PROJECT PE-3

COMMUNITY MANAGEMENT OF NATURAL RESOURCES IN HILLSIDE AGROECOSYSTEMS OF LATIN AMERICA

ANNUAL REPORT
OCTOBER 2001

CIAT
Centro Internacional de Agricultura Tropical
International Center for Tropical Agriculture

Colette Girard

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When the Board of Trustees visited the reference sites of the CIAT Hillsides project in Central America in June this year, Collette Girard, the Board Member who has accompanied and helped us for the last five years, captured in her notebook the beautiful view from her room in Yorito. We wish to thank her for all her support and the insightful interpretations she has always made of our work, and for offering us the chance to give our Annual Report a meaningful cover.

Project PE-3: Community Management of Natural Resources in Hillside Agroecosystems of Latin America

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Executive Summary

Executive Summary

This year we have had to deal with a second disaster – that of drought - following Hurricane Mitch. In a way this has forced us to see the necessity of including in our strategy, activities on disaster relief that are more research oriented and long lasting. Disaster relief, and not just research for development, has to be included into the agenda as part of our research and for immediate impact. A disaster prevention and response demonstration product is being developed (see 2.3.6) that will be of use in this area. The Atlas of Honduras (see 4.2.2) has seen much of its use related to Hurricane Mitch relief and response. We need to bring geographic information to bear on the problems of hazard response and planning.

Last year, we identified that farmers first want food security and then seek alternatives that produce extra income. We are working on both these fronts. New materials, particularly of maize and beans, continue to be evaluated by researchers and by local groups and we are now introducing the idea of drought tolerance to help cope with climate change. The strategic research of CIAT in the SOL has one of its focuses on the use of multiple species to improve producers' food security and crop capacity to be integrated into the market (1.2.1). Drought tolerance is also investigated at SOL sites (1.2.2, 1.2.5, 5.1). The CIALs are being strengthened and empowered with new components of annual crops to diversify their systems of production to improve food security (1.3.1). See also 2.4.2 the food security project, 3.3.2 for work in the Tascalapa River watershed, and 5.4.2 for the FAO-CIAT agreement involving improved food security.

We have looked further into the multi-scale approach to the region. We believe that we have to work on different scales—plot (Output 1), watershed (Output 2), and regional and national (Outputs 3 and 4)—and have to facilitate the connection between these different scales. We have work progressing at each of these levels. We have to develop strength at the local and landscape levels if we wish to have products that influence decision making at the larger scale. At the same time we must produce tools and information to facilitate decision making at larger scales (see under 2.2 and 2.3).

For long-term sustainable impact we need to extend our work with the present adult population by targeting younger people, to empower young people by providing accurate and relevant information and involving them in technological advancement and the decision-making processes in the areas where they live. A project to develop research by youth groups in food security and natural resource management (NRM) using participatory methodologies and simulation models has begun (4.3.2). Through this project we are contributing to the early involvement of rural youth in research, leading to the discovery and/or adaptation of practices for better food availability and NRM.

We are moving towards globalization, working with many principles that can be generalized and are not specific to the Central American countries where we are working. We are stretching out towards Haiti (approved funding see 5.6.1), and Bolivia and Africa (development proposals). The idea is to take some of the more general "winner" technologies as a starting point to connect

existing work from CIAT to CIAT-Africa and/or partners in other places. A cash problem is causing delay, and new activities in new geographic places always require more initial inputs.

We have made every effort to fulfill the project work plan, but activities were affected this year because several staff members left the project, thus significantly constricting activities planned in Outputs 2, 3, and 4. Another restricting element was the drastic reduction of about 35% in the 2001 operating budget. This had strong impacts on all project activities, but especially those of Vicente Zapata (Output 3). For these reasons, we decided to concentrate our economic and human resources on the activities reported here.

We believe that our work is not just that of PE-3, but rather calls on the strengths of other CIAT projects and partners as well. These help us produce inputs to the five different capitals (natural, physical, economic, human, and social). An integrated approach of activities that contribute to the five capitals can lead to a more holistic advance towards our goals. We need to identify, include, and push forward with partners the activities that are "winners" – those we feel will move us ahead. An example of what could lead us into an upscaled impact would be the integration of geographic information systems (GIS), monitoring and evaluation (M&E), drought tolerance, training, and formation of seed enterprises. This group of activities could effectively deal with the situation of disaster and lead into upscaling.

Our major highlights give a summary of main achievements this year. We are looking forward to a new CIAT structure that will better aggregate the strengths of the Center and that will allow CIAT projects to move together beyond our present boundaries.

Project PE-3: Community Management of Natural Resources in Hillside Agroecosystems of Latin America

Objectives: To improve the standard of living and food security of hillside farmers in tropical America, and make their interaction with the environment more sustainable.

Outputs:
(1) Improved production systems, (2) More sustainable landscapes, (3) Strengthened organizations, (4) Decision makers supported, (5) Efficient and participatory management system of the project.

Gains: Farmers and locally organized producers use technologies, tools, and methodologies developed by CIAT and its partners at the level of reference sites. Results are sustainable, production systems profitable, land use improved, and natural resources preserved at the landscape level. Partner organizations use technologies, tools, and methodologies developed by or with the project for their planning and activities at local, national, and regional levels. Decision makers at different levels have more information, tools, and methodologies, provided by the project, to support their planning, monitoring, and decisions.

Milestones:

2001: *Impact*: Sustainable and profitable production systems, improved land use, and natural resource preservation on farms, spreading to the landscape within reference sites. *Strategic research*: Partner organizations use the project's outputs for their activities at local, national, and regional levels.

2002: *Impact:* Sustainable and profitable production systems, improved land use, and natural resource preservation at the landscape level within reference sites. *Strategic research:* Decision makers at local, national, and regional levels use the project's results for their activities.

2003: Impact: Sustainable and profitable production systems, improved land use, and natural resource preservation on farms, spreading to the landscape beyond the reference sites. *Strategic research:* Decision makers at local, national, and regional levels use new results from the project for their activities.

Users: Farming families and rural communities of the Andean and Central American hillsides. Project sites profit from increased community action aimed at sustaining the productivity of the resource base. As a result, off-site stakeholders benefit. National and international development organizations involved in priority setting and investments in development.

Collaborators[1]: SDC, IDRC, DGIS, CIMMYT, CIP, IFPRI, IWMI, IICA, PASOLAC, CARE; universities of Florida, Wageningen, Edinburgh, Guelph, Nacional Agraria (Nicaragua); CURLA (Honduras); DICTA, INTA, CONDESAN, CIPASLA, Campos Verdes, CLOs, CIALs, individual farmers.

CIAT project linkages: Collaboration with the Ecoregional Program for Tropical Latin America, soils (PE-2), land use (PE-4), smallholder systems (PE-5), agroindustries (SN-1), participatory methods (SN-3), forages (IP-5), and impact assessment (BP-1) projects.

[1] See page 131 for acronyms in full.

Project PE-3: Community Management of Natural Resources in Hillside Agroecosystems of Latin America 2001

Project Objective
To improve the standard of living and food security of hillside farmers in tropical America and make their interaction with the environment more sustainable

Output 1

Production systems improved

1.1 Ex-ante evaluate improved system alternatives (identify markets, perform simulation modeling)

1.2 Identify new alternatives for improving production systems

1.3 Validate new alternatives and improved practices

1.4 Promote and support multiplication of successful alternatives validated at farm level

1.5 Monitor and evaluate the adoption of validated improvements

Output 2

More sustainable landscapes

2.1 Benchmark status report at the landscape level (study land use, analyze sustainability)

2.2 Ex-ante evaluate alternative scenarios of landscape management

2.3 Develop and apply the methodological tools for natural resource management at landscape level

2.4 Promote and implement consortia for landscape management

2.5 Strengthen participation of grass-roots organizations in consortia for landscape management

2.6 Monitor and evaluate landscape changes

Output 3

Organizations strengthened

3.1 Develop and/or validate methods and tools for developing and strengthening key organizations

3.2 Train local, regional, and national organizations in the use of methodologies and/or tools developed by CIAT

3.3 Strengthen small-scale producers, managers, and local, regional, and national organizations through participatory investigative methods

3.4 Support, through incorporating processes of participative investigation, local organizations oriented to agricultural research

3.5 Promote and support interinstitutional plans for sustainable rural development

Output 4

Decision makers supported

4.1 Identify, at different levels, decision-makers related with project tasks and diagnose their needs

4.2 Support decision taking at different levels using the information, tools, and methods generated by the project

4.3 Strengthen capacity for management and use of information, tools, and methods (train, diffuse, and follow up the process)

4.4 Provide technical support for decision taking

Output 5

Efficient, participatory project management

5.1 Foster the active participation of partners in the planning of project activities in the region

5.2 Actively and permanently coordinate the reference sites, projects, and individuals working in the region

5.3 Maintain an efficient information system of the project with its partners

5.4 Strengthen joint work with other projects and organizations

5.5 Establish a participative system of monitoring and evaluation of the project to monitor its performance and feed back to planning

5.6 Establish an efficient and participatory administrative system within the project

5.7 Establish a system of efficient administration

PE-3 Logframe Work Plan, 2001-2003[a]

Narrative summary	Measurable indicators	Means of verification	Important assumptions
Goal To improve the standard of living and food security of hillside farmers in tropical America and make their interaction with the environment more sustainable.	• Reduced infant mortality • Reduced maternal mortality • Reduced soil erosion • Improved water quality in rivers and streams • Increased income (monetary and/or in kind)	National and local statistics Local research	The environmental, social, economic, and political conditions, on a macro level, are maintained.
Purpose To strengthen local processes of sustainable rural development in the hillsides of tropical America, based on the experiences of natural resource management at benchmark sites.	• Groups residing at five work sites in Honduras and Nicaragua successfully implement land management initiatives consistent with those ones validated by the project and its partners • At least 15 key entities of the region have access to at least three tools and methods developed by the project	Field verification Institutional reports	Local partners continue project-related activities. Donors remain interested in the proposed project objectives and continue to give support.
OUTPUT 1 **Improved production systems.** Farmers use technologies developed by CIAT and its partners to establish sustainable and profitable production systems.	• Screening alternatives in demonstration parcels in San Dionisio, Yorito, and Cabuyal ("Supermarket of Options for Hillsides") • Validating alternatives in at least 25 CIALs in San Dionisio and Yorito • Alternatives adopted by at least 100 farmers at project work sites • Successful alternatives being transferred to at least 12 sites other than the initial work sites	Field verification Project reports CIAL reports	That climate variability is normal.
OUTPUT 2 **More sustainable landscapes.** Land use has improved across the landscape because locally organized farmers are using the tools and methods developed by the project and its partners.	• Three local consortia of NRM operating at work sites in Honduras, Nicaragua, and Colombia • Five local consortia of NRM in formation at other sites of Central and South America • Stable water quality (sediments and contaminants) as integrating indicator of the status of natural resources in at least three watersheds at the work sites • Environmental monitoring initiated in at least two work sites in Honduras and Nicaragua	Consortia reports Monitoring reports	

Continued.

a. For acronyms and abbreviations, see page 131.

PE-3 Logframe Work Plan, 2001-2003[a] (Continued).

Narrative summary	Measurable indicators	Means of verification	Important assumptions
OUTPUT 3 **Strengthened organizations.** Local and national organizations involved in sustainable rural development at various levels (site, national, regional) use the technical and methodological resources developed by the project in their decision making and other activities. Interinstitutional coordination is enhanced.	• At least 25 CIALs operating at project work sites • At least 30 CIALs in formation at other work sites in the region • At least 20 national technicians trained and promoting CIALs	CIAL reports Training reports Institutional reports	
OUTPUT 4 **Decision makers supported.** Decision makers at various levels use and have access to more information, tools, and methods to use in decision making, planning, and monitoring.	• At least two technicians of each collaborating institution trained and using tools developed by the Project and its partners • Digital information (CD-ROM and Web site) available and accessible in Honduras and Nicaragua, and in process in other countries • Local decision makers at the level of three municipalities with access to site-specific information on natural resources and trained to use this information		
OUTPUT 5 **Efficient, participatory project management**. Different internal and external partners directly participate in project management to ensure adequate and efficient use of the project's resources.	• Plans and reports opportunely prepared and approved by previously established authorities • Partners are well informed and actively participate in fieldwork at the project sites (local consortia) or elsewhere • National hillside consortia operating in Honduras and Nicaragua • Regional hillside consortium operating • Experiences and lessons learned by the project and its partners disseminated in Latin America through different channels (e.g., networks, publications, meetings) • New projects adopt methods, techniques, and experiences generated by the project and its partners	Planning documents and reports Proceedings of Consultative Group and Executive Committee meetings Reports of members and consortia Dissemination materials and project reports Direct verification through networks and consortia	

a. For acronyms and abbreviations, see page 131.

Major Highlights 2001

Output 1 Production systems improved

The SOL is an initiative of the CIAT-Hillsides project to develop technological options that are economically viable and environmentally sustainable and to offer these to technicians, producers, and institutions. The experience generated by the alternative cropping systems work in the Colombian hillsides is an ingredient to the SOL in Nicaragua and Honduras. This year we are highlighting results from the SOL in Honduras. The participative evaluations with producers in Honduras performed in the grains and legume nurseries accelerated the knowledge and adoption of forages. Fifty-two producers have been testing improved grains and 37 forages, and 68% of producers are using their plots for seed multiplication. The criteria that producers most utilized in the process of selection were abundance of foliage, quick growth, tolerance to drought, multiple uses, cover, and soil composting. Producer interest in legumes increased during this year. This is reflected in an increase of requests for seed.

In order to support the formation of two PES prototypes in the Honduras reference site to produce improved seed for the upper and lower parts of the watershed, organized producers were incorporated into the multiplication of promising materials from the SOL. The project is being executed by two groups of producers in the Department of Yoro; the first group started with six CIAL members and was established in 1999, the second was established in 1996 with the participation of 26 partners. Both groups produced about 2.4 tons of pure seed, which was sold to 113 producers of the region. Producers were highly satisfied with the yields and the economic benefit that came from the sale of improved seed. Producers of the region had a high demand for seed.

The monitoring system implemented in the SOL site in Yorito, Honduras is permitting us to evaluate the efficiency of the SOL as a mechanism and exchange of knowledge and of materials with the producers of the region. It also permits quantifying the demand for technologies and the costs of production. The aim is to systematize the information generated through the visits of producers at SOL and from the activities of evaluation and exchange of materials and knowledge. During the monitoring period, 21 events were registered with producers of different communities of Yorito, Sulaco, and Victoria, and the participation of 316 men and 57 women.

Output 2 More sustainable landscapes

A georeferenced database is available of the edaphic resources of the watersheds of the Jalapa and Luquigüe Rivers. The object was to update the taxonomy of the soil of the study area through the knowledge of its internal and external characteristics both physical and chemical. Most of the area studied has a steep topography with slopes greater than 60%. For this reason we recommend maintaining an adequate forest cover and agroforestry systems. Minimal farming and the use of soil conservation systems are required for the sustainable exploitation of areas with agricultural possibilities. A database is also available of daily rainfall and distribution in the Tascalapa River watershed, Honduras. We determined the variation in daily precipitation at watershed level by means of community participation that supports the systematization of information and that serves as backup in decision taking at local level. In the Tascalapa

watershed, we found that the change in the quantity of rainfall can be differentiated and predicted according to altitude. The monthly distribution of rainfall conditions crop sowing-dates, which begin in May and end in October. Two production cycles can be sown.

The Comité Local para el Desarrollo Sostenible de la Cuenca del río Tascalapa (CLODEST) is an organization that groups together farmers taking decisions at landscape level. Work with CLODEST has been towards assuring the sustainability of the interinstitutional consortium through obtaining Legal Title, jointly developing projects, and the operation of working committees and self-management of funds. This has helped the empowerment of farmers whose decisions can affect the landscape. As a result of the strengthening of CLODEST, changes in the operation of its organizing structure were generated, especially for committee-level work. At the same time, the management of funds and interinstitutional coordination was improved.

Output 3 Organizations strengthened

The preparation, revision, and approval of Action Plans for follow-up purposes are part of our training strategy. This year a major effort was made in terms of following up the Action Plans (18) prepared by members of institutions attending the training events. The nongovernmental organization (NGO), Ecofuturo, worked intensively with 10 communities of Bolivar, Valle, Colombia in the application of four of the decision-support (DS) instruments. These communities in turn prepared Action Plans that were consolidated by Ecofuturo, in consensus with the communities, and later presented to the Mayor of Bolivar for his consideration. He has included this plan in the municipal agenda as the "Environmental Plan" for the municipality. CIAT is now lobbying before the State Watersheds Authority (CVC, its Spanish acronym) to motivate this organism to provide the funds for Bolivar to execute the plan.

Trainers in Nicaragua, Honduras, and Colombia were trained to carry out the monitoring and evaluation of Action Plans. In three workshops designed for this purpose, a set of guidelines was presented to the trainer teams that included the guiding principles and the methodology to prepare the instruments to be applied during monitoring and the terms of reference for the preparation of reports. The guide is entitled "Guia para el Seguimiento de Planes de Acción". As a result of the training, a set of instruments was prepared with the participation of trainers and CIAT professionals in charge of training activities. The tools were used during visits to Action Plan sites and were the basis for writing the ex-ante reports. We expect that this methodology and the instruments will be adjusted to the needs of African Action Plans now underway and will be applied during ex-ante visits at the beginning of next year.

Indicators of progress for organizational processes were developed for CLODEST in Honduras and Campos Verdes in Nicaragua as support tools for decision taking for local strengthening. The establishment and order of this series of indicators, validated at the level of the local organizations, makes it possible for these to carry out monitoring before their activities. As a result of their own analysis they can also evaluate their organizational processes more precisely. These indicators also permit us to systematize the information and help the communities improve decision taking with regard to their resources. The work on indicators with local organizations and consortia is a start to constructing a methodology of the causal routes of impact and indicators of activities.

Output 4 Decision makers supported

An important function of the coordinators at country and reference site levels is that of promoting events and participating in workshops to identify demands of research, training, and development that the project can contribute to resolve. Demands at local level were identified through planning workshops and presentation of SOL results. At national and regional levels we have participated in forums and meetings organized by national institutions and development projects. An inventory of project partners' demands was identified at local, national, and regional levels, and strategies of contribution were implemented. A greater compatibility exists among project activities and the demands perceived by producers and institutions that work in the area of agriculture and NRM. However, the low availability of resources limits the project's capacity to attend these demands in a much more effective form. Punctual training was supported on the use of decision tools at the request of the project's partner institutions. Thirty institutions or organizations were given training in Honduras, 23 in Nicaragua, and 5 in Colombia.

A Documentation Center was established in Yorito on February 16th this year. It aims to provide useful information to local stakeholders on topics relevant to the management of their natural resources, to train the local community in the use of computers and information, and to make DSS available at the local level. In the Center, people from the community are able to access technical documents about agriculture, the environment, food processing, woodwork, and administration. The main targets are technicians, and students from primary schools and high schools. We hope to reach farmers also, either directly or indirectly.

The use and impact of the Atlas of Honduras were evaluated with a questionnaire and interviews – an empirical component and a descriptive approach. This combined methodology has been recommended for information technology studies. Respondents to the questionnaire belonged to several organizational types, 75% were from either the natural resources management or agricultural sectors; other sectors were included in the survey to a lesser degree. Seventy percent of respondents considered their knowledge of GIS fair, good, or very good, while 30% indicated that their knowledge of GIS was poor or very poor. For many of the latter, the Atlas was their first exposure to GIS. The Atlas had a very positive impact on decision making largely because users were able to obtain information pertinent to their work. In many cases, the information in the Atlas indirectly supported decision making. Technicians, analysts, and decision makers alike perceived the Atlas as a useful tool.

Output 5 Efficient, participatory project management

In fostering the active participation of partners in the planning of project activities in the region, an exchange of research results has begun. Germplasm exchange was effected with partners in the reference sites in Honduras and Nicaragua. A general policy for germplasm distribution was established in which every institution that is participating actively in the SOL Sites Network would be able to freely acquire seed for verification trials of varieties. The SOL Sites Network was implemented at the level of the Tascalapa River watershed in Honduras. The SOL research model is beginning to show positive results in the integration of activities among institutions and the generation of improved options. Several of the materials selected in the SOL are already in the hands of producers.

The CIAT Web site in Cali is being redesigned and brought up to date with project information based on changes carried out by the Communications Unit. A user-friendly interface is available on the Hillsides Web page for consultation on the Cabuyal River watershed. Our Central American Web site gives access to partners in the region to the information generated by the project through a new Web page, which can be accessed at http://www.123.hn/ciathill.

Potential donors were identified for the project activities in Honduras and Nicaragua, and the development of specific proposals was initiated. Good possibilities exist of obtaining resources for the project, especially through the European agencies of cooperation in Nicaragua. The Hillsides Agricultural Program in Haiti (HAP) was approved for funding by the United States Agency for International Development (USAID) through Development Alternative Inc. (DAI), which is subcontracting CIAT. Our contribution to this project consists of a combination of outputs between germplasm (beans, cassava, and forages) and NRM projects (Hillsides and punctual contributions from other NRM projects). Other possibilities are being followed up with the Swiss Development Cooperation (SDC), International Development Research Centre (IDRC), and partners in Bolivia and in Africa.

Output 1 Production systems improved

1.1 Ex-ante evaluate improved system alternatives (identify markets, perform simulation modeling)

1.1.1 Socialize with producers the results of production models at farm level

Highlight

✓ Model of optimization of market options validated with producers

Objective

- Evaluate the utility of linear programming models to decide the options that adjust best to the resources of the producers

Methods and Materials

This year, last year's results were validated with a sample of producers from different communities in Yorito. The work consisted initially in compiling information through interviews of closed type with selected producers that represented the three typologies and the three types of access used for the development of the models. The information collected was: (1) availability of capital, land, and labor; (2) productive activities in the farm; (3) sale prices of products; (4) yields; (5) production costs; (6) labor used in each production stage; (7) destination of the products; and (8) number of processors.

To better estimate the potential of new options in increasing the income of producers, the options were evaluated in several stages:

(1) Design and development of base models of each farm before evaluating new production options;
(2) Evaluation of the new short-cycle options introducing them into the base models to be able to make recommendations for short-cycle options;
(3) Sensitivity analysis of availability of capital for the adoption of the new short-cycle options;
(4) Sensitivity analysis of the availability of capital for evaluating all the options (short-cycle crops, perennial crops, and milk products); and
(5) Evaluation only of options most preferred and classified as good by each category of producers.

Indices of erosion for the different crops were introduced to the models developed with the purpose of evaluating the potential erosivity of the new production systems.

Results and Discussion

If the adoption of the new options is accompanied by an efficient commercialization, the maximum monetary incomes obtainable with them are greater than the maximum incomes possible with the present systems. Overall, considering the producers' optimum use of the available resources at present, the model generates tomato and avocado as the most

recommendable options. Tomato harvesting is recommended in periods of high prices. In case of greater availability of capital for investing in the other options, the models evaluate milk products as a more profitable option. However, their feasibility depends on an increase in the availability of liquid milk in the zone because producers have not the capacity for dairy cattle on their farms.

Within the more profitable options are semi-mechanized bean production, sweet chili, cassava, red onion, plantain, and cabbage. However, these require the optimum combination of soil, capital, and labor resources that producers have. The sensitivity analyses of the options generated by the models indicated that the net incomes obtained with the promising options are sensitive to different coefficients of aversion to risk. The models developed can be useful tools for planning the adoption of improved systems at farm level, taking into account the producer's resources. Nevertheless, other specific restrictions of the individual producer must be included to offer adequate solutions for each case. Similarly, new methods of risk analysis must be adopted.

Contributors: J Escolán (Escuela Nacional de Agricultura [ENA]), B Barbier (Centre de coopération internationale en recherche agronomique pour le développement, [CIRAD]), O Mejía

1.1.2 Validate at farm level the linear programming model for evaluating production systems

This work is initiating and is not reported on this year.

1.2 Identify new alternatives for improving production systems

1.2.1 Participative workshop on the evolution of production systems

Highlight

✓ The development of production systems was defined based on a workshop of reflection with 21 farmers of the communities of the Calico River watershed in San Dionisio

Objective

- Analyze agricultural systems' problems of San Dionisio jointly with producers and to identify the entry points for research in Supermercado de Opciones para Ladera (SOL) sites

Methodology

The methodology used in this work was that of participative reflection. The aim, through this methodology, was that all participants should have the opportunity of expressing their points of view, and to confront them with those of others, in such a way that the conclusions obtained were objective, truthful, and shared by all the participants.

Results

The results of the workshop permitted the identification of several stages in the agricultural development of the watershed. Before 1970, the agriculture of San Dionisio was basically one of subsistence with little market focus. Basic grains such as maize, beans, rice, and sorghum were sown, as well as others of less importance such as cassava, sweet potato, and pumpkin.

Traditional practices for establishing crops were based on the system of cutting down, slashing, and burning. The effects of burning were not so severe given that the plots that were burned in a year were left empty for a certain time (natural fallow). This was possible because pressure was low on land and population. After 1968, the production systems had an important change given that production began commercially using technologies such as the plow and agrochemicals. The government incited this change to favor the increase of production (Green Revolution). According to producers, the soils began to deteriorate with the almost general use of the ox-driven plow. The soils themselves eroded and lost their fertility. This effect, added to continual burning and the impossibility of leaving fallow, led to the loss of the natural fertility of these soils. At present, producers consider the use of fertilizer indispensable for sowing maize. When resources are scarce, they sow bean without fertilizer.

Another factor that has affected crop yields during recent years has been the erratic rainfall distribution patterns. Producers mentioned that it used to rain with more frequency and that now the rains are less intense and less frequent. This has led producers to change their patterns of sowing. Before, only bean was produced in the second season, but now producing bean in the first season (from May to August) is safer.

