Improving Rural Livelihoods:

CIAT's Medium-Term Plan 2004-2006

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

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CIAT Medium Term Plan

2004-2006

Draft Summary and Overview

For Consideration at the CIAT ExFin 77

May 2003

Since the September 2002 submission of the 2003-2005 MTP to the interim Science Council of the CGIAR, CIAT has progressed steadily along its planned course.

- A full programmatic integration with TSBF has been achieved
- The Biofortification Challenge Program is operational
- CIAT is active in other CG Challenge Programs
- No major changes were introduced in the CIAT project portfolio
- Cross project integration around priority issues is being fostered
- World Bank money for genetic resources and CIDA money for Africa have done much to stabilize the financial situation.

Program Developments

The Biofortification Challenge Program has started with $1.5 million from an expected $3.0 million World Bank grant. A grant of $47 million is being sought from the Bill and Melinda Gates Foundation over the first four-year phase of the program. USAID has made a pledge of $6 million for the coming fiscal year. The newly formed Program Advisory Committee, chaired by Peter McPherson, President of Michigan State University, held its first meeting in Washington on March 11-12. The PAC appointed Dr. Howarth Bouis as Director. A formal cooperative research agreement has been signed by CIAT and IFPRI, the two lead centers of the program. A technical meeting is planned to be held at CIAT in June to develop the CP workplan. Within this program CIAT will conduct research to improve the vitamin A content of cassava and the iron content of beans.

Water and Food Challenge Program. In this CP CIAT is leading research Theme 2 on the multiple use of water in upper catchments. Research areas, objectives, research pre-proposals, and conceptual framework development for Theme 2 can be found at http://gisweb.ciat.cgiar.org/wcp/. Largely due to CIAT's initiative, the Andean system of basins were approved as an Associated Benchmark Basin which would take part in the Challenge Program with a budget and a part-time coordinator, to facilitate activities and develop research projects. CIAT also led the development of 19 concept notes that were submitted to the competitive funding mechanism of the CP. In June we will know which were approved for full proposal development. Full proposals will be presented in August and decision on which will be funded will be known in October, with actual work starting in January 2004.

Genetic Resources Challenge Program: The revised Challenge Program proposal was submitted in February, after the Stakeholders Meeting of 14-16 January, held in Alexandria. CIAT participated in this meeting and helped forge a commitment to investigating "species from each crop group" (cereals, roots and tubers, legumes, and forages) with emphasis on drought. These changes reflect significant improvements in the CP which will allow 1) CIAT to be represented on the program Steering Committee, and 2) CIAT scientists from all four crop projects to be in better positions to access the challenge program funds. It will

be very important to be represented at the technical committee meeting that will be held within the first six months after the approval of the challenge program and to write competitive grant proposals. The CG ExCom is considering this CP proposal in its May 18-19 meeting.

Sub-Saharan Africa Challenge Program held a stakeholders' meeting March 10-13 in Accra, Ghana, which four CIAT scientists attended. The proposal will be presented at the FARA (Forum for Agricultural Research in Africa) plenary meeting in Dakar in May, coinciding with the GFAR meeting that the DG will attend. By June the proposal will be submitted to the iSC. If approved by the iSC it would then go to the CG Excom. Funding could come online in late 2003 or early 2004. The CP is envisioned as using the Integrated Natural Resources Management framework within which the major cross cutting themes would be on soils, policy, markets, and capacity strengthening. Further developments can be followed at http://www.fara-africa.org. It was very pleasing to note that many meeting participants naturally and spontaneously referred to TSBF-CIAT, which means this union is gaining recognition.

Cross Project Integration: CIAT's portfolio of projects provides an effective structure for meeting the objectives of the Strategic Plan and provides a mechanism for collaboration with partners and for attracting stakeholder investment. Nevertheless, internal reflection has for some time now stressed the need for seeking ways to promote enhanced scientific collaboration across projects within CIAT. This was the focus of a Management-Project Manager facilitated retreat April 3-4, 2003 which identified three priority areas for cross project integration:

- Implications of International Conventions for Genetic Resources
- Restoring Degraded Land
- Learning to Compete

Internal task forces have been formed to develop each of these ideas further into a framework conceptual paper and to identify a fund raising strategy to seek new resources to fully pursue these issues. These issues draw on already ongoing research in a variety of CIAT projects. By combining forces around these issues on a cross project basis, greater effectiveness in resource utilization is anticipated, as is greater attractiveness to potential donors.
Although the task forces are only beginning their work, a preliminary progress report to the Management on April 29 confirmed that these groups are advancing with commitment. A couple of key points on each of the integrating themes follow.

CIAT's NARS partners, especially in Latin America, have expressed the need for assistance in designing their policy and scientific responses to new international treaties that affect how genetic resources will be managed in the future. These include the Convention on Biological Diversity, the Biosafety Protocol, and the Treaty on Plant Genetic Resources. Much CIAT research is already addressing related issues, including, for example, long ongoing research on gene flow between cultivated and wild species; more recent work on the below ground biodiversity effects of transgenic crops; GIS research on the distribution of wild relatives of crop species; socio-economic analysis of the benefits of genetic resources and the distribution of these benefits.

The tentative objective of the research to restore degraded land would be to improve access to multiple stress-adapted crop and forage germplasm and management tools and knowledge that enable resource-poor farmers of the tropics to restore degraded lands to profitability through intensifying the production and value-added processing of diverse agricultural products. This work clearly brings together the unique strengths of CIAT research projects in competitive agriculture, agroecosystem health and rural innovation to initiate a concerted effort to mitigate the long-standing problem of land degradation. It would aim to convert hotspots of poverty and fragile land into bright spots of profitable restored land for a better future of millions of rural poor. The key factor for success is to identify and target modifiable situations. Since degradation results when the pressure exerted on a system exceeds the ability of the system to sustain it, a three-part solution of avoidance, adaptation and mitigation would be initially proposed.

Learning to Compete: This issue is more fully titled as an initiative to increase incomes of the rural poor through competitive knowledge based innovation. CIAT's goal would be to make rural communities more competitive by linking them to the modern economy through knowledge networks. CIAT can play an important role in accessing and systematizing large amounts of information, as well as in tapping into existing global resources. However, CIAT's comparative advantage lies in putting this information into the context of resource poor farmer groups. This can be accomplished in devising systems to capture and systematize local knowledge, and in providing feedback mechanisms. When developing a more detailed strategy framework, we will have to clearly focus on what we will choose to do well, while deciding what we will NOT do. This requires systemized feedback from the people for whom we work. This effort would draw on, among others, information from CIAT commodity research, on CIAT's experiences with community information management in participatory research and agroenterprises, and on the information and computing systems units', experiences in managing information and data.

Financial Developments:

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

Appendix I

Project Description and

Log Frames for 2004-2006

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

PROJECT DESCRIPTION

Objective: To preserve the 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 nonmandated 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. Mandated crops conserved and multiplied as per international standards.
5. Germplasm available, restored, and safely duplicated.
6. Designated Collections made socially relevant.
7. Strengthen NARS for conservation and use of Neotropical plant genetic resources.
8. Conservation of Designated Collections linked with on-farm conservation efforts and protected areas.

