quality attributes are developed.	• Determined utility of legume mixtures for increasing protein supply in ruminants while reducing methane emissions by 2005 • New *Brachiaria* genotypes with superior forage quality for improved animal performance characterized by 2006 • Known utility of forages with added value to increase on farm milk yield and income of smallholders in Central America by 2007	• Demonstrated differences under field conditions • Scientific publications • Annual Reports • Theses	• Effective collaboration with CIAT Projects (PE-2), AROs, partners and farmer groups
2. Grass and legume genotypes with known reaction to pests and diseases and interaction with symbiont organisms are developed.	• Validated fast screening method to assess *Rhizoctonia* resistance in *Brachiaria* by 2005 • QTL's for resistance to spittlebug and high aluminum in the soil in *Brachiaria* are available for marker-assisted selection by 2006 *Brachiaria* genetic recombinants with combined resistance to at least three species of spittlebug are available for regional testing and release by 2007	• Demonstrated differences under field conditions • Scientific publications • Annual Reports • Theses	• Effective collaboration with CIAT Projects (SB-1, SB-2), AROs, partners and farmer groups
3. Grass and legume genotypes with superior adaptation to edaphic and climatic constraints are developed.	• Improved accessions of *Vigna* with adaptation and known value to farmers in hillsides of Central America multiplied and distributed to partners 2005 • Defined variability for nitrification inhibition in *Brachiaria* hybrids by 2006. • *Brachiaria* hybrids with resistance to low P and high aluminum in the soil and with drought tolerance are available for testing by 2007.	• Demonstrated differences under field conditions • Scientific publications • Annual Reports • Theses	• Effective collaboration with CIAT Projects (SB-1, PE-2, PE-4), AROs, partners, NGOs and farmer groups
4. In partnership with NARS, superior and diverse grasses and legumes are evaluated and disseminated through participatory research.	• Scaling process of *Vigna*, *Lablab* and *Cratylia* and improved *Brachiaria* are in place in Central America by 2005 • A Decision Support Tool for targeting forages to different environments and production systems in Central America is available by 2005 • New market opportunities in Central America for processed forages assessed by 2006. • An information network on forages and an effective forage multiplication systems with smallholders are established and functioning in benchmark sites in SE Asia by 2005. • New Brachiaria hybrids with adaptation to acid soils and high seed yield are preselected by 2006 • Improved multipurpose grasses and legumes result in increased on-farm milk, meat, and crop production, and reduced labor requirements in benchmark sites in SE Asia by 2007.	• Promotional publication • Newsletters • Journal • Extension booklets • Surveys on adoption impact of new grasses and legumes: • Seed sold • Area planted • Production parameters • Environmental/socioeconomic indicators	• Effective collaboration with CIAT Projects (PE-2, SN-1, SN-2, SN-3, BP-1 and Ecoregional Program), partners, NGOs and farmer groups

PROJECT PE-1: INTEGRATED PEST AND DISEASE MANAGEMENT

PROJECT DESCRIPTION

Objective: To develop and transfer knowledge systems and pest-and-disease management components for sustainable productivity and healthier environments, through the reduced or rational use of pesticides.

Outputs:

1. Pest and disease complexes described and analyzed.
2. Pest and disease management components and IPM strategies and tactics developed.
3. NARS' capacity to design and execute IPM research and implementation strengthened.
4. Global IPM networks and knowledge systems developed.

Gains: Increased crop yields and reduced environmental damage. Natural enemies of major pests and diseases evaluated. IPM developed, and tested and verified on farms. Increased knowledge of the biology and ecology of pests and diseases and of the damage they cause. Molecular characterization of major arthropod pests, pathogens and diagnostic kits made available for developing durable host plant resistant. FPR methods for IPM developed and implemented. Biological control agents established in new regions. Pests and diseases on additional food and fruit crops evaluated or characterized.

Milestones:

2005 Complexes of soil borne pests identified. Integrated components for IPM of soil borne pests available for implementation of FRP methods. IPM for CBB implemented. Candidate genes for resistance to CBB on *Phytophthora* root rot of cassava identified. Role of endophytic fungi in plant protection of forages defined. Biocidal proteins of plant origin (e.g. forages) characterized. Brachiaria hybrids resistant to *Rhizoctonia solani* developed. Root rot resistant bean varieties available. Molecular markers for rice hoja blanca virus available. Resistant genes to *R. solani* and rice stripe necrosis virus identified from wild rice species. New Brachiaria hybrids with multiple resistance to spittlebug available. Quantification methods for bean Fusarium root rot pathogen in soil validated. Bean stem maggot tolerant bean varieties evaluated. Botanical and other traditional pesticides for bean pest management evaluated by farmers in eastern and southern Africa. Novel approaches in scaling up bean IDPM technologies evaluated.

2006 New lines resistant to Bean Golden Mosaic virus available. Bean lines combining angular leaf spot and root rot resistance available. Citrus viruses diagnostics available. Molecular markers for pod weevil and Mexican bean weevil identified. *R. solani* resistant genes incorporated in rice. Soil associated microbes with beneficial role on disease management identified. Biological pesticides identified for whitefly control. Participative application of integrated control methods of soil borne pests. Quantification methods for bean *Pythium* root rot pathogens in soil validated.

2007 Biological pesticides for soil borne arthropod pests and plant diseases available. IPM of soil borne arthropod pests implemented. Methodologies for evaluating effect of transgenic crops (Bt) on non-target species developed. Whitefly IPM implemented on selected crops (beans, snap beans, cassava). Brachiaria hybrids resistant to rhizoctoria foliar blight developed. Gene for antifungal protein cloned from tropical forage clitoria and characterized for use in transgenic plants. Rice blast resistance genes incorporated into Latin American rice commercial cultivars. Method to quantify *Pithium* and *Fusarium* root rot pathogens in soil validated. *Pithium* root rot pathogens in Eastern Africa characterized and distribution established. ALS and *Pithium* resistance genes characterized and deployed in improved varieties. A molecular detection assay for bacterial blight of common bean implemented. Identification of resistance sources of phytoplasm associated to Cassava Frogskin Disease using molecular markers.

Users: Information on biodiversity in tropical agroecosystems, improved IPM components and technologies and knowledge systems will benefit NARS scientists, extension workers, farmers and consumers, by increasing crop yields and stabilizing production systems.

Collaborators: IARCs (IITA, ICIPE, CIP, ICARDA, AVRDC); AROs (e.g., CATIE, NRI, Crop and Food Research, BBA, DBT, ETH, IPP, CIRAD, IRD, John Innes Center, CRCTPP); universities (Florida, Wisconsin, Cornell, São Paulo, Caldas, Palmira, Valle); NARS (e.g., EMBRAPA, CORPOICA, ICA, INIAP, INIVIT, MADR, NARO, IDIAP, INTA); NGOs; private industries (ASOCOLFLORES, Palmas de Casanare, Palmar de Oriente, Biocaribe); PRONATTA; COLCIENCIAS, SENA, CLAYUCA, FLAR, Profrijol.

CGIAR system linkages: Crops (30%); Saving Biodiversity (20%); Protecting the Environment (40%); Strengthening NARS (10%). Whitefly and Participatory Methods Projects, and Soil Biota, Fertility and Plan Health in the systemwide program on IPM.