These results show the necessity of identifying management options that improve soil fertility and minimize the risks of producers facing climatic uncertainties. The CIAT strategic research in the SOL should be focused on identifying options of no burning, of crop rotation components, and of the use of multiple species to improve producers' food security and crop capacity to be integrated into the markets. Also, management systems need to be developed that improve water storage at critical times, and germplasm that is more tolerant to drought needs to be developed.

Contributors: P Orozco, M Ayarza; J Bosco (consultant)
Collaborators: Farmers of San Dionisio

1.2.2 Introduce and participatively evaluate new genetic materials of annual crops in the SOL

Highlights

- ✓ Five new bean materials selected through participative agronomic evaluations in Nicaragua
- ✓ Five new maize materials were selected to initiate a process of verifying and diffusing results in Nicaragua
- ✓ Varieties of bean, maize, rice, and soya were identified that presented desirable agronomic characteristics for the design of new production systems

Objectives

- Determine the yield potential and adaptation of improved bean, maize, soybeans, upland rice, and sweet potato materials to the soil and climatic conditions of the SOL sites in Honduras and Nicaragua
- Evaluate potential acceptance of improved materials by farmers incorporating participatory evaluation methods

Materials and Methods

Traditionally, improved germplasm of the International Centers is delivered to the National Institutions through the Regional Programs. These materials are evaluated at experiment stations and then validated with producers. Within the project's research-action scheme, the materials can enter directly from International Centers to the SOL to do strategic research or through the National Programs to evaluate yield and adaptation (Figure 1).

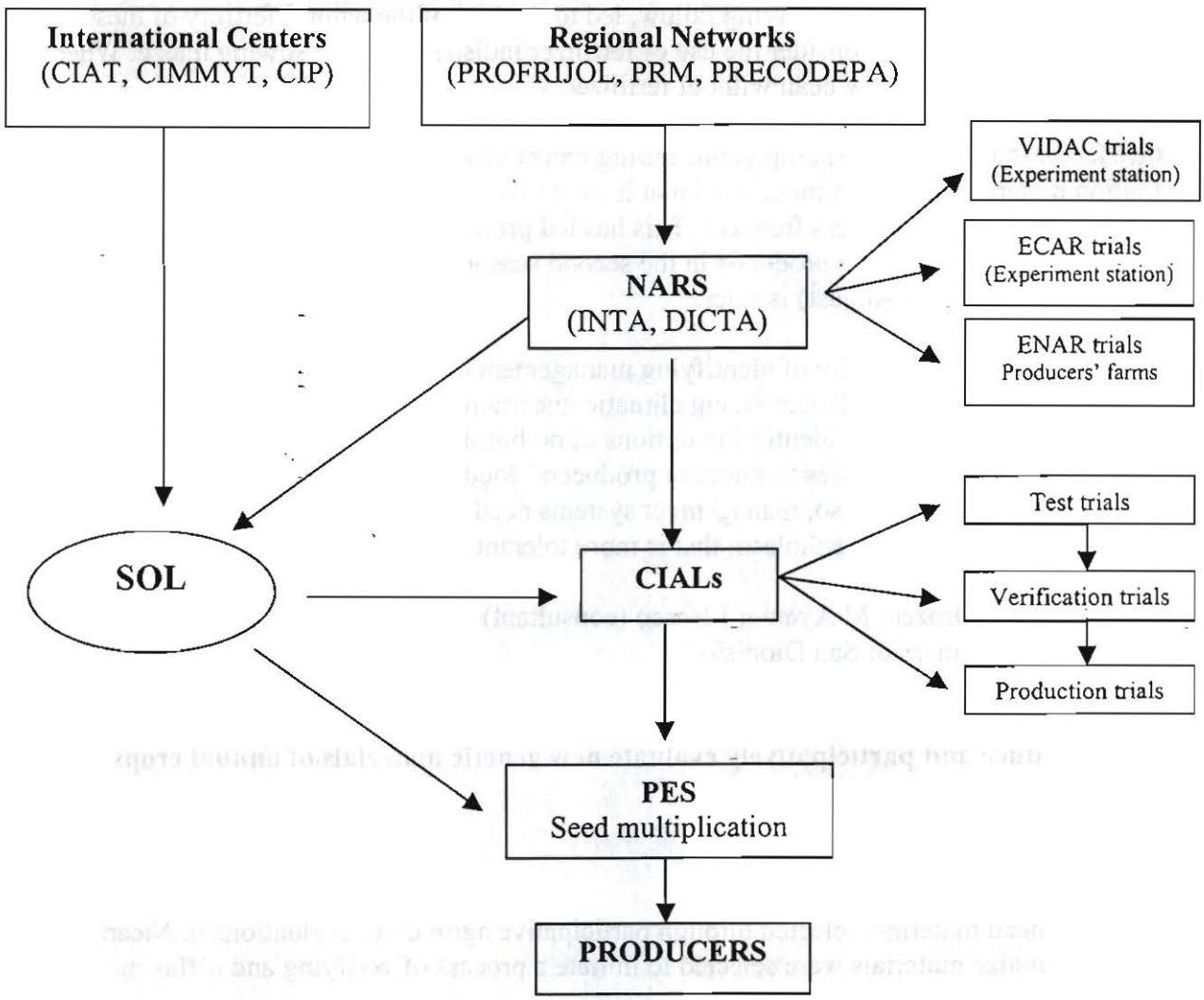

Figure 1. Flow diagram of germplasm of annual crops in the benchmark sites (for acronyms and abbreviations used, see page 131).

These materials are evaluated participatively in the SOL and then taken to producers' fields to continue the process of evaluation by the Comités de Investigación Agrícola Local (CIALs). At the end of this stage, farmers can rest assured that the proposed recommendations have been evaluated sufficiently in the region. The better materials are multiplied by the Pequeñas Empresas de Semillas (PES) and sent out to producers of the region.

Germplasm evaluations were developed in the SOL-Luquigue (636 m, an annual precipitation 1046 mm). Many improved materials of bean, maize, rice, soya, cassava, and sweet potato were evaluated during 2001 (Table 1). The bean materials are part of the Network of the Ensayos Centroamericano de Adapción y Rendimiento (ECAR) of the Proyecto Regional de Frijol para Centro América, México y el Caribe (PROFRIJOL). The maize materials are advanced lines of white maize of intermediate earliness generated by the Programa Regional de Maíz (PRM) and distributed by the Instituto Nacional de Tecnología Agropecuaria (INTA) and the Dirección de Investigación de Ciencias y Tecnología Agrícola (DICTA). The rice materials are commercial rice varieties and drought lines with tolerance to rice blast. The CIAT Drought Rice Project provided these. The collection of sweet potato is composed of local materials and of introduced materials originating from the Centro Internacional de la Papa (CIP). The cassava collection is composed of local materials.

Table 1. Accessions of annual crops tested during 2000-01 in Hillsides Options Supermarket (SOL) sites, Honduras and Nicaragua.

Germplasm	Honduras	Nicaragua
Bean - PROFRIJOL[a] advanced lines:		
SRC 1-12-1	✓	
SRC 1-1-18 (A)	✓	
PCE 9351-8	✓	
PM 9422-3	✓	
DICTA 117	✓	✓
DICTA 146	✓	
EAP 9508-48	✓	✓
EAP 9508-93		✓
EAP 9510-1	✓	✓
EAP 9510-77	✓	✓
EAP 9508-41	✓	✓
EAP 9509-29	✓	✓
EAP 9558-17		✓
PRF 9657-53-14	✓	✓
PR 9653-16b-1	✓	✓
PR 9653-16b-2A	✓	✓
PRF 9657-53-14	✓	
PRF 9659-25 B1	✓	✓
PTC 9558-17		✓
PTC 9557-98	✓	✓
PTC 9557-10	✓	✓
Tío Canela	✓	
DOR 364		✓
ESTELI 150 (Nicaragua check)		
Cocha Rosada (Honduras check)	✓	
Total	20	18

Continued.

Table 1. (Continued.)

Germplasm	Honduras	Nicaragua
Soya – Commercial varieties:		
FHAI-15	✓	
FHIA-24-1	✓	
Obando	✓	
Nandu	✓	
Marlen	✓	
Total	5	
Maize - Tropical white varieties, Intermediate earliness:		
Across 9623	✓	
Across 9649	✓	
Across 9349	✓	
Across 8243		✓
Cotaxtla S 9623	✓	
Cotaxtla S 9649	✓	
Ferke 9449 SR (TIWD)	✓	
ICA V-157# (WSD)	✓	
ICA V-258# (WSD)	✓	
Sinematiali 9423 RE	✓	
Local check - 1	✓	
Local check - 2	✓	
SC3P76N		✓
(RPMxC17)x D8043		✓
SC3P73N		✓
NB-9043		✓
NB-8243		✓
NB-9576		✓
PRAC-736 C2		✓
NIC-5		✓
NB-Perlita (QPM)		✓
Total	11	10
Rice - Varieties and promising lines:		
CR 258	✓	
ICTA Pazos	✓	
IRAT 90	✓	
IRAT 301	✓	
IRAT 349	✓	
IRAT 362	✓	
IRAT 364	✓	
Oryzica C-8	✓	
P 3621	✓	
INTA 1	✓	
P 1048	✓	
CT 945	✓	
Cuyamel 38-20	✓	
CR 2515	✓	
Cubana	✓	
Total	15	0
Cassava -		
Collection of 15 local varieties	✓	
Total	15	0

a. PROFRIJOL = Proyecto Regional de Frijol para Centro América, México y el Caribe.

Management of the trials was according to the protocols defined by PROFRIJOL, PRM, and CIP. All experiments were done in the field in a random block arrangement with three repetitions. The participative evaluations with producers were made during the flowering phase at harvest time. The producers generated the evaluation parameters during the evaluations. Some of the parameters selected for each crop are shown below.

Parameters of evaluation of germplasm of annual crops generated by producers in Hillsides Options Supermarket (SOL) sites.

Soya	Bean	Rice	Maize
▪ Production	▪ Color of grain	▪ Production	▪ Production
▪ Height	▪ Pod fill	▪ Maturity	▪ Plant height
▪ Pod fill	▪ Plant height	▪ Health	▪ Lodging
▪ Grain size	▪ Maturity	▪ Yield	▪ Black color
▪ Lodging	▪ Number of pods	▪ Grain size	
▪ Earliness	▪ Growth habit	▪ Lodging	
▪ Lodges		▪ Grain size	
▪ Good pod fill			
▪ Good height			
▪ Small yield			

Results

Bean - Nicaragua

Significant differences occurred in the yields of the materials evaluated. These varied from 1282 to and 281 kg per ha (Figure 2). Producers selected the materials PTC 9557-98, PRF 9659-25B1, and EAP 9510 and EAP 9509-29. The first three were among the more productive, while the last had low yields, but good grain quality.

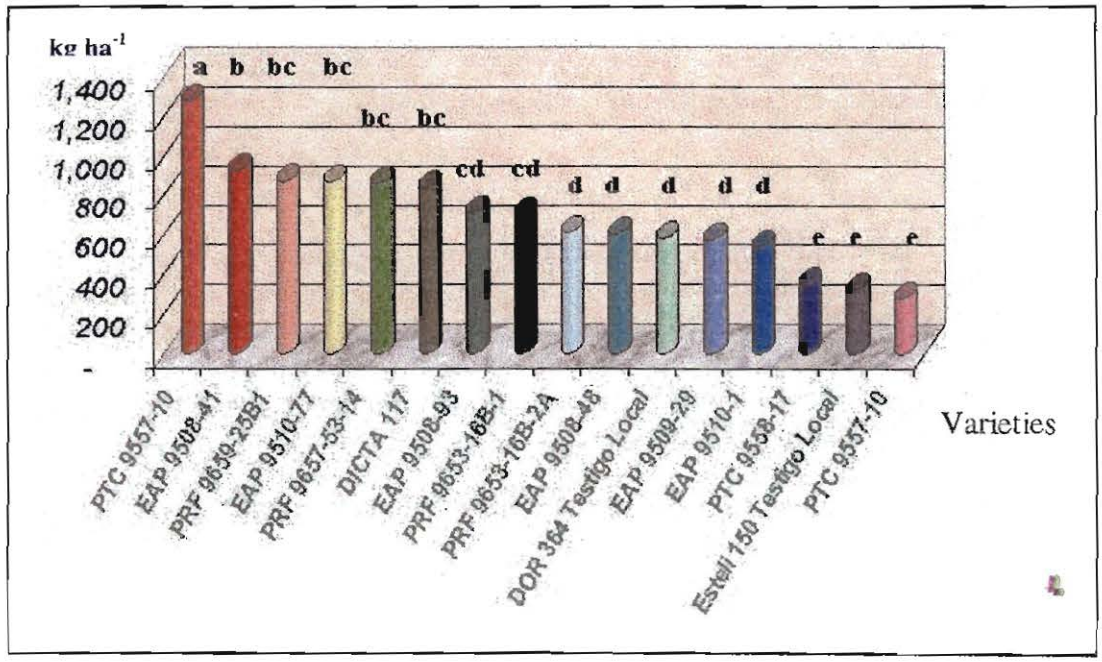

Figure 2. Bean yields of different varieties in Nicaragua (Testigo local = local check).

Based on these results the following materials were selected for a verification trial next year: PTC 9557-98, PRF 9659-25B1, EAP-9510-77, EAP 9509-29, and EAP 9508-41. These will be compared again with the variety DOR-364, which is currently the most diffused in the zone.

Bean - Honduras

The variety SRC 1-12-1 presents the best yield (3688 kg ha^{-1}) among the materials tested (Figure 3). However, the differences were not significant between this material and the local checks (Tío Canela and Concha Rosada). The physiological maturity of the materials varied from 83-89 days. Producers selected the varieties SRC 1-12-1, PTC 9557-10, and PCE 9351-8 based on their good color and small size of grain, well-filled pods and good height.

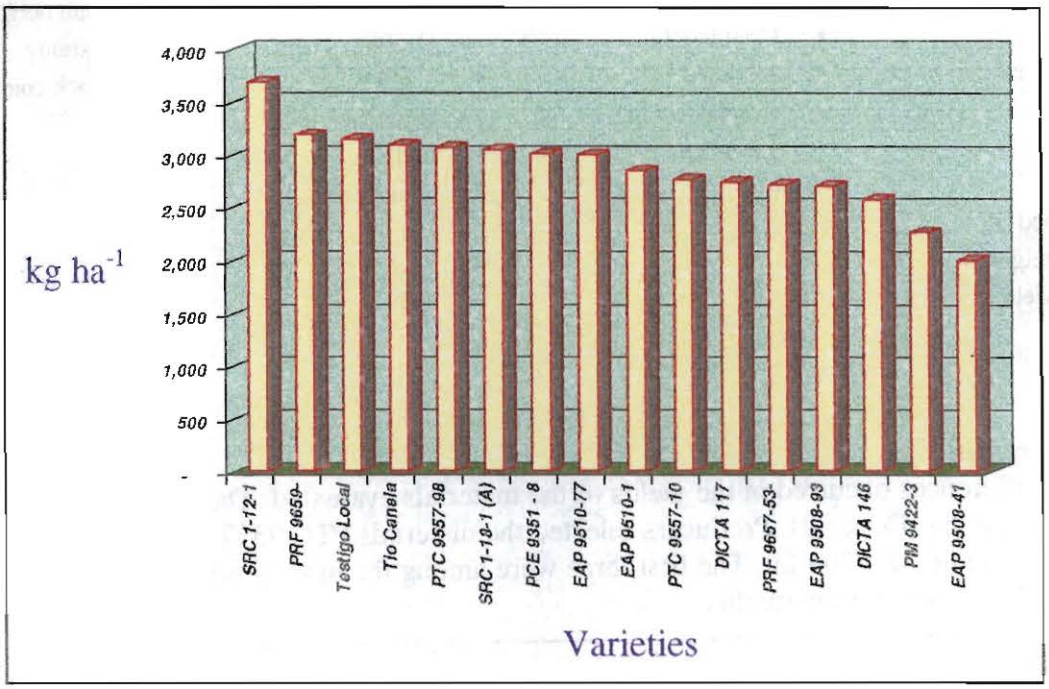

Figure 3. Bean yields (kg ha^{-1}) of different varieties in Honduras.

Maize - Nicaragua

The analysis of variance reflected highly significant differences in grain yields (Figure 4). The test of separating means allowed the grouping of materials into three different categories: first the genotypes SC3P76N, (RPM x C17)xD-8043, SC3P73N, NB-9043, ACROSS 8328, and NB-8243, which obtained the best yields ranging between 4848 and 4163 kg per ha. The variety NB-9576 was second, and PRAC-736-C2, NIC-5, and NB-Perlita form the third group with least potential, obtaining yields less than 2375 kg per ha.

Farmers selected the varieties (RPM x C17) x D-8043, SC3P73N, NB-9043, and ACROSS 8328 for their yield, grain color, height, growth habit, and resistance to lodging. Farmers did not select the best-yielding variety (SC3P76N) because its height gives it a tendency to lodge. These varieties will be evaluated in producers' fields through the CIALs.

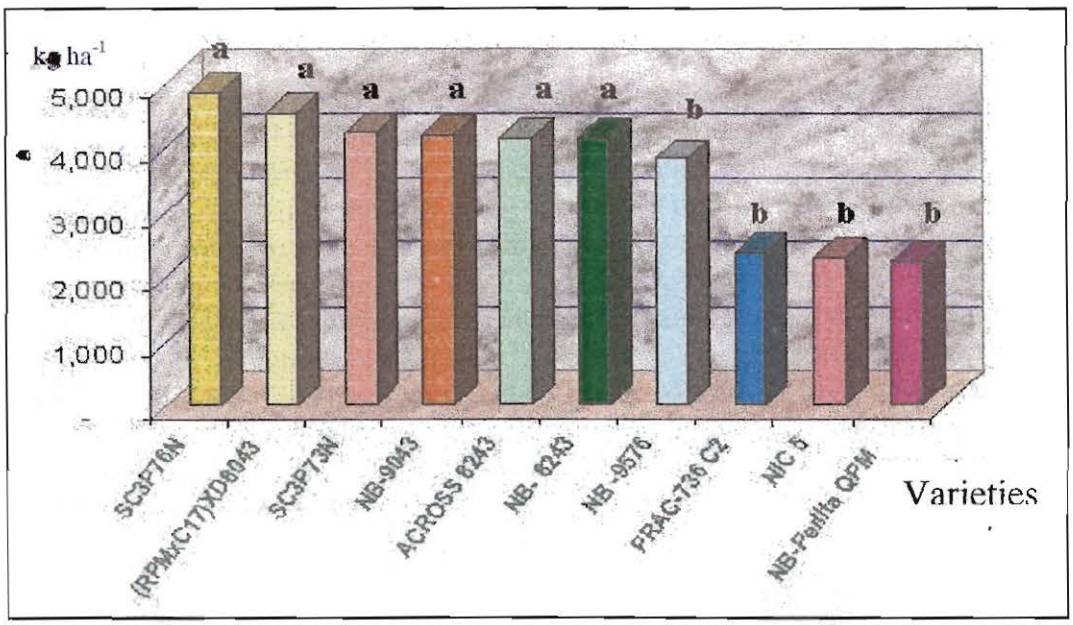

Figure 4. Maize yields (kg ha^{-1}) of different varieties in Nicaragua.

It is important to indicate that this trial was developed in low rainfall conditions for the normal development of the crop and this may have diminished yields (Figure 5).

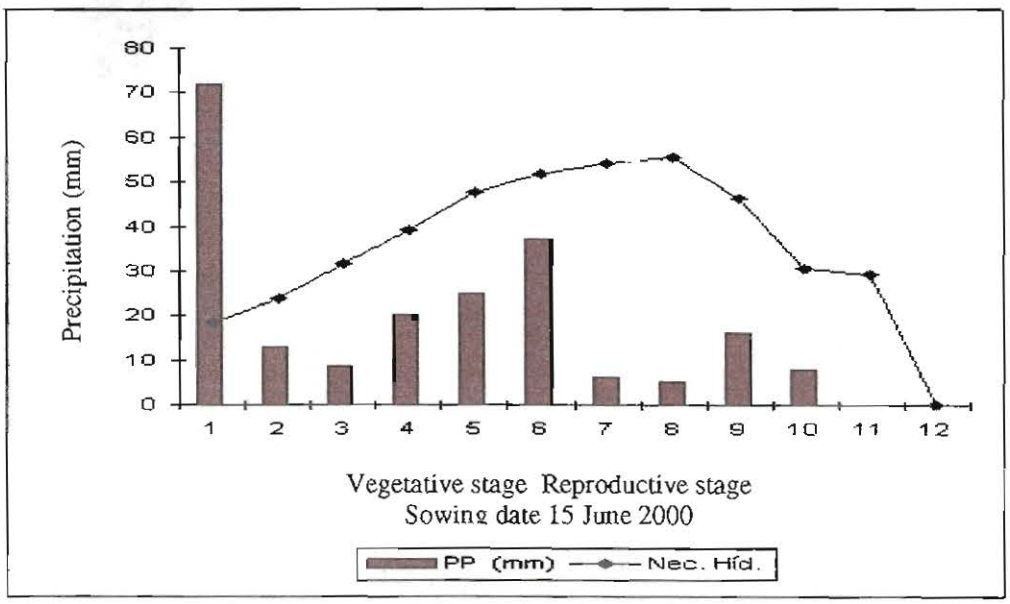

Figure 5. Behavior of rainfall demand and satisfaction of the maize crop, season 2000A, San Dionisio, Wibuse, Nicaragua.

Soya - Honduras

The yields of the varieties included in the trial varied from 1.3 to 2.2 tons per ha (Figure 6). The variety that produced the greatest yields was FHIA-15 (about 2221 kg ha^{-1}). On the other hand, big differences were observed in the earliness of the materials. The variety Obando began flowering at 53 days while Nandu did so at 85 days. The other materials had intermediate flowering times. Seed of all the varieties was multiplied through an agreement with a PES to evaluate them at producers' field level through the CIALs. The producers selected the variety Marlen for its good yield, and for earliness (124 days) compared with FHIA-15 (165 days)—important parameter for introducing as a component of rotation systems. We plan to introduce and evaluate soya materials with a shorter cycle that originate from the International Institute for Tropical Agriculture (IITA).

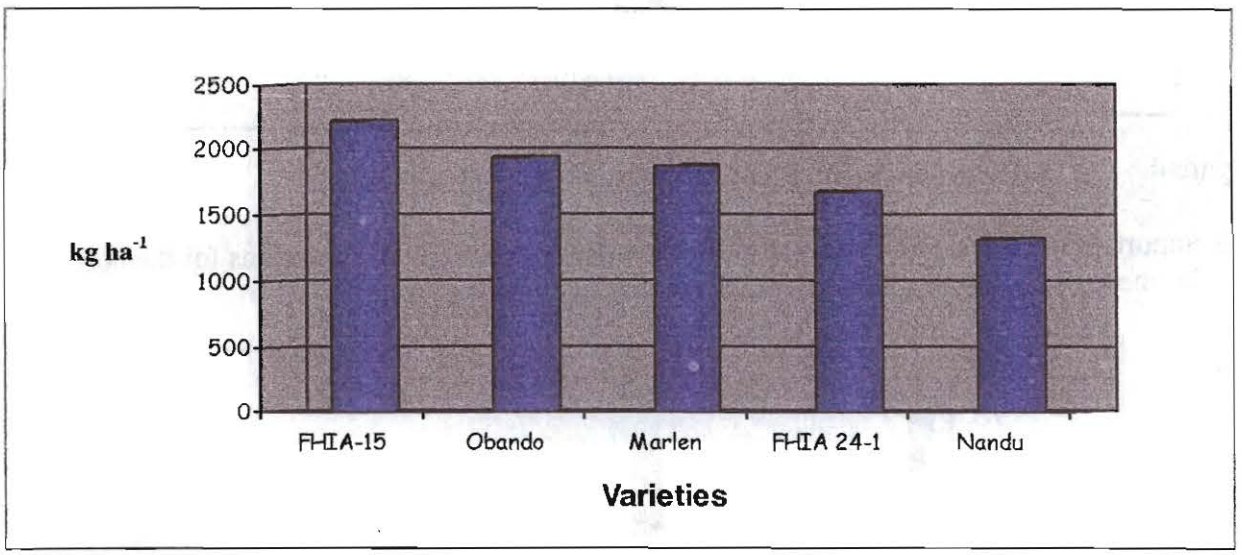

Figure 6. Grain yields (kg ha^{-1}) of five soya varieties evaluated in the Hillsides Options Supermarket (SOL)-Luquigue, Yorito, Honduras.

Rice - Honduras

The greater yields and the best milling quality were obtained with the variety INTA No 1 (Figure 7). The IRAT varieties are generally of high growth habit and the earliest flowering (average of 75 to 105 days). The earliest variety was IRAT-90, which flowered at 75 days. Producers selected CR 2525, INTA No.1, and CT 9545 for subsequent evaluations in the CIALs. The producers were interested in their low growth habit and earliness.

Cassava - Honduras

Results of the characteristics of the 35 materials of the collection are pending; they will be reported next year.