Milestones:

2004 High throughput screening of germplasm bank and breeding materials implemented, using microarray technology. Al tolerance in *Brachiaria* characterized. Gene discovery for drought tolerance in bean for nitrification in brachiaria initiated. Marker-assisted selection for ACMV and whitefly resistance initiated. Transgenic rice resistant to a spectrum of fungal diseases. Development of insertion mutagenesis population in rice, using Ac/Ds. Gene flow studies for bean and rice completed. Links with conservation efforts in protected areas and on farms established. Germplasm collections regenerated. Initiation of DNA banks for core collections. Safe-duplication and restoration continued. Biosafety field testing of transgenic cassava initiated.

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 trough 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.

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); AROs (IRD, CIRAD, Danforth Center, CAMBIA, NCGR, and universities—Cornell, Yale, Clemson, Kansas State, Bath, Hannover, Rutgers, Ghent, Gembloux); biodiversity institutions (A von Humboldt, 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 (2004-2006)

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.
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:

2004 Marker-assisted selection developed for various biotic constraints. Lines with resistance to angular leaf spot, root rots, drought, bean common mosaic virus, and bean golden mosaic virus developed. Specialty types developed in Andean beans.

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.

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 (2004-2006)

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:

2004 The first set of S1 lines planted in the field. Better understanding of methods for the control of post-harvest physiological deterioration. Better understanding of germplasm and processing procedures for the production of fried cassava chips. Project to develop biofortified cassava begins. First genetically modified cassava planted in the field following strict biosafety regulations.

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.

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 (2004-2006)

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:

2004 Two rice germplasm nurseries CIAT-ION will be evaluated with partners throughout the region. Regional breeder's workshops will be reactivated. Genetic progress and gains for populations enhanced by recurrent selection for different traits will be assessed in several countries. Studies of the genetics of complex traits including yield that used interspecific crosses and molecular markers will be completed. Marker aided selection will be used to combine complete resistant genes to produce rice that has a more durable resistance to rice blast. Molecular and virulence characterization of Rhizoctonia, which causes sheath blight will be started. Advanced populations using wild rice genes and recurrent selection will continue to be developed. These populations will include characteristics additional traits such as resistant to crinkling disease, good yield potential, aggressiveness, water stress adaptation. Molecular marker for at least five traits will be identified to use in marker aided selection and test as a breeding tools. Knowledge based activities for the small rice farmer will be started.

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. An interactive training for rice researchers and extension agents will be available through as E-learning tools. Many of the modules will be appropriate for farmers as printed materials. The developing systematic selection methods for complex traits will increasingly become the focus of the genetic studies. 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.

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. Rice as one component in the agricultural community will be analyzed as a means to increase farmer's incomes. Regional networks that have been strengthen through 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. Monitoring the use of the CIAT rice germplasm and the release of commercial varieties by our partners is a way to assess impact.

Users: Rice researchers especially 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 (2004-2006)

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:

2004 Defined utility of *Flemingia*, and *Lablab* hay as feed resources for dairy cows.
Opportunities are identified in Africa to promote the utilization of forages developed by CIAT.

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 Widespread adoption of improved forage technologies in the subhumid and humid tropics (e.g. Central America and SE Asia).
A *Brachiaria* hybrid with resistance to different spittlebug species, with high forage quality and high seed production available as a commercial cultivar to farmers in the tropics.

Users: Governmental, nongovernmental, and farmer organizations throughout the subhumid 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 the Tropileche Consortium.

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 (2004-2006)

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.	Defined utility of *Flemingia*, and *Lablab* hay as a feed resource for dairy cows by 2004. 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	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.	Efficient screening method to assess *Rhizoctonia* resistance in *Brachiaria* developed by 2004. Role of endophytes on drought tolerance determined under field conditions by 2004. QTL's for resistance to spittlebug and high aluminum in the soil in *Brachiaria* are available for marker-assisted selection by 2005. *Brachiaria* genetic recombinants with combined resistance to different species of spittlebug are available by 2006.	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* and *Lablab* with adaptation and known value to farmers in hillsides of Central America are available to partners by 2004. Defined variability for nitrification inhibition in *Brachiaria* genotypes by 2005. *Brachiaria* genetic recombinants with resistance to low P and high aluminum in the soil and with drought tolerance are available by 2006.	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 2004. New market opportunities in Central America for processed forages assessed by 2006. A Decision Support Tool for targeting forages to different environments and production systems in Central America is available by 2005 Opportunities identified in Africa to promote the utilization of forages developed by CIAT by 2004 An information network on forages and an effective forage multiplication systems are established in benchmark sites in SE Asia by 2004. 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 2005. Widespread adoption of forage technologies in the subhumid and humid tropicis by 2006.	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 IP-6: TROPICAL FRUITS, A DELICIOUS WAY TO IMPROVE WELL-BEING

Project Description

Objective: To provide information and support to partners in the public and private sectors to promote the production, processing, and marketing of tropical fruits by rural communities, and thus increase wealth and improve welfare of current and future generations in the countryside.

Outputs:
The project's first phase is to obtain a stable funding base for the initiative. The present level of commitment of core funding for this project is so ridiculously low that all plans for the future are totally dependent on satisfying the whims of external donors and obtaining special project funding. In effect future planning for this project will be negotiated with donors rather than determined internally by CIAT. Hence the plans established here are indicative of the directions in which we would like to move but are totally dependent on reaching satisfactory agreements with donors. Once the funding is base the following outputs are tentatively expected:

1. Interactive Web-based information system in place for farmer groups, development agencies, and entrepreneurs to determine which tropical fruits would grow successfully in a given locale.
2. Tropical fruit-based business opportunities identified for targeted populations and/or areas by Agro enterprises or other agencies, and input from tropical fruits for development of these opportunities.
3. Two projects established in areas in which CIAT has special expertise, to satisfy specific needs of local organizations and add value to CIAT's Tropical Fruit Project.

Gains: Farmers, farmer groups, entrepreneurs, and development agencies will have information on those fruit crops that can be grown successfully according to agroecological similarities. The rural population will be able to identify new business opportunities by matching crops that can be grown in their area and demand different classes of product. Development agencies will be able to identify income-generating opportunities for targeted populations or regions.

Milestones:

2004 Preliminary versions of software to interpret relationships between fruit, climates, and soils. Pilot testing of climate homologues to identify promising species linked to a specific population identified jointly with Agroenterprises, Hillsides, or other CIAT projects. Inventory of Latin American Fruit species.

2005 Database carries information on 100 fruit crops. Database queries used by external organizations to identify business opportunities. Two fruit-based agroenterprise projects initiated (jointly with SN-1 or other agency). Techniques for participative selection implemented on pilot scale. Improved research scheme for tropical fruits in Colombia established.

2006 Database carries information on 300 fruit crops. Germplasm exchange of 10 species facilitated by the project. Fruits used as pilot scheme for information macro-project.

2007 Flowering centre established.

Users: Farmer groups, farmers, entrepreneurs, and any development agencies interested in increasing rural incomes in areas where tropical fruits may have a role to play; local research and development organizations; importers/exporters of tropical fruits.

Collaborators: Fruit gatherers and producers, national and international research and development agencies, developed and developing country universities, IPGRI, ICRAF, EMBRAPA, Univ. Florida, CORPOICA, MADR.

CGAR systems linkages: Enhancement & Breeding (25%); Crop Production Systems (25%); Protecting the Environment (25%); Training (10%); Information (5%); Organization and Management (5%); Networks (5%).