CIAT: PE-1 PROJECT LOG FRAME (2005-2007)

PROJECT: INTEGRATED PEST AND DISEASE MANAGEMENT
PROJECT MANAGER: ANTHONY BELLOTTI

Narrative Summary	Measurable Indicators	Means of Verification	Important Assumptions
Goal **To increase crop yields and reduce environmental contamination through the effective management of major pests and diseases.**	Increased crop yields. Reductions in environmental degradation through adoption of improved technology. Reduction of losses to several major diseases.	**Production statistics.** Adoption and impact studies. Project reports.	
Purpose To develop and transfer knowledge systems and pest-and-disease management components for sustainable productivity and healthier environments.	Adoption of germplasm with resistance to biological constraints. Establishment of released natural enemies. Use of environmentally friendly control strategies. Improved understanding of major biotic constraints.	End-of-project reports. Refereed publications, book chapters. Adoption and impact studies.	National policies favorable to adoption of IPM strategies (i.e., increased support to extension, reduction of subsidies for pesticides). National programs are active and strong in key countries. Active collaboration from other IARCs and DC research organizations. Active collaboration from AROs.
Output 1 Pest and disease complexes described and analyzed.	Arthropod pests, diseases, natural enemies, and vectors characterized. Host/pest/natural enemy/vector interactions analyzed. Better diagnostic tools available. Biological control agents identified and established. Better understanding of the influence of abiotic constraints in host-pest interactions. Identification of crops (cassava, beans, rice, forages) with tolerance of diseases. Pest and disease distribution (maps) determined.	**All areas: project reports, refereed publications, book chapters.** Reports with maps, economic damage, biological information. Analysis of experiments. Transfer of tools to seed health facilities. Molecular markers for pest and diseases available. Candidate genes for resistance identified.	NARS have the needed resources. Adequate interaction with other disciplinary scientists. **Successful experiments.** Continued development of new varieties that are commercially acceptable. Farmers have adequate access to extension agents, credit lines, and other factors that influence adoption. Collaboration with NARS possible. Evaluation, screening, and exploration sites accessible.
Output 2 Pest-and-disease management components and IPM strategies and tactics developed.	Testing of components for effectiveness. Control strategy recommendations clearly identified and crop management practices determined. Farmers test components. Participatory testing, monitoring and evaluation of IPM components with farmers implemented. Guides on IPM strategies published. Disease detection methods available. Web site published.	Analysis of experiments. Guidelines for IPM. Reports on field effectiveness and probability of adoption of components. Field-oriented brochures. Farmer participatory research implemented. Reports available.	Funding for research and technology (IPM) practices available. Stakeholders are willing to participate.
Output 3 NARS' capacity to design and execute IPM research and implementation strengthened.	Training, especially in FPR. Development of projects with NARS. Training materials developed.	Reports on training courses. Concept notes and projects prepared with partners. IPM projects implemented	Trainees are keen to become trainers of farmer communities.
Output 4 Global IPM networks and knowledge systems developed.	Network of researchers established. Preparation of Web pages and databases with relevant IPM information.	Electronically published Web pages and databases. Progress reports.	

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

PROJECT DESCRIPTION

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. Indicators of soil quality used for farmer's decision making in hillsides, forest margins and savanna agroecosystems. Decision support tools made available to identify more productive, 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. Analysis of the role of social differentiation in the creation and maintenance of soil fertility

2006 Indicators of soil health and fertility at plot, farm and landscape 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 20 pilot sites in at least 6 countries.

2007 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 regions. 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).

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).

CIAT: PE-2 PROJECT LOG FRAME (2005-2007)

PROJECT: INTEGRATED SOIL FERTILITY MANAGEMENT IN THE TROPICS
Project Manager: Nteranya Sanginga

Narrative Summary	Measurable Indicators	Means of Verification	Important Assumptions
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.	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.	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.	Continued government and donor support. Sustained political and financial support for agricultural research and protecting the environment. Linkages maintained among research and development organizations.
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.	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 half. By 2010, capacity built in at least five 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 2006, 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).	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.	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.
Output 1 Biophysical and socioeconomic processes understood, principles and concepts developed for protecting and improving the health and fertility of soils.	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.	Annual Reports/ publications. Reviews published. Documents of synthesized results. Detailed tables published in Annual Report. Decision guides for ISFM developed.	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.

Narrative Summary	Measurable Indicators	Means of Verification	Important Assumptions
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.	By 2006, decision support framework for ISFM developed 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.	Scientific publications. Soil and crop management guidelines published. Decision support systems developed. Annual reports.	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.
Output 3 Partnerships developed and capacity enhanced for improving the health and fertility of soils of all stakeholders.	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.	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).	Continued interest/participation of NARS and ARO partners, and national and international universities. Continued support for collaborative activities e.g. Challenge programs.
Output 4 Improved rural livelihoods through profitable, diverse and intensive agricultural production systems.	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.	Farmer's surveys. Regional/national production statistics. Land use surveys (satellite imagery, rapid rural appraisal).	Land survey data available. Farmers adopt new technologies. Socioeconomic conditions are favorable for achieving impact. Adequate resources available for soils research.
Output 5 Sustainable land management for social profitability developed, with special emphasis on reversing land degradation.	By 2007, identification, characterization, restoration and monitoring of degraded lands available for at least 2 regions. By 2008 methods for socioeconomic evaluation/valorisation of ecosystem services for trade-off and policy analysis used, at least in 2 humid and 2 sub-humid Agro-ecological zones.	Farmers surveys. Regional/national production statistics. Land use surveys (satellite imagery, rapid rural appraisal).	Land survey data available. Farmers adopt new technologies. Socioeconomic conditions are favorable for achieving impact. Adequate resources available for

Narrative Summary	Measurable Indicators	Means of Verification	Important Assumptions
	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.		land management research.

PROJECT PE-3: COMMUNITIES AND WATERSHEDS

PROJECT DESCRIPTION

Goal: To improve water, food and environmental quality and services through research on land-water community interactions.

Outputs:
1. Improved watershed management: land-water interactions
2. More equitable highland-lowland resource allocation
3. Provision of environmental services: water, biodiversity, and recreation
4. Strengthened organizations: community and institutional capacity building
5. Efficient use of project resources through participatory project management

Gains: Farmers and local organizations adopt technologies, tools, and methodologies developed with CIAT and its partners at research watersheds. Results are sustainable, production systems profitable, land use improved, and natural resources preserved at the watershed level. Partner organizations apply technologies, tools, and methodologies developed by or with the project for their planning and activities at local, national, and regional levels. Decision makers at various levels have information, tools, and methods provided by the project to support their planning, monitoring, and decisions.

Milestones:

2005 Collection of indicators for individual research sites / watersheds at established monitoring networks. Document land-water interactions, highland-lowland interactions, resource allocation inequity, and community priorities. Capacity building programs at the local level, training programs. Promote the adoption of already proven approaches and technologies.

2006 Continuation of monitoring networks. Capacity building, strengthening local organizations, and training programs. Develop new technologies and approaches. Replication of proven methods and technologies to new watershed sites. Improved local management using CIAT's research results.

2007 Continuation of monitoring networks. Community based adaptive management with proven methods and technologies. Ongoing capacity building. Decision support providing information, tools and methods in a multi-scale approach (local, national, and regional). Training programs. Improved watershed management using CIAT's research results. Scaling out.

Users: Farming families, youth and rural communities of tropical watersheds. Project sites profit from increased community action aimed at improving watershed management. Educational institutions directly through youth involvement and student participation, and indirectly through access to research materials. National and international research and development organizations involved in priority setting and investments in development.

Collaborators: CATIE, CIP, IPCA, IWMI, IICA, PASOLAC, CARE; CGIAB, ACTUAR, CIPAV, CVC, universities of Georgia, Guelph (Canada), British Columbia (Canada), Nacional Agraria (Nicaragua), PRONADERS, INTA, CONDESAN, Grupo Randi Randi, ACERG. Herederos del Planeta, Asobolo, CIPASLA, Campos Verdes, CLOs, CIALs.

CGIAR system linkages: IWMI, CIP, CIMMYT, and Water and Food CP.

CIAT project linkages: Soils (PE-2), Land Use (PE-4), Participatory Methods (SN-3), Forages (IP-5), Impact Assessment (BP-1), Bean Improvement (IP-1), Cassava (IP-3), Rice (IP-4) Projects.