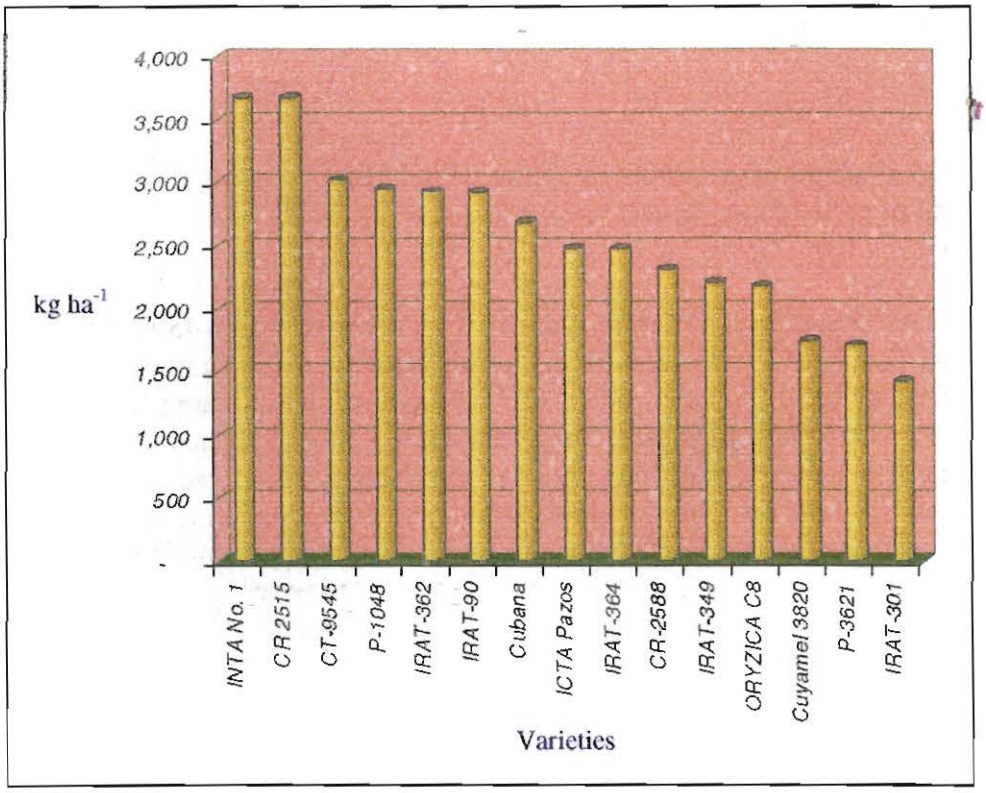

Figure 7. Rice yields (kg ha^{-1}) of different varieties in Honduras.

Contributors: P Orozco, L Brizuela, G Palma
Collaborators: Escuela Agrícola Panamericana Zamorano (EAP), Investigación Participativa para Centro América (IPCA), Instituto Nacional de Tecnología Agropecuaria (INTA)

1.2.3 Design new production systems based on crops with market options and on management of soil fertility

This work is initiating. Some options have been selected and the research protocol has been developed. Fieldwork will begin next year.

1.2.4 Evaluate the compatibility of new rotation components to diversify traditional production systems

Components of the new systems and their experiment arrangement were established in the field. The evaluation will begin at the end of the present year.

1.2.5 Evaluate grains and forage legumes in the SOL and on producers' farms

Highlights

- ✓ Indication of adoption of forages in Yorito, Honduras
- ✓ First draft of participatory procedure for forages

Honduras

Participatory diagnoses with 59 farmers, aged 18-75 years, of which 45% were women, were carried out at three sites (Victoria, Sulaco, Yorito), with the major limitations identified as scarcity of feed for the dry season and lack of seed availability. All are involved in fieldwork. Based on the participatory diagnoses, forage nurseries were established and farmers participated in land preparation and planting, and continued to be actively involved in the participatory selection. Each group is composed of 15 to 20 farmers. Participation in individual events is 65% to 75%, with very low variation in composition; that is, farmers maintain interest in the evaluations. However, only 10%-15% of farmers participating regularly are women, with a strong emphasis in Jicaro. Age groups are much better presented in the evaluations, varying between 25 and 76 years.

As part of the process, farmers now have less fear in communication and have obtained a better understanding of forage materials, increasing the information flow in the participatory evaluations. The project tries to link technical information with perception from farmers. Table 2 shows the productivity of a selection of grasses in the dry season as an example of agronomic results from Honduras. Yields were slightly higher in Luquique than in Las Cañas. However, as expected with the effects of drought, yields and cover were relatively low. Significant differences ($P<0.05$) were found between accessions at the two sites, with *Brachiaria brizantha* CIAT 16322 and *B. brizantha* CIAT 26646 in Luquigue, and the cut-and-carry grass (Camerún) at the two sites having highest productivity.

Table 2. Dry matter yield of 8-week regrowth of grasses in the dry season, at two sites in Yoro, Honduras.

Treatment	Las Cañas		Luquigue	
	cover (%)	kg ha^{-1}	cover (%)	kg ha^{-1}
Pennisetum purpureum cv Camerun	37	1430	25	1022
Panicum maximum CIAT 16031	25	624	18	413
Brachiaria brizantha CIAT 26646	42	521	30	936
Andropogon gayanus CIAT 621	26	510	30	638
B. brizantha CIAT 26110	25	464	23	668
B. brizantha CIAT 16322	33	439	20	1088
B. híbrido CIAT 36061	25	385	17	640
B. humidicola CIAT 6133	60	133	28	137
LSD ($P<0.05$)		525		462

Nicaragua

In Nicaragua, the project is working at three sites in the municipality of San Dionisio: Wibuse, El Corozo, and Piedras Largas. In mid 2000, the involved institutions (Proyecto de Desarrollo de San Dionisio [PRODESSA], INTA, and CIAT) identified farmer leaders, who then invited small- to medium-scale crop-livestock owners for a meeting to identify interest groups, present the project, and establish farmer committees. Fifty-six farmers (15 in El Corozo, 18 in Piedras Largas, and 23 in Wibuse) participated; however, women constituted only 3%. During the same meeting, information was obtained on the feed strategies employed throughout the year. In general, during the wet season cattle are maintained on native pastures, Jaragua (*Hyperrhenia* spp.) and Estrella (*Cynodon* spp.). In the dry season, crop residue grazing of maize, bean, and sorghum fields gains importance, in addition to dry and mature pastures. Producers stress the problem of quantity and quality of available feed resources during the dry season and several have to resort to buying by-products of rice at very high prices. Poorer livestock owners face a reduction in production, and lower reproduction and even death of their animals.

During 2000 and 2001, to further characterize farmer groups, a rapid participatory diagnosis on livestock production was carried out at the El Corozo and Wibuse sites. Of the farmers, 90%-95% indicated the low productivity of Jaragua, Estrella, and native pastures as the principal problem in livestock production. Hence farmers suggested the introduction of a variety of forages to be compared to these as a possible solution.

Of the 56 farmers initially participating in the formation of the three committees, 60% maintain active participation, while the participation of the other 40% was more irregular or discontinued. New interested farmers have replaced them. Strengths of the groups include the active participation of a large percentage, and several farmers with the capacity to disseminate results were identified. Farmers are conscious of the need to look for new forage alternatives to improve production and conserve natural resources, and an increasing demand for seeds of preferred germplasm has been manifested. Weaknesses include some farmers' still-existing lack of understanding of the participatory process and their role in it. The conservative attitudes of some livestock owners have limited progress, and lack of trust in religious and political processes sometimes leads to limited participation in collective activities. Moreover, some producers state their time limit in participation, and based on a prior project some had high expectation of obtaining benefits without any participation.

To sustain the groups, the project continuously clarifies concepts and motivation, a process strengthened by the identification of farmers with dissemination and motivation capabilities. Also, an active process occurs of feedback of objectives, activities, and results to local organizations, with the aim that farmers and local organization obtain project ownership. The project also participates in local events, showing results and facilitating active interaction between different project sites. Events are scheduled to correspond to times of lower farmer activity.

Depending on the frequency of criteria we aim at defining farmer priorities across sites. Figure 8 presents preferences for cover legumes. We can see that farmers better accept Caballero (a *Lablab purpureus* local variety, statistically significant at 15%, positive intercept), and least

accept Mungo (*Vigna mungo*). These results are related to the criteria obtained in the same evaluation, giving indication for potentially successful technologies.

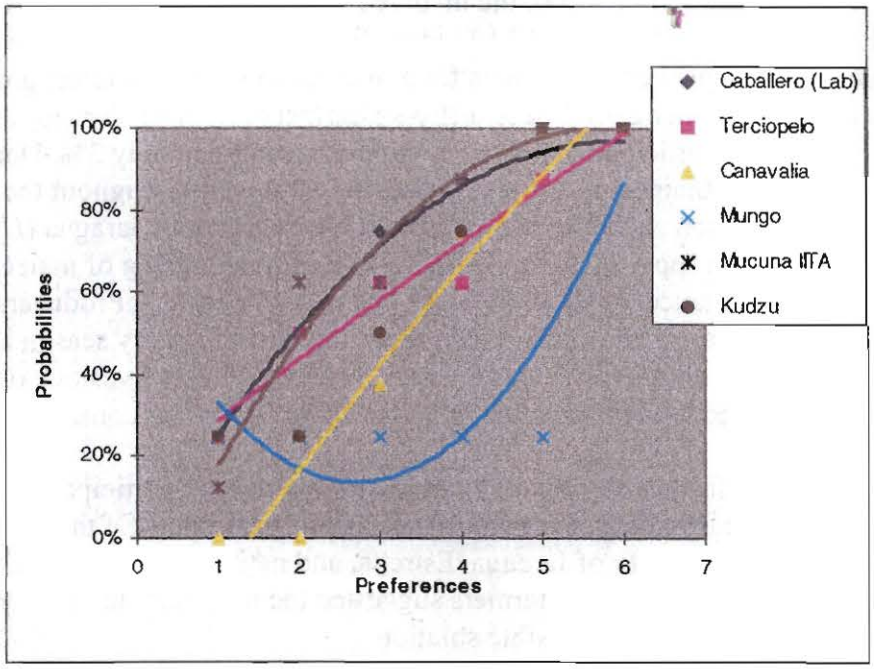

Figure 8. Preference ranking of six cover legumes, Piedras Largas, Nicaragua.

Parallel to developing a participatory procedure, a training procedure is developed as an important component for the project, institutionalization, and outscaling. Employed methods are disseminated through courses followed by workshops and field practices. The amplitude of this component was not anticipated at the project's onset, but was found essential for its success.

The project is handling a small fund scheme to facilitate the outscaling and upscaling of results and methods employed. The main problem in the approval of proposals was some lack of knowledge on participatory methods, a requirement for approval. Most proposals therefore were assigned to partners involved in the project and the focus in project approval hence is more on upscaling and institutionalization than on outscaling. Two main outputs are expected, (1) that people participating in the training and the project become trainees themselves, and (2) utilizing the experiences to develop a Training module, which guides technicians through the process. Both these outputs are aimed at future outscaling of the approach. Finally, the project has initiated a database in Excel facilitating the analysis of information. Greater detail on activities is given in the Forages (IP-5) Annual Report.

Contributors: M Peters (IP-5), LA Hernández Romero (Participatory Research in Agriculture [IPRA]), LH Franco (IP-5), A Schmidt (PE-2), MI Posas (Servicios Técnicos para el Desarrollo Sostenido [SERTEDESO]); W Sanchez, M Mena (INTA); J Bustamante (Fundación Ecotropica); H Cruz, T Reyes; CE Reiche (Instituto Interamericano de Cooperación para la Agricultura [IICA]- German Agency for Technical Cooperation [GTZ]); C Burgos (DICTA); R Schultze-Kraft, V. Hoffmann (University of Hohenheim), P Argel (IP-5)

1.2.6 Quantify the performance of animals in traditional and improved pastures in SOL

The start of this activity was held back by problems in establishing legumes in the pastures. Nevertheless, the pastures in the SOL in Nicaragua are now ready to initiate the evaluation. Pastures in Honduras are still in the phase of establishment.

1.2.7 Define the potential of cover species for soil improvement

Highlights

- ✓ *Centrosema plumieri*, Mucuna IITA Benin, and *Canavalia brasiliensis* have the potential to be established well in degraded areas
- ✓ *Canavalia* presented the highest yields in the different sampling times

Objectives

- Determine the potential of legumes and grains for establishing in soils affected by Mitch
- Determine the capacity of producing fodder under limitations of soil fertility

The experiment was sown including the following species: first year (1999) *Vigna unguiculata, Centrosema plumieri, Canavalia ensiformis, Lablab purpureus, Mucuna pruriens* IITA Benin, *Brachiaria dictyoneura*, and Natural. In the second year we changed *M. pruriens* negra for *V. unguiculata*, and *Pueraria phaseoloides* for *B. dictyoneura.*

Results and Discussion

The results of the first year of evaluation indicated that under extreme conditions of sandy soil, *V. unguiculata* and *L. purpureus* did not persist after the phase of establishment (Figure 9). The better coverages were obtained with *Canavalia*. The plot check presented good coverage because of the regrowth of pasture (*B. dictyoneura* + *Arachis* + *Cynodon* sp.) established previously.

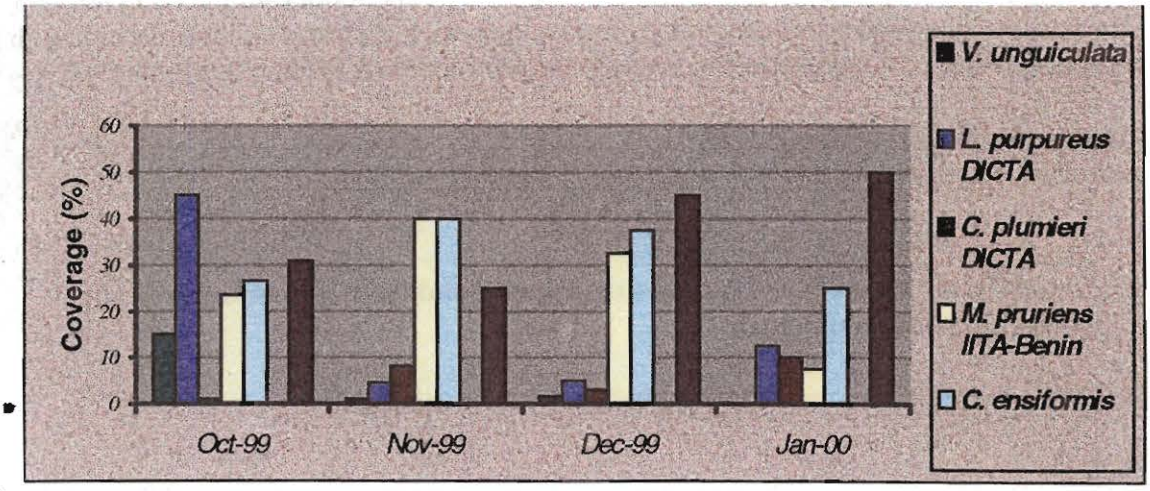

Figure 9. Soil recuperation trial. Evaluation of percentage of coverage at 16, 20, 24, and 28 weeks, Evelyn farm, Ayapa, Yoro, 1999-2000.

During the second year of evaluation, *Canavalia* maintained an average cover of 48%. *Centrosema plumieri*, which had slow establishment during the first year, attained a similar coverage to that of *Canavalia* during the second year.

Canavalia ensiformis produced the biggest quantity of biomass compared with the other legume evaluated during the first year of evaluation (Figure 10). During the second year, its production of dry matter diminished to less than 1 ton per ha, while the biomass production of *C. plumieri* improved considerably compared with the first year, showing superior behavior. *Lablab* and *Pueraria* were not established in the conditions of this experiment.

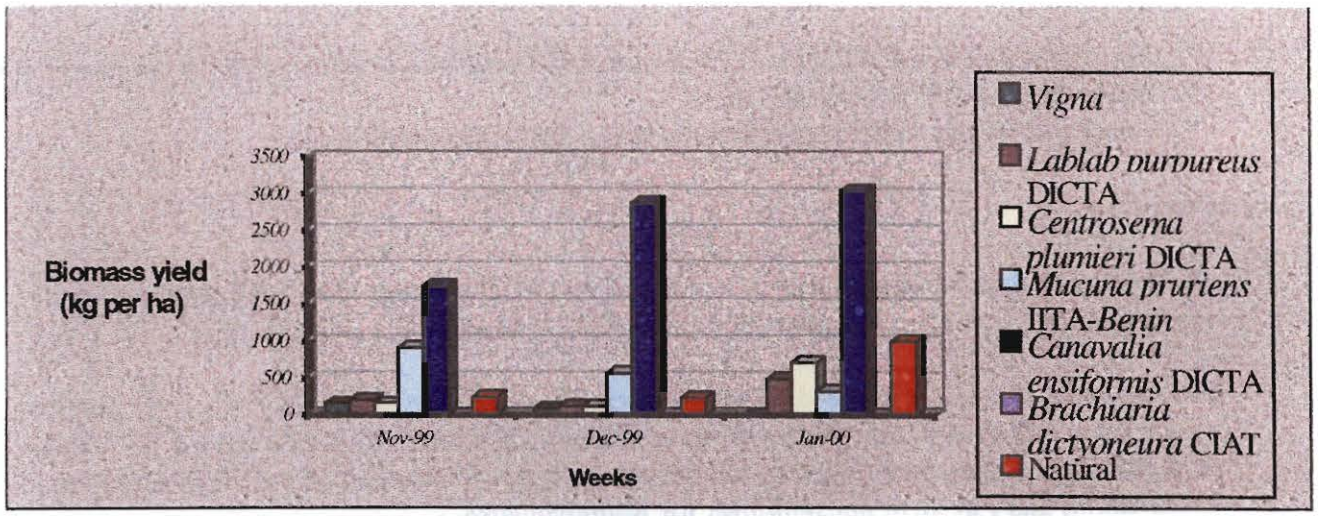

Figure 10. Soil recuperation trial: evaluation of biomass yield at 16, 20, 24, and 28 weeks, Evelyn farm, Ayapa, Yoro, 1999-2000.

Conclusions

Canavalia ensiformis has the potential to be established quickly in degraded areas and to produce from 2 to 3 tons of dry material. This corresponds to 40% of the fodder produced in normal conditions. *Centrosema plumieri* is another promising species for these conditions, although it has slow establishment. The other species presented very low levels of coverage and yield.

Contributors: H Cruz; M Peters (IP-5)
Collaborator: Owner of Finca Evelyn, Sulaco, Yoro, Honduras

1.2.8 Quantify the efficiency of combining organic and inorganic sources in the production of annual crops

This activity is not reported on this year; results are being validated.

1.2.9 Select species for live barriers that improve producer income and conserve soils

Objective

- Determine the economic contribution of live barriers of sugarcane under traditional management

The work was carried out on the live barriers of sugarcane that were established in the SOL-Luquigue project in September 1999. The variety used was the local one known as caña negra. This variety of sugarcane is consumed fresh and is used in animal and human foods.

Results

At the time of the evaluation an average of 10 sticks of cane was found per linear meter of barrier, with a stem perimeter of 11.3 cm and an average weight of 3 lb each (Table 3). This indicates that sugarcane has good capacity for retaining soil in the medium term.

Table 3. Results of the evaluation of sugarcane as a live barrier.

Barrier	Meters cut	No of canes	No of canes per m	Weight of cane per m	Weight per cane	Perimeter of stalk (cm)	Length of stalk (m)	Total weight of canes (lbs)	Volume (L)
1	27.7	191	6.9	18.6	2.7	11.6	1.63	514	102.15
2	30.5	311	10.2	29.8	2.9	11.6	1.65	908	193.13
3	36.6	315	8.6	21.0	2.4	11.1	1.38	769	153.65
4	34.0	500	14.7	50.9	3.5	11.0	1.90	1,732	400.43
Total/Ave	128.8	1,317	10.2	30.5	3.0	11.3	1.64	3,923	849.36[a]

a. 3.87 barrels.

According to the opinion of the producers that participated in making the blocks of *panela* (crude sugar), this variety produces a lot of broth. Only 1.5 canes per liter of juice were needed, resulting in the production of about 6.6 liters of juice per meter of barrier. From each meter of barrier almost 2 blocks of *panela* were obtained of 1.7 lb each. In the region, *panela* has a value of about 19 US cents per lb and has high demand during the period of December-April because of its use in religious celebrations and the coffee crop. Conversion of the 128 m of sugarcane to *panela* would give gross revenue of about US$ 48.

To be able to measure the economic income from the barrier providing animal feed, we calculated the number of animal units that could be fed with the 128.8 m of live barrier that were cut. It was assumed that lactating cows were being fed with a production average of 4 liters per cow.

Dry material of stalks (kg)	310.2
Animal units fed	29.0
Liters of milk (4 per cow)	118.2
Milk sales (US$)	38.1

The net profits that would be obtained per meter of cane would be about US$0.17 deducting establishing and cutting expenses from gross incomes (see below). The profits could be increased if the rent of the *trapiche* (cane press) was lowered and there was access to vegetative material of low cost.

Economic contribution and costs of live barriers of sugarcane

Activity	Cost / m (US cents)
Meter of barrier established including vegetative matter	20
Maintenance of barrier	3
Harvesting of barrier	2
Transport of cane to press	5
Wood cutting	2
Rental of cane press	19
Total costs	50
Total income	67
Net utility per meter	17

The income from the sugarcane processing and the sale of stalks generates a net utility per meter of barrier of little attraction to the producer, especially considering the time required (18 months) for obtaining it. Productivity of the barriers must be improved with better management of their density and fertilization. Incomes could be increased by giving an aggregate value to the sugarcane products (crude sugar, honey etc).

Contributor: L Brizuela
Collaborator: E Barrios (PE-2)

1.2.10 Select bushy species with potential of being used as improved fallow

Not reported on this year.

1.2.11 Identify nutrients that limit productivity of the systems in the reference sites

Highlight

✓ The combination of N + P significantly increased the yields of maize in the SOL sites of Honduras and Nicaragua

Objective

- Identify nutrients that limit the development of maize and measure their availability in the soil

Methods and Materials

The experiments were established in the SOL sites during the spring of 2000. A randomized complete block (RCBD) design was used, with four repetitions. The maize variety HB-104 was used in Honduras, and the variety NB-6 in Nicaragua. A chemical-mechanical weed control was carried out (pre-emergent herbicides-Azadon). Initial and final soil samples were taken at 0-15 cm depth, to measure availability of nutrients at the start and end of the crop cycle. Treatments included in the experiment were (1) control without fertilization, (2) 100 kg N per ha, (3) 100 kg P per ha, and (4) 100 kg N + 100 kg P per ha and 100 kg N + 100 kg P + 100 kg K per ha. Half the N was applied at 20 days and the other half at 40 days, as there was sufficient humidity in the soil it was only spread on the surface of the furrow. The P and K were applied to the furrows and incorporated with hoeing at the time of sowing. The variables evaluated during the cycle of the crop were the content of nutrients in the vegetative mat at 50% of female flowering, height of plant, grain yield and its components, and superficial biomass of the maize.

Results and Discussion

Honduras

Significant differences were found at the level of treatments in all the yield components (Table 4). The number of damaged cobs was very high in the control and in the application of N treatment. At the same time, these treatments had less relation between cob per plants and grain weight.

Table 4. Effect of fertilization on various yield components of maize in the Supermercado de Opciones para Laderas (SOL) site, Honduras.

Treatment	Plants per mz[a]	Damaged cobs	Cobs per plant	Grain weight (g)
Control	45269	11.00	0.8	0.28
100 kg N ha^{-1}	44358	16.30	0.8	0.25
100 kg P ha^{-1}	43446	6.75	0.9	0.32
100 kg N+P ha^{-1}	42839	4.75	1.0	0.29
100 kg N+P+K ha^{-1}	41927	4.50	0.9	0.33

a. 1 mz (manzana) = 0.704 ha (80 m^2).

Figure 11 shows the effects of different fertilization treatments. The application of N + P produced 3.8 tons per ha more than the control. The application of N in individual form did not produce any yield increase, and associated intravenal chlorosis was observed.

The application of N alone did not improve crop yields, perhaps because of the interaction that exists with other elements (possibly Mg). The best yield was reached when N + P and N + P + K were applied. Although the soil presents a high content of phosphorus, it may not be readily available; thus it must be applied. Verification of these results has begun at landscape or watershed level, mounting a network of experiments at different altitudes and with different parent materials during this year.

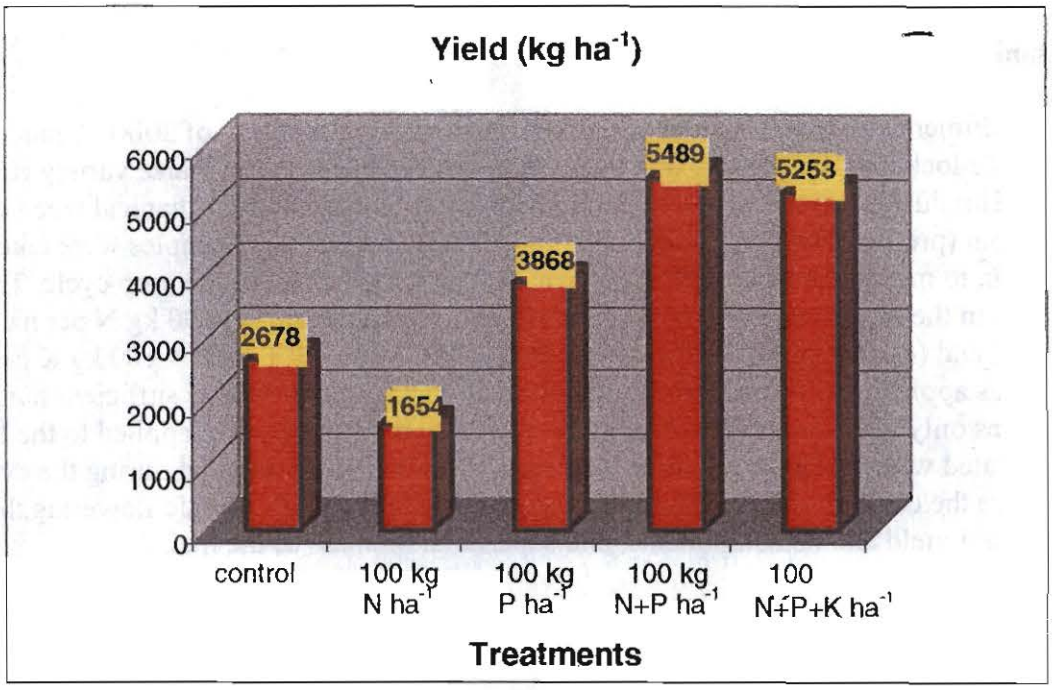

Figure 11. Maize yields at Supermercado de Opciones para Ladera (SOL) sites in Honduras under different nutrient treatments.