CIAT project linkages: Collaboration with Land Use (PE-4) for software development, access to databases, and management and pilot testing of the fruit/soil/climate queries. Identification of business opportunities in conjunction with Agroenterprises (SN-1). Participatory research (SN-3) will collaborate with studies on selected fruits. Hillsides (PE-3) will identify sustainable business opportunities and implement fruit projects.

CIAT: IP-6 Project Log Frame (2004-2007)

Project: Tropical Fruits, a Delicious Way to Improve Well-Being
Project Manager: James H. Cock

Narrative Summary	Measurable Indicators	Means Of Verification	Important Assumptions
Goal To encourage rural communities to promote production, processing, and marketing of tropical fruits in an environmentally sound manner, thus bringing wealth and improved welfare to current and future generations in the countryside.	Increased sales of tropical fruits by rural communities. Environmental certificates such as ISO[1] 14000 obtained by fruit production chains.	Case studies, agribusiness reports, and personal testimonies on socioeconomic benefits perceived by rural communities. Case studies of production, processing, and marketing systems. Internationally accepted certificates of environmentally sound practices.	Funding obtained
Purpose To provide information and support to partners in the public and private sectors to promote production, processing, and marketing of tropical fruits.	*What to Grow Where* databases and software used by farmer groups, entrepreneurs, and development agencies. Agribusiness opportunities based on matching market demand with potentially growable crops identified for specific populations (regions). Exotic fruit species (crops) introduced, based on *What to Grow Where*, into commercial production schemes. Specific new technologies commercially used.	Number of hits on Web site. Documentation of satisfied requests for support in developing fruit-based agribusiness. Documented cases of introduction of exotics. Documented use of new technologies and beneficial effects.	Collaboration and support from other CIAT units. Markets for new products. Germplasm available. Active and effective collaboration between local, national, and international institutions. Logistical and administrative support with CIAT.
Output 1 Interactive Web-based information system in place for farmer groups, development agencies, and entrepreneurs to determine which tropical fruits can grow successfully in a given place. *What to Grow Where*.	Funded projects on *What to Grow Where*. Various climatic homologues identified (2003). Pan-tropical climate databases established (2003). Database with 300 tropical fruits (2005). Web-based access to databases (2007). Database with 2000 tropical fruits (2008).	Documents and deposits in the bank. Demonstrations. Reports. Scientific publications. Hits on Web site and follow-up surveys.	Donor(s)' interest in long-term projects with indirect impact. Available resources and effective collaboration with IPGRI and local organizations. Normal germplasm exchange.
Output 2 Fruit-based business opportunities identified for targeted populations and/or areas and development of these opportunities. Rural agroenterprises.	Funded projects on rural business enterprises (2004). Agreements with partners within and outside CIAT (2004). Successful adaptation and adoption of technology from one region (continent) to another. Successful new agrobusinesses established, using transferred technology (2005).	Documents and deposits in the bank. Visits to agribusinesses, business reports. Case studies. Reports.	Resources allocated to and collaboration with CIAT project PE-4. Note resources from core probably required as donor funding difficult. Free exchange of information and technology.
Output 3 Two projects established in areas in which CIAT has expertise. Specific fruit crop technologies.	New technology developed by CIAT under contract to other agencies effectively used by the fruit business.	Baseline studies and surveys. Reports of local agencies.	Funding obtained. Willingness of farmers to introduce new fruits.
Output 4 Improved national research organization	New research policy documents approved Positive feedback on use of information.	Documents and reports of expert meetings and consultants. Feedback and testimony from users.	Cooperation from Ministries of various countries.
Output 5 Flowering centre	Flowering centre established	Eyes of those interested	Management support to obtain donor support. Donor

1. The International Organization for Standardization issues the *ISO 14000 Certification* to environmentally sound enterprises.

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:

2004 IPM for cassava viruses and root rots implemented. Global communication network for information on soil borne pests operational. Taxonomy on soil borne arthropod pests advanced. Major components for whitefly management in beans and cassava available. Cassava varieties resistant to frog skin disease available. Resistance genes to rice blast incorporated in new varieties. Association of a cassava reovirus and cytoplasm with frogskin disease advanced. Molecular markers tagging resistance to Cassava Bacterial Blight (CBB) available. Germplasm screened for resistance to *Phytophthora* root rot using marker assisted selection. New viruses of snap bean characterized. Biological control through entomopathogens developed for some soil-borne pests. Natural enemies of whiteflies identified. Characterization of cassava reovirus associated with frogskin disease completed. Soil borne arthropod pest complexes identified. Studies on control strategies for bean foliage beetle (BFB) advanced. *Pythium* root rot pathogens in Eastern Africa characterized and their distribution established. ALS and *Pythium* resistance genes in beans characterized.

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.

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 (2004-2006)

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: OVERCOMING SOIL DEGRADATION

PROJECT DESCRIPTION

Objective: To develop and disseminate to clients strategic principles, concepts, methods and management options for protecting and improving the health and fertility of soils through manipulation of biological processes and the efficient use of soil, water and nutrient resources in tropical agroecosystems.

Outputs:
1. Sustainable and profitable ISFM (integrated soil fertility management) practices developed.
2. Improved agroecosystem health through management of BGBD (belowground biodiversity).
3. Enhanced provision of soil-based ecosystem services (water quality and quantity, soil C, erosion control) within food secure land use systems.
4. Strategies for scaling up and out of ISFM practices developed, implemented and evaluated
5. Research and training capacity of stakeholders enhanced.

Gains: NARES, NGOs, IARCs, ARIs and private sector working together, in partnership with farmers on ISFM, in key research sites in the savannas, forest margins and hillsides of Africa and Latin America. Soil-quality indicators to assist in assessing 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 Quesungal / 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 management is strengthened through the AfNET network in Africa and MIS consortium in Central America. Rural poor farmers benefit from adoption of improved food systems that result in increased agricultural productivity, higher income, and environmental protection.

Milestones:

2004 Innovations for building-up an arable layer and recuperating degraded lands in savannas available. Indicators of soil quality used for farmer's decision making in hillsides, forest margin and savanna agroecosystems. Decision making tool available for combined management of organic and inorganic resources. Decision support tools 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 The relationships between agricultural intensification and the diversity, abundance and function of soil biota understood and processes involved in indirect management of BGBD through cropping system design and in direct management through inoculation strategies quantified.
Technological interventions for diversification and intensification of the target farming systems are scaled up using ISFM. List of soil quality indicators available to NARS to monitor soil degradation. Decision support tools used in identification of improved smallholder productivity options and identified improved scenarios tested on-farm. Policy issues affecting investment in natural resource management and integrated soil fertility management identified and addressed.

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); AROs: CIP, IFDC, ICRAF, IITA, ICRISAT, IRD (France), ETH (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), Leuven (Belgium), Paris (France), Bayreuth and Hohenheim (Germany), SLU (Sweden), NAU (Norway), Cornell (USA), Ohio State (USA). Universidade Federal de Lavras (Brazil) Jawaharlal Nehru University (India), Universitas Lampung (Indonesia) Université de Cocody (Cote d' Ivoire), Instituto de Ecologia (Mexico) and Wageningen University and Research Centre

CGIAR system linkages: Enhancement & Breeding (10%); Crop Production Systems (30%); Protecting the Environment (30%); Saving Biodiversity (10%); Strengthening NARS (20%).
Convener of Systemwide Program on Soil, Water & Nutrient Management (SWNM), and contributes to the Ecoregional Program for Tropical Latin America, the African Highlands Initiative ; the Alternatives to Slash and Burn Programme, SSA and Water and Food challenge programmes.