CIAT: PE-3 PROJECT LOG FRAME (2005-2007)

PROJECT: COMMUNITIES AND WATERSHEDS
PROJECT MANAGER: JOSÉ IGNACIO SANZ

Narrative Summary	Measurable Indicators	Means of Verification	Important Assumptions
Goal To improve water, food and environmental quality and services through research on land-water community interactions.	Water quality Ecological restoration Conflict management mechanisms Income (monetary and/or in kind) Farmer adoption of technologies / methods	National and local statistics. Local research.	The environmental, social, economic, and political conditions are maintained on a macro level.
Purpose To strengthen local processes of watershed management and sustainable agricultural development in tropical regions based on the experiences of NRM at research sites.	User groups (# and types) Institutions with community involvement Local capacity building – training programs Youth involvement in NRM Community based involvement in watershed management	Field verification. Institutional reports.	Local partners continue project-related activities. Donors remain interested in the proposed project objectives and continue to provide support.
Output 1 Improved watershed management based on knowledge of land-water interactions. Farmers adopt approaches and technologies developed with CIAT and its partners to establish environmentally sound management and livelihood alternatives.	Land-water interactions: Water quality Land use change / intensification/ diversification Sediment load Nutrient management Productivity Income (monetary and/or in kind)	Local research. Field verification. Project reports. Youth reports. Local research groups' reports	Climate variability is normal.
Output 2 More equitable resource allocation based on highland-lowland interactions and trade-off analysis. Identify and monitor indicators of highland-lowland resource interactions. Promote community-based approaches for resolution of inequities.	Highland-lowland interactions: Sediment load Water quality Water quantity (drinking and irrigation) Trade-off analysis: Water rights / concession Income distribution (highland-lowland)	Local research. Field verification. Youth reports. CIAL reports. Consortia reports. Monitoring reports.	Social stability.

Narrative Summary	Measurable Indicators	Means of Verification	Important Assumptions
	Livelihood opportunities Conflict management: User association participation Policy and/or institutional changes		
Output 3 Valuation and analysis of environmental services including water and ecological function. Adoption of sustainable management practices by local farmers and user groups. Increased forest and agricultural biodiversity	Water: Water quality Water quantity Ecology: Ecological restoration Agro-biodiversity (# and type) Health: Nutrition Fecal coliform	Field verification. Local research. CIAL reports. Youth reports. Institutional reports.	Climate variability is normal.
Output 4 Strengthened organizations. Local and national organizations involved in sustainable agricultural development at multiple scales (site, national, regional) use the technical and methodological resources developed by the project in their decision making and other activities. Inter-institutional coordination is enhanced.	Training programs (# and type) Youth group formation and activities User groups supported (# and type) Digital information (# and type) Decision support mechanisms Information dissemination (format and content) Networking: physical and virtual	Local research groups' reports. Youth reports. Training reports. Institutional reports. Dissemination materials and project reports.	Social stability.

Narrative Summary	Measurable Indicators	Means of Verification	Important Assumptions
Output 5 Efficient use of project resources through participatory project management. Internal and external partners directly participate in project management to ensure adequate and efficient use of the project's resources.	Approved projects designed with partners and donors Partners participate in fieldwork Data sharing agreements Lessons learned by the project and its partners disseminated New projects adopt methods, techniques, and experiences generated by the project and its partners	Planning documents, proposals, and reports. Dissemination materials and project reports. Direct verification through networks and consortia. Reports to donors. Annual Reports.	Institutional linkages maintained.

PROJECT PE-4: LAND USE IN LATIN AMERICA

PROJECT DESCRIPTION

Objective: By providing relevant information about land use change, the project aims to help decision makers, ranging from farmers to World Bank investors, reduce the uncertainties of development.

Outputs:
1. Baseline and time-series data for subsequent analysis performed.
2. Information and insight of biological limitations and drivers of land use change developed.
3. Analysis and prediction of socioeconomic factors influencing land use development performed.
4. Analysis and prediction of vulnerability of land use systems to significant external events performed.
5. Methods of capturing farmers' knowledge in land use division support developed.

Gains: Detailed georeferenced databases on land use, ecological, and socioeconomic factors. Environmental and sustainability indicators of land use, networking on the environment, land use, sustainable agriculture, and indicators. A blend of theoretical, methodological, and field-based inquiry for decisions on sustainable land use. Upscaling and extrapolation tools available for a variety of uses.

Milestones:

2005 Delivery of second-order information products (e.g., policy guidelines, analytical methods, or information exchange networks) that will reduce the risks associated with specific land use changes that might otherwise threaten the well-being of significant numbers of rural people in the tropics. These will address specific issues such as water productivity, climate change, and application of new germplasm.

2006 Development of problem-specific instruments to support change decisions (quantification of value of environmental services, natural hazard insurance, forward pricing mechanisms), trials with development partners.

2007 Validation of risk reduction instruments in specific locations (LAC, Africa). Further development of products to cover wider range of risks (e.g. drought, frost, flood). Indicators of vulnerability adopted by policy-makers.

Collaborators: Water for Food Challenge Program, ICRAF, CIP, ILRI, ECLAC, WWF-US, Univ. Guelph (Canada), IICA (Costa Rica), IILA (Italy), IIASA (Austria), WRI (USA), RIVM (Netherlands), TCA (Amazonian Cooperation Treaty), Earth Council (Costa Rica), World Bank; NARS, GOs, and NGOs in Latin America: DNP, IGAC, MinAmbiente, IDEAM, CARDER (Colombia); Ministry of the Environment, EMBRAPA (Brazil); IVITA, INIAA (Peru); INIAP (Ecuador), Cenicafe, Cenibanao, GTZ.

CGIAR system linkages: Protecting the Environment (60%); Improving Policies (20%); Enhancement & Breeding (10%); Saving Biodiversity (10%). Contributes to the Ecoregional Program for Tropical Latin America.

CIAT project linkages: GIS studies assist SB-1, SB-2, IP-1, IP-3, IP-5, IP-6 and PE-2; model development with PE-3, PE-6, and BP-1.

CIAT: PE-4 PROJECT LOG FRAME (2005-2007)

PROJECT: LAND USE IN LATIN AMERICA
PROJECT MANAGER: SIMON COOK

Narrative Summary	Measurable Indicators	Means Of Verification	Important Assumptions
Goal To reduce the risk of agricultural development in the tropics by providing spatial information about significant opportunities and threats of natural resource management.	Risk recognized as a reducible factor. Information adopted by decision makers. CIAT, CGIAR, or other collaborating research institutional activities enhanced by the ability to target activities.	Policy, projects, or funding strategies modified identifiably to include spatial information. Research portfolios modified identifiably by targeting or pre-selection. Risk management strategies, based on spatial information, included in development projects.	
Purpose To enable decision makers, ranging from farmers to World Bank investors, to reduce the uncertainties of development by providing relevant information about land use change.	Decision makers use spatial information to reduce risk.	Documented case studies at farm, national, and regional scales. Published methods of generalizing improved decision making, using spatial information of land use.	That uncertainty significantly obstructs land use decisions at a range of scales. That spatial variation introduces significant uncertainty to these problems. That relevant spatial information can be generated in a cost-effective manner.
Output 1 Baseline and time-series data for subsequent analysis performed.	Population, crop, and selected databases generated. Detailed climate data sets developed for modelers. Detailed future climatic data sets used to predict climate change effects.	Information available at CIAT. Selected information downloadable at CIAT Web site.	Information can be delivered to analysts and decision makers.
Output 2 Information and insight of biological limitations and drivers of land use change developed.	Threats of global climate change (GCC) to regional crop production defined for entire regions. Threats of climate change to plant genetic resources defined. Models developed for defining the impact of GCC on the potential productivity of a range of crops developed.	Maps and databases completed. Models developed, calibrated, verified, and published. Projects developed to apply models.	Sufficient data are available to generate insights.
Output 3 Analyses and predictions of socioeconomic factors influencing land use development performed.	Spatial processes driving land use change identified. Distribution of poverty and its causes identified more accurately, using spatial information.	Published explanations of the improved accuracy of explaining land use change. Spatial drivers of poverty explained in published case studies by June 2004. Information used to direct poverty alleviation policy.	Sufficient data are available to generate insights. Links exist with governmental and NGO partners to enable implementation of poverty alleviation policies.
Output 4 Analyses and predictions of vulnerability of land use systems to significant external events performed.	Indicators of vulnerability adopted by policy agencies. Spatial information on vulnerability used to reduce investment risks in at least one country case study. Practical risk management tools produced	Methods of vulnerability assessment published with case study at national or regional scale by June 2004. *Ex ante* analysis of the benefits of risk reduction published. Risk management tools adopted by users.	Sufficient data are available to generate insights.
Output 5 Methods of capturing farmers' knowledge in land use decision support developed.	Strengths and weaknesses, overlaps and gaps identified between farmer and scientist knowledge with respect to locally (e.g., declining soil fertility) and globally rooted resource-base management problems (e.g., climate change). Respective roles of farmers and scientists identified in local decision problems about locally and globally rooted resource-base problems. Farmer-to-farmer decision-support network established that tackle selected locally and globally rooted resource-base problems.	Case study documented of farmers generating information and merging with "hard" data on natural land resources. Network of farmer support initiated, including a minimum of 200 users at second-order organization level. Generated methods and tools documented and disseminated.	Sufficient data are available to generate insights. Local structures enable network establishment.