Contributors: L Brizuela, M Ayarza

Nicaragua

No significant differences were found among treatments because of the high variability of the experiment sites. However, visual observations showed that better yields were obtained with application of N + P and N + P + K (Table 5). When P was applied, increases of 40% were obtained compared to the check, and when N was applied, of 20%. This allows us to conclude that both nutrients behave like limitants given that on applying N+P+K the yield barely increases (about 3%), which seems of little importance.

Table 5. Result averages for treatments[a] of trials of limiting nutrients in the Supermercado de Opciones para Ladera (SOL), Nicaragua.

Treatments	Plants per plot	Plant height per plot (cm)	Cobs per plot (no.)	Cob weight per plot (g)	Grain weight per plot (g)
Control	20 a	119.7	11.3 a	1563.3	988.8 a
100 kg + N ha^{-1}	24 a	127.0	11.0 a	1718.0	1,196.3 a
100 kg + P ha^{-1}	24 a	120.5	14.7 a	2135.2	1,385.8 a
100 kg + N P ha^{-1}	24 a	122.6	14.0 a	2164.0	1,465.6 a
100 kg +N + P + K ha^{-1}	24 a	124.1	15.0 a	2352.3	1,492.1 a

a. Treatments with the same letter signify that results (means) were not statistically different, using Duncan's Multiple Range test, Student-Newman-Keuls test, and Tukey's range test.

Contributors: P Orozco, M Ayarza, J Bosco (consultant)
Collaborators: E Barrios, JG Cobo, N Azakawa (PE-2)

1.3 Validate new alternatives and improved practices

1.3.1 Validate on producers' farms the promising management options that come from the SOL

Highlight

✓ The CIALs are being strengthened and empowered with new components of annual crops to diversify their systems of production

Objective

- Strengthen the capacity of rural communities and seek alternatives that permit them to improve their food security and manage their natural resources in a rational way

The different CIAL groups, through tours of the countryside, exchanges with other institutions, farmer experimenters, and participative evaluations of technologies in the SOL, identify promising options that are analyzed and discussed with the community at the point of planning the experiments.

Results

At present, 15 CIALs exist at municipality level in San Dionisio, of which four were formed in 1997, four in 1998, four in 2000, and three in 2001. The research of the committees has concentrated on trials of basic grains because of the importance that producers give to these crops to improve their food security. However, since 1999, six of the groups have begun to make use of the germplasm options that have emerged from the SOL (Table 6).

Table 6. Comités de Investigación Agrícola Local (CIAL) crop evaluation and research cycles from technological options selected in the Supermercado de Opciones para Ladera (SOL), San Dionisio, Matagalpa, Nicaragua.

CIAL	Community	Seasons[a]				
		1999A	1999B	2000A	2000B	2001A
Wibuse	Wibuse			Rice (t)		Rice (v)
Women	Jicaro 1	Soya (t)	Soya (v)	Soya (p)		Rice(t)
El Progreso	El Zapote			Rice(t)		
Women	El Zapote					Soya(t)
19 de Abril	Jicaro 2			Rice(t)	Soya(t)	
Women	El Chile					Soya (t)
	El Carrizal					Bean (t)

a. A = first season and B = second season; p = production, t = trial, and v = verification.

Materials of soya, rice, and bean are being evaluated that were selected during the participative evaluations made in the SOL. We expect that by 2002, 60% of the CIALs will be using promising options originating from the SOL in their respective trials.

Most CIALs (76%) are trying out mostly basic grains (bean and maize). However, already the first steps are being taken to investigate other themes (rice, soya, pest control). Women's participation has been growing significantly; there are three women CIALs and five mixed CIALs, because of the importance of food security options. From the research process the women are learning to elaborate subproducts such as in the case of soya. The CIALs have established coordination with local Institutions that permit them to learn new technological alternatives used during the planning of their experiments.

Contributor: T Reyes
Collaborators: JA Beltrán, CA Quiroz (IPRA)

1.4 Promote and support multiplication of successful alternatives validated at farm level

1.4.1 Support the establishment of PES prototypes in the project's reference sites

Highlight

✓ Producers were incorporated into the multiplication of promising materials from the SOL

Objective

- Support the formation of two PES prototypes in the Honduras reference site to produce improved seed for the upper and lower parts of the watershed

The project is being executed by two groups of producers in the Department of Yoro, one located in the community of La Sabana in the Municipality of Yorito, and the other in the community of San Antonio, in the Municipality of Sulaco. The first group was established in 1999 and initiated with six members of a CIAL. The second was established in 1996 with the participation of 26 partners. Both groups sowed commercial varieties and promising genetic material originating from the participative evaluations in the SOL.

Results

Both groups produced about 2.4 tons of pure seed, which was sold to 113 producers of the region (Table 7). Producers were highly satisfied with the yields and the income that came from the sale of improved seed. Producers of the region had a high demand for seed. Future plans include forming a PES in the Nicaragua reference site and consolidating businesses in Honduras with the technical support of the SOL and the multiplication of other promising material.

Table 7. Results of the sale of seed by two Productores Empresarios de Semillas Artesanales (PES), Honduras.

Group[a]	Crops	Production	Beneficiaries (no.)	
		Pure seed (kg)	Communities	Producers
AMHUPRO CIAL	Soya Obando	166	5	14
	Maize Pob. 21	552	4	13
	Maize pool 15C-11	272	1	1
San Antonio producers	Maize DICTA Guayape	1409	3	85
Total	5	2399	13	113

a. AMHUPRO = Asociación de Hombres y Mujeres Progresistas de Honduras, and CIAL = Comités de Investigación Agrícola Local.

Contributors: G Giraldo (Seed Project), L Brizuela
Collaborators: Producers of the region

1.5 Monitor and evaluate the adoption of validated improvements

1.5.1 Evaluate the functioning of the SOL monitoring system

Highlight

✓ Monitoring system operating in the SOL site in Yorito, Honduras

Objective

- Systematize the information generated through the visits of producers at SOL and from the activities of evaluation and exchange of materials and knowledge

Materials and Methods

During 1999, the indicators were defined (see below) and the type of information that should be collected according to the methodology developed by Probst (2000)[2]. Based on this, the formats were designed to register the information. Of the activities planned, 90% have been executed to date. Only the evaluation of short-cycle fruit species and the studies of the effect of fallows on soil fertility are pending. During the monitoring period, 21 events were registered with producers of different communities of Yorito, Sulaco, and Victoria, and the participation of 316 men and 57 women.

[2] Probst K. 2000. Sistema de monitoreo y evaluación de la red de SOLes. Working Doc, CIAT, Cali, Colombia.

Monitoring indicators for the Supermercado de Opciones para Ladera (SOL) site in Yorito, Honduras

Object of observation / indicator	Frequency / dates
Function:	
Fulfilling the operative plan	Continuous documentation of activities
No. of workshops and field days developed on site	Each time an event develops
Participation of men and women	
Comments and observations of the technician	
Evaluation of events	At end of events
Registration of who visits and attends (client record)	Each time that clients visit the SOL
Participation of other institutions in the SOL	Each crop cycle
Costs of the trials	Each month
Demands requested by clients	Registration of quantity of materials delivered
Registration of trials	

Analysis, evaluation, and use of results	Frequency / Dates
Planning events of each crop cycle with producers	May, September
Presentation of summaries at level of each SOL site	March, November

Results and Discussion

The evaluations of bean, rice, and soya were done with groups of CIALs of Luquigue and Río Arriba. Also the new bean materials were sampled with groups from Río Arriba, Luquigue, La Ladera, Santa Cruz, and merchants of the zone. This was coordinated with Investigación Participativa para Centro América (IPCA) through the CIALs; and IPCA trained para-technicians in the CIAL methodology. All farmers that attended the events developed in the SOL say they have learned new things and they now know several varieties of different crops, which will give them the opportunity of improving their production systems.

Of 40 producers registered in the SOL, 25 requested seeds of soya, sweet potato, cassava, rice, and bean. For pastures 16 producers were registered who requested seed of *Penisetum*, *Brachiaria brizantha* 26110, *Cratylia* CIAT 18668, and *B. dictyoneura* 6133. The registration of seed distribution indicates that 14 verification trials of bean varieties were delivered to different NGOs and organized groups of producers. The objective is to evaluate, in producers' fields, the yield of the varieties selected in the SOL.

The monitoring system implemented in the SOL is permitting us to evaluate the SOL's efficiency as a mechanism for exchange of knowledge and materials with the producers of the region. It also permits quantifying the demand for technologies and the costs of production.

Contributors: G Palma, L Brizuela
Collaborators: K Probst (University of Hohenheim)

Output 2: More sustainable landscapes

2.1 Benchmark status report at the landscape level (study land use, analyze sustainability)

2.1.1 Edaphically characterize the reference watersheds for the Manejo Integrado de Suelos (MIS) consortium (San Dionisio, La Dalia, and Congolón)

Highlight

✓ Georeferenced database of the edaphic resources of the watersheds of the Jalapa and Luquigüe Rivers

Objective

- Update soil taxonomy of the study area through knowledge of its internal and external characteristics both physical and chemical

Materials and Methods

The study included three phases, collection of secondary information, fieldwork, and analysis of results. During the first phase, secondary information and cartographic material needed for the study was collected. The study area was defined and a photo-interpretation of the landscape units was made.

In the fieldwork, general recognition of the study area was made. Limits were corrected and 51 soil profiles were opened to perform their morphological and taxonomic descriptions. Thirty profiles correspond to Jalapa, 18 to Luquigüe, and three to Ojo de Agua. The Local Indicators of Soil Quality were then identified and prioritized. For criteria for the denomination of horizons, texture, structure, consistency, porosity, limitants, etc. the United States Department of Agriculture (USDA) specifications of the methodology were followed. In analysis of results, all information generated in the field was put in order, revised, and classified; laboratory results were interpreted and thematic maps digitized. Based on this information the following thematic maps were generated at a scale of 1:10.000: taxonomic soil maps, soil types, present use, recommended use, and conflicts of use.

Results and Discussion

The area study corresponds to 65.95 km^2, which include the Jalapa River watershed of 25.11 km^2, the Ojo de Agua River watershed of 8.97 km^2, and the Luquigüe River watershed of 31.87 km^2. The area is composed of high terraces, hills, and mountains. The climate corresponds to humid subtropical forest. The main hydrographical network consists of the Jalapa, Ojo de Agua, and Luquigüe Rivers.

We found that soils originated from rocks of the Cretaceous epoch such as Kva, Kti, and Ky, as well as the Qal colluvium soils. Taxonomically they belong to the orders of Entisols and

Inceptisols in the higher areas, and Mollisols in the lower areas of the watershed. Based on the horizons' diagnostic, the soils were classified as Ustorthents, Ustochrepts, Haplustholls, and Argiustols, the subgroups identified were, Tipic, Lithic, and Udic (Figure 12). Most of the area studied has a steep topography with slopes greater than 60%. For this reason we recommend maintaining an adequate forest cover and agroforestry systems. Minimal farming and the use of soil conservation systems are required for the sustainable exploitation of areas with agricultural possibilities.

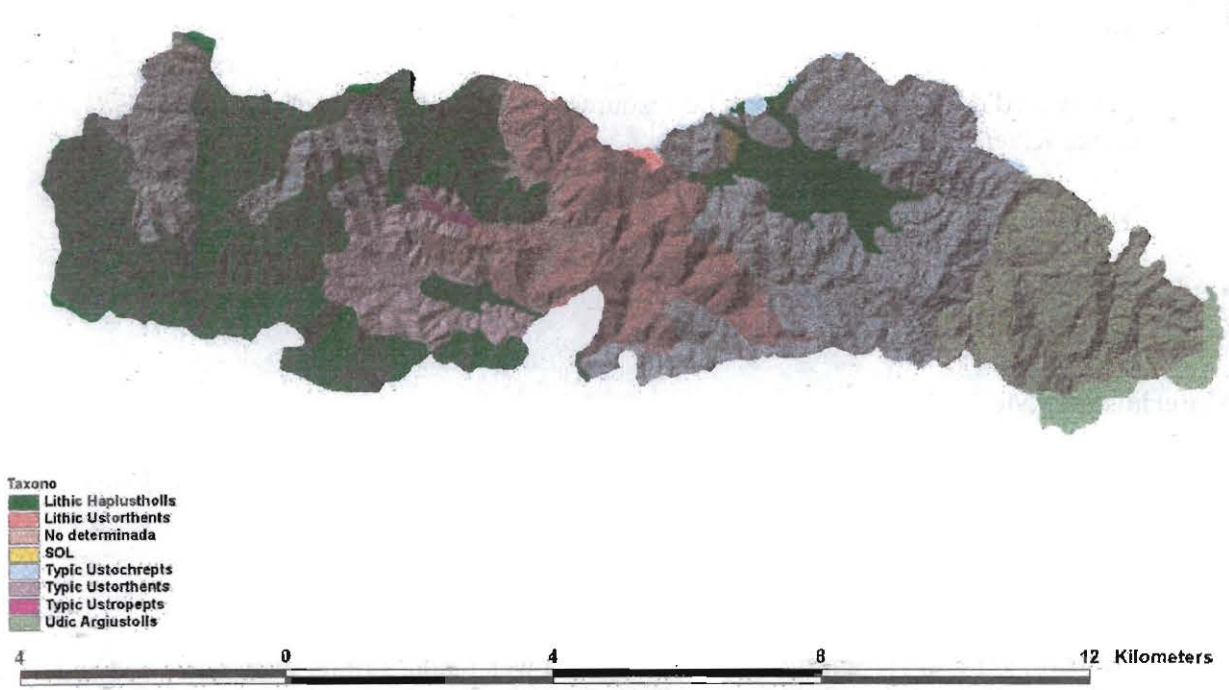

Figure 12. Soil types identified for the Jalapa, Ojo de Agua, and Luquigue watersheds.

Contributors: J Martínez (consultant), MT Trejo
Collaborators: M Ayarza, L Brizuela

2.1.2 Compile and analyze information on river flow and sedimentation in the Tascalapa watershed

Objectives

- Describe daily and monthly data of water volume in three smaller watersheds within the Tascalapa watershed
- Describe sediment samples in the three watersheds

The measuring of sediments was done from 5 June to 15 December. Readings were taken in the same sites as daily readings of water volume. Samples were collected in receptacles of 500 mL and then filtered and dried. The dried samples were weighed then further dried for one hour at 300°C in an oven. Thus we obtained dry weight by subtracting filtered dry weight from final dry weight. The weight in grams was related to a quantity of 500 mL of water to obtain the quantity of sediment dissolved in grams per liter.

Results

Table 8 shows the monthly means of dissolved sediments measured during the period June to December 2000.

Table 8. Monthly means (g L^{-1}) of dissolved sediments measured in the Tascalapa watershed from June to December 2000.

Watershed	June	July	August	September	October	November	December
Desmonte (Salida)	0.285	0.300	0.283	0.292	0.329	0.262	0.257
Jalapa	0.369	1.088	0.504	1.897	0.744	0.374	0.403
Ojo de Agua	0.402	0.894	0.417	0.403	0.265	0.380	0.372
Luquigue	0.371	0.422	0.455	0.408	0.214	0.329	0.375

The Jalapa watershed had the greatest amount of dissolved sediment possibly because of a greater deterioration in the forest cover and the use of intensive agriculture on lands with slopes greater than 30%. Figure 13 shows the percentages of area as land use according to 1995 satellite images. Figure 14 shows the percentages of slopes expressed as a percentage.

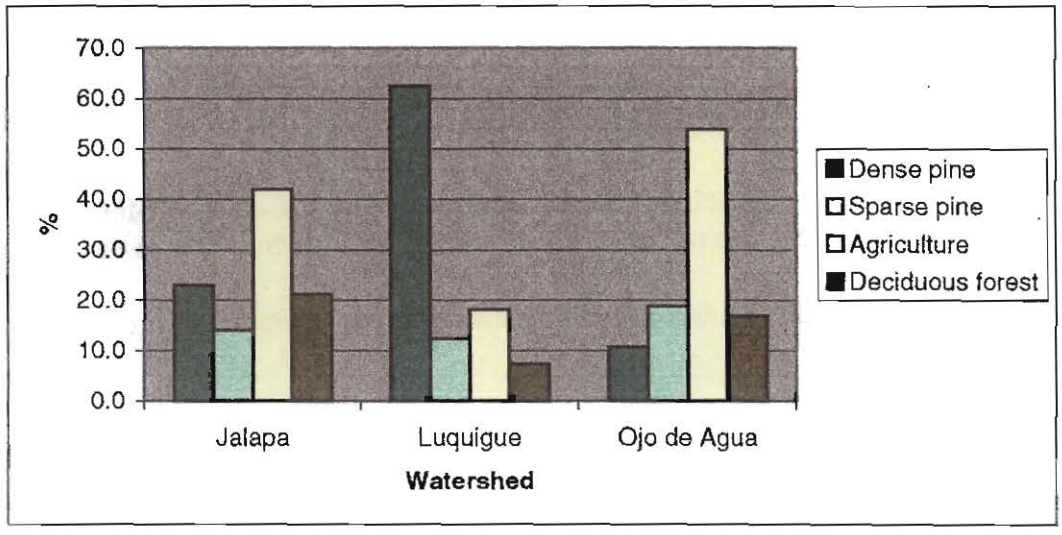

Figure 13. Land use in the Jalapa, Luquigue, and Ojo de Agua watersheds expressed as percentage of the area.

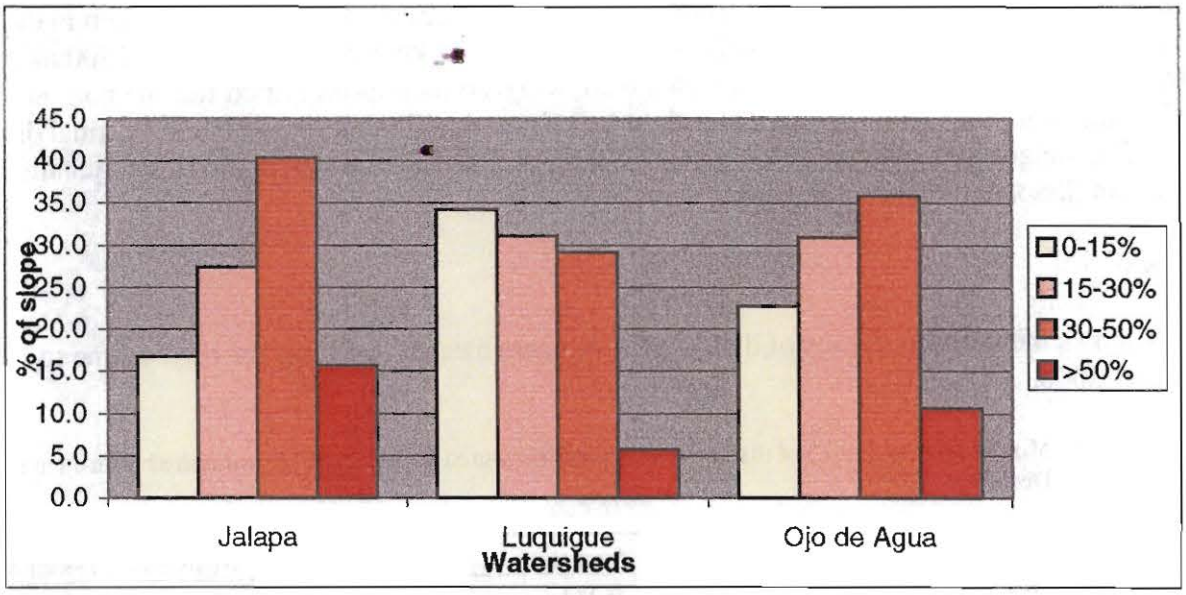

Figure 14. Slopes (%) in the Jalapa, Luquigue, and Ojo de Agua watersheds.

Contributor: O Mejía
Collaborators: B Barbier (CIRAD), S San Martín (SERTEDESO)

2.1.3 Establish the water balance of the Jalapa watershed

Highlight

✓ Rainfall interception was quantified in four management in the Tascalapa River watershed

Objectives

- Determine and compare the capacity of rainfall interception of pine- and oak-forest covers, a coffee plantation under the shade of broad-leaved forest, and a pasture area in the Jalapa River watershed
- Estimate the effect that rainfall interception of each system would have upon the water cycle of the watershed

Materials and Methods

Measurements were taken in the community of Capiro, Jalapa River watershed, municipality of Yorito, Department of Yoro, Honduras. In this area, pine forest, oak forest, coffee areas, and pastures of *Hyparrenia rufa* were identified. Three areas of each cover type were selected where three lineal rain gauges were installed for measuring precipitation among crowns in pine, oak, and coffee. Also zinc channels were placed to measure rainfall draining from pine and oak trunks. In the pasture area, the rate of losses from interception was estimated as 10% of the gross precipitation. The measurements included overall rainfall, the precipitation that reaches the soil, and that which drains from trunks. Based on these values, we estimated the interception of the

crowns and forest floor. Also, we measured infiltration and water flow in each system using a rain simulator. The calculations allowed us to establish the effect on the watershed's water balance of the systems in use.

Results and Discussion

Figure 15 shows that the average interception values of the covers of pine, oak, and coffee for the study period (May-October) varied from about 34% to 47%, but differences were not significant. There were no statistical differences in water interception regarding the different diametric classes in the pine and oak forests and the degree of cover under coffee. In the case of pastures, interception was assumed to be minimal. The relation between water intercepted and quantity of rain was lineal in forest and coffee covers ($r^2 = 0.7$).

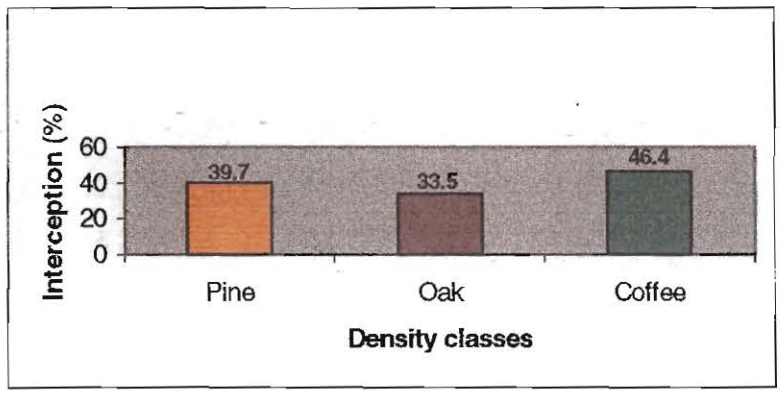

Figure 15. Means of water interception for three cover types in the Tascalapa River watershed.

The values for water flow were greater in the pine and oak covers (Figure 16). In the same way, the rates of infiltration were also lower in these systems compared with those measured in coffee and pasture covers.

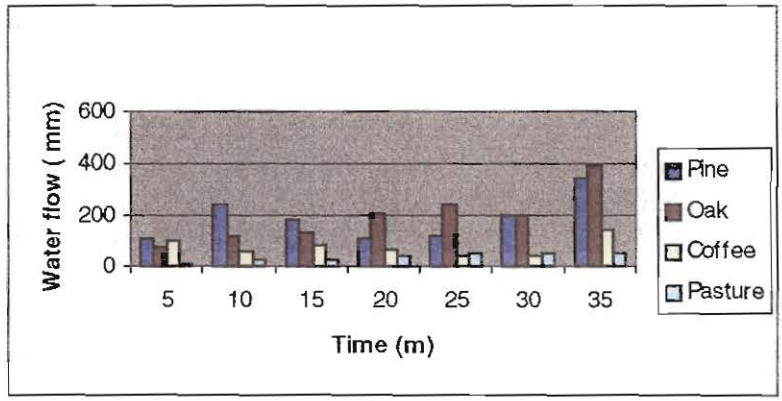

Figure 16. Volume of water flow (mL) for four cover types calculated using a water simulator of 36 mm.

Based on these results we calculated the water balance for each cover and the aquifer's capacity to recharge. Table 9 shows that the pasture cover generates a greater potential recharge because of its smaller interception and greater infiltration of water compared with the pine and oak forests and the coffee system. The beneficial effect of the pasture can vary drastically if it is submitted to inadequate animal management.

Table 9. Summary of water balance (mm) in four cover types in Yorito, Honduras.

Components of the water cycle	Covers			
	Pine	Oak	Coffee	Pasture
Total precipitation (mm)	970.00	970.00	970.00	970.00
Leaf interception(%)	3.73	1.61	0.55	0.00
Cover interception(%)	39.67	33.50	46.38	9.72
Precip. infiltrated (mm)	847.45	831.54	941.38	951.77
Water flow (mm)	122.95	138.86	29.02	18.63
Evapotranspiration (mm)	337.85	337.94	327.20	272.53
Recharge (mm)	124.40	168.25	158.56	584.55
Recharge m^3 ha^{-1}	1244.01	1682.50	1585.00	5845.50

The results of this study show the importance of the land use systems for the water cycle of the watersheds. The forest cover systems have the capacity to diminish the erosivity of the rains through their power of interception. Nonetheless, in the long term they also diminish the recharge capacity of the water sources.

Contributor: A Sosa, Escuela Nacional de Ciencias Forestales (ESNACIFOR)
Collaborators: S Rivera (ESNACIFOR), B Barbier (CIRAD), O Mejía

2.1.4 Ethnobotanical study of native plants as indicators of soil quality in the Calico River watershed

This activity is a product of the agreement with the Universidad Centroamericana (UCA), Nicaragua through an undergraduate thesis. To date, the protocol is being worked upon and fieldwork has begun. The main objective is to identify plants as indicators of soil quality, based on the traditional knowledge of the people of the Calico River watershed in San Dionisio, Matagalpa.

Specific objectives are to:

- Elaborate a list of plants as indicators of soil quality in the study zone and classify them taxonomically;
- Seek information on people's additional uses for these plant indicators of soil quality;
- Study edaphic characteristics associated with plant indicators of soil quality; and

- Establish a relationship between plant indicators of soil quality and their position in the described landscape according to local nomenclature.