CIAT project linkages: Integrated soil fertility and soil pest and disease management (IP-1, PE-1), acid-soil adapted components received and adaptive attributes identified for compatibility in systems (IP-1 to IP-5), strategies to mitigate soil degradation (PE-3, PE-4), agro enterprise alternatives to improve profitability of soil management options (SN-1), and strengthening NARS via participation (SN-2). Climate change and SN-3, Rural Innovation Institute.

CIAT: PE-2 Project Log Frame (2004-2006)

PROJECT: **OVERCOMING SOIL DEGRADATION**
Project Manager: **Nteranya Sanginga**

Narrative Summary	Measurable Indicators	Means Of Verification	Important Assumptions
Goal Empowering farmers to conduct sustainable agroecosystem management by increasing capacity for ISFM through the generation and sharing of knowledge and tools across multiple scales.	Yields in farmers' fields increased. Land degradation halted or reduced. Yields per unit area and input increased. Changes in land use.	Farmer surveys. Regional and national production statistics. Land use surveys (satellite imagery, rapid rural appraisals).	Land survey data available. Farmers adopt new technologies. Socioeconomic conditions are favorable for achieving impact. Adequate resources available for soil research.
Purpose To develop and disseminate to clients strategic principles, concepts, methods, and management options for protecting and improving the health and fertility of soils through manipulation of biological processes and the efficient use of soil, water, and nutrient resources in tropical agroecosystems.	Technologies for soil improvement and management developed. Limiting soil-plant-water processes identified. Compatible plant components identified for low fertility soils in crop-livestock systems. Guidelines, manuals, and training materials for ISFM produced.	Scientific publications. Soil and crop management guidelines published. Decision-support systems developed. Annual reports.	Economic analysis of options available. Effective linkages within CIAT and partners in sub-Saharan Africa, LA, and Southeast Asia. Socioeconomic inputs available from other projects (e.g., PE-3, BP-1). Field sites accessible.
Output 1 Biophysical and socioeconomic constraints to ISFM identified, and knowledge on soil processes improved.	Soil, water, nutrient, and knowledge constraints to sustainable production defined, and the understanding of the roles of soil biota, multipurpose germplasm, and organic and inorganic resources for sustainable management of land resources improved.	Annual report and 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-2, PE-3, and PE-4 actively participate. Collaboration of participatory research project (SN-3), RIIs, and NARS.
Output 2 Improved soil management practices developed and disseminated.	Relevant knowledge, methods, and decision tools for improved soil management to combat soil degradation, increase agricultural productivity, and maintain soil health provided to land users in the tropics.	Annual reports and publications. Management guidelines and decision trees published and available to farmers, NARS, and NGOs. Training manual for use with tools. Maps published. Simulation models used to assess alternative management of organic resources for ISFM. A policy brief for ISFM produced.	Sufficient operational funds available for chemical analyses. Continuity of long-term experiments. Modeling expertise available from partners, e.g., Michigan State Univ., IFPRI, and CSIRO. Soil biology expertise from IRD and Univ. of Paris available.
Output 3 Ecosystem services enhanced through ISFM.	The soil's capacity to provide ecosystem services (global warming potential, water quality and supply, erosion control, nutrient cycling) and maintain soil biodiversity in the face of global change in land use and climate enhanced.	Annual reports and publications. Internationally accepted standard methods agreed upon for characterizing and evaluating below-ground biodiversity (BGBD), including a set of indicators for BGBD loss (GEF-funded special Project). Methods for assessing impacts of land management on soil microbial and faunal diversity tested. Work plan developed to evaluate interactions between soil management practices and soilborne pests and beneficial organisms.	Collaboration from partners. Information from questionnaires synthesized and comparisons made with available PE-3 results. Collaboration with PE-3 on soil erosion in CA. Collaboration with SN-2, PE-4, PE-3, and SWNM Program. Collaboration with PE-4 on land quality indicators at reference sites.
Output 4 Research and training capacity of stakeholders enhanced.	Research and training capacity of stakeholders in the tropics in the fields of soil biology and fertility and tropical agroecosystem management enhanced through the dissemination of principles, concepts, methods, and tools.	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, NGOs).	Continued interest and participation of NARS and ARO partners, and national and international universities. Continued support for collaborative activities, e.g., SWNM program.

PROJECT PE-3: COMMUNITIES AND WATERSHEDS

PROJECT DESCRIPTION

Goal: To foster community based watershed management (CBWM) to address local natural resource priorities and contribute to improved environmental management, equitable resource allocation and enhanced livelihood and food security.

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 methodologies provided by the project to support their planning, monitoring, and decisions.

Milestones:

2004 Establish monitoring networks and indicators for individual research sites / watersheds. Document land-water interactions, highland-lowland interactions, resource allocation inequity, and community priorities. Initiate capacity building programs at the local level. Promote the adoption of already proven approaches and technologies.

2005 Continuation of monitoring networks. Capacity building, strengthening local organizations, and training programs. Develop new technologies and approaches. Community based adoption of proven methods and technologies. Improved local management using CIAT's research results.

2006 Continuation of monitoring networks. Community based adaptive management with proven methods and technologies. Ongoing capacity building. Decision support providing information, tools and methods at various levels (local, national, 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 development organizations involved in priority setting and investments in development.

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

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

CIAT project linkages: Soils (PE-2), Land Use (PE-4), Agroindustries (SN-1), 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 (2004-2006)

PROJECT: COMMUNITIES AND WATERSHEDS
PROJECT MANAGER: JOSÉ IGNACIO SANZ

Narrative Summary	Measurable Indicators	Means of Verification	Important Assumptions
Goal To foster community based watershed management (CBWM) to address local natural resource priorities and contribute to improved environmental management, equitable allocation and enhanced livelihood and food security.	Water quality Biodiversity Conflict resolution 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 Soil erosion Nutrient management Productivity	Local research. Field verification. Project reports. Youth reports. Local research groups' reports	Climate variability is normal.

Narrative Summary	Measurable Indicators	Means of Verification	Important Assumptions
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: Erosion Water quality Water quantity (drinking and irrigation) Trade-off analysis: Water rights / concession Income distribution (highland-lowland) Livelihood opportunities Conflict resolution: User association participation Consortium functioning Policy and/or institutional changes	Local research. Field verification. Youth reports. CIAL reports. Consortia reports. Monitoring reports.	Social stability.
Output 3 Valuation and analysis of environmental services including water, biodiversity and recreation. Adoption of sustainable management practices by local farmers and user groups. Increased forest and agricultural biodiversity. Realizing the potential of recreational opportunities.	Water: Water quality Water quantity Biodiversity: Native vs. exotic species numbers (temporal and spatial) Agro-biodiversity (# and type) Recreation: Types and # of suppliers Eco-tourism	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 various levels (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)	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 agriculture. Upscaling and extrapolation tools available for a variety of uses.

Milestones:

2004 Germplasm targeting tool completed (Beta version). World climate surfaces upgraded to 1-km Data, analyses, and tools for natural resource management disseminated throughout tropical America and other tropical areas of the world.