Project SN-1: Rural Agroenterprises Development

Project Description

Objective: To develop methods and tools for use by local practitioners in the participatory design and execution of development schemes for decentralized, rural agroenterprise, by which the production of smallholders can be diversified and value-added.

Outputs:

1. Methods for identifying viable market opportunities that would incorporate small-scale farmer selection criteria.
2. Decision-making tools and institutional models for strengthening rural agroenterprises and complementary support services.
3. Methods and tools for developing local capacity to select and develop postharvest processing and handling technologies.
4. Options for integrating collective action with business organization to establish sustainable enterprises.
5. National personnel trained in the design and execution of agroenterprise development projects.

Gains: Rural populations in CA, Andean Region, eastern and southern Africa, and Southeast Asia gain enhanced capacity to establish small-scale agroprocessing enterprises. Linkages improved between conservation, production, added-value processing, markets, and consumers. Sustainable production practices catalyzed and adopted more widely.

Milestones:

2005 Guidelines for identifying and developing viable rural agroenterprises prepared for Eastern Africa, based on pilot experiences in Uganda, Malawi and Tanzania. Guidelines for the strengthening of rural business development services developed through pilot experience in Honduras and Colombia. Prototypes of the Information System for Rural Enterprise Development and the Rural Agroindustrial Research Groups concept.

2006 Guidelines for identifying and developing viable rural agroenterprises validated and adapted for SE Asian situations. Learning Alliance concept extended with CRS to West and Central Africa and S and SE Asia.

2007 Initial products on trade and agribusiness policy issues related to the development of agroenterprises available. Model of the Information System for Rural Enterprise Development scaled up in pilot sites in Latin America, E. Africa and SE Asia. The Rural Agroindustrial Research Groups concept validated in Central America and South America.

Users: Immediate beneficiaries are the technical personnel of GOs and NGOs in rural development and rural policy makers. Ultimate beneficiaries are the inhabitants of rural areas, including female small farmers, and entrepreneurs, who benefit from training and information on market opportunities, postharvest technologies, enterprise skills, and access to better support services.

Collaborators: *Development of methods and technology components:* CIRAD, NRI, PRODAR (in Lima), IDRC, CIP, IITA, SEARCA, UPWARD, CARE, CRS, Foodnet. *Execution of pilot projects:* CIPASLA (Colombia), CLODEST (Honduras), Africare (Uganda), TIP (Tanzania), ADD-Lilongwe (Malawi). *Training and networking:* PRODAR-IICA (Peru), members of P*h*Action (GTZ, NRI, JIRCAS, ACIAR, CIRAD, FAO, IITA, CIP, IFPRI, IRRI); ASARECA (Foodnet).

CGIAR system linkages: Crops and Livestock Production Systems (15%); Livestock (5%); Protecting the Environment (20%); Training (10%); Information (10%); Networks (10%); Organization and Management (30%). Participates in the Global Post-*h*arvest Forum (P*h*Action).

CIAT: SN-1 PROJECT LOG FRAME (2005-2007)

PROJECT: RURAL AGROENTERPRISES DEVELOPMENT
PROJECT MANAGER: RUPERT BEST

Narrative Summary	Measurable Indicators	Means of Verification	Important Assumptions
Goal To improve the livelihoods of rural populations in LA, Africa, and Asia by enhancing the capacity of support institutions to promote competitive and environmentally responsible agroenterprises that equitably link smallholders to growth markets.	Percentage decrease in rural poverty index in selected areas of Africa, Asia, and LA.	National statistics of different countries where projects have been implemented.	
Purpose To develop methods and tools for use by local practitioners in the participatory design and execution of decentralized rural agroenterprise development schemes aimed at diversifying and adding value to the production of smallholders.	By the end of 2007, the project has complemented its activities in the reference sites by establishing alliances with important partner institutions in LA who are widely using the methods, tools, and institutional models developed by the project. These products have been adapted by partners in Asia and Africa and are applied in a selected number of sites on both continents.	Reports and project documents of our partner institutions.	Political and institutional support for sustainable rural and agricultural development at the reference sites and targeted countries is maintained. Natural disasters or civil strife do not impede progress toward the project's goal.
Output 1 Tools, methods, and information for identifying and developing market opportunities, developed as an input for the design of economically viable and sustainable rural agroenterprises.	Training materials for market opportunity identification available and being used by partners in LA, Asia, and Africa. A series of methods and tools for identifying market opportunities are available for use in different situations; these methods and tools are developed at the reference sites and elsewhere through alliances. Information system on alternative trade available. Training materials for the design of market plans and strategies for small agroenterprises available.	Manual published. Annual reports and project proposals. Project home page. Training materials.	Collaborating institutions have adequate resources to use the materials and tools developed. Natural disasters or civil strife do not impede progress toward the project's goal.

Narrative Summary	Measurable Indicators	Means of Verification	Important Assumptions
Output 2 Tools, methods, and information systems that can be used in the selection and local development and adaptation of appropriate postharvest technologies for small-scale rural agroenterprises.	Methods and tools developed for establishing local information systems in support of agroenterprise development. Series of manuals on methods and techniques for the participatory development of postharvest technology for improving the efficiency of rural agroindustry. Manuals in preparation on techniques for the participatory development of new rural agroindustrial products and processes.	Project home page. Manuals published. Annual reports and working documents.	
Output 3 Information, options, and recommendations for the design of efficient and effective organizational and business schemes for small-scale rural agroenterprise and their support services.	Case studies of small rural agroenterprises, documenting best practices, key success factors, and lessons learned, completed for LA and Asia. Options for the organization of enterprises, their links in the agrifood chain, and the organization of support services are being tested in the reference sites and with other partner institutions.	Case studies published. Project proposals and annual reports. PhD thesis on agroenterprise clusters (local food systems).	
Output 4 Institutional models and policy options for establishing and strengthening rural agroenterprises and their support systems within a territorial context.	Ten or more agroenterprise projects being executed at reference sites in LA, Asia, and Africa. Manual for identifying and developing integrated R&D rural agroenterprise projects completed. Guidelines for designing local support systems to promote agroenterprises at the microregional level.	Project proposals and reports. Published field guides and associated training materials. Guide published.	

Narrative Summary	Measurable Indicators	Means of Verification	Important Assumptions
Output 5 Alliances consolidated with a range of strategic stakeholders, with whom the project carries out research and training to enhance the capacity to design and develop successful agroenterprise projects.	200 personnel trained in aspects of agroenterprise development in LA, Africa, and Asia. Case studies on the adoption and impact of agroenterprise R&D completed. Project's Web site expanded and updated periodically with project outputs. Strategic alliances with research and development partners for both research and capacity building.	Training documents, course evaluations, and annual reports. PhD thesis completed on rural innovation and impact of the project's work in the LA reference sites. Project's Web site. Letters of Understanding, project contracts, and interinstitutional agreements.	