2.1.5 Analysis and mapping of vegetation in the Wibuse/Jicaro watershed

As for 2.1.4, this activity is a product of the agreement of collaboration with UCA, Nicaragua through an undergraduate thesis. To date, the protocol is being worked upon and fieldwork has begun. The main objective is to analyze and elaborate, with community participation, the vegetation map in the Wibuse/El Jicaro watershed of San Dionisio, Matagalpa.

Specific objectives are to:

- Elaborate maps of the study area with community participation to evaluate the state of the vegetative component of the Wibuse/El Jicaro watershed;
- Analyze the actual state of vegetation and, through results obtained in the participative mapping, give alternatives for better management; and
- Involve and promote people's or community participation so that they describe, identify, and evaluate the natural resources and socioeconomic problems of their living zones.

2.1.6 Socioeconomic characterization of the Calico River watershed

This is a collaborative project with the Swiss Federal Institute of Technology (ETHZ). The fieldwork phase has been completed and a workshop of results is planned for February 2002.

2.1.7 Monitoring the socioeconomic impact of land ownership on the level of well being of small-scale producers

Reported jointly under 2.1.8 below.

2.1.8 Elaborate the San Dionisio baseline

Highlight

✓ Characterization shows that the reference site in Nicaragua has low productivity, high poverty, and little access to public utilities

Objectives

- Characterize the main uses of the soil in the watershed, the typology of the producers, and production problems
- Identify entry points for adaptive and participative strategic research that should be done in the SOL

The process began with the compilation and analysis of the available secondary information in several institutions in the municipality. Workshops were also held to validate the collected information with key informants.

Results and Discussion

The Calico River watershed has a total extension of 170 km and heights range from 400 to 1200 m. The annual average precipitation over the last 13 years was 1547 mm and varied between 1000 to 2050 mm). Rainfall distribution is unimodal with greater falls in the months of September and less in March. The soil types that predominate in the watershed are Entisols (86%), Inceptisols (5%), Alfisols (4%), and Vertisols (4%) (Murillo and Osorio 1999[3]). Most of the soils have little depth, from 2-5 inches (Baltodano et al 1998[4]). According to producers, the soil does not yield well without fertilizer and weeds are a problem.

According to information from PRODESSA, this municipality is characterized by a strong smallholding sector, which coexists with a sector of medium and large farm exploitations. From 60% to 65% of the rural families do not own land (they rent). They produce basic grains, use few inputs, and occupy less than 6% of the total surface. About 10% of producers have from 9 to 70 ha of land and produce basic grains for consumption and coffee commercially. The main use of the land is natural or cultivated pasture.

The same diagnostic indicates that the production systems are stratified according to altitude. Coffee is found mainly in the higher areas (700-800 m) and basic grains from 500-800 m. Average crop production is low: maize 1.8 t per ha, bean 0.8 t per ha, sorghum 2.4 t per ha, and coffee 0.27 t per ha. An increase has been observed both in the yield and in area sown between 1995 and 1998 as a result of incorporating new areas to agriculture and the use of inputs. The analyses of prices indicate an increase in the costs of production and a decrease in the prices of sale of basic grains. There is evidence of using trees for the production of firewood, fence posts, and live barriers, and of home gardens.

Below we list results of the last population diagnostic carried out by the Mayor's Office in 1998. These figures, compared with other sources of information, indicate that from 1995 to 1998 the population grew by more than 2000 inhabitants per year, which suggests high growth and a density of 140 inhabitants per km^2. The average of persons per dwelling is 6.47, which is slightly greater compared with 6.37 in the population overall. Water services are variable—in some watersheds they are adequate (e.g., Susulí), while in others they are deficient, especially during the dry period. Education levels are very low; the most educated person has an average of about 4 years of study. The index of illiteracy is 60% and is similar to the national level. Health and birth problems are high. The diagnostic carried out by the Mayor's Office classified 15 communities and the urban area of San Dionisio within the strata of extreme, high, average, and low poverty.

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[3] Murillo K, Osorio D. 1999. Caracterización de los recursos naturales edáficos de la subcuenca del río Calico, San Dionisio, Matagalpa, Nicaragua. Dissertation, Facultad de Recursos Naturales (FARENA), Universidad Nacional Agraria (UNA). CIAT, Managua, Nicaragua. 64 p.

[4] Baltodano ME, Tijerino D, Vernooy R. 1998. Análisis de bienestar en la subcuenca del río Calico, San Dionisio, Matagalpa, Managua. Technical report, PE-3, CIAT, Cali, Colombia.

Results of population survey made by the Mayor's Office, San Dionisio, Matagalpa, Honduras

Population	Potable water	Electricity	Education	Health
Urban: 2,215 Rural :14,601 Total :16,816	Households: Domestic connections: 1,773 (57%) Wells: Total coverage of potable water: 77%	Domestic connections: 601 (19% of coverage) and an indeterminate no. of illegal connections	Students: Primary:2,998 Secondary: 395 Total: 3,393 Illiteracy: 60%	Three health centers in the rural area and one center in San Dionisio (ambulance)

Below we summarize the conclusions drawn about the main problems facing San Dionisio.

Problem	Causes	Effects
Decrease in soil fertility	➢ Water erosion ➢ Crop practices ➢ Little use of conservation systems	➢ Few production alternatives ➢ Decreasing yields ➢ Migration or advance of the agricultural border
Decrease in quantity and quality of water	➢ Deforestation ➢ Contamination ➢ Long periods of drought ➢ Problems of ownership over sources of water	➢ Deterioration of health ➢ Decrease in agricultural potential ➢ No use of irrigation
Little diversification of production	➢ No knowledge of options ➢ Lack of markets ➢ High costs of alternatives	➢ Reduced food supply ➢ Low income levels ➢ Poverty sustained
Low productivity	➢ Low seed quality ➢ Infertile soils ➢ Natural pastures of low quality ➢ Little use of technology appropriate to the zone	➢ Less food availability ➢ Economy of survival ➢ Low margin of commercialization ➢ Low production volumes
Low levels of education	➢ Insufficient physical infrastructure ➢ Few qualified personnel ➢ Children have to work	➢ Low individual development ➢ Low social development ➢ Low house sustainment

Contributor: ME Baltodano
Collaborators: Institutions of the region

2.1.9 Characterization of the state of degradation of production systems in Wibuse/Jicaro

Reported in Soils (PE-2) Annual Report.

2.2 Ex-ante evaluate alternative scenarios of landscape management

2.2.1 Apply the Soil and Water Assessment Tool (SWAT) model for quantifying river flow and sedimentation in the Jalapa watershed

Objectives

- ✓ Evaluate soil use in the watersheds where research takes place
- ✓ Evaluate the hydrological behavior of the watersheds

Training was given on use of the model in a course given by CONDESAN and the Ministry of the Environment at CIAT. All information necessary to carry out the analysis on the three watersheds was obtained from data collectors and those working in GIS. Only most of the data required were obtained for Cabuyal-Cauca, Colombia. Thus the analysis was done for this watershed.

A water balance approximate to the behavior of the watershed with parameters such as precipitation and water flow was made at daily level for 8 years. A real verification was not carried out because no data were available from the watersheds. The fluctuation over time and the different uses of soil can be seen in the reports, which are available for consultation.

Contributor: A Jiménez Nieto

2.2.2 Validate the model of accessibility for small-scale coffee processors

Highlight

- ✓ Ex-ante methodology of economic appraisal applied and validated

Objective

- Present a strategy that contributes to reducing the number of discharges of coffee contaminants by means of an optimization of the number of coffee processing plants and incentives for producers to use them

The study was carried out in the municipality of San Nicolás, Frío River watershed, western Honduras. One hundred and thirty-seven coffee farms there produce 47,361 sacks of coffee. To eliminate the artisanal processing plants run by small-scale producers, an economic incentive would have to be paid that covers the profit margin that the producer has from the whole process.

To define this margin, we elaborated a linear programming model to minimize the cost of transportation subject to six restrictions:
(1) Maximum volume of coffee that each producer needs for processing, (2) Maximum distance to nearest processing site, (3) Water available per processing plant, (4) Rate of conversion applied in the commercial transactions, (5) Sum of the contaminants generated, and (6) Total amount invested in the project.

To obtain the optimum solution, we used the GAMS program. This determines the optimum number of plants that should operate in a watershed, type of benefits, optimum location, contaminant control, water quantity used in the process, coffee distribution from farms to the distinct processing sites that will be opened, and cost of the objective function per year.

Results and Discussion

The solution generated by the model indicates that an investment of US$667,000 would be needed to implement the whole plan. The cost of the objective function is US$138,000 per year. The number of plants that should operate in the watershed is about 15, of which eight should be of model 5 or central type, complemented with seven model 2s. To apply the solution, the producer would need to be paid US$5.75 per bag. The model allows us to generate settings of change in the strategy in the case that water availability is diminished or production increased. With the optimal solution, the levels of contamination would be reduced by 70%.

The use of bioeconomic models permits us to evaluate the environmental and economic impact of decisions at farm and watershed levels, and to generate scenarios of solutions that can be discussed among the groups of interest.

Contributor: JM Gonzales, Instituto Hondureño del Café (IHCAFE)
Collaborator: B Barbier (CIRAD)

2.2.3 Extrapolation: Spatial Quantile Regressions (tool) and carrying capacity estimates

Highlights

- Quantile and spatial regressions were implemented in S-PLUS
- Carrying capacity was estimated for Honduras agricultural productivity

Methods

We implemented in SPLUS a new version of quantile regressions with goodness-of-fit assessment, from source code provided to us by the authors (Koenker and Machado1999[5]). This allows us to make robust estimates of regression parameters for various percentiles of the conditional distribution, as well as allowing us to explore its shape.

[5] Koenker R, Machado J. 1999. Goodness of fit and related inference processes for quantile regressions. PDF document (R1V5.pdf). 30p.

We devised a novel application of quantile regressions: the estimate of carrying capacity and of the influence of factors that correlate to it. We applied the method to the per capita agricultural productivity (PCAP) at village level in Honduras. By choosing the highest 90th percentile, we address the case of villages that have performed the best, i.e., have highest PCAP, which is an indicator of what is the best productivity to expect provided a given environment (accessibility, education, climate, etc). A village that performs poorly cannot expect to do much better than the 10% best performing villages in Honduras (or in the region) in similar environments. Therefore, the upper limit to agricultural productivity is set by productivity achieved by villages in real world conditions, and this helps us estimate the real productivity gains to expect for poor villages, the ones that CIAT is targeting (Figure 17). On the other hand, if we analyze the lowest 10th percentile, we address the case of poorly performing villages and assess what parameters correlate to this condition, independently of better off villages.

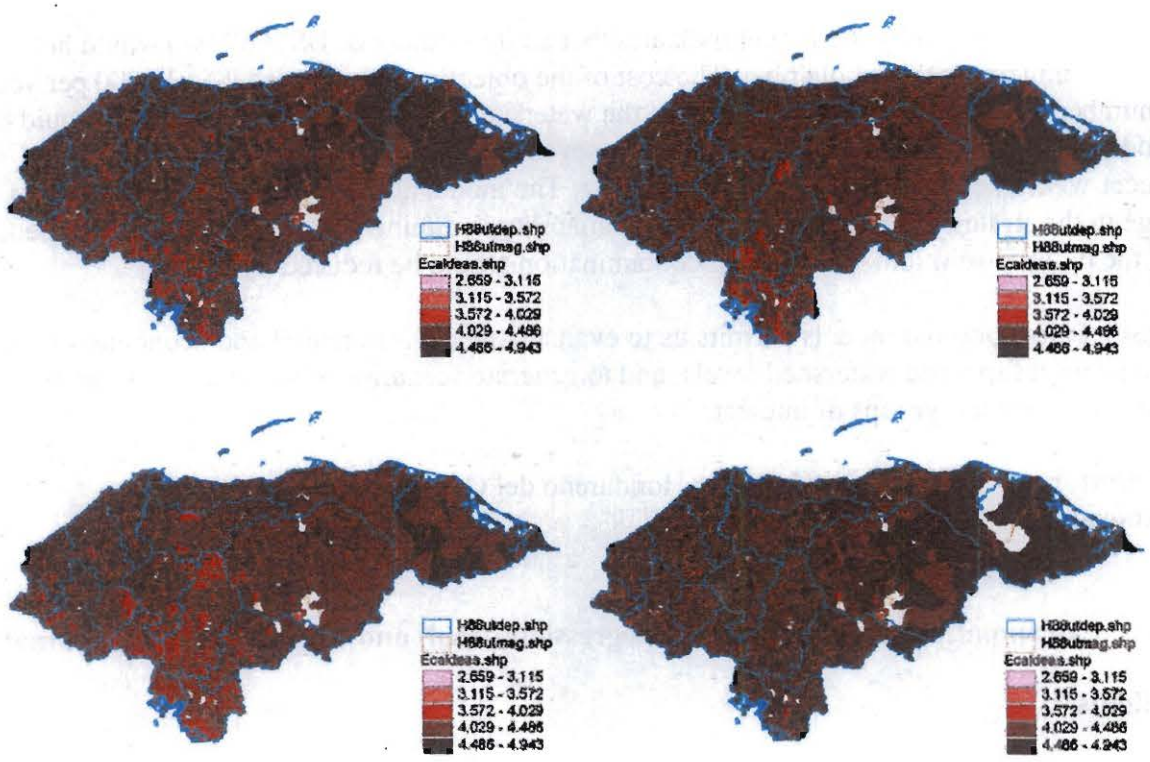

Figure 17. 1993 Honduras agricultural productivity spatial distribution ($\log_{10}$ of Lempiras per capita), nationwide model. Top left: actual; Top right: median (i.e., average situation); Bottom left: lowest 20% percentile (i.e., worst case, or what would happen if development fails); Bottom right: highest 20% percentile (i.e., best case, or what productivity could look like in the best real-world conditions (i.e., carrying capacity for agriculture). Note: white = no data.

Results

With quantile regressions, we can estimate the potential of a region and factors that contribute to a given outcome. Therefore, we can harmonize desired future condition with an actual projected future condition, based on actual data. By implementing quantile regressions in a spatial context, (i.e., process data in a given geographical environment as opposed to nationwide data as a whole) we can compare the potential of regional and national development. We can then decide what is the best approach to take to raise the well being of our target population. This work results particularly useful both to CIAT, by helping improve our targeting, and for our partners responsible in designing policies. The Proyecto Censo Estratégico (PROCES) concept note, that the Institut de recherche pour le développement (IRD) and CIAT are preparing, suggests a way of building a learning process into regional development, where these methodologies can be transmitted to our partners.

Contributor: G Leclerc
Collaborator: B Barbier (CIRAD)

2.3 Develop and apply the methodological tools for natural resource management at landscape level

2.3.1 Finalize and socialize the Rural Atlas of Nicaragua

Antonio Iturbe's leaving the project complicated the normal procedure of this activity. Nevertheless, the initial version of the Rural Atlas is in the hands of the Nicaraguan institutions to include the metadata. We expect to have the final version ready next year.

2.3.2 Finalize and socialize the Rural Atlas of Matagalpa with environmental indicators

At local level (Matagalpa and San Dionisio, Nicaragua) a project with CIAT's Land Use Project (PE-4) and the Ministerio Agropecuario y Forestal (MAGFOR) was defined to produce an Atlas for Matagalpa and San Dionisio. In this context, an indicator set was defined, databases consolidated and made operational, and the interface to use indicators and produce the Atlas was defined. At the same time, a case study at watershed level was developed for the Tascalapa watershed in Honduras. In this context, a framework and an indicator set was defined at this level. The work was finished in 2000 with the production of a CD-ROM.[6]

The Indicators Toolkit was sent to the regional network members and other potential users. Of the Spanish version, 125 copies were sent to Central American institutions, and 300 copies of the English version were distributed to other regions/users. A database of recipients has been compiled for future analysis.

Contributors: M Winograd (PE-4), JA Beltrán

[6] CIAT-MAGFOR-World Bank-UNEP. (CIAT-Ministerio Agrocpecuario y Forestal-World Bank-United Nations Environment Program). 2000. Rural indicators for Matagalpa. CD-ROM Beta version for ArcView 3.1. CIAT, Cali, Colombia.

2.3.3 Participative diagnostic on the use and state of water and determination of local indicators of water quality

This work is initiating and is not reported on this year.

2.3.4 Determine bio-indicators of soil quality based on invertebrate communities

This is the thesis work of Helena Velásquez (PE-2) and was initiated with an initial sampling in various land-use systems in the Wibuse watershed, San Dionisio, Nicaragua. Results are being analyzed.

2.3.5 Guide on the use of mapping and photo-topographical analysis for evaluating natural resources at watershed level

In several analyses and follow-up meetings on the training strategy carried out with trainers from Honduras and Nicaragua participating, it was recommended that the Guide on Photo-topographical Analysis of Land Use Trends be merged with the Participatory Mapping Guide. While waiting for this new product, trainers continued to use the two guides in separate format, but one beside the other to show their complementarities in the diagnosis of natural resources.

The integration of these two guides was proposed as part of a workshop to revise all guides by mid 2001. Shortage of funds has postponed this workshop, but we expect it will be a priority for 2002. By then, some of the experiences that are being collected in Africa through the presentation and adjustment of the guides will serve the purpose of a second edition of the DS instruments. On the other hand, new visions of CIAT's GIS experts on this topic may throw new light on the more advanced diagnostic tools to use in combination with the other biophysical DS instruments (e.g., modeling).

Contributor: V Zapata

2.3.6 A disaster prevention and response demonstration product

Highlight

- A product is being developed, aimed at Latin American countries vulnerable to serious damage caused by natural disasters such as floods and landslides

Results

Dendron Resource Survey, a Canadian consulting firm in geomatics, is collaborating with CIAT to produce the disaster prevention and response demonstration product, aiming at Latin American countries vulnerable to serious damage caused by natural disasters such as floods and landslides. Dendron is responsible for the "story" and its presentation, while we produced orthomosaics and "fly-over videos" of RADARSAT images combined with relevant base data

and highlighting vulnerable areas. This was done using PCI Fly!® and Berkeley MPEG encoder. Geocoding / orthocorrection and mosaicking of RADARSAT imagery. Relevant auxiliary data (terrain, water, population, infrastructure, environmental and sustainability indicators for Honduras) were prepared and their associated representation style. Figure 18 shows an example of the work in progress.

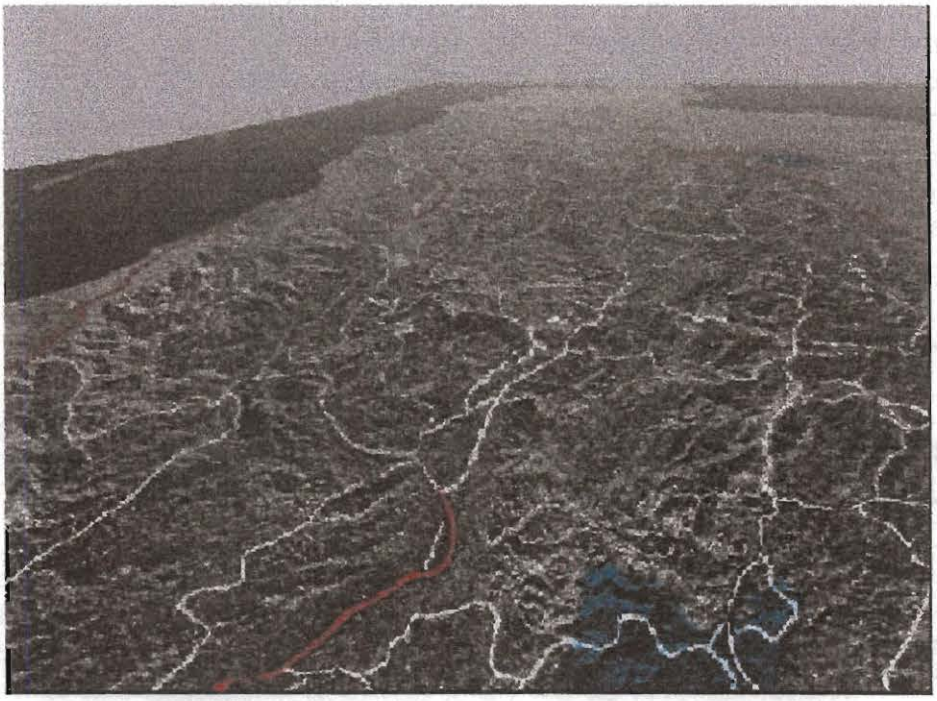

Figure 18. Aerial view (30,000 m) of Honduras North Coast, with main roads (red), secondary roads (white), and vulnerable municipalities colored according to their degree of vulnerability to natural disasters (blue, yellow).

This product is in its final stage of development. It has helped raise CIAT capacity to deliver cutting-edge information products, strengthened our relationships with the private sector, and will be used to promote CIAT and Dendron's capacity to integrate geoinformation and RADARSAT imagery for country disaster preparedness and response. In addition, CIAT now counts on radar imagery for Honduras worth US$40,000.

Contributor: G Leclerc
Collaborators: S Bolaños (PE-4), U Nielsen (Dendron Resource Surveys Inc)

2.4 Promote and implement consortia for landscape management

2.4.1 Prepare the Annual Operative Plan (AOP) of the MIS consortium

The AOP of the MIS is available through a link on the project's Web page at http://www.123.hn/ciathill/poa2k.htm

Contributor: M Ayarza

2.4.2 Define the CLODEST AOP and form the San Dionisio Interinstitutional Consortium

Highlights

- ✓ Germplasm exchange to SOL sites at network level (Commission for agriculture and the environment)
- ✓ Elaboration of proposals jointly with local organizations
- ✓ Forming of a committee to develop the project "Improving education for development"
- ✓ Definition of villages and activities for a food security project of the Institut de Nutrición de Centro América y Panamá (INCAP)
- ✓ Formation of the provisional Committee (NGOs, and government and local organizations) for the consortium in San Dionisio, Nicaragua

Objective

- Assure the sustainability of the interinstitutional consortium through obtaining Legal Title, jointly developing projects, and the operation of working committees and self-management of funds

To develop activities for strengthening CLODEST, meetings were held with members of the Boards of Directors, committees, and other work teams temporarily formed to elaborate or to revise a particular document. For certain activities, workshops had to be organized with local representatives of organizations, government organizations (GOs), and NGOs. In both cases, participative methodologies were used, for example brainstorming, to facilitate participation of the assistants or team members.

Results

Because of the strengthening of CLODEST, changes in the operation of its organizing structure were generated, especially for committee-level work. At the same time, funds management and interinstitutional coordination were improved. Main results for each area of activity follow.

(1) Management and administration

As a result of the support to the Board of Directors in this area, a plan to reduce expenses was elaborated that clearly establishes the responsibility of each partner in payments to be made. CLODEST needs to sell some services such as training to partners to collect funds for operating expenses. A system of monitoring and participative evaluation is being established at the level of CLODEST, the Red de Organizaciones Locales de Yorito y Sulaco (REDOLYS), and the Agroenterprise Committee. These systems establish indicators that permit the Boards of Directors to know the degree of advance in activities. The three monitoring systems are being established at this time and we expect to see results next year.

Another activity developed for CLODEST is the socialization of the route toward impact, which is explained elsewhere in this report. However, socializing more with members of the consortium is felt to be necessary. With the new change of Board of Directors the operation of CLODEST

has improved substantially. In many of the meetings and workshops developed, it is felt that the consortium partners are taking possession. The CLODEST has retaken its role of interinstitutional coordination. A third phase is initiating that is oriented to the joint search for funds. However, the percentage that CLODEST should contribute to facilitating proposal attainment is not well defined. We should improve relations with the municipality and support it in the execution of the municipal plan of development. We expect that obtaining Legal Title will not be an obstacle to legalizing CLODEST as the municipal committee of development.

(2) Organizing structure

The bringing up to date of membership through applying the agreement framework, and the revision and approval of the internal regulation of CLODEST, had as only objective the obtaining of Legal Title. The CLODEST members decided to obtain legal status to facilitate the obtaining of funds and to assure permanence. However, within the sustainability strategy presented, the group contemplates the legalization of CLODEST before the government ministry as the municipal committee of development. This will be an activity that we will support in the future.

The Comisión de Agricultura y Medio Ambiente (COAMA) is integrated by CIAT, IPCA, SERTEDESO, and members of the groups of producers that form the SOL Sites Network in Yorito. It has a well-defined work plan and is developing activities of research, validation, training, and seed multiplication. Advances in its activities are reported under Output 5, but in general it has developed about 50% of the 2001 work plan. This advance is because of good communications and relations among the committee members that have permitted excellent coordination of activities.

With the support of the CIAT Agroenterprise Project, members of the Comité de Agroempresa y Comercialización have elaborated and developed a workplan oriented to establishing a local support system to improve commercialization of products and the forming of agroenterprises. The commission has improved its image relating to other member of CLODEST and is beginning to establish the support system through the Documentation Center (bulletins of prices, wall displays of visits to agroenterprises). Details of activities are reported under Output 4. It is important to emphasize that most of the members that form the committee are small-scale hillside producers.

The main function of the Comisión de Aprobación de Pequeños Proyectos Productivos is that of revising and approving productive projects. During part of the year the financing of projects diminished because of the moratorium of credit (58%). An analysis by the Commission established the following measures:

- Revise and improve the productive projects' financing politics,
- Establish negotiations and recuperate the capital lent, and
- Activate recuperation of the fund and reduce expenses by fixing the salary of the CLODEST technical advisor.

Currently it has a well-defined policy of financing, elaborated taking into account the experience of the partners of CLODEST and the Union de Campesinos Organizados de San Dionisio (UCOSD). Lately, the idea was discussed of designing a credit system through rural community

credit associations or "*cajas rurales*", which have created and strengthened the Agroenterprise Committee and SERTEDESO. In this way, funds will be handled in the communities.

(3) Interinstitutional coordination

Five meetings were held during the year with INTA, Asociación para la Diversificación y Desarrollo Agrícola Comunal, Matagalpa (ADDAC), PRODESSA, Programa Campesino a Campesino (PCaC) and CIAT-Hillsides attending. It was established that the municipality would call together the institutions and local organizations, for which reason it was agreed to establish a provisional committee to continue with the coordination process. Themes for future discussion include reactivation of the Municipal Committee of Development, establishment of a database about beneficiaries and state of credit, and elaboration of a project for the Documentation Center.