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.

Collaborators: ICRAF, CIP, ILRI, ECLAC, 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).

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, and PE-2; model development with PE-3, PE-5, and BP-1.

CIAT: PE-4 PROJECT LOG FRAME (2004-2006)

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.	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.	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 PE-6: CONFRONTING GLOBAL CLIMATE CHANGE

PROJECT DESCRIPTION

Objective: To overcome expected reductions in productivity of some major food crops and forages as a consequence of climate change (CC) in ecoregions within the scope of CIAT's mandate, while reducing the environmental impact from agriculture.

Outputs:

1. Vulnerability and opportunity assessments of responses made by ecoregions, populations, crops, and crop wild relatives at risks from changing climates.
2. Germplasm and management systems adapted to changing climatic conditions and exacerbated incidence of pests and diseases.
3. Crop, forage, water, and soil management strategies developed to minimize sources and/or increase sinks of greenhouse gases (GHGs).
4. Impact of implemented strategies for adaptation to and mitigation of CC assessed, and institutional capacity enhanced.

Gains: *Plant breeders* and *agronomists* have access to realistic and detailed definitions of the climates encountered in response to CC. *Farmers* and *consumers* of CGIAR-mandated and other food crops have varieties adapted to marked changes in temperature and drought conditions. *Farmers* benefit from informed decision capacity and sustainable systems that minimize GHG emissions (CO_2, CH_4, and N_2O) and maximize carbon sequestration for international carbon trading. *Policy makers* have information of the effects of CC on the performance of CGIAR-mandated and other food crops and possible changes required to confront CC and prevent widespread land degradation. *National governments* have more accurate information on sources of GHG emissions and their removal by sinks for incorporation in their annual inventories under Article 7 of the Kyoto Protocol.

Milestones:

2004 Present and expected distribution of *Macrophomina* in Latin America. Definition of priority areas for conserving wild relatives of cassava, and release of drought-tolerant *Brachiaria* hybrids. Incubation protocol developed and tested to rapidly screening Nitrification inhibitory activity from plant/root extracts and exudates affecting fluxes of N2O from soils. Case study assessment of net reductions in N_2O emissions due to *B. humidicola* in CA and Colombian savannas. Develop a pilot project to trade C from agroforestry systems (AFS) in Colombia. Preliminary estimate of GWP for the Quesungual reference site (Honduras).

2005 Key crops and forages ranked according to their Nitrification inhibition capability. Field studies completed to assess effects of contrasting forages on inhibiting Nitrification activity and reducing nitrate leaching and N_2O emissions from soils. Implementation phase initiated for a pilot project to trade C from AFS in Colombia. Environmental characterization of intensive, high-input, cattle-production systems: case studies in Colombia and CA.

2006 Field studies completed to assess effects of contrasting crops on inhibiting Nitrification activity and reducing nitrate leaching and N_2O emissions from soils. Monitoring of the pilot project to trade C. Baseline assessment of GHG net fluxes in a pilot watershed in the Andes.

Users: **Immediate beneficiaries are farmers growing CGIAR-mandated crops and consumers, especially poor *farmers in* developing regions. Policy makers will use information on predicted changes in climate to plan land use and to include environmental services as part of the development agenda for selected regions.**

Collaborators: NARS and national research centers: Brazil (EMBRAPA, INPE, INPA); Colombia (CORPOICA, Instituto von Humboldt, Univ. Nacional, MinAmbiente, IDEAM, CONIF), Central America (Univ. Honduras, Ministerio del Ambiente); CGIAR centers: ILRI; CIMMYT, ICRAF; ARIs: universities—Cornell and Florida (USA), Zurich (Switzerland), Bayreuth (Germany); climate change modelers—Hadley Climate Center (UK), NCAR (USA); international and local NGOs; farmer and community organizations.

CGIAR system linkages: Enhancement & Breeding (17.5%); Crop Production Systems (20%); Livestock (20%); Protecting the Environment (35%); Training (2.5%); Information (2.5%); Networks (2.5%). Participation in the ICWG—CC.

CIAT project linkages: IP-1, IP-3, PE-1, PE-2, PE4, PE-5, SN-2, SN-3.

CIAT: PE-6 PROJECT LOG FRAME (2004-2006)

PROJECT: CONFRONTING GLOBAL CLIMATE CHANGE
PROJECT MANAGER: MARCO RONDÓN

Narrative Summary	Measurable Indicators	Means of Verification	Important Assumptions
Goal To contribute to long-term increases in agricultural productivity, poverty reduction, and conservation of the global environment.	Agricultural production increased. Farmers' income increased. Agriculture-related emissions of greenhouse gases (GHG) reduced. Water production levels maintained or increased.	National statistics of agricultural production and rural income. National and international inventories of GHG. National and regional inventories of water resources.	
Purpose To overcome expected reductions in productivity of some major food crops and forages as a consequence of global climate change, while reducing the environmental impact from agriculture in ecoregions within the scope of CIAT's mandate.	Net increase in agricultural productivity resulting from adoption of climate change (CC)-adapted crops. Net reduction in the global warming potential (GWP) of key ecoregions: tropical lowlands, hillsides, and Andes.	National and regional statistics of food and forage production. Regional and national inventories of GHG compared over time.	NARS partners show interest in collaborative research. Adequate funds from global challenge programs (climate change, water) allocated. Favorable policies for the release and adoption of new crop and forage varieties. Timely implementation of policy and trading incentives to favor adoption of environmentally safe management practices.
Outputs 1. Vulnerability and opportunity assessments of responses of ecoregions, populations, crops, and wild relatives of crops in crisis from changing climates. 2. Germplasm and management systems adapted to changing climatic conditions and exacerbated incidence of pests and diseases. 3. Crop, forage, water, and soil management strategies developed to minimize sources and/or increase sinks of GHGs. 4. Impact of implemented strategies for adaptation to and mitigation of GCC assessed, and institutional capacity enhanced.	Maps of risk of yield decline (maize, beans, cassava) for Africa and Latin America. Maps of risks of loss of habitat for wild relatives of crops. Adoption of drought-adapted crop and forage varieties as key components of production systems that minimize crop failures. Pilot testing of developed methodologies in at least three benchmark ecoregions: tropical lowlands, hillsides, and Andes. Implementation of a pilot project for trading C sequestered in soils and/or biomass. Studies to assess economic benefits of adopting drought-tolerant beans and pastures in LA. Study prepared on scenarios for potential C trading in improved pastures and no-tillage cropping systems. One BSc and two MSc theses submitted.	Maps available. Information transferred to policy makers. Field verification. Project reports. National average of yields in dry seasons. National GHG inventories. Pilot contract for C trading. Studies transferred to policy makers.	Active participation of germplasm development projects. Access to benchmark sites continued. Continued commitment of local partners to project activities. Successful involvement NARS partners for release of new varieties. Approval of the CDM Successful involvement of suitable partners experienced in C trading.

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:

2004 Draft guidelines available for designing support systems for rural agroindustry, based on experiences in Latin America and case studies. Learning alliances consolidated with major NGO partners in Central America and East Africa. Pilot projects initiated in Vietnam and Lao PDR.

2005 Guidelines for identifying and developing viable rural agroenterprises prepared for Eastern Africa, based on pilot experiences in Uganda, Malawi and Tanzania.