PROJECT SN-3: PARTICIPATORY RESEARCH

PROJECT DESCRIPTION

Objective: To develop and disseminate participatory research (PR) principles, approaches, analytical tools, indigenous knowledge, and organizational principles that strengthen the capacity of R&D institutions to respond to the demands of stakeholder groups for improved levels of human well-being and agroecosystem health.

Outputs:

1. PR approaches, analytical tools, and indigenous knowledge that lead to the incorporation of farmers and other users' priorities in R&D agendas developed for interested institutions.
2. Organizational strategies and procedures for PR.
3. Professionals and others trained as facilitators of PR.
4. Material and information on PR approaches, analytical tools, indigenous knowledge, and organizational principles developed.
5. Impact of SN-3 activities documented.
6. CIAT projects and other institutions supported and strengthened in conducting PR.
7. Capacity of the SN-3 team strengthened.

Gains:

Users involved at early stages in decisions about innovation development. Methods available for incorporating user preferences. Participatory methods applied on a routine basis in CIAT research. At least three LA universities with the capacity to teach PR methods. At least 1000 trainees and 40 trainers able to apply these methods in the region. Contribution of PR to technology adoption rates measured in restricted areas. Lessons learned, and methodologies and materials disseminated globally, jointly with the Systemwide Programme on Participatory Research and Gender Analysis for Technology Development and Institutional Innovation (SP-PRGA), convened by CIAT, and with the Farmer Participatory Research for the IPM project of the Systemwide Program on Integrated Pest Management (SP-IPM).

Milestones:

2005 Capacity of national partners to implement and support PM&E and PR processes established within R&D institutions in at least 2 countries in Latin America and at least two country in East Africa.
Lessons from resource to consumption (R-to-C) framework tested and validated in at least two countries in Latin America.

2006 National team of trainers/facilitators capacitated and scaling up PM&E and PR processes at national level
Local capacity to identify demands and develop projects that respond to these demands, that feeds into Bolivian national agricultural research and technology transfer systems
Results of Impact Assessment studies to derive lessons and impacts of PR methods on livelihoods, disseminated widely and applied to scale PR activities in other countries
PM&E systems evaluated and lessons applied to develop guidelines and principles appropriate for Africa

2005 Approach methods and tools for analysing and learning from innovation ecologies to accelerate rural innovation developed and being applied by at least one learning alliance.
Social technologies for strengthening community-based organizations developed, tested and results published
Participatory evaluation and monitoring methods, training and materials in use in at least three national systems
Impact of PM&E methodologies on enabling resource poor farmers to make effective demands on R&D providers demonstrated and documented in Bolivia.

Users: This work will benefit poor farmers, processors, traders, and consumers in rural areas, especially in fragile environments. Farmer-researchers will have improved capacity for innovation. Researchers will receive more accurate and timely feedback from users about acceptability of production technologies and conservation practices. Researchers and planners will profit from methods for conducting adaptive research and implementing policies on natural resource conservation at the micro level.

Collaborators: NARS, NGOs, universities, SP-PRGA, SP-IPM, national agricultural extension service

CGIAR system linkages: Enhancement & Breeding (25%); Crop Production Systems (16.7%), Livestock (8.3%), Protecting the Environment (25%); Training (5%); Information (5%); Organization and Management (15%). Convenor of SP-PRGA; Coordinator of the FPR-IPM project of SP-IPM.

CIAT project linkages: Inputs to PE-1, PE-3, PE-4, PE-5, IP-1, IP-2, IP-3, IP-5, SN-1, and BP-1; outputs from PE-3, PE-4, IP-3, BP-1, and SN-1.

CIAT: SN-3 PROJECT LOG FRAME (2005-2007)

PROJECT: PARTICIPATORY RESEARCH
PROJECT MANAGER: CARLOS A. QUIRÓS (ACTING)

Narrative Summary	Measurable Indicators	Means of Verification	Important Assumptions
Goal To develop and apply knowledge, tools, technologies, skills, and organizational principles that contribute to improving human well-being and AES health.	Application of participatory methods, analytical tools, and organizational principles by R&D organizations that result in incorporating farmers and other end-users' needs in integrated agroecosystem management and conservation (IAEM). Use of project products at additional reference sites in two AES (hillsides and forest margins) of CIAT's mandate in 5 years. Use of project products by a minimum of three institutions outside LAC at end of year 5. Improvement in end-users' well-being at the respective reference sites.	Projects, plans, and reports of national public-sector entities, donors, NGOs, and community-based organizations in the three reference sites and mandated AES of CIAT's mandate, which refer to their use of project products.	
Purpose To develop and disseminate PR principles, approaches, analytical tools, indigenous knowledge, and organizational principles that strengthen the capacity of R&D institutions to respond to the demands of stakeholder groups for improved human well-being and AES health.	Number of R&D organizations applying participatory methods, analytical tools, and organizational principles. Number of entities in LAC teaching participatory methods. Number of meetings among stakeholder groups. Number of participatory projects implemented by R&D institutions.	Impact study. Institutional reports. Publications. Proceedings.	Institutional economic stability. Financing for training activities and publication and dissemination of materials. Institutions willing to prepare and support facilitators and to share information. End-users—above all, farmers—willing to participate.
Output 1 PR approaches, analytical tools, and indigenous knowledge that lead to the incorporation of farmers and other users' priorities in R&D agendas developed for interested institutions.	Number of methodological approaches developed or adapted and analytical tools developed for IAEM	Project reports. Publications.	Good coordination and integration among collaborators. Minimal conflicts for meeting demands. Full participation of stakeholder groups. Field staff fulfilling true facilitator roles. Data available from reference sites. Internet system functioning well.
Output 2 Organizational strategies and procedures for PR.	Number of strategies and organizational procedures for PR adopted and adapted.	Project reports. Publications.	
Output 3 Professionals and others trained as facilitators of PR.	Number of professionals, technicians, and farmer-researchers trained in PR methodology.	Project reports.	Institutions willing to prepare and support facilitators. Funding available.
Narrative Summary	**Measurable Indicators**	**Means of Verification**	**Important Assumptions**
Output 4 Material and information on PR approaches, analytical tools, indigenous knowledge, and organizational principles developed.	Number of visits to Web sites. Number of requests for materials and information. Number of materials published.	Project reports. Publications.	
Output 5 Impact of SN-3 project activities documented.	Dependent on nature of study, e.g., for CIALs: number of host countries; total no. of initiated, inactive, and mature CIALs; research and self-management capacity; no. and diversity of institutions facilitating CIALs; gender composition; diversity of research themes; no. of beneficiaries, microenterprises formed, community services performed, facilitators and trainers trained, second-order organizations formed, and requests for publications and training materials.	Case studies, M&E reports and databases, impact studies.	Staff have time, suitable methodologies, and funds available.
Output 6 CIAT projects and other institutions supported and strengthened in conducting PR.	Number of internal projects supported. Number of external entities strengthened. Number of participatory projects carried out by internal projects and other institutions.	Project reports. Publications of internal projects and of other institutions.	
Output 7 Capacity of SN-3 team strengthened.	Number of team meetings. Number of team-organized seminars and workshops.	Project reports.	

PROJECT SN-4: INFORMATION AND COMMUNICATIONS FOR RURAL COMMUNITIES (INFORCOM)

PROJECT DESCRIPTION

Objective: To strengthen local capacity for innovation by better enabling rural communities and the R&D organizations that serve them to obtain, generate, and share information and knowledge, with the aid of new information and communications technologies (ICTs).

Outputs:

1. Techniques and tools with which international and national R&D institutions can better share knowledge and learn from experience.
2. Computer-mediated distance-education (e-learning) programs and multimedia products on CD-ROM that convey science-based methods in forms that are useful for development professionals
3. Strategies for using community telecenters to integrate the use of ICTs into rural development
4. Strategies for enabling information intermediaries to construct and share knowledge in rural communities, using ICTs and other communications media
5. Approaches for developing local information systems that reinforce participatory R&D

Milestones:

2005 Projects under way in Colombia, at least one other Andean country, and in two Central American countries that incorporate the use of ICTs into rural development, with particular emphasis on support for small agroenterprises. CIAT's second Web-based, distance-education program in place.