(4) Self management

For the first time in CLODEST's history, a new institution has arrived in the region (INCAP). It is using the consortium to define its objective population and to arrange its future activities. Another example of coordination is the facility with which the Executive Committee was formed for the project Improving Education for Development, in which the Instituto San Pedro (ISP), IPCA, CIAT, and some members of the Board of Directors of CLODEST are participating. To strengthen the self-management of funds, the preparation of eight joint proposals has been initiated. Representatives of local organizations prioritized them. These proposals will be submitted jointly with the municipality at the Programa Nacional de Desarrollo Sostenible (PRONADERS), in this way avoiding the duplication of activities and resources.

Contributors: L Brizuela, JA Beltrán
Collaborators: B Ferrara

2.5 Strengthen participation of grass-roots organizations in consortia for landscape management

2.5.1 Documentation of the processes of forming networks of local organizations

Information is being compiled on lessons learned about networks. Steps needed for the formation of networks of local organizations are being formulated. Results will be reported next year.

2.5.2 Establish a method of follow up and evaluation of NRM projects in local organization networks

Not reported on this year.

2.6 Monitor and evaluate landscape changes

2.6.1 Analyze and monitor the water of the Tascalapa River watershed

This work is in process of analysis and not reported on this year.

2.6.2 Analyze and monitor rainfall distribution at watershed level

Highlight

✓ Database available of daily rainfall and distribution in the Tascalapa River watershed

Objective

- Determine the variation in daily precipitation at watershed level by means of community participation that supports the systematization of information and serves as backup in decision taking at local level

The Tascalapa River watershed covers an area of 112 square kilometers. Its waters circulate from north to south. Tascalapa has a central corridor and two mountain groups to the east and west. The height above sea level varies between 400-1600 m. The network is formed by producers that manually take rain data by means of rain gauges. The rainfall readings are carried out daily. An analysis was carried out of the information that spans the period 1996-2001, in order to determine rain distribution and monthly averages. Figure 19 shows the distribution of the rain stations in the watershed and the respective altitude in agreement with a digital elevation model (DEM) at a scale of 1:50,000. Heights range from 400 to 1600 meters above sea level.

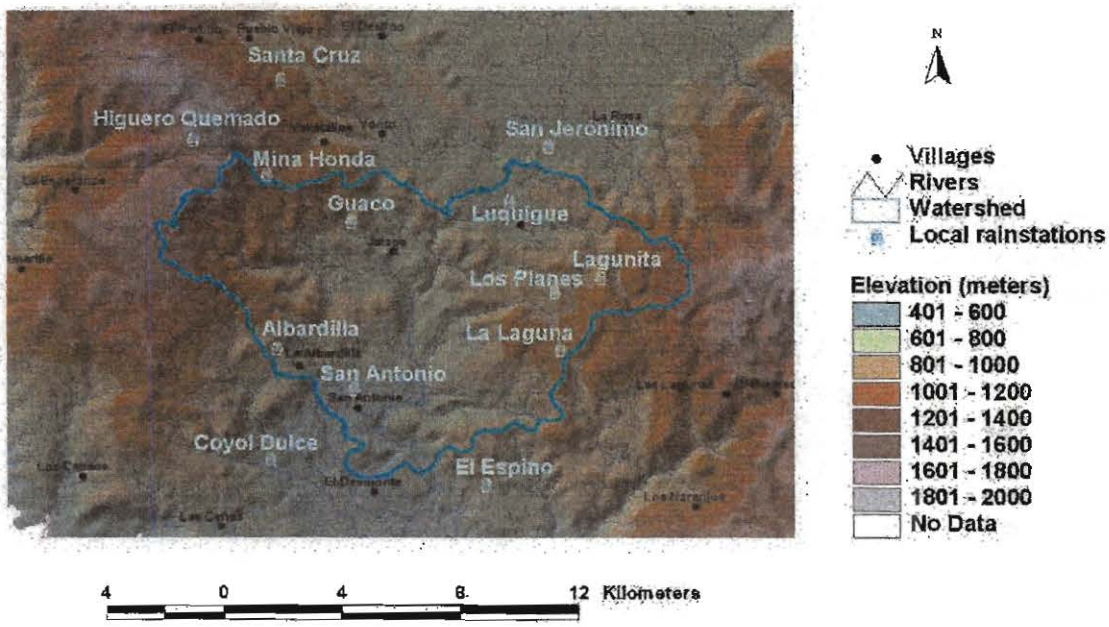

Figure 19. Distribution of local rain stations in the Tascalapa River watershed.

Results and Discussion

The annual average of precipitation in the watershed is 1500 mm. March and April have the lowest rainfall, with March the driest month. July and September have the most rainfall, with September the rainiest month of the year (Figure 20).

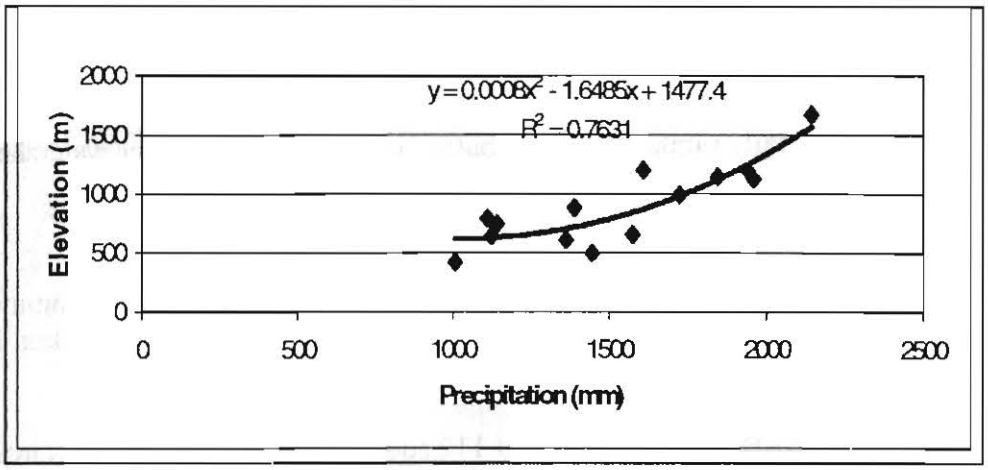

Figure 20. Relationship between elevation and precipitation in the Tascalapa watershed, Yoro, Honduras.

To determine differences both for production systems and coverage of the soil inherent in the sites of the watershed, two areas were defined - the upper area and the central corridor. The upper area of the watershed shows greater averages of rainfall than the lower central area. Table 10 shows rainfall totals in order from greatest to least.

Table 10. Rainfall totals for communities in the Tascalapa River watershed, Yoro, Honduras.

Community	Area of watershed	Elevation (m)	Annual total (mm)
San Antonio	Central	420	1005
Coyol Dulce	Central	492	1445
San Jeronimo	Central	600	1362
El Espino	Central	636	1121
Luquigue	Central	650	1572
Sol- Luquigue	Central	740	1140
El Guaco	Central	790	1110
Albardilla	Central	880	1388
La Laguna	Upper	995	1721
Lagunitas	Upper	1123	1955
Los Planes	Upper	1147	1841
Mina Honda	Upper	1194	1939
Santa Cruz	Upper	1200	1605
Higuero Quemado	Upper	1673	2142

The change in the quantity of rainfall can be differentiated and predicted according to altitude in the Tascalapa watershed. The adjustment of the regression function is good ($r^2 = 0.7631$). The monthly distribution of rainfall conditions crop sowing dates that begin in May and end in October. Two production cycles can be sown.

Contributor: O Mejía
Collaborators: G Palma, L Brizuela

Output 3: Organizations strengthened

3.1 Develop and/or validate methods and tools for developing and strengthening key organizations

3.1.1 Validate the Guide for establishing small seed enterprises

The guide for establishing small seed enterprises was completed in July 2001. It collects together all the experience gained through the Seeds of Hope Project and other previous CIAT experiences in the field. Guillermo Giraldo and his associates in Honduras and Nicaragua are carrying out validation of the guide. We expect that training activities with this guide will be fully developed by next year. Financial resources for its publication and for training activities are expected to be in place for the year 2002.

Supported by the training strategy, an important innovation was included in this new product. A set of four three-dimensional models that are fully operational accompanies the guide. These small-scale models of cleaning and selection machines are carried to the training sites for demonstration purposes and to motivate farmers to construct of real machines. The true-scale blueprints of machines are included in the guide for future reference in their construction.

Contributor: V Zapata

3.1.2 Apply the methodology of levels of well being at curricular level

Not reported on this year.

3.1.3 Elaborate a manual for postharvest of basic grains

The manual was written and a first printing was made with a local printing press. However, the diffusion process was postponed because of problems with the quality of the printing.

3.1.4 Elaborate a teaching booklet for preparing community projects

Highlight

✓ The Campos Verdes Association in San Dionisio elaborate criteria for approving community projects

Objective

- Strengthen self-management capabilities in grass-roots organizations

The Board of Directors of Campos Verdes met for a brainstorming session that resulted in a first draft of a list of possible criteria for incorporating the methodological instruments. Criteria were grouped by theme, each theme having a series of indicators both precise and quantitative. Facilitators from CIAT collaborated in the final design of the tool (teaching booklet). The second level of consultation was with representatives and leaders of the Association; and the third and final level was meeting with inhabitants of the 15 communities that make up the municipality of San Dionisio through discussion forums with each community where the process was revealed. A final activity was the training of leaders and Association representatives in the use of the teaching booklet.

Results

A commission of four community representatives was formed to evaluate and approve community projects jointly with the members of the Association's Board of Directors. Dates coinciding with sowing times were defined for receiving community project proposals. The Association prioritized criteria for acceptance of projects. With use of the teaching booklet, approved mini-projects increased slightly from five (in 1998) to seven (in 2001). The number of communities benefiting also increased from three to five. The tool is thought to have helped communities better prioritize their needs. Table 11 shows how three selected projects scored using the criteria for selection.

Table 11. Criteria for selection and scoring of three selected projects.

Project	Community	Criterion	Maximum score	Score assigned
Drinking water	Piedra Colorada	Justification	30	30
		Beneficiaries	25	20
		Community contribution	35	35
		Budget and Plan	20	20
		Contribution to NRM	15	15
		Legal documents	10	10
		Project duration	5	5
		Total	140	135
Well	Junquill	Justification	30	18
		Beneficiaries	25	25
		Community contribution	35	21
		Budget and Plan	20	12
		Contribution to NRM	15	15
		Legal documents	10	10
		Project duration	5	5
		Total	140	106
Land	Carrizal	Justification	30	18
		Beneficiaries	25	25
		Community contribution	35	0
		Budget and Plan	20	12
		Contribution to NRM	15	15
		Legal documents	10	0
		Project duration	5	2
		Total	140	82

As can be seen, the financial resources available to Campos Verdes, instead of financing mini-projects related to NRM, were oriented to satisfying demands in the area of infrastructure and production. Almost 70% of invested resources in 1999-2001 were destined to these areas. - Communities need more training in the use of the booklets and the filling out of the format.

Contributors: D Tijerino, JA Beltrán
Collaborators: Association of local organizations Campos Verdes

3.1.5 Elaborate a Guide on monitoring and participative evaluation at the level of grass-roots organizations

Highlight

✓ A first draft of a training guide is available for validation with partners

Objective

- Support communities and local organizations in the implementation of a monitoring system

At the beginning of August 2001, a workshop to prepare this guide was held in Honduras with the participation of Kirsten Probst and 20 professionals from the Apoyo a la Forestería Comunal (AFOCO) and IPCA, the two associated institutions that worked with her on the development of this methodology. After the workshop, work continued on refining the general structure of the guide that was agreed upon and was completed. Support was also provided to the main author in dealing with the didactic aspects of the guide.

A first draft is now being prepared with the support of the Hillsides Project. Some of the workshop participants will take the role of reviewers and some will participate in developing content and exercises. A first draft of the guide will be used in a workshop on participatory monitoring and evaluation (PM&E) to be held in Honduras at the beginning of October 2001. This workshop, coordinated by Susan Kaaria, will shed insights on the initial work on the guide.

Contributor: K Probst (University of Hohenheim)
Collaborator: V Zapata

3.1.6 Elaborate the second edition of the Guides on Informed Decision Making for Sustainable Natural Resource Management and the new poster presentations of the Guides

The second edition of the eight decision-support guides is an activity that could not be financed this year. Nevertheless, the experiences gained through the production of the Local Indicators of Soil Quality Guide for East Africa indicate that the feedback provided by the African scientists enhanced the quality of this research. Thus the original authors could adjust the Guide in its structure and content. A series of workshops will be held for East and South African countries

between October and November 2001, followed by a training-for-trainers activities foreseen for 2002. From these events, the Hillsides Project is expected to collect an important amount of feedback and recommendations that will make the revision of the training guides more relevant both for Latin America and for African countries. Then, new posters of the training guides will be worth publishing.

3.2 Train local, regional, and national organizations in the use of methodologies and/or tools developed by CIAT

3.2.1 Monitor Action Plans of institutions trained in the use of the project tools

Highlight

✓ Ten communities in Bolivar, Colombia prepare Action Plans then included into the "environmental plan" for the municipality

Objectives

- Support the elaboration of Action Plans at community level
- Strengthen links with partner organizations

Materials and Methods

The preparation, revision, and approval of Action Plans for follow-up purposes are part of the training strategy. The Hillsides Project provided technical support in the preparation of all Action Plans. A guide for the design of plans and instruments to conduct follow-up activities was prepared and applied during visits carried out by trainers and CIAT's training team. Subsequent adjustments of this guide and the instruments were adopted for use in East African countries and for the preparation of thesis proposals for universities in Nicaragua.

This year a major effort was made in terms of following up the Action Plans (18) prepared by members of institutions attending the training events. Six of the Action Plans were in Nicaragua, and seven in Honduras. Ten communities of the municipality of Bolivar (Valle, Colombia) made a cluster of Action Plans. Acuavalle, the regional contractor of water distribution services in Valle, working with two community organizations (Asobolo and Asofrayle), presented another plan. The Corporación Colombiano de Investigación Agropecuaria (CORPOICA) presented another plan. The Universidad La Molina in Peru presented an Action Plan, and the Fondo Nacional de Investigaciones Agropecuarias (FONAIAP) presented one in Venezuela.

A report on ex ante analysis of Action Plans is available separately.

Results

Although financial support for the development of these plans is expected to be provided by the institutions themselves, very limited funds (less than US$15,000) were provided this year to a

few institutions that requested complementary resources to carry out some of the activities included in the Action Plans. The single most important recipient of funds this year was Ecofuturo (US$5000), an NGO that signed a cooperation agreement with CIAT and the Corporación Vallecaucana de las Cuencas Hidrograficas y el Medio Ambiente (CORPOCUENCAS). This latter organization in the Department of Valle provides support for sustainable management of natural resources, and made a contribution of US$5000 to the application of the Guides. The NGO Ecofuturo worked intensively with 10 communities of Bolivar, Valle, Colombia in the application of four of the DS instruments. These communities prepared Action Plans that were consolidated by Ecofuturo, in consensus with them, and later presented to the mayor of Bolivar for his consideration. He has included this plan into the municipal agenda as the "Environmental Plan" for the municipality. CIAT is now lobbying before the State Watersheds Authority (CVC, its Spanish acronym) to motivate this organism to provide the funds for Bolivar to execute the plan.

Ecofuturo and the local communities in Bolivar have responded to CIAT training efforts better than any other institutions in the three reference countries. Therefore, we strongly recommend that next year this NGO continues to work hand in hand with CIAT, not only with PE-3, but also with other projects that need a reference site for research purposes. The renewal of an agreement of cooperation with CIAT is now underway to strengthen the relationship with this organism and the community of Bolivar.

Contributor: V Zapata

3.2.2 Strengthen the national training teams

Highlight

✓ A set of tools developed with participation of trainers as a basis for writing ex-ante reports on Action Plans

Objective

- Train trainers in Nicaragua, Honduras, and Colombia to carry out the monitoring and evaluation of Action Plans

Materials and Methods

Trainers in Nicaragua, Honduras, and Colombia were trained to carry out the monitoring and evaluation of Action Plans. In three workshops designed for this purpose, a set of guidelines were presented to the trainer teams that included the guiding principles and the methodology to prepare the instruments to be applied during monitoring and the terms of reference for the preparation of reports. The Guide, entitled "Guia para el Seguimiento de Planes de Acción" is a document that covers among other topics:

- Purposes and justification for the monitoring of Action Plans, (efficiency, efficacy, and relevance of Action Plans are covered here),

- Considerations on the end users of follow-up reports (for whom do we monitor?), to include researchers, end users, decision makers, and even policymakers,
- Purposes of process/product monitoring and the steps to follow up Action Plans, and
- Uses of baseline studies and relevant questions that should be included in the monitoring instruments with particular emphasis on the description of the local physiography, the local organizational set up, and the initial status of Action Plans.

Results

As a result of training, a set of instruments was prepared with the participation of trainers and CIAT professionals in charge of training activities. The tools were used during visits to Action Plan sites and were the basis for writing the ex-ante reports. Reports on 18 Action Plans are available in a separate document. We expect that this methodology and the instruments will be adjusted to the needs of African Action Plans now underway and will be applied during ex-ante visits at the beginning of next year. So far, African partners have followed the same formats used in Latin America. Those who received financial support this year will be provided with the follow-up instruments for their adaptation during the next visit to Africa in November 2001.

Contributor: V Zapata

3.2.3 Develop learning alliances in establishing rural agroenterprises with CRS, CARE, World Vision, and CASM

The initiative of learning alliances was presented during a meeting to four NGOs in Honduras: Catholic Relief Service (CRS), Cooperative for American Remittances Everywhere (CARE), Comisión de Acción Social Menonita (CASM), and World Vision. The main agreement of this meeting was to send a work proposal to each of these organizations, because all showed interest in the initiative. Of the four, only CRS indicated it could not participate in this initiative. The others reaffirmed their interest. In the last meetings held with each, they informed us that they are socializing this information within their projects. Some of the projects are including these activities in their annual planning for next year beginning in October 2001 and finalizing in September 2002. Therefore the signing of an agreement of cooperation with these institutions in this area will be carried out possibly between November and December this year.

3.2.4 Support national and international training workshops

Highlight

✓ Twelve activities carried out in Honduras, and fourteen in Nicaragua

Objective

- Diffuse the methodological tools generated by the project

Results

Dissemination of the DS tools was carried out in multiple scenarios and to a wide range of audiences. In Honduras the tools, along with proposals for interinstitutional cooperation for their application in several cases, were presented to:

- PRONADERS,
- The Secretary of Natural Resources and the Environment,
- Administración Forestal del Estado (AFE)/ Corporación Hondureña de Desarrollo Forestal (COHDEFOR),
- Asociación de Municipalidades de Honduras (AMHON), and
- Comisionado Permanente de Contingencias (COPECO), the National Disasters Authority.

In Nicaragua, the tools and related strategies for their application were presented to:

- The Ministry of Agriculture and Forestry and related organisms,
- INTA, for whom a proposal to develop an in-house facility to train trainers and to develop training materials was presented upon their request,
- Eleven institutions of higher education for whose students and teachers a special training workshop was conducted this year, and
- The donor community through visits and communications.

This year, 14 activities geared to strengthening institutional knowledge about the DS instruments and seeking institutional collaboration were carried out in Nicaragua. Activities included:

- Regular meetings with the National Coordinating Training Committee,
- Visits to institutions in Matagalpa, Estelí, Somoto, Managua, Rivas, Jinotepe, Carazo, and Leon,
- Meetings with university professors, deans, and rectors,
- Visits to Action Plans,
- Meetings with the Programa del Trópico Seco (TROPISEC), and
- Meetings with students of the Universidad Nacional Agraria (UNA) to help them design their theses to use the DS tools.

Training activities were reduced in number this year because of scarcity of financial resources. Nevertheless, targeted audiences were provided with training. A workshop to present four of the eight DS tools to 11 Nicaraguan organizations working in close cooperation with TROPISEC was carried out in Estelí with 27 people participating. In Nicaragua, a workshop to present the eight DS tools was delivered to 24 students and teachers of 11 Nicaraguan institutions in El Crucero to promote the use of the tools in the development of theses. Students from the National University of Matagalpa presented an interesting proposal, but their request to support this initiative was turned down because of financial constraints.

In Honduras, two institutions were provided with training in the use of DS tools this year. Twenty-four professionals from World Vision received a workshop on the use of the tools. Unfortunately, the local workshop coordinator collected no Action Plans. The other institution visited was ENA, whose teachers have integrated some of the DS tools into the agronomic sciences' curriculum and are using some of the tools in field activities oriented to NRM.

This year, a series of 12 activities was carried out in Honduras, different to the preparation and execution of training workshops. We participated in three Soils Fairs, one in San Francisco de Los Valles, Santa Bárbara, another at ENA, and one in Quimisaca, Lempira, in coordination with Food and Agriculture Organization (FAO)- Proyecto Lempira Sur (PROLESUR). Three meetings were held with the National Team of Trainers to prepare the monitoring instruments, study the proposed methodology, and write follow-up reports after visits to Action Plans. Visits were made to seven institutions in Tegucigalpa and San Pedro Sula to motivate their signing of cooperation agreements with CIAT (CARE, the Secretaria de Recursos Naturales y Ambiente [SERNA], ENA, SDC, CASM, Escuela Nacional de Ciencias Forestales [ESNACIFOR], and World Vision). A seminar was held in August 2000 in which Miguel Ayarza and his team presented CIAT's portfolio of technologies. Other activities relate to furthering the training of trainers through two "micro-teaching workshops", one carried out at ESNACIFOR, Siguatepeque and another in Catacamas, for the National Agricultural School.

A continuous interaction with PRONADERS has provided room to collaborate with this organism in paving the way towards the establishment of the Inter-American Development Bank (IDB) Priority Watersheds Program. On their request, training was delivered to a group of professionals from GOs and NGOs on the topic of "Local Management" (*Gestión Local*). The material presented in the Land Discovery Approach was redesigned into a guide that was useful for participants to

- Analyze the meaning of "*gestión local*",
- Review some of the decision-making tools that can be used to develop institutional capacities for "local management", and
- Formulate a model that would fit the needs of the participating institutions.

It is also expected that this new guide can be sharpened for use in African and Asian countries when presenting the NRM DS tools. A guide and a report on this activity are available in the Project's Documentation Unit.

All training and consultation activities carried out this year were almost totally supported by institutions requesting training. In most cases the national training teams conducted the training. Local coordinators in Honduras and Nicaragua and local CIAT personnel provided logistic support to the training. In this endeavor both the regional coordinator in Honduras and the liaison officer in Nicaragua were tirelessly aggressive.

Contributor: V Zapata

3.2.5 Support the incorporation of the methodological tools in organizations by means of training and consultancy

This year, two institutions received training and consultancy to incorporate the DS tools into ongoing plans and projects. The first is the Universidad Nacional Agraria "La Molina" (UNALM) in Peru, where a project to develop innovations in curriculum implementation is being financed by the Kellogg Foundation. This project intends to strengthen the capacity of teachers (agriculture and other faculties) to engage in extramural activities where community and

students have the opportunity to interact to gain technical information on the one hand and field experience on the other. CIAT delivered a course for teachers where Participatory Mapping, Local Indicators of Soil Quality, and Stakeholder Analysis were covered. Additionally, guidelines on curriculum development were provided to the teachers. A follow-up visit was made 6 months later to observe the results of the incorporation of the tools into the curricula. Seven instructors reported having used the DS tools in a variety of activities, mainly at the reference site the University has at Mala, a small desert location 60 kilometers southeast of Lima. The other institution incorporating the DS tools in an ongoing project is CORPOICA, in the regional center of Nariño. The "Proyecto Guaitara", as it is called, focuses on degraded soils in 10 municipalities of this state. Using nationally recruited funds, CORPOICA is working with the Unidades Municipales de Asistencia Técnica Agropecuaria (UMATAs), its own technical assistance experts, and researchers both from the local offices and from other regional CORPOICA offices in the country. They are applying participatory research, technical assistance, and training strategies to recover degraded soils in this zone. CIAT provided training to these professionals in Soil Quality Indicators, Participatory Mapping, Organizational Processes, and Stakeholder Analysis. The use of these instruments was incorporated into the diagnostic phase of the project now underway. Specific information regarding the way in which these instruments are being used is condensed into the report on the visit to the CORPOICA Action Plan, presented after training was delivered.

Contributor: V Zapata

3.3 Strengthen small-scale producers, managers, and local, regional, and national organizations through participatory investigative methods

3.3.1 Support the consolidation of development committees of Rural Agroenterprises in Yorito and Sulaco

Highlight

✓ Two local committees for the development of agroenterprises and support to commercialization established and functioning according to the work plan

Objectives

- Support the consolidation of the rural agroenterprise development committees in the municipalities of Yorito and Sulaco in the department of Yoro, Honduras
- Train members of the committees in the management of the methodologies of the "Market - Options Identification for Small Producers and the Productive Development of Integrated Projects"

First we applied the Market Opportunities Identification methodology for small-scale producers (Ostertag 1998[7]) from which a portfolio was obtained of 14 products. After identifying these products, work continued in 2000 on forming a committee of commercialization and micro-industry. A Plan of Activities was elaborated for each committee and the Vision, Mission, and Objective was defined for each committee. During 2001 another plan of activities was carried out, taking as a base the activities that were pending from the previous year and adding new activities to these.

Results and Discussion

This year, most of the activities of both committees were carried out, according to what was outlined in the plan of activities for the present year. This is because of greater support to the committees on the part of the project agroenterprises, and the committees' greater understanding of their true role within the watershed.