2006 Guidelines for identifying and developing viable rural agroenterprises validated and adapted for SE Asian situations.

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 (2004-2006)

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 2006, 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:

2004 Associations of community-based farmer research groups providing services and supporting the CIALs and with strategic alliances with R&D institutions.
Impact Assessment analysis to derive lessons and impacts of PR methods on livelihoods, conducted in at least two countries in Latin America.
A method for testing and evaluating technologies in a resource to consumption (R-to-C) framework developed, tested, and evaluated in two countries in Africa.

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

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 (2004-2006)

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

PROJECT DESCRIPTION

Objective: To strengthen rural communities' capacity for innovation by better enabling them to obtain, generate, and share information and knowledge, with the aid of modern information and communications technologies (ICTs).

Outputs:

1. Web-based distance-education (e-learning) programs and multimedia products that convey science-based knowledge and methods in forms that are useful for development professionals
2. Innovative tools and approaches that make it easier to find and obtain agricultural information via the Web
3. Strategies by which local institutions can integrate the use of ICTs into rural community development
4. Local information systems that reinforce participatory approaches to activities such as rural agroenterprise development, adaptive agricultural research, and community-based natural resource management and land-use planning

Milestones:

2004 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 first Web-based, distance-education program in place.

2005 ICTs-for-development projects under way in Bolivia, Uganda, as well as in the countries mentioned above. Local information systems and distance-education programs functioning in Colombia and other Latin American countries.

Users: The users of the project's outputs will be 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 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 International Institute for Communication and Development (IICD), 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 (2004–2006)

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 rural communities' capacity for innovation by better enabling them to obtain, generate, and share information and knowledge, with the aid of modern information and communications technologies (ICTs).	• 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 electronic communications both among communities and with R&D organizations. • A greater capacity in local organizations to satisfy information demand in rural communities.	• 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. Web-based distance-education (e-learning) programs and multimedia products that convey science-based knowledge and methods in forms that are useful for development professionals 2. Innovative tools and approaches that make it easier to find and obtain agricultural information via the Web 3. Strategies by which local institutions can integrate the use of ICTs into rural community development 4. Local information systems that reinforce participatory approaches to activities such as rural agroenterprise development, adaptive agricultural research, and community-based natural resource management and land-use planning.	• Financially and socially sustainable telecenters established by local organizations with the aid of training tools developed by CIAT. • 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. • Relevant information services developed for farmers that use participatory R&D methods, thus providing a basis for virtual networks of farmer groups.	• Training tools available in print form and on CD-ROM. • Locally developed information systems available on the World Wide Web. • Consultancy reports and project information on the Web 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:

2004 Two studies on technology adoption completed, and two new studies initiated. Impact of investments in social capital on NRM estimated. Links with the World Bank and Interamerican Development Bank rural development projects are established.

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.

Users: Research planners in NARS and the CGIAR who make decisions on resource allocation. 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; universities—Hohenheim, California State Polytechnic, San Luis Obispo, Valle (Colombia); Center for Development Research (Denmark); CIAT projects—genetic resources, biotechnology on forages, rice, cassava, beans, hillsides; CLAYUCA. *Impact of past research monitored*: CIMMYT; IFPRI; SP—PRGA; all CIAT projects, but particularly, cassava, rice, forages, IPM, hillsides, land use, and agroenterprises.

CGIAR system linkages: Improving Policies (100%).

CIAT project linkages: All CIAT projects.

CIAT: BP-1 PROJECT LOG FRAME (2004-2006)

PROJECT: **IMPACT ASSESSMENT**
PROJECT MANAGER: **RAFAEL POSADA**

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.

PROJECT SW-2: SOIL, WATER & NUTRIENT MANAGEMENT

PROJECT DESCRIPTION

Objective: To contribute to long-term increases in agricultural productivity, poverty reduction, and the conservation and enhancement of land and water resources.

Outputs:
1. Economically viable *SWNM technologies* that are socially acceptable and ecologically sound.
2. Improved methods and diagnostic tools for PR.
3. Indicators to monitor the environmental and economic impact of land use systems.
4. Decision-support systems, such as models and GIS, for generating and extrapolating options.
5. Stronger institutional capacity to implement SWNM programs and policies.
6. A framework for partnerships between stakeholder groups.
7. Information on appropriate policies to promote sustainable practices.

Gains: Linkages of research on SWNM at key sites within the CGIAR ecoregional programs. Improved research efficiency through collaboration among NARS, IARCs, and SROs through capacity building. Prevention of duplication of efforts in SWNM and increased rate of technology development. A core group of resource management scientists. Accelerated scientific progress through sharing of experience, common methods, databases, and models across regions. Strengthened research projects already in place through an integrated approach. Complementation of ongoing research where knowledge gaps exist and provision of new knowledge is required to improve NRM worldwide.

Milestones:

2004 Validation of soil quality indicators. Cadre of local scientists, farmer groups, and extension workers trained to develop local solutions to SWNM constraints in the four SWNM consortia.

2005 Independent community-based investigations established by the four consortia in benchmark areas. Technologies for soil improvement established in two sites.

Users: Farmers and other land users, NARS, extension workers, NGOs, and community-based groups.

Collaborators: IARCs (IBSRAM, IFDC, ICRISAT, ICARDA, IITA, ICRAF, ORSTOM); NARS, universities, and AROs of the four SWNM consortia.

CGIAR system linkages: Crops (9%), Livestock (21%), Protecting the Environment (50%), Policy (10%), Strengthening NARS (10%).

CIAT project linkages: Confronting soil degradation (PE-2); watershed resource management (PE-3); land use studies (PE-4) and participatory methods (SN-3).

CIAT: SW-2 PROJECT LOG FRAME (2004-2006)

PROJECT: SOIL, WATER & NUTRIENT MANAGEMENT
PROJECT MANAGER: NTERANYA SANGINGA

The SWNM program's log frame, presented below, is still being developed, pending contributions from the four research consortia.

Narrative Summary	Measurable Indicators	Means of Verification	Important Assumptions
Goal To contribute to long-term increases in agricultural productivity, poverty reduction, and the conservation and enhancement of land and water resources.	Agricultural production increased in benchmark sites. Farmers' income increased. Land degradation halted or decreased.	Agricultural census data. Human welfare statistics.	
Purpose To develop, disseminate, and promote implementation by land users of effective, ecologically sound technologies and systems for sustainable land management and conservation.	20% of farmers in restricted areas adopt at least one new SWNM technology per consortium through individual and community-based actions. Information on SWNM technologies published.	Surveys of land use practices. Lists of publications, Web pages. Bulletins and brochures.	Policy environment is favorable for the adoption of improved SWNM technologies. Farmers are reached through NARES and IARCs. NARES have the means to disseminate technologies and information.
Output 1 Technologies and tools for improved soil, water, and nutrient management developed.	At least two new or improved SWNM technologies developed by each of the four research consortia.	Publications in international journals. Manuals and decision-support tools. Annual reports.	External funding levels are maintained. Benchmark sites established and maintained with partners.
Output 2 Community-based institutional mechanisms that encourage use of sustainable land management practices developed, tested, and promoted.	Each consortium has established at least one community-based organization in each restricted area or study site.	Annual reports, newsletters, and bulletins.	Community-based groups continue with their own resources. Institutions within each consortium maintain their matching support for the SWNM program.
Output 3 Capacity of stakeholders to plan and implement research programs on sustainable land management enhanced.	Farmers, NARES personnel, and policy makers trained. At least four training manuals and guidelines for SWNM produced.	Numbers of training courses and field visits held. Number of personnel trained. Institutional reports.	NARES have means to execute programs.
Output 4 Policies that address equity issues, access to resources, and land tenure developed.	Guidelines and decision-support systems developed.	Policy guideline documents. Publications in international journals.	Policy makers are open to dialog with SWNM program.