2006 Projects under way in Southeast Asia and East Africa as well as in the countries mentioned above. Local information networks notably enhanced through projects in Latin American countries where InforCom has projects under way, and distance-education programs being developed routinely for users in Latin America.

2007 Multimedia training tools and printed materials available on approaches devised by the project for supporting information intermediaries and developing local information systems. Multimedia products and e-learning programs available on a wide array of R&D methods developed by CIAT.

Users: The users of the project's outputs are researchers, development professionals and community leaders associated with local organizations (particularly farmer groups, NGOs, and schools). These persons will acquire new tools and approaches that better enable them to help rural people create useful knowledge and improve services needed for solving problems and acting on new opportunities in agriculture.

Collaborators: SN-4 is building alliances with a wide variety of national R&D organizations in Colombia and other countries where it is developing projects. The project is also cultivating close contacts with various international organizations that support the use of ICTs for development, including Canada's Institute for Connectivity in the Americas (ICA), Fundación Chasquinet (a Latin American initiative based in Ecuador), the Global Knowledge Partnership (GKP), and the global Association for Progressive Communication (APC). In addition to profiting from these organizations' experience and expertise, CIAT can tap into their networks of local partners in developing countries.

CGIAR system linkages: Training (30%); Information (60%); Organization and Management (5%); Networks (5%).

CIAT project linkages: SN-4 will provide all Center projects with new means of increasing research impact and obtaining feedback on research products from rural people. The project should be particularly useful to CIAT's new Rural Innovation Institute as a means of strengthening participatory approaches to agroenterprise development, local adaptive research, community-based watershed management and rural planning.

CIAT: SN-4 PROJECT LOG FRAME (2005–2007)

PROJECT: INFORMATION AND COMMUNICATIONS FOR RURAL COMMUNITIES
PROJECT MANAGER: NATHAN RUSSELL

Narrative Summary	Measurable Indicators	Means of Verification	Important Assumptions
Goal To help the rural poor build sustainable livelihoods by improving the flow of genuinely relevant information among rural communities and research and development (R&D) organizations.	• Increased numbers of more efficient rural agroenterprises. • Increased numbers of local initiatives aimed at improving natural resource management. • Increased opportunities for off-farm activities that generate income and employment.	• Impact evaluation within a sustainable livelihoods framework, based on household surveys, interviews with key informants, and group techniques in target rural communities.	
Purpose To strengthen local capacity for innovation by better enabling rural communities and the R&D organizations that serve them to obtain, generate, and share information and knowledge, with the aid of new information and communications technologies (ICTs).	• Improved ability to adapt and change based on learning from experience in collaborating international and national organizations. • A greater capacity in local organizations to satisfy demand for knowledge and information in rural communities. • New options for enhancing livelihoods identified by individuals and organizations in rural communities through improved information access. • Stronger planning and problem-solving capacities in rural communities, based on improved communication both among communities and with R&D organizations.	• Case studies on learning and change in R&D institutions. • Case studies on the use of information obtained with the aid of ICTs in target rural communities. • Impact evaluation of Web-based information applications developed by local organizations.	• Rural communities can obtain affordable, reliable access to the Internet. • National and local organizations commit themselves to providing rural communities with relevant information services. • Rural communities prove receptive to a new information culture based on the use of modern ICTs. • Systems for continuous monitoring and evaluation adopted by organizations hosting rural community telecenters.
Outputs 1. Techniques and tools with which international and national R&D institutions can better share knowledge and learn from experience. 2. Computer-mediated distance-education (e-learning) programs and multimedia products on CD-ROM that convey science-based methods in forms that are useful for development professionals 3. Strategies for using community telecenters to integrate the use of ICTs into rural development 4. Strategies for enabling information intermediaries to construct and share knowledge in rural communities, using ICTs and other communications media 5. Approaches for developing local information systems that reinforce participatory R&D	• Partner organizations routinely using knowledge sharing (KS) approaches. • E-learning programs and multimedia products being used by R&D organizations. • Financially sustainable telecenters established by local organizations with the aid of CIAT training tools. • Dynamic, Web-based information systems developed by local organizations receiving training and other support from the Center. • Locally developed Web-based information systems successfully integrated with conventional communications media in rural communities.	• E-learning programs available on line and multimedia materials available online and on CD-ROM. • Locally developed information systems available online. • Consultancy reports and project information online and in print form. • Conference papers, journal articles, and technical reports on the performance and impact of community telecenters.	• Public and private telecommunications agencies support initiatives to create affordable, reliable Internet access in remote rural areas. • National and local organizations can generate resources through information services that enable them to sustain these services. • National and local organizations gain credibility in rural communities as reliable providers of useful Web-based information services.

PROJECT BP-1: IMPACT ASSESSMENT

PROJECT DESCRIPTION

Objective: To generate and disseminate information and tools to improve the capacity of CIAT and partner organizations to allocate research resources efficiently.

Outputs:
1. Expected impact of future research estimated.
2. Impact of selected past CIAT research monitored.
3. Tools developed to assess the impact of research, both *ex ante* and *ex post*.
4. Institutional capacity for estimating, monitoring, and evaluating research impacts improved.

Gains: Improved allocation of resources can increase the rate of return on investment in agricultural research. Project target is 2%.

Milestones:

2005 Impact of CIAT research on poverty reduction estimated. Impact-monitoring system operational in all agroecological sites. Expected benefits of four potential research outputs appraised.

2006 CIAT regional evaluation experiences will be revisited and reviewed to highlight lessons learned. Methodologies and practices will be strengthened.

2007 Evaluation system in place for assessing progress on the three Development Challenges (Sharing the benefits of biodiversity, Restoring degraded lands and Learning to innovate).

Users: Research planners in CIAT and partner organizations who make decisions on resource allocation. All stakeholders who need to measure expected returns to investment in agricultural and natural resource management research.

Collaborators: *Future impact of research:* Colombian Ministry of Agriculture; University of Hohenheim, Germany, Harvest Plus Challenge Program, Challenge Program on Food and Water, 3 Development Challenges, CIAT projects—genetic resources, cassava in LAC , beans in LAC, forages, and agroenterprises *Impact of past research monitored*: SPIA, SP—PRGA; CIAT projects-- cassava in Asia, beans in Africa, rice, IPRA, Rural Innovation Institute, IPM, and agro enterprises. *Tools and strengthening capacity*: IDS University of Sussex, (UK), IDRC, CGIAR Program on Gender and Diversity, CGIAR initiative on Institutional Learning and Change (ILAC), working groups on CIAT's 3 Development Challenges

CGIAR system linkages: Improving Policies (100%).

CIAT project linkages: All CIAT projects.

CIAT: BP-1 PROJECT LOG FRAME (2005-2007)

PROJECT: IMPACT ASSESSMENT
PROJECT MANAGER: NANCY L. JOHNSON

Narrative Summary	Measurable Indicators	Means of Verification	Important Assumptions
Goal To obtain knowledge and expertise for enhancing performance of decision making in the agricultural and development sectors are made available to appropriate users.	Performance of investment in tropical agricultural research improved.	Research project portfolios in tropical agricultural research.	
Purpose To generate and disseminate information and tools to improve the capacity of CIAT and partner organizations to allocate research resources efficiently, and document the impact of research investments.	Research resources allocated more efficiently (expected rate of return to CIAT research portfolios increased). Results of impact analysis used in decision making and priority setting. Economic and environmental impact of selected past research identified and quantified.	Scientific publications from BP-1 and other projects. Published planning documents of CIAT and partner organizations. Published minutes of planning meetings in CIAT (BOT, MT, Project Managers) and partner organizations. External reviews of CIAT. Data on use of tools developed at CIAT.	Adequate funding to agricultural research and extension. Decision makers willing to use economic analysis in research priority setting.
Output 1 Expected impact of future research estimated.	Expected rate of return for potential research projects estimated. Expected economic, distributional, and environmental impact identified and quantified.	CIAT technical publications. CIAT published planning documents.	Willingness of decision makers to use the information. No external shocks that invalidate the results.
Output 2 **Impact of selected past CIAT research documented.**	Economic, social, and environmental impact of CIAT research outputs identified and quantified.	CIAT technical publications.	
Output 3 Tools developed to assess the impact of research, both *ex ante* and *ex post*.	Methodologies generated. Databases compiled and maintained. Causal paths of impact mapped. Indicators identified.	Databases available on BP-1 sites on Internet, on CIAT's internal network, and in BP-1's data library. Site flow data from Web sites. Data on registered users of BP-1 software. Citations of project publications and tools in technical publications.	Analysts willing to use the tools in their impact analyses. Data available for using the tools.
Output 4 Institutional capacity for estimating, monitoring, and evaluating research impacts improved.	Appropriate and well-designed impact assessment components included in the work plans and budgets of CIAT projects and projects of partner organizations.	CIAT project log frames and budgets. Work plans of CIAT researchers. Research proposals submitted by projects. Similar documentation from partner organizations.	Institutional and financial support for impact assessment.