The main results obtained with both committees were:

- Annual work plan elaborated for each committee and being executed according to plan.
- Active committees. Both committees are executing the programmed activities in agreement with the plan elaborated at the start of the year. The committee of Yorito has been more active than that of Sulaco, because of a greater degree of commitment of the Yorito committee members and their greater dedication of time.
- Two *proyectos productivos integrados* (PPIs) were developed. The Yorito committee developed the Coffee PPI and began to work on one of vegetables and one of processed kitchen garden products. At least one of these will be finished at the end of this year. In Sulaco, the Maize PPI was completed and is now being executed. Also work was begun on the PPI of milk products for the zone and is expected to finish at the end of the year.
- Two new rural credit associations were created and four more strengthened through training in management and banking operation, and with seed capital to support the activities of product transformation in the municipalities of Yorito and Sulaco. Likewise, a regulation for credit was elaborated for their management.
- Markets information system initiated. Members of the Yorito committee received information on prices of the Comercialización Alternativa (COMAL) network each week. Every 2 weeks the committee members process this information and make it available in visible places in the municipality of Yorito and Sulaco through pages that are pasted in different public places of the watershed. Likewise, a primer for each market option identified in the market study containing market windows for each crop is being distributed among the producers. To date, five primers have been elaborated, of which three were distributed. More information on the impact of this system will be available next year.
- A monitoring and evaluation system was initiated in the Yorito committee. This system will be implemented in the Sulaco committee and in the rural credit associations.

[7] Ostertag CF. 1998. Identification and evaluation of market opportunities for small-scale rural producers. Guide No. 7 (in Spanish) of the series "Instrumentos metodologicos para la toma de decisiones en el manejo de los recursos naturales". CIAT, Cali, Colombia. 182 p.

- Leadership was given in the elaboration of proposals to submit to PRONADERS of the government of Honduras. A workshop was carried out to determine the project needs of the organizations pertinent to CLODEST. Then organizations with interests in common united to carry out proposals as a group. Finally, six proposals were obtained that will be presented by CLODEST at PRONADERS.
- Committee members know the methodologies of Market Identification by Small Producers and of elaboration of PPIs, although they are lacking in some aspects of both methodologies that both committees should improve.
- An accounting system was established for each committee. Each committee has an accounting system that permits it to know how the budget of each committee is spent.
- The Yorito and Sulaco committees developed, jointly with other local organizations of the Tascalapa River watershed, five profiles of proposals to present at the Proyecto de Reactivación de la Economía (RERURAL) of PRONADERS. However, because RERURAL only finances project infrastructure, the proposals will be presented to other donors to raise complementary funds for training, seed capital, and technical assistance to set the projects in motion. Table 12 gives the projects in more detail.

Table 12. Profiles of projects elaborated by organizations of Yorito and Sulaco to be presented to various donors[a].

No.	Project	Participating organizations	Presentation to donors
1	Center for Managerial Development	CLODEST	RERURAL Project
2	Grain Bank for the municipality of Yorito	REDOLYS, ACELY, ASOCIAL	RERURAL, EEC, and ASPPE Project
3	Laying hens	ASOCIAL	RERURAL, EEC, and ASPPE Project
4	Transformation of Sugarcane Project	Caja Rural Tascalapa and REDOLYS	RERURAL, EEC, and ASPPE Project
5	Seed Production	CIAL AMHUPROH and ACELY San Antonio	RERURAL, EEC, and ASPPE Project
6	Grain Bank for the Sulaco valley	CIDES, PIIS	RERURAL, EEC, and ASPPE Project

a. For acronyms and abbreviations used, see page 131.

- Both committees participated in the elaboration of the final proposal to determine the feasibility of the local support services in the region of Yorito and Sulaco. Christopher Wheatley initially presented the proposal at the level of Concept Note. The New Zealand government approved this and then asked for the final proposal, which was presented at the end of August 2001 and approval is expected to begin work in January 2002.
- Commercialization channels were identified for products of the Tascalapa River watershed. The Yorito committee members toured to different agricultural fairs in the area of Valle de Sula, which includes the cities of San Pedro Sula, La Lima, Choloma, El Progreso, and Villanueva. Contacts for product commercialization were identified, and the conditions of purchase - sale at all the fairs except for that of Choloma. The Sulaco committee made a

verbal agreement with the DEMAHSA business, the biggest maize flour producer of Honduras, to sell maize production of the Sulaco valley at a price of 148.00 Lempiras (about US$9.50) per quintal[8] in the crop season at the DEMAHSA installations in San Pedro. Compared to the price that producers normally receive in the crop season (US$5.80 per quintal) this represents a net increase (less transport costs) of 44% in producer income.

Contributor: M Méndez (SN-1)
Collaborators: B Ferrera (CLODEST); M Flores (CIDES); members of the Comisión de Crédito, Microempresas y Comercialización (CMC)-Yorito; members of the Comisión de Producción, Crédito, Comercialización y Microempresas (CPCCM)-Sulaco; M Lundy (SN-1); M Totobesola (SN-1); L Brizuela

3.3.2 Support the identification, evaluation, and design of the Coffee and Seeds PPIs in the Tascalapa River watershed

Highlight

✓ Two PPIs (coffee in Yorito and maize in Sulaco) were designed and are being executed

Objectives

- Generate an Action Plan to strengthen the production chain of coffee and of maize
- Train members of the Rural Committees of Agroenterprises of Yorito and Sulaco in the management of the methodology used that permits obtaining results with the participation of invited actors—so that the committees can execute similar workshops to support other managerial chains

Materials and Methods

Taking as base the results of the Market Opportunities Identification study for Small Producers elaborated in 1999, the prioritization of the coffee production chain was carried out as promising according to the criterion of Yorito committee members. This chain was prioritized because coffee is a product that is produced extensively in the zone and represents an important source of income and of employment for most people of the zone.

A workshop where participative tools were used in order to visualize the flow of products, information, inputs, and funds in the chain. This was done to analyze the real capacities of the economic organizations that constitute the chain and to understand the available support services and past interventions. At the end of this phase, the chain could be better visualized and the interactions among its different actors and the support services, which are counted on in each link of the chain. Then bottlenecks were identified and analyzed and possible solutions to the difficulties were proposed. This process is done with the participative methodologies of analysis of cause and effect.

[8] 1 quintal = approximately 50 kg.

The last step in the elaboration of the PPI is the negotiation among the actors of the chain and the generation of a final concerted plan of action. This phase will focus on the facilitation of this process and the final plan generation.

Results and Discussion

The coffee PPI is focused on creating two coffee businesses.

(1) The first business will be dedicated to the production and conventional commercialization of coffee, initially through exporters and in the future through direct exportation, using the experience of the Cooperativa Agrícola Cafetalera Triniteca Ltda. (CACTRIL) or Division de Comercialización de Café (DICOMCAFE) cooperatives. Small- and medium-scale producers and the local intermediaries of the zone will form this business.

(2) The second business will be dedicated to the production and commercialization of organic coffee. This business will be formed by a reduced group of producers that are working on organically producing coffee. They will be trained in all aspects related to the organic production of coffee and the necessary contacts will be made to achieve certification of their farms.

To carry out the coffee PPI we intend to help small producers improve their incomes by obtaining better prices for their coffee and hence improve their standard of living. Table 13 details activities to be carried out in the short-, medium-, and long-term to carry out the Coffee Productive Project.

Table 13. Design of activities and responsibilities in the Coffee Productive Project (for acronyms and abbreviations used see page 131).

Business development		
Prioritized action/link	Persons responsible	Time span
Production:		
- Search for resources, contact credit organizations (formal and/or alternatives) - Training and technical assistance in conventional coffee crop management - Training and technical assistance in organic coffee crop management	- Producers - Credit organizations SERTEDESO - Committee - BANADESA - RAOS	short term
Postharvest management:		
- Training and technical assistance in crop management - Lacks fermentation troughs, drying patios → obtain financing to build them	- Producers - SERTEDESO - Commercialization committee - PRONADERS - Seeds of Hope Project	medium term
Processing:		
* Beneficiary - Training in management of ecological benefit - Construction of ecological benefits	- PRONADERS - SERTEDESO - Trip to Marcala	medium term

Continued.

Table 13. (Continued.)

Prioritized action/link	Persons responsible	Time span
Business development		
Marketing:		
- Establish contracts with exporters - Establish contracts with transporters - Establish contracts with buyers of organic coffee - Use market information system. Request support of CACTRIL and RAOS - Seek financing for support of commercialization.	- Producers - EEC - Market information center, other sources of information - CACTRIL - Transporters - RAOS	medium term
Managerial organization		
- Producer leaders (including local intermediaries) are organized in a coffee commercialization group and seek support of other producers - Producers of organic coffee are grouped in a business to produce and market organic coffee	- Producers - Intermediaries - Commercialization committee - RAOS	short term
Research		
Production:		
- Few resources, lack of knowledge on crop management (including soil improvement) :→research on organic compost (components, costs per mz)	- Coffee SOL	medium term
Postharvest management		
- Lack of knowledge on postharvest management of crop →research	- Coffee SOL	medium term
Processing		
- Lack of knowledge on ecological benefit → research	Coffee SOL	long term
Marketing		
- Other forms of commercialization are not known→ Study of organic coffee market	- Market information center - Revise database of alternative commerce	long term
Managerial organization		
- Organization of leader producers together with local intermediaries	- Commercialization committee - Producers - Intermediaries	medium term

With the implementation of this maize PPI we intend to reach two objectives:

(1) Improve the incomes of maize producers in the Sulaco valley and hence improve their living conditions.

(2) Support food security of the zone by retaining grain production in the zone and selling it during the period of shortage at lower prices.

Table 14 gives more details of activities to carry out the Maize Productive Project in the short-, medium- and long-term.

Table 14. Design of activities and responsibilities in the Maize Productive Project (for acronyms and abbreviations used see page 131).

Business development		
Prioritized action/link	Persons responsible	Time span
Production:		
- Obtain resources for production, contact credit organizations (formal and/or alternatives)t - Technical assistance in crop management - Establish production contracts with DEMAHSA, Du West, and DICTA	- Producers - Credit organizations - DICTA/Management division - Committee - BANADESA - DEMAHSA - Du West	short term
Postharvest management:		
- Training and technical assistance in management of stored grain - Construction of silos and cellars for maize storage	- Producers - INFOP - Commercialization committee - PRONADERS	medium term
Processing:		
- Construction of driers	- PRONADERS	medium term
Marketing		
- Establish purchase contracts - sale of grain with businesses producing maize flour - Establish contracts with transporters - Use market information system - Establish a Grain Bank	- Producers - DEMAHSA or MASECA - Commercialization committee - EEC - Markets information center, other sources of information - Transporters	medium term
Managerial organization		
- Organize producers in a business that markets its products directly with the maize processors and form a Grain Bank at community level to improve the incomes of producers and food security of the municipality	- Producers - Commercialization committee - DEMAHSA or MASECA - EEC	short term
- Varieties resistant to drought	- DICTA	medium term
Postharvest management: Processing Marketing - Study of feasibility of grain banks - Feasibility study of commercialization with processors - Study the effect of market information	- Commercialization committee - COMAL	long term

Collaborators: Committee of Microenterprises and Commercialization of CLODEST; M Lundy, M Totobesola (SN-1); Coffee producers of Yorito and Sulaco; local and regional intermediaries and coffee exporters of San Pedro Sula; Committee of Microenterprises and Commercialization of CIDES, Sulaco; and maize producers of Sulaco

3.3.3 Consolidate the local support system for small rural agroenterprises in Yorito-Sulaco

This is reported jointly under 3.3.1.

3.3.4 Establish a monitoring and evaluation system for CLODEST, REDOLYS, and Campos Verdes

Highlight

✓ Lessons learned and principles of organizational processes were identified for CLODEST and REDOLYS (Honduras) and the Campos Verdes Association (Nicaragua)

Objective

- Elaborate an initial conceptual framework on organizational processes based on CIAT's experience in the Central America reference sites, to establish lessons learned and to generate principles of work

For each phase from the methodological Guide for Decision Taking in NRM (Beltrán et al 1999[9]), lessons learned and work principles were identified (Table 15).

Results

These experiences from Central America (Honduras and Nicaragua) reveal important aspects that should be kept in mind to achieve greater impact at the level of the local organizational processes. Table 15 emphasizes the diverse lessons learned and the principles of work that are related to indicators of organizational processes and that are the base for developing actions in agreement with the demand and needs of the different actors (communities, institutions, and local governments).

[9] Beltrán JA, Tijerino D, Vernooy R. 1999. Developing processes of organization at local level for collective management of natural resources. Guide no.9 (in Spanish) of the series "Instrumentos metodológicos para la toma de decisiones en el manejo de los recursos naturales". CIAT, Cali, Colombia. 147 p.

Table 15. Lessons learned and principles of the experiences of organizational processes in Central America.

Steps	Lessons learned	Principles
Selection of site and reference framework	- Reference site selection should obey criteria of local demands, acceptance of the community, and impact potential. - Early participation of local partners and other projects generates confidence, greater levels of belonging, and commitment. - The Participative Planning by Objectives (PPO) should permit real identification of local needs and solutions (without technical bias). - It should start from a baseline on natural, economic, financial, human, and social capitals that permit us to measure impact.	- Identification of the demands and solution alternatives should be with the **participation** of most of the groups of interest. - In each area decisions should be **harmonized.** - The organizational processes must be **flexible** to be adapted to the changing needs or opportunities.
Identification of social actors and partners	- Some methodological instruments need to be used that facilitate the identification of interest groups. - First the actors, their interests, and their inter-relationships should be identified. - Partners with common objectives should be sought to establish commitments in the medium term and to guarantee greater continuity and sustainability of the process. - The municipal authorities should play an important role in the local process of development. - It is important to begin collaboration at the personal level and with commitment in order to later seek institutionalization.	- The involvement of different groups of interest assures equal opportunities in the organizing process **(equity)**. - Collaboration should be established with partners that have similar interests and definite commitments in order to generate synergy **(coordination)**. - The capacity and confidence shown by an institution that facilitates the local processes increases summoning power.
Facilitate new organizational forms	- New organizational forms should be based on community demand and needs. - The organization is not the purpose, but the sustainability of the process and the empowerment of the actors. - Organizational forms should not be imposed, but rather based on those already existing. - High institutional presence of temporary form generates weak local organizations.	- The voluntary nature of self-organization, the sense of belonging, and local culture should be respected **(equity)**. - Organizations that obey community needs assure the **sustainability** of the process and empowerment of the actors.

Continued.

Table 15. (Continued.)

Steps	Lessons learned	Principles
Strengthening existing local organizations	- The strengthening process is not short term; time and resources need to be invested. - Tangible results of short and medium term should be sought parallel to the long-term organizing processes. - The continuous formation of leaders increases the strengthening of the local organizations.	- Effective leadership should be consolidated within the organization. - Spaces for reflection for decision taking should be guaranteed. - Paternalistic and over-supportive practices should be avoided. - The number of conflicts resolved by an organization reflects its strength.
Promote networks or associations of local community groups	- Connections and relationships between the local organizations, their structures, and procedures should be analyzed and taken into account in the decision taking of the grass-roots organizations. - The needs of each local organization that forms the network must be identified in order to improve support to the same. - Do not attempt to link all the community organizations to the organizing processes from the start.	- The networks improve **communication** and exchange among the organizations, and have access to relevant information. - Impact is generated with less resources and of high quality **(efficiency)** - The networks require their own space for analysis and discussion.
Interinstitutional coordination	- Goals or concrete activities are required and should be held in common to achieve an effective coordination. - Interinstitutional coordination through consortia accelerates the preservation and conservation of natural resources. - Coordination at the level of technicians is an effective way to improve coordination at interinstitutional level. - The creation of documentation centers and/or telecenters improves the levels of coordination. - By allying with the processes of decentralization of the countries, greater sustainability is obtained and impact in development.	- All members participate in the planning, execution, and evaluation **(participation)**. - Decisions are taken on planning, execution, and evaluation with all those involved **(harmony)**. - The institutions work harmoniously in the area of their mandate avoiding duplicity and generating synergy **(coordination)**. - The duplication of efforts is diminished, greater impact is generated, and the **efficiency** of economic and human resources is improved. - The coordination meetings should lead to **opportune decision taking** and real commitments.
Generation of links between local, regional, national, and international levels.	- Technical demands at local level cannot be satisfied only at that level, therefore links to other levels must be found. - Links to different levels promote the strengthening of the community organizations. - The need for resources to cover demands lowers the capacity of local organizations, which limits the development of self-management.	- Co-management of resources should be established that assures **sustainability**. - The feeling of ownership of what they do permits the quick search for solutions **(empowerment)**. - Rendering of accounts to the community is promoted **(transparency)**.

To increase the possibilities of success in the organizational processes at local level, the following lessons should be reflected upon, originating from these experiences in Central America and subject to the dynamics in the processes.

(1) Site selection should obey local criteria of demand, acceptance of the community, and potential of impact. It should be based on natural, economic, financial, human, and social capitals, which permit us to measure impact.
(2) Identify the key actors, their capacities, and interests.
(3) According to demand, stimulate an autonomous process of organization in the community.
(4) Strengthen the local organizations for collective action, which assures the conservation or improvement of natural resources.
(5) Activities with the objective of involving local organizations should contain principles of participation and of decentralization. The process should be seen as something that has the probability of changing and that should change over time, as local priorities change and institutions mature.

Contributors: JA Beltrán, L Brizuela, D Tijerino
Collaborators: V Gotrett (Institute for Social Studies [ISS], Neths), D Holland (PE-3 consultant), O Westermann, M Lundy (SN-1), CA Quirós (IPRA)

3.3.5 Development of participatory research methods for forage-based technologies for smallholders

Highlight

✓ A research proposal was formulated, focused on developing participatory research methods for forage-based technologies in the Central-American hillsides

Most of the research activities take place at the CIAT reference site in Honduras. Expected outputs include a manual on participatory methods for forage-based technologies, scientific publications, and a PhD thesis (Hohenheim University).

The main elements are:

- Systematizing of farmers' perception on their own land use and the influence of new technologies.
- Development and adaptation of participatory approaches for the identification, testing, and evaluating of forage-based technologies in complex systems.

Results and Discussion

To date, a detailed research proposal has been elaborated and a first analysis of the farming systems in the research area carried out. Conclusions are as yet preliminary.

From about 40 interviews conducted with farmers in different zones (especially related to altitude), it appears that altitude is a major determining factor for farmer categories. This characteristic and access to resources are strongly correlated. Farmers in the lower lying areas (<

500 m) have about 15 ha of arable land, whereas farmers in the medium zone (500-1000 m) have access to 5 ha, and those in the higher zone (>1000 m) to 3 ha. Maize is the main crop at lower altitudes; beans are mostly grown at the medium and higher altitudes, whereas coffee is mostly found at the higher altitudes. Many farmers from the lower regions have bean and coffee fields at medium and higher altitudes. Livestock (and more specifically cattle) ownership shows the same tendency. Many farmers in the lower areas possess more than 10 head of cattle, whereas in the medium altitude zones farmers have five animals or less. In the higher areas, almost all farmers have no cattle at all. Other types of livestock, such as pigs and poultry, are found in all zones. In some higher situated villages, considerable numbers of sheep and goats are found.

Most cattle owners have experience with local forages. CIAT and SERTEDESO are carrying out research activities to introduce new species. However, up to present, activities have been focused mainly on cattle owners who represent only a small part (15%) of all farmers.

Contributors: R Van der Hoek (University of Hohenheim), M Peters (IP-5), V Hoffmann (University of Hohenheim), J Ashby (Director NRM), M Ayarza

3.4 Support, through incorporating processes of participative investigation, local organizations oriented to agricultural research

3.4.1 Synthesize and analyze CIAL experiences in the Nicaragua reference site

Highlights

- ✓ Results received from CIALS located in the Calico River watershed, San Dionisio, Nicaragua on qualitative and quantitative research on crops such as beans, maize, and soya
- ✓ Selection criteria have proved highly significant in producers' final decisions
- ✓ Other results available from monitoring and evaluation of the strengthening, consolidation, and empowering of research groups

Objective

- Strengthen the capacity of rural communities to take decisions and seek farming alternatives and solutions to their problems on the management of natural resources through research

The work of a CIAL involves motivating the community, electing members of the committee, performing a diagnostic, planning of experiments, establishing trials, evaluating and analyzing results, and informing the community of results.

Results

Table 16 summarizes the number of CIALs and the communities to which they belong, and the crops evaluated in the different cycles (first and second seasons). To date, 12 CIAL committees exist, of which four were formed in 1997, four in 1998, four in 2000, and three in 2001. The concentration of trials on basic grains reflects the importance that producers give to these crops,

but the technological presence of options permits evaluation of other crops such as rice and soya, especially by the women's groups.

Table 16. Crops evaluated in different cycles (A first season, B second season) by Comités de Investigación Agricola Local (CIALS), 1997-2001.

Community (CIAL name)	1997A	1997B	1998A	1998B	1999A	1999B	2000A	2000B	2001
Wibuse (Wibuse)	Maize	Beans	Maize, beans	Beans	Beans		Rice		Rice
Jicaro I (San José)	Maize		Maize	Beans	Beans		Beans		Beans, maize
Jicaro I (Women)		Garden produce	Soya		Soya	Soya	Soya		Rice
Piedras Largas (Prod. Unidos)		Beans	Maize	Beans		Beans	Beans		Maize
El Zapote (El Progreso)			Beans	Beans	Beans		Beans, maize, rice	Beans	Maize, beans
Quebrachal (Quebrachal)			Beans	Beans			Beans, maize		
Jicaro 2 (19 de Abril)			Maize	Beans	Maize	Beans	Rice, soya		
Las Mesas (Experimenters)			Maize	Beans	Maize	Beans	Beans		Beans
La Cuchilla							Beans	Beans	Beans
La Suana (Las Nubes)							Beans	Beans, fallow control	Beans
Zarzal							Soya		Maize
El Chile (Women)									Soya
El Carrizal									Maize, beans
El Zapote (Women)									Soya

A women's CIAL performed trials with soya and the most important result was learning the preparation of a diversity of subproducts intended to improve the diet. At present, this group has trained about 40 women of other communities, which led to the forming of two new CIALs in 2000. It must be mentioned that exchange between the SOL and the CIALs has allowed the latter to identify new technological alternatives as in the case of rice, besides the identification of new germplasm in basic grains. This quantitative information is available in the database of the Participative Research Project, and is linked to the results of countries such as Honduras, Colombia, and Bolivia among others.

In order to strengthen CIALs at local level, an evaluation was carried out of eight CIALs with results that gave their positive and negative aspects. Positive aspects included, for example, motivation of working in research and knowledge of new seed varieties of bean, maize, rice, sweet potato, pastures, and others. Negative aspects included, for example, not complying with some promises (meeting other national CIALs), and lack of responsibility on the part of some CIAL members.

Contributors: N Espinoza, T Reyes
Collaborators: JA Beltrán, CA Quiroz (IPRA)

3.5 Promote and support interinstitutional processes and plans for sustainable rural development

3.5.1 Document organizational processes in the reference sites

Objective

- Systematize the experiences acquired in strengthening CLODEST, to obtain lessons learned and generate applicable organizational principles in formation of consortia at interinstitutional level

To document activities we have used reports of the CLODEST Board of Directors and Assembly, workshop proceedings, and internal documents with their respective records. The documents were put together by CLODEST personnel with the advice of CIAT personnel, chosen for having lived close to the whole process, guaranteeing in this way their reliability. The main documents and their authors are given under results.

Results

Documents are available from the PE-3 internal library. Three of the main ones are outlined below.

Informe general sobre la operatividad y participación en CLODEST,
Maria Audelia Palma, secretary

This general report on CLODEST activities gives overall results and information over the last 3 years. Figure 21 shows how the CLODEST Assembly is composed. The large number of farmers that have attended CLODEST assemblies can be seen from the figure. However, not always the same persons have attended, which has made communication difficult between the consortium and local organizations. The report analyses the performance of agreements made in assembly and by the board of directors and the most frequent problems that the committee has faced.

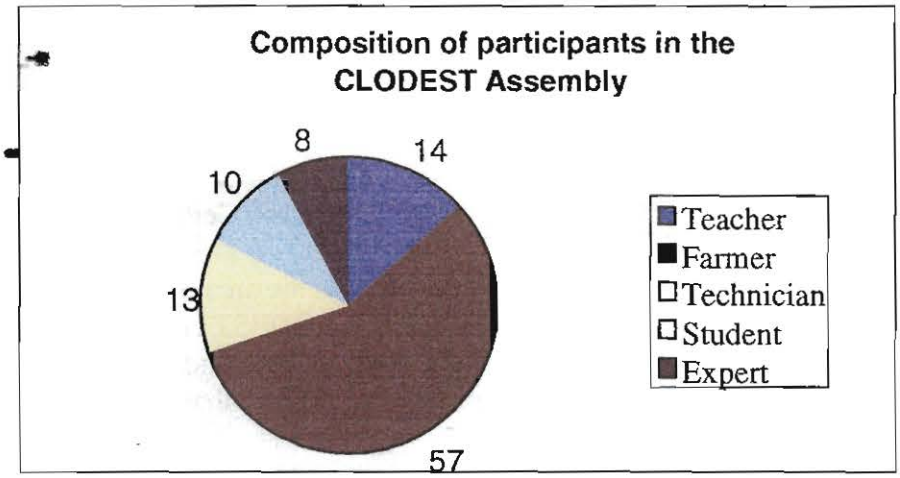

Figure 21. Composition (%) of participants in the Comité Local para el Desarrollo Sostenible de la Cuenca del río Tascalapa (CLODEST) Assembly, Honduras.

Experiencias en financiamiento de proyectos productivos,
Benjamín Ferrera, CLODEST technical advisor

This report details the process of financing small production projects on economics or the environment. From the CIAT viewpoint, this financing has as objective to increase the adoption of technologies oriented to decreasing soil degradation and anything relevant to the environment. To date, 43 projects have been financed in seven areas (Table 17). The effect that these may have on the adoption of a determined technology or on the improvement of environment conservation has not been documented.

Table 17. Small production projects financed by the Comité Local para el Desarrollo Sostenible de la Cuenca del río Tascalapa (CLODEST), Honduras.