PROJECT SW-3: PARTICIPATORY RESEARCH AND GENDER ANALYSIS

PROJECT DESCRIPTION

Objective: To assess and develop methodologies and organizational innovations for gender-sensitive participatory research (PR), and operationalize their use in plant breeding (PB), and in crop and natural resource management.

Outputs:
1. Methods for PPB developed and mainstreamed into scientific practice and organizational policy.
2. Methods for PR on NRM developed and mainstreamed into scientific practice and organizational policy.
3. Gender-sensitive methodologies suitable for pre-adaptive PR developed and broadly implemented.
4. Evaluation and application of innovations for institutionalizing gender-sensitive participatory approaches.
5. Innovative approaches to capacity building developed and undertaken.
6. New partnerships among the IARCs, NARS, NGOs, and farmer groups developed.

Gains: Accelerated learning from existing experience and generation of new, widely applicable, methodologies for pre-adaptive PR and GA. The CGIAR and NARS will access a worldwide exchange of expertise on PR and GA among a wide range of institutions. Considerable savings and increased impact from NARS generated by better designed technologies. Indigenous systems of crop development and NRM will be strengthened and integrated in a mutually reinforcing way with formal research. Poor rural women will be important participants in and beneficiaries of research. The development and adoption of diverse germplasm will be greatly accelerated in major food crops.

Milestones:

2004 Programmatic collaboration undertaken with at least two CGIAR Challenge Programs and at least one non-CG regional program. Publication and dissemination of an analysis of impacts of different PR approaches under contrasting conditions. Two case studies undertaken assessing the impact of applying gender analysis.

2005 At least five CGIAR centers with partners incorporate PR into core (mainstream) PB and/or NRM programs. Action research undertaken and tools developed for enabling scientists to capture product and process impacts , and to integrate learning from IA into research planning and adaptation.

2006 A core capacity in the CGIAR to conduct PR has been institutionalized in terms of people trained in the methods, changes implemented in research organization, multi-year funding committed and institutional policies adopted, such that the scientific use of PR is an organic part of research, project design, staff recruitment and capacity building in the CGIAR.

Users: Poor rural women farmers, poor farmers in general, CGIAR centers, NARIs, NGOs, and rural grassroots organizations.

Collaborators: IARCs, NARS, NGOs, grassroots organizations, universities.

CGIAR system linkages: Enhancement & Breeding (25%); Crop and Livestock Production Systems (18.8%); Livestock (6.3%); Protecting the Environment (30%); Training (8%); Information (8%); Organization and Management (2%), Networks (2%). I am not sure what this refers to. However, if you like, we could provide an annex of a table that lists all our partnerships (CG and non-CG and the nature of those partnerships. Let me know.

CIAT project linkages: IP-2 (CIAT-Africa, Beans), IP-3 (includes CBN? If so, yes.), PE-2 (TSBF. If so, yes. Otherwise, no), SN-3 (IPRA), and BP-1 (Impact assessment).
I only have a very old list of the project codes, so I would like to verify that these are correct, or if they need updating.

CIAT: SW-3 PROJECT LOG FRAME (2004-2006)

PROJECT: PARTICIPATORY RESEARCH AND GENDER ANALYSIS
PROJECT MANAGER: ANNA KNOX

Narrative Summary	Measurable Indicators	Means of Verification	Important Assumptions
Goal Improve the competencies of the CG System and collaborating institutions to develop technology that alleviates poverty, improves food security, and protects the environment with equity	Increased capacity to use PR-GA in at least 70% of the IARCs at the end of 5 years, with at least 2 senior scientists in each of these Centers specialized in PR-GA methods, and at least 5 trained in the approaches. Use of PR-GA integrated into CG system and partner institutions' core research. PR-GA incorporated into organizational policies and practices of at least 5 IARCs at the end of 5 years.	Program monitoring and assessment of use of PR-GA approaches by IARCs and their partners, including institutional analyses of mainstreaming and process outcomes. Program monitoring and assessment of PR-GA capacity in the IARCs External review reports Reports of collaborating institutions	CGIAR centers and partner institutions willing to commit staff and budget to using PR-GA, to contribute to capacity building, and to integrate PR-GA into their core research agenda.
Project purpose Assess and develop methodologies and organizational innovations for gender-sensitive PR and mainstream their use in plant breeding (PB), and crop and natural resource management (NRM)	Impact of PR-GA on technology development processes and research organization documented in multiple studies as result of appropriate use of PR-GA, from which improved benefits for rural poor and women can be projected Effective methods developed and disseminated for PR-GA in technology development and institutional innovation; methods recognized and understood by relevant senior management and staff; and being applied appropriately by at least 70% of IARCs supported by Program research and capacity building at the end of 5 years Collaborating IARC, NARS, and other projects with gender-sensitive stakeholder or farmer participation incorporated in the organization and management of the research process	Program publications; IARC annual reviews, reports and publications Published results of Program's impact studies Results of Program partnerships. External review reports Reports of collaborating institutions	Donor commitment to the Program constant over the 5-year period IARCs and other institutions collaborating with the Program able to include results in their institution's reports and annual reviews Stakeholders willing to contribute actively to Program planning and evaluation Collaborating institutions able to include results

Narrative Summary	Measurable Indicators	Means of Verification	Important Assumptions	N
Overall Output I Evidence of the impact of PR methods assessed; and methods developed that enable IA results to be effectively integrated into R&D decision-making				
Specific Outputs 1. Empirical studies on participatory research methods in PB and NRM assessed.	At least 5 partnership studies undertaken and published as working documents and in professional journals, plus an analysis of impacts of different PR approaches under contrasting conditions, including biophysical, institutional and policy environments. Publications on results and impact of methods disseminated to CG liaisons (to disseminate to Center scientists), PNRM and PPB working groups, CG libraries and donor community. Twice a year, a list of all PRGA Program publications and website address sent to CG DGs for distribution. Research briefs and powerpoint presentations prepared succinctly highlighting impact assessment results and widely disseminated to IARCs, NARs, and NGOs. Workshops to exchange results conducted Impact assessment tools developed and training materials available	Impact assessment studies and methods. Program publications, briefs, presentations, journal articles, books, program Webpage Annual reports, workshop proceedings, program Webpage	Willingness of IARCs and partner institutions to collaborate in impact assessment. Availability of funding to conduct empirical studies.	
2. Tools and methods developed and disseminated that enable scientists to capture product and process impacts, and integrate learning from impact assessment into research planning and adaptation (learning and change.)	Collaborative action research conducted with at least 5 partners, to develop, test and assess methods for - improving information resulting from IA (product and process impacts) - identifying IA objectives and IA tools to achieve them. - assessing the contribution of IA to organizational learning and change. Studies and guidelines are widely disseminated to IARCs, NARS, and NGOs. Capacity development through trainings, consultancies, and learning workshops.	Published studies on IA tools and methods and assessments of their effectiveness in improving the usefulness of IA and stimulating organizational learning and change. Annual reports, collaborator reports, Program Webpage.	Interest and willingness of partner institutions to participate in action research. Interest of funding partners in supporting these initiatives.	