Appendix II

List of Acronyms and Abbreviation

List of Acronyms and Abbreviations

Acronyms

ACERG	Asociación de Centros Educativos del Cañon del Río Garrapatas, Colombia
ACIAR	Australian Centre for International Agricultural Research
ADB	Asian Development Bank
AHI	African Highland Initiative
APC	Association for Progressive Communications
ASARECA	Association for Strengthening Agricultural Research in Eastern and Central Africa
ASOCOLFLORES	Asociación Colombiana de Exportadores de Flores
AVRDC	Asian Vegetable Research and Development Center
Bean/Cowpea CRSP	Bean/Cowpea Collaborative Research Support Program (*of the* Univ. Georgia, USA)
BOT	Board of Trustees (*of* CIAT)
CA	Département des Cultures Annuelles (*of* CIRAD)
CAMBIA	Centre for the Application of Molecular Biology to International Agriculture, Australia
CARDER	Corporación Autónoma Regional de Risaralda, Colombia
CARE	Cooperative for American Relief Everywhere, USA
CATIE	Centro Agrónomico Tropical de Investigación y Enseñanza, Costa Rica
CBN	Cassava Biotechnology Network
CENIPALMA	Centro de Investigación en Palma de Aceite, Colombia
CIAT	Centro de Investigación Agrícola Tropical, Bolivia
CIFOR	Centre for International Forestry Research, Indonesia
CIMMYT	Centro Internacional para Mejoramiento de Maiz y Trigo, Mexico
CIP	Centro Internacional de la Papa, Peru
CIPASLA	Consorcio Interinstitucional para una Agricultura Sostenible en Laderas, Colombia
CIPAV	Fundación del Centro para la Investigación en Sistemas Sostenibles de Producción Agropecuaria, Colombia
CIRAD	Centre de Coopération Internationale en Recherche Agronomique pour le Développement, France
CLAYUCA	Consorcio Latinoamericano y del Caribe de Apoyo a la Investigación y Desarrollo de la Yuca, *based in* Colombia
CLODEST	Comité Local para el Desarrollo Sostenible de la Cuenca del Río Tascalapa, Honduras
CNPMF	Centro Nacional de Pesquisa de Mandioca e Fruticultura Tropical (*of* EMBRAPA)
CODESU	Corporación para el Desarrollo Sostenible de Ucayali, Peru
COLCIENCIAS	Instituto Colombiano para el Desarrollo de la Ciencia y la Tecnología "Francisco José de Caldas"
CONDESAN	Consorcio para el Desarrollo Sostenible de la Ecorregión Andina, Peru
CORPOICA	Corporación Colombiana de Investigación Agropecuaria
CRCTPP	Cooperative Research Centre for Tropical Plant Pathology, Australia
CRS	Catholic Relief Services, USA
CSIRO	Commonwealth Scientific and Industrial Research Organisation, Australia
CURLA	Centro Universitario Regional del Litoral Atlántico, Honduras
CVC	Corporación Autónoma Regional del Valle del Cauca, Colombia
DANAC	La Fundación para la Investigación Agrícola—Danac, Venezuela
DANIDA	Danish International Development Agency, Denmark
DBT	Department for Biotechnology and Biological Control (*of the* Univ. Kiel, Germany)
DFID	Department for International Development, UK
DGIS	Directorate-General for International Co-operation, the Netherlands
DICTA	Dirección de Ciencia y Tecnología Agropecuaria, Honduras
DNP	Departamento Nacional de Planeación, Colombia
EAP-Zamorano	Escuela Agrícola Panamericana *at* Zamorano, Honduras
EC	Economic Commission (*of the* European Union)
ECABREN	Eastern and Central Africa Bean Research Network
ECLAC	Economic Commission for Latin America and the Caribbean
EMBRAPA	Empresa Brasileira de Pesquisa Agropecuária

EPMR	External Program and Management Review (*of* CIAT)
ETH	also ETHZ; Eidgenössische Technische Hochschule—Zürich, Switzerland
E-TIP	Ecologia's Environmental Technical Information Project (online service)
FAO	Food and Agriculture Organization of the United Nations
FCRI	Field Crop Research Institute, Thailand
FEDEARROZ	Federación Nacional de Arroceros, Colombia
FLAR	Fondo Latinoamericano y del Caribe para Arroz de Riego, *based at* CIAT
FONAIAP	Fondo Nacional de Investigaciones Agropecuarias, Venezuela
FPR-IPM	Farmer Participatory Research for IPM Project (*of the* SP-IPM *and* SP-PRGA)
GEF	Global Environment Facility (*of the* UNDP, UNEP, *and* World Bank)
GRU	Genetic Resources Unit (*of* CIAT)
GTZ	Deutsche Gesellschaft für Technische Zusammenarbeit (German Agency for Technical Cooperation)
GWG	Gender Working Group (*of the* SP-PRGA)
HAP	Hillside Agricultural Program, Haiti
IAR	Institute for Agricultural Research, Nigeria
IBSRAM	International Board for Soil Research and Management, Thailand
ICA	Instituto Colombiano Agropecuario
ICARDA	International Center for Agricultural Research in the Dry Areas, Syria
ICER	Internally Commissioned External Review (*of* CIAT)
ICIPE	International Centre of Insect Physiology and Ecology, Kenya
ICRAF	International Centre for Research in Agroforestry, Kenya
ICRISAT	International Crops Research Institute for the Semi-Arid Tropics, India
ICWG—CC	Inter-Center Working Group on Climate Change (*of the* CGIAR)
IDEAM	Instituto de Hidrología, Meteorología y Estudios Ambientales, Colombia
IDIAP	Instituto de Investigación Agropecuaria de Panamá
IDRC	International Development Research Centre, Canada
IER	Institut d'Economie Rurale du Mali
IFDC	International Fertilizer Development Center, USA
IFPRI	International Food Policy Research Institute, USA
IGAC	Instituto Geográfico "Agustín Codazzi", Colombia
IGDN	Inter-American Geospatial Data Network
IGER	Institute of Grasslands Environment Research, UK
IIA	Instituto de Investigaciones Avícolas, Cuba
IIA	Instituto de Investigaciones Agropecuarias, Venezuela
IIASA	International Institute for Applied Systems Analysis, Austria
IICA	Instituto Interamericano de Cooperación para la Agricultura, Costa Rica
IILA	Instituto Italo-Latino Americano, Italy
IITA	International Institute of Tropical Agriculture, Nigeria
ILRI	International Livestock Research Institute, Kenya
INBIO	Instituto Nacional de Biodiversidad, Costa Rica
INERA	Institut de l'Environnement et de Recherches Agricoles, Burkina Faso
INIA	Instituto de Investigaciones Agropecuarias, Chile
INIA	Instituto Nacional de Investigación Agraria, Peru (*now* INIAA)
INIA	Instituto Nacional de Investigación Agropecuaria, Uruguay
INIA	Instituto Nacional de Investigaciones Agrícolas de Venezuela
INIAA	Instituto Nacional de Investigación Agraria y Agroindustrial, Peru (*formerly* INIA)
INIAP	Instituto Nacional Autónomo de Investigaciones Agropecuarias, Ecuador (*formerly* Instituto Nacional de Investigaciones Agropecuarias)
INIFAP	Instituto Nacional de Investigaciones Forestales, Agrícolas y Pecuarias, Mexico
INIVIT	Instituto de Investigaciones de Viandas Tropicales, Cuba
INPA	Instituto Nacional de Pesquisas da Amazônia, Brazil
INPE	Instituto Nacional de Pesquisas Espaciais, Brazil
INRAB	Institut National des Recherches Agricoles du Bénin
INRAN	Institut National des Recherches Agronomiques du Niger
INTA	Instituto Nacional de Tecnología Agropecuaria, Argentina
INTA	Instituto Nicaragüense de Tecnología Agropecuaria