Narrative summary	Measurable Indicators	Means of Verification	Critical Assumptions
Overall Output II Use of participatory approaches and gender analysis mainstreamed in public sector agricultural research			
Specific Outputs 1. Opportunities and constraints for mainstreaming PR-GA approaches into agricultural research institutions identified and strategies developed to institutionalize these approaches.	Action research undertaken with 8 IARCs or partner institutions and studies published. 5 internal working groups formed to spearhead the organizational change process and mainstream PR-GA in their respective institutions. Mentoring and capacity building provided to partner institutions to guide and lend support to the mainstreaming process.	Program publications, journal articles. Collaborator reports and publications. Annual report and PRGA Webpage.	Willingness and interest of partner institutions to engage in action research for mainstreaming PR-GA and organizational change. Interest of funding partners to support action research and capacity building.
2. Partnerships formed with organizations that enable the PRGA Program to have a major impact on 1) integrating PR-GA into agricultural research practice and 2) enhancing methods and approaches – that contribute to improving the livelihoods of the poorest, particularly rural women.	Robust partnerships are formed with Challenge programs, regional networks and prominent national partners that (have the potential to) have a considerable impact on the rural poor. The nature of collaboration takes the form of either 1) exploiting synergies in objectives, 2) opportunity to considerably expand the integration or improve the quality of PR-GA practiced, or 3) incorporate PR-GA approaches where they would otherwise be absent or weakly applied. PPB and PNRM working groups are engaged in the partnership process and this is reflected in their workplans.	Collaborator reports. Annual report and PRGA Webpage.	Willingness and interest of potential partner institutions to collaborate with the PRGA Program. Interest and willingness of working groups to collaborate with different partners, with support from the Program. Interest of funding partners to support fruitful engagement with partners.
3. Capacity of IARC and NARs scientists to use good practice PR, GA and impact assessment, and organizational development methods is considerably strengthened through training of trainers.	Methods workshops held for PR, GA, and IA, training a minimum of 80 trainers in a variety of good practice approaches; and follow-up support extended to trainers to enable them to provide training and technical support to scientists in their institutes. Manuals produced on good practice in PR, GA and IA, based on workshop outcomes.	Workshop summary reports. Manuals produced from workshop outcomes. Annual report and PRGA Webpage. Collaborator reports.	Interest and contribution of budget and human resources by Centers and NARs to participate in workshops and host local follow up trainings.

Narrative summary	Measurable Indicators	Means of Verification	Critical Assumptions
Overall Output III Gender analysis and its results integrated into agricultural research planning and practice with the objective of fostering the development of considerably more technologies that are valued and adopted by women			
Specific Outputs 1. Effective methods and capacity for using gender and/or stakeholder analysis, developed	Field training manual for gender analysis in agricultural research developed and widely disseminated. This document should also provide a brief review of existing GA methods and draw on best practice in developing guidelines. Gender Analysis page of PRGA website developed to include a wide range of gender analysis tools and resources. Training of trainers workshop held focusing on best practice gender analysis methods (see Output II, no. 3.	Published field manual. PRGA website, Gender Analysis page. Annual reports. Training reports.	Willingness of PRGA community to contribute and review gender analysis tools and resources. Interest of funding partners in supporting capacity building. Willingness of IARCs and partner institutions to commit budget and human resources for internal capacity development.
2. Effects of using gender and/or stakeholder analysis in technology development assessed	Results of research published and disseminated on effects of differentiating users by gender and other characteristics, on adoption of PPB and NRM technologies by different groups, and IARCs and/or partners using results Results of research published and disseminated on effects of differentiating users by gender and other characteristics on design of PB or NRM technologies, and IARCs and partners using results	Program publications. PRGA Webpage Annual reports	Interest and willingness of partner institutions to participate in impact assessment studies.
3. Opportunities and constraints for mainstreaming gender into agricultural research are identified and strategies developed to enable institutionalization.	System-wide study undertaken to understand why gender has failed to be adequately addressed by IARCs and NARs research, and opportunities for reversing this trend. Collaborative action research undertaken and strategic gender partnerships formed (e.g. CG Gender and Diversity Program; Himalayas Network). See Output II, no. 1 and 2.	Program publications/PhD dissertation? PRGA Webpage Annual reports Collaborator reports.	Identification of a PhD student/resource person to carry out the study. Interest and willingness of partner institutions to participate in action research. Interest and willingness of Challenge Programs, regional networks and national programs in partnering with PRGA, including commitments of budget and staff time. Interest of funding partners in supporting study, action research and strategic partnerships.

Narrative summary	Measurable Indicators	Means of Verification	Critical Assumptions
4. Tools developed that go beyond generic gender diagnosis and analysis to a) enable the design of tailored analyses, and 2) guide researchers in interpreting gender analysis results so as to effectively address their implications in research planning and adaptation.	Action research studies undertaken with at least 3 partner organizations, and results reported. Guidelines developed and disseminated for tailoring and interpreting gender analysis and incorporating its implications into research.	Program publications and journal articles. Annual report and PRGA Webpage. Collaborator institution reports.	
Overall Output IV PRGA Program research findings reach a large and diverse audience, and are particularly read and used by IARC and NARs scientists			
Specific outputs 1. PRGA interactive website launched and attracts a large and diverse range of users who not only read, but also contribute to the site content.	Site developed that is user-friendly and accessible to users in developing countries with slow modem connections. Site contains a rich set of research findings and resources that are relevant to users, and is regularly updated.	Monthly website statistics: no. of hits, visitor sessions and downloads.	Users have the interest and the time to contribute to website content. Identification of a qualified individual (Communications Officer) to manage and update the site content. Donors interested in providing support for the technical development of the new site and Program capacity for communications.
2. Awareness of PRGA research results and other publications is considerably increased, particularly among agricultural scientists.	Systems in place to regularly publicize new PRGA research results via PRGA-Info, web-publish them and disseminate printed copies to authors, donors and CG libraries. PRGA liaison regularly forward PRGA publicity to their Center scientists. New sources of distribution are identified. PRGA-Info email listserve membership doubles to 800 members.	PRGA-Info listserver membership (number and profession). Monthly website statistics, particularly downloaded publications. Requests for hardcopy publications, including from scientists who are not members of PRGA-Info.	Capacity to strengthen relationships with PRGA liaisons and assure their commitment to disseminating PRGA information. Identification of a qualified individual (Communications Officer) to engage in awareness raising. Donors interested in providing support for Program capacity for communications.
3. Research results published in media favored by non-academic audiences and researchers not well acquainted with the PR-GA field.	Packaging of research results in 1-2 page brief forms, disseminated in hardcopy as well as electronic form. Mailing list built that includes IARC and NARs scientists, NGO practitioners, civil society organizations, and policymakers.	Mailing list membership for briefs (number and profession).	Donors interested in providing support for Program capacity for communications and mailing costs. Identification of qualified individual (Communications Officer) to prepare briefs from PRGA research publications.

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 Hidrologia, Meteorologia 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