IPCA	Proyecto de Investigación Participativa en Centroamérica, *based in* Honduras
IPGRI	International Plant Genetic Resources Institute, Italy
IPP	Institute for Plant Protection, Germany
IPRA	Investigación Participativa en Agricultura/*Participatory Research in Agriculture, based at* CIAT
IRD	Institut de Recherche pour le Développement, France (*formerly* ORSTOM)
IRRI	International Rice Research Institute, the Philippines
ITRA	Institut Togolais de Recherche Agronomique
IVITA	Instituto Veterinario de Investigaciones Tropicales y de Altura, Peru
IWMI	International Water Management Institute, Sri Lanka (*formerly* International Irrigation Management Institute)
JIRCAS	Japan International Research Center for Agricultural Sciences
KARI	Kenya Agricultural Research Institute
KSU	Kansas State University, USA
Lempira Sur	FAO project in Honduras to change slash-and-burn agriculture
LSU	Louisiana State University, USA
MADR	Ministerio de Agricultura y Desarrollo Rural, Colombia
MinAmbiente	Ministerio del Medio Ambiente, Colombia
MIS	*also* MIS Group; Management and Information Systems Research Group (*of the* Univ. York, UK)
MT	Management Team (*of* CIAT)
NARO	National Agricultural Research Organization, Uganda
NCAR	National Center for Atmospheric Research, USA
NCGR	National Center for Genome Resources, USA
NLH	Norges Landbrukshøgskole (Agricultural University of Norway)
NRI	Natural Resources Institute, UK
NRMG	Natural Resource Management Group (*of the* SP-PRGA)
OFI	Oxford Forestry Institute, UK
ORSTOM	L'Institut Français de Recherche Scientifique pour le Développement en Coopération (*now* IRD)
PABRA	Pan-Africa Bean Research Alliance
PASOLAC	Programa de Agricultura Sostenible de Laderas en Centro América
PBG	Plant Breeding Group (*of the* SP-PRGA)
PhAction	Global Post-harvest Forum
PROCITROPICOS	Programa Cooperativo de Investigación y Transferencia de Tecnología para los Trópicos Suramericanos
PRODAR	Programa de Desarrollo de la Agroindustria Rural para América Latina y el Caribe, *based in* Costa Rica
PROFRIJOL	Programa Cooperativo Regional de Frijol para Centro América, México y el Caribe
PROFRIZA	Proyecto Regional de Frijol para la Zona Andina
PRONATTA	Programa Nacional de Transferencia de Tecnología Agropecuaria, Colombia
RDA	Rural Development Administration, Korea
RIVM	Rijksinstitut voor Volksgezondheid en Milienhygiene (National Institute of Public Health and Environmental Protection), the Netherlands
SABRN	South Africa Bean Research Network
SDC	Swiss Agency for Development and Cooperation
SEARCA	Southeast Asia Regional Center for Graduate Study and Research in Agriculture
SENA	Servicio Nacional de Aprendizaje, Colombia
SINCHI	Instituto Amazónico de Investigaciones Científicas, Colombia
SINGER	The CGIAR System-wide Information Network for Genetic Resources
SLU	Sveriges Lantbruksuniversitet (Swedish University of Agricultural Sciences)
SP-IPM	Systemwide Program on Integrated Pest Management (*of the* CGIAR)
SP-PRGA	The CGIAR Systemwide Programme on Participatory Research and Gender Analysis for Technology Development and Institutional Innovation

SRI	Soil Research Institute, Ghana
SWNM	The CGIAR Systemwide Program on Soil, Water & Nutrient Management
TAC	Technical Advisory Committee (*of the* CGIAR)
TCA	Tratado de Cooperación Amazónica
TSBF	Tropical Soil Biology and Fertility Programme, Kenya (*now* TSBFI)
TSBFI	Tropical Soil Biology and Fertility Institute (*of* CIAT, *formerly* TSBF)
UCor	Universidad Católica de Córdoba, Argentina
UCR	Universidad de Costa Rica
UNA	Universidad Nacional Agraria, Nicaragua
UNAH	Universidad Nacional Autónoma de Honduras
UNDP	United Nations Development Programme
UNEP	United Nations Environment Programme
UNIVALLE	Universidad del Valle, Colombia
UPWARD	Users' Perspectives With Agricultural Research and Development, *based in* the Philippines
USDA	United States Department of Agriculture
WARDA	West Africa Rice Development Association, Cote d'Ivoire
WRI	World Resources Institute, USA
WWW	World Wide Web

Abbreviations

Ac/Ds	The first pair of transposons discovered (biotechnology)
ACMV	African cassava mosaic virus
AES	Agroecosystem
AFS	Agroforestry systems
Al	Aluminum
ARIs	Advanced research institutes
AROs	Advanced research organizations
BGBD	Below-ground biodiversity
C	Carbon
CA	Central America
CBB	Cassava bacterial blight; *also* Common bacterial blight of beans
CBWM	Community-based watershed management
CC	Climate change
CD-ROM	Compact disk—read-only memory
CFSD	Cassava frogskin disease
CH_4	Methane (a pollutant)
CIALs	Comités de investigación agrícola local (Colombia)
CLOs	Comités locales (local committees)
CO_2	Carbon dioxide (a pollutant)
DCs	Developed countries
DNA	Deoxyribonucleic acid
DS	Decision support
ESTs	Expressed sequence tags (biotechnology)
FM	Forest margins
FPR	Farmer participatory research
FTE	Full-time equivalent
GA	Gender analysis
GCC	Global climate change
GHG	Greenhouse gases
GIS	Geographic information systems

GM	Genetically modified
GOs	Governmental organizations
GWP	Global warming potential
HS	Hillsides
IAEM	Integrated agroecosystem management and conservation
IARCs	International agricultural research centers (the CGIAR system)
ICTs	Information and communication technologies
INIAs	Instituciones nacionales de investigación agropecuaria (national institutions for agricultural and livestock research)
IPM	Integrated pest management
IPR	Intellectual property rights
ISFM	Integrated soil-fertility management
LA	Latin America; Latin American
LAC	Latin America and the Caribbean
LDCs	Lesser developed countries
LIMS	Laboratory information management systems
LoRSDIs	Local rural sustainable development initiatives
M&E	Monitoring and evaluation
MAS	Marker-assisted selection
MTA	Material transfer agreement (used in germplasm exchange)
MTP	Medium-Term Plan (CIAT)
N	Nitrogen
N_2O	Nitrous oxide (a pollutant)
NARES	National agricultural research and extension systems
NARIs	National agricultural research institutes
NARS	National agricultural research systems
NGOs	Nongovernmental organizations
NRM	Natural resource management
NZ	New Zealand
P	Phosphorus
PB	Plant breeding
PM&E	Participatory monitoring and evaluation
PPB	Participatory plant breeding
PR	Participatory research
QTLs	Quantitative trait loci
R&D	Research and development
RHBV	Rice "hoja blanca" virus (rice white leaf virus)
RIIs	Research intensive institutions
R-to-C	Resource-to-consumption *framework*
SP	Systemwide program (*of the* CGIAR)
SROs	Specialized research organizations
SS	Senior staff (*of* CIAT)
TLA	Tropical Latin America