Activity or area financed[a]	Number of projects	Actual amount financed (Lempiras)	Percentage
Minor species (poultry and pigs)	14	4700	31
Basic grains (maize and beans)	12	5280	35
Coffee nurseries	9	3220	21
Fruit nurseries	2	290	2
Garden produce	2	790	5
Organic fertilizer	2	468	3
Transformation and storage	2	460	3
Total	43	15200	100
IICA-Holland/Hillsides contribution	33	11156	73
CIAT-Hillsides contribution	10	4050	27

a. IICA = Instituto Interamericano de Cooperación para la Agricultura.

El centro de documentación en Yorito
Neptalí Zúñiga, person responsible for the CLODEST Documentation Center.

This document describes what the CLODEST Documentation Center is, how it functions, and what its most relevant results have been. Also, mention is made of the private services it gives, to guarantee its long-term functioning. Among the Documentation Center's greatest achievements were:

- Training given to technicians, teachers, and students in the area of computing,
- Secretarial and information support to the different CLODEST commissions,
- A mini-library formed with technical literature of agriculture and natural resources and documents published by partners of the Center, available to inhabitants of Yorito, and
- The forming of a database at municipal level

The building of database to municipal level was not initiated because of lack of computers with sufficient memory that permit the digital handling of the information.

Contributors: L Brizuela, JA Beltrán

3.5.2 Establish a joint interinstitutional plan for the San Dionisio Municipality

Objective

- Systematize the experiences of the process of interinstitutional coordination with local organizations through the Municipality, making use of decentralization mechanisms

To document activities we have supported the production of minutes of interinstitutional meetings that permit us to identify participation and results obtained and the commitments acquired.

Results

As part of the organizational processes to local level, interinstitutional coordination in San Dionisio is in the initiating stage. During previous years, efforts were dedicated to strengthening and self-management at local organization level. The main results of the interinstitutional work were:

- Elaboration of a baseline for the region,
- Elaboration of a joint interinstitutional plan that covers activities in organization, training, research, NRM, commercialization and transformation, and infrastructure,
- Database of beneficiaries and credit defaulters, and
- Initiation of a Documentation Center.

Table 18 gives a brief summary of the content of meetings to date carried out in the development of this process. We will soon be initiating a strengthening process for the Municipal Development Committee, in which it will exercise leadership with the participation of different local actors, organizations, and institutions.

Table 18. Activities of the interinstitutional process, San Dionisio, Matagalpa, Nicaragua[a].

Date of meeting	Objective	Agreements	Participants	
			Present	No. invited
31-08-2000	- Reflection on the importance of interinstitutional coordination and the role of the Municipality - Definition of future actions	- Compilation of information of the zone - Presentation of institutional work plans - Elaboration of an integral work plan	INTA, ADDAC, CARITAS, CIAT, PRODESSA	8
27-02-2001	- Revise joint plan of activities	- Circulate the joint plan of activities - Deliver information for the baseline of the Municipality	INTA,ADDAC, CIAT, PRODESSA	9
23-03-2001	- Present the draft document on the information of the region - Presentation by institution of the 2001 activities.	- Finalize the integral plan - Establish a meeting with the Mayor's Office	INTA, ADDAC, CIAT, PRODESSA, PCaC, Mayor's Office	9
2-05-2001	- Establish agenda for meeting with the Mayor's Office	- Consult date agreed with the Mayor's Office for meeting	INTA, ADDAC, CIAT, PRODESSA, PCaC	8
14-06-2001	- Inform the Municipality of the problems identified in the participative workshops - Presentation of the joint Interinstitutional Plan - Future Actions	- Convoke an extensive meeting on the part of the Mayor's Office with the participation of GOs, NGOs, and local organizations	INTA, ADDAC, CIAT, PRODESSA, PCaC	8
26-07-2001	- Revise the functions of the CDM - Reactivate the new Committee - Plan of development and investment in the municipality - Joint Interinstitutional Plan	- Provisional Coordinating Committee appointed	INTA, ADDAC, CIAT, PRODESSA, PCaC, UCOSD, Sueños Reales, Campos Verdes, C. Malinche, C. Progreso, Judiciary, Town Councilor, Police, Evangelic Church	20

a. For acronyms and abbreviations used, see page 131.

Contributors: JA Beltrán, J Bosco (consultant)
Collaborators: INTA, ADDAC, PCaC, PRODESSA

3.5.3 Establish indicators of progress for organizational processes

Highlight

✓ Indicators of progress for organizational processes were developed for CLODEST in Honduras and Campos Verdes in Nicaragua as support tools for decision taking for local strengthening

Objective

- Facilitate consortia and associations of local organizations to use these tools for monitoring, follow up, and evaluation of their management, besides permitting them to evaluate sustainability and predict tendencies of the same, that is, to know that they are achieving the desired results. This systematization of information helps communities to improve decision taking with regard to their resources.

To establish the indicators we took as a base the reports in the methodological guide of Beltrán et al 1999[10]. The training workshops for the methodological instruments for "Informed Decision Making for Sustainable Natural Resource Management" have served to validate and adjust the indicators for organizational processes. Workshops with the local organizations Campos Verdes Association of Nicaragua and the interinstitutional consortium CLODEST have permitted us to carry out the definitions and their corresponding indicators.

Results

The establishment and order of this series of indicators, validated at the level of the local organizations, makes it possible for these to carry out monitoring before their activities. As result of their own analysis they can also evaluate their organizational processes more precisely. These indicators also permit us to systematize the information and help the communities improve decision taking with regard to their resources. The indicators were classified in four themes (Table 19).

This work on indicators with local organizations and consortia is a start to constructing a methodology of the causal routes of impact and indicators of activities. The development of this methodology for the construction of monitoring and evaluation systems, as well as its indicators, is an activity that itself is developing during 2001. The ideas for the methodology are inspired by the work of Kirsten Probst.

[10] Beltrán JA, Tijerino D, Vernooy R. 1999. Developing processes of organization at local level for collective management of natural resources. Guide no.9 (in Spanish) of the series "Instrumentos metodológicos para la toma de decisiones en el manejo de los recursos naturales". CIAT, Cali, Colombia. 147 p.

Table19. Themes, descriptor, definition, and indicators of organizational processes.

Theme	Descriptor	Definition	Indicator
Institutional	Representation	All groups of interest are represented and they participate in decision taking.	No. of organizations represented vs. no. of relevant organizations
	Real presence	Persons are present at the time and in the space that is required of them.	Attendance of representatives at events vs. no. of events
	Commitment	Members of the organization assume the responsibilities to which they commit themselves or that are assigned them.	No. of completed commitments vs. agreed commitments
The organization	Summoning power	The prestige of the organization makes partners, users, and beneficiaries respond to its call.	No. of participants in events vs. no. of participants invited
	Image	The organization has presence in the social dimension of the community.	No. of external events attended vs. no. of invitations formulated
Principles	Participation	Members of the organization participate in all the phases.	Degree of involvement of the members of the organization in roles of planning, execution, and evaluation of activities
	Equity	Members enjoy equal opportunities of access to the resources and of management of the organization.	Degree of satisfaction of the different groups of interest
	Efficiency	The organization generates desired impact with the least resources without sacrificing quality.	Activities carried out vs. activities planned according to timetable and budget
	Efficacy	The organization produces results with the quality expected inside required time limits.	Cost benefit by activity
	Coordination	The organization works harmoniously with other organizations of the area of its mandate avoiding duplicity and generating synergy.	No. of projects, activities, and products jointly executed
	Institutional sustainability	The organization continues functioning when external support is withdrawn.	Quantity of resources obtained for the operation of the organization
Processes	External disclosure	The relevant external context knows the achievements of the organization.	No. of informative events carried out and diffused
	Opportune decision taking	The operative decisions, administrative and financial, facilitate achievement of goals.	Problems identified vs. decisions taken in time scale

Contributors: JA Beltrán, L Brizuela, D Tijerino
Collaborators: Asociación Campos Verdes, CIALs, CLODEST

Output 4: Decision makers supported

4.1 Identify, at different levels, decision makers related with project tasks and diagnose their needs

4.1.1 Participate in workshops and events organized by the project and other projects

Highlight

✓ Inventory of project partners' demands identified at local, national, and regional levels, and strategies of contribution implemented

Objective

- Define activities of research and training in the management of natural resources according to local, national, and regional needs

An important function of the coordinators at country and reference site levels is that of promoting events and participating in workshops to identify demands of research, training, and development that the project can contribute towards resolving. Demands at local level were identified through planning workshops and presentation of SOL results. At national and regional levels we have participated in forums and meetings organized by national institutions and development projects. The work was complemented with visits to donors in each country to discuss priorities and demands.

Table 20 shows institutional demands at different levels. Demands for training in the tools generated by the project are emphasized and the technological accompaniment of GIS, seed management, watershed management, commercialization, and organizational strengthening.

Table 20. Research and training demands of the project partners at various levels of action[a].

Level of action		Institutions	Demand
Local	Honduras	SERTEDESO, PDA, CLODEST, IPCA	Improved seed, training, systematization of information
	Nicaragua	Campos Verdes PRODESSA	
Nacional	Honduras	Secretaría de Agricultura. PRONADERS	GIS, watershed management, technological innovations, seed management, organizational strengthening
		Red Cross, FAO, GTZ, USAID, ACDI	Watershed management, commercialization
	Nicaragua	NORAD DANIDA SDC	Management of natural resources Artisanal production of seed Pasture germplasm
Regional		CATIE	Indicators of pasture degradation

a. For acronyms and abbreviations used, see page 131.

In the area of training, we elaborated specific agreements with institutions, and projects to train technicians in the use of tools, such as the Local Indicators of Soil Quality, Participative Mapping, and Identification of Market Options. In the area of improved seeds, a policy of seed multiplication and distribution was established from the options generated by the SOL. Technical aid in artisanal production of seed and postharvest management was established directly by a technician of the project. The Support in GIS is concentrated on strengthening of the group formed by the Proyecto Centroamericano de Información Geográfica (PROCIG).

A greater compatibility exists among project activities and the demands perceived by producers and institutions that work in the area of agriculture and NRM. However, the low availability of resources limits project capacity to attend these demands in a much more effective form.

Contributors: V Zapata, M Trejo, D Tijerino

4.1.2 Identify the needs of training, research, and evaluation of impact of the partner organizations

A single study to identify the needs of institutional capacity development was conducted in Honduras as part of the IDB Priority Watersheds Program. This 30-page study forms part of the official documents prepared for the government of Honduras entitled of "Sintesis de Estrategias por Módulo". In the study, the needs of five government organizations (SERNA, PRONADERS, AHMON, AFE/COHDEFOR, and COPECO) were described along with objectives to be pursued by each of the Program modules and strategies that could be applied.

Needs that were identified included the strengthening of institutional capacities to apply participatory processes and tools; the use of planning, monitoring, and evaluation strategies in multiple stakeholder scenarios; and decision-making abilities and skills at different levels and for different groups. Other areas of concern were:

- Strengthening of institutional capacity to conduct participatory diagnosis of decision-making capabilities of different stakeholder groups,
- Ability to establish training and technical assistance needs at the local level,
- Preparation of local atlases with information on weather, soils, and forests,
- Ability to provide support to local organizations for the sound management of natural resources, and
- Need to develop negotiation and consensus building abilities and skills.

Several institutions identified the need to develop their capacity to formulate policies for integrated NRM and conflict resolution skills with particular reference to water resources.

Contributor: V Zapata

4.2 Support decision taking at different levels using the information, and methodological tools generated by the project

4.2.1 Strengthen the local Documentation Center of Yorito

Highlight

✓ A Documentation Center was established in Yorito

Objectives

- Provide useful information to local stakeholders on topics relevant to the management of their natural resources
- Train local community in the use of computers and information
- Make DSS available at local level

Materials and Methods

The Documentation Center opened on 16 February 2001. Six organizations from CLODEST put together money or material to open the locale adjacent to the CLODEST office (Figure22). In the Documentation Center, people from the community are able to access technical documents about agriculture, the environment, food processing, woodwork, and administration. The main targets are technicians, and students from primary schools and high schools. We hope to reach farmers also, either directly or indirectly. So far, six local organizations have made contributions of US$700 to purchase materials. The municipality offered the locale. The IICA and CIAT donated several old computers. No additional money was needed from partners because the Center is generating income thanks to computer training provided by the local technician to potential clients.

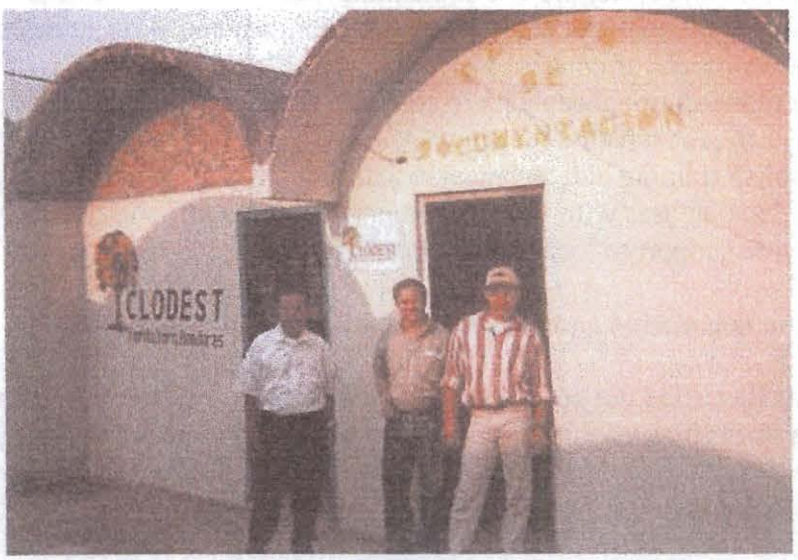

Figure 22. Jorge A. Beltran and friends outside the local Documentation Center, Yorito, Honduras.

Results and Discussion

- The Center offered seven training courses on the use of computers and software.
- The digital database of the Atlas of Yorito and Sulaco was made available to visitors at the Center.
- The centers of CIAT, IPCA, and IICA made available most of their publications and internal reports.
- Reports of the results of the SOL network of Yorito are available.
- Weekly reports of the market price of main cash crops are available.
- The Center provides additional services to students on school activities.

Computer science is mostly a self-taught activity. For this reason it is likely that the computer training activity will be self-sufficient, but will not generate much income for CLODEST. Some other services could be offered within the computer center. Individual courses can be given to private citizens. Many people can train themselves with software such as learning English, typing, publishing, accounting, or atlas software. Some can commission studies or an address list for services required. Clients may borrow Center documents for a small price.

Several organizations were trained, for example the high school and the PDA. The courses are given at the high school. For the first courses, computers were borrowed from four or five organizations. CIAT-Honduras has four computers, SERTEDESO three, PDA three, the municipality one, the college one, and various other institutions have at least one computer.

The Center's objective is to inform and train the community. However, we expect that the main clients will be technicians and students and a few farmers. Training technicians and students in computer science is expected to help farmers too. Technicians are able to get things done quickly, write better reports, draw maps, write better proposals, and are likely to improve their services to small-scale farmers. To better target farmers, the committee has had several ideas; the first is to give farmers a special discount for using the Documentation Center.

We believe that use of the Internet will improve the situation of small-scale farmers in the hillsides. The site could contain information on SOL technologies, commodity prices, market opportunities, E-trade, food processing, and tourism information. The possibility of upscaling the experience seems high even in the short term. First, a similar computer service can be offered at our other sites (Sulaco and San Dionisio). Then we have to consider writing a Guide, and finding a donor to upscale the experience to a larger number of municipalities.

Contributor: N Zuniga (CLODEST)
Collaborators: B Barbier (CIRAD), O Mejia, L Brizuela

4.2.2 Evaluate the impact of using the Atlas of Honduras

Highlight

✓ The digital Atlas of Honduras had a very positive impact on decision making largely because Atlas users were able to obtain information pertinent to their work

Objectives

- Document how the influx of digital information distributed on the Atlas of Honduras contributed to better decision making and spurred on digital information use
- Understand how to measure the impact of geographic information—in the past, geographic information products such as CD-ROMs typically were evaluated by relatively simplistic quantitative measures such as "number of CD-ROMs distributed". However, better measures are needed to assess the overall significance of geographic information

Materials and Methods

The use and impact of the Atlas of Honduras were evaluated with a questionnaire and interviews – an empirical component and a descriptive approach. This combined methodology has been recommended for information technology studies. A first step in both techniques was to obtain a user profile. Use is dependent on the level of user skill, and thus affects the impact. Similarly, the sector of use and the size of the organization have been found relevant factors. Therefore, the study took into account the level of user skills, the sector in which the user is based, and the size of the organization.

A structured questionnaire was used to evaluate the use of the Atlas and included sections on technical aspects to ascertain what improvements could be made to future information products. Fifty-two questions were multiple choice type and nine were open-ended. There were also six questions at the beginning to characterize the respondent. The questions were divided into the following categories: (1) Installation, (2) Training, (3) Tools, (4) Data, (5) Use, (6) Operational Impact, (7) Impact on Decision Making, and (8) Evaluation of Data Dissemination by the Honduran Government. The multiple-choice questions relied on either yes/no responses or a ranking according to a Likert-type, five-point scale. Before distributing the questionnaires, we conducted an in-house pilot test to improve the questions, modify, add, or delete some items, and to obtain an accurate estimate of the time required for completing the questionnaire. Test-respondents found that 10-15 minutes were sufficient for its completion.

Using E-mail and fax, 154 questionnaires were distributed, and people asked to respond within 3 weeks. At the end of this time, only a few people had returned the questionnaire, so we followed up with phone calls and extended the period for receipt of questionnaires another 3 weeks. In the end, of these 135 successfully distributed questionnaires, 43 were filled out and returned to us (24 by E-mail, 15 by fax, and four in person), yielding almost a 32% response rate.

A subsample of those users listed in the database was interviewed to evaluate the impact of the Atlas. Twenty individuals offered their perspective on the Atlas and on the use of geographic

information in decision making. This subsample represented a range of users, although most of those interviewed were technicians.

It was understood that those familiar with the technical and data aspects of the Atlas might not be those who made strategic decisions about project activities and resource allocation, etc. However, in general, the technicians were the people that could best comment on the Atlas and that were also available for interviews. These interviews were conducted face-to-face over a 6-week period. The interviewees responded to open questions such as:

- For what specific purpose did/do you use the Atlas?
- What difference has the Atlas made to your work?
- Can you estimate the economic impact of using the Atlas?
- What would you have done instead if you had not had the Atlas?

The last question strove to ascertain what the alternatives were in the absence of the Atlas. This question was asked in order to assess the Atlas's contribution to ameliorating a poor data access environment.

Results and Discussion

Respondents to the questionnaire belonged to several organizational types (Figure 23). Figure 24 summarizes the sectors in which respondents worked. Seventy-five percent were from either the natural resources management or agricultural sectors; other sectors were included in the survey to a lesser degree. Seventy percent of respondents considered their knowledge of GIS fair, good, or very good, while 30% indicated that their knowledge of GIS was poor or very poor. For many of the latter, the Atlas was their first exposure to GIS.

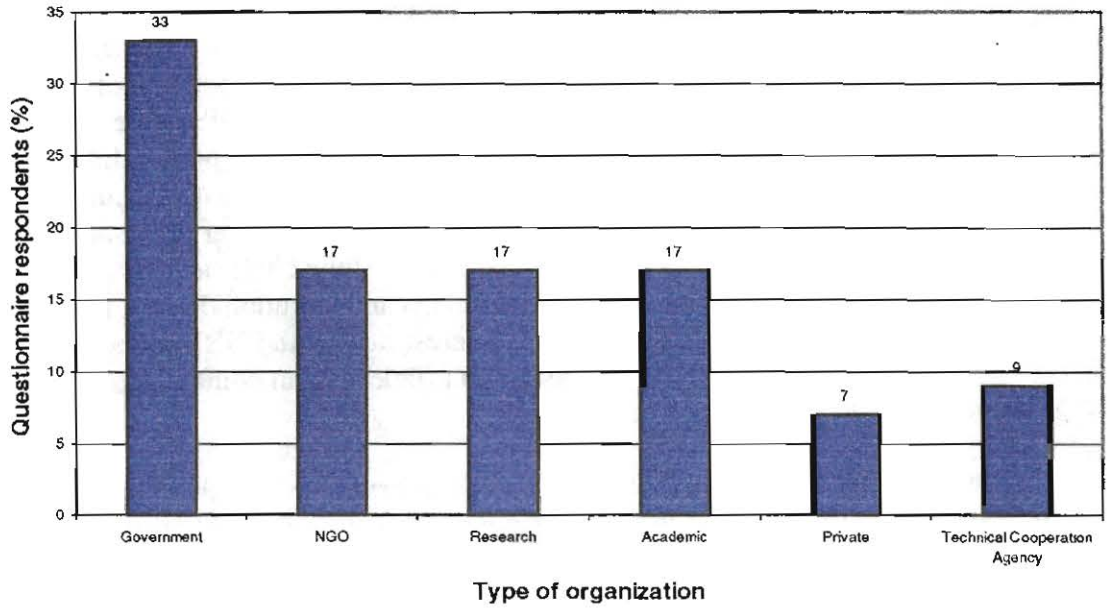

Figure 23. Types of organizations in which users of the Atlas of Honduras work.

Use of the Atlas was greater in the capital city of Tegucigalpa where government agencies, NGOs, universities, and the private sector are concentrated. As with the case of the economic

sector, national-level institutions show more interest in and awareness of GIS in Honduras. Only a few of the municipal representatives that received the Atlas had installed it onto computers and used it. In a number of cases, the municipal representatives received a copy of the Atlas in error - the offices in which they worked lacked computers (and electricity).

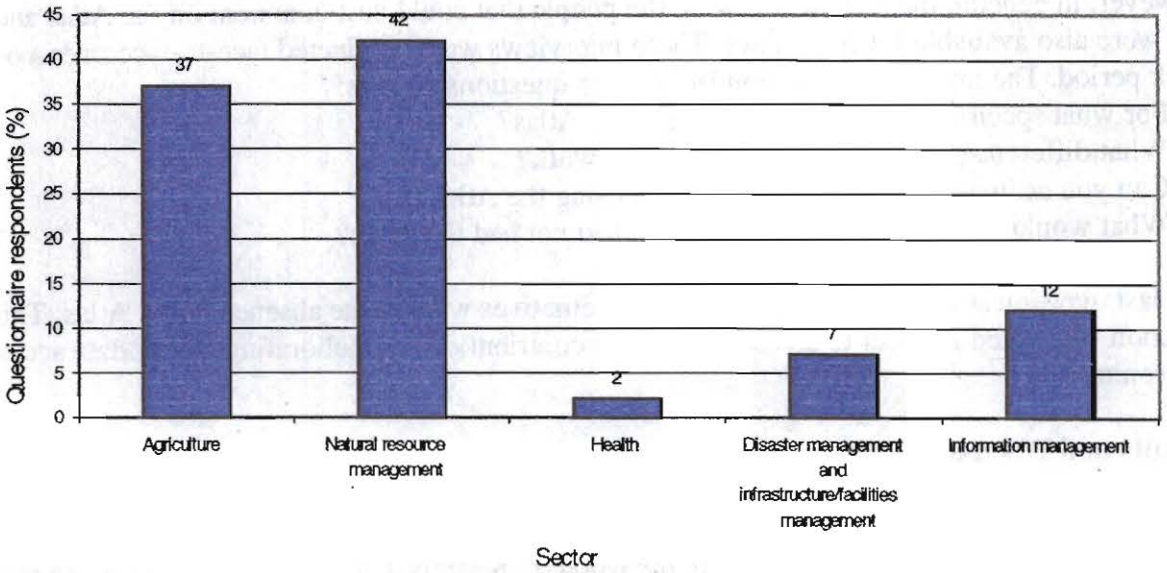

Figure 24. Sectors in which users of the Atlas of Honduras work.

Responses to the questionnaire indicate that the Atlas had a substantial impact on institutional uses of geographic information. Overall, about 98% of respondents said they thought the Atlas was a useful tool, and 85% did not think a better compilation of geographic information existed in Honduras. Most users said the Atlas had a positive economic impact on their organization and saved them time. In general, the Atlas improved the presentation and communication of information. Users learned more about NRM, and increased their interest in GIS while recognizing a need for more training on how to use the software. Over 75% reported that they intended to use GIS more in the future, but less than 25% said the Atlas stimulated them to hire a GIS expert, so it seems that people intend to develop their own GIS skills. Over 50% said the Atlas stimulated them to make contacts with other organizations. Almost half said the Atlas stimulated them to create geographic databases of their own. On an institutional level, the Atlas appeared to have a multiplier effect. It generated greater interest in GIS and NRM. Respondents indicated that the geographic information in the Atlas led to efficiencies in communication and presentation of information, and in time and money saved.

Overall, most respondents considered that digital geographic information is highly useful in decision making. Only about 2% of users found geographic information only moderately useful. With respect to the utility of the Atlas specifically, we found that most users (73%) thought the Atlas helped improve decision making, and nearly all (94%) said that it saved them considerable time. Also, 70% of users said the Atlas improved the efficiency as well as the quality of their decisions. About 81% said the Atlas increased their confidence in their analyses. This last impact is significant, because one of the greatest values of information is that it removes uncertainty.

All interviewees considered the Atlas a useful tool in the decision-making process. Many of them mentioned that the Atlas was one of a range of tools they applied in their work, so they refrained from saying that the Atlas was a decisive factor in their decisions. They emphasized that the Atlas was an integral part of their analyses, yet its impact on decision making was indirect. Unanimously, interviewees agreed that the Atlas saved them considerable time. This was perhaps its most significant impact, and could be translated into economic savings as well. Interviewees agreed that the Atlas is a user-friendly tool, even for those who have no training in GIS.

All those interviewed expressed their interest and willingness to provide technical support and information in the event that an updated version of the Atlas could be produced. In order to provide information, formal requests for information to the institutions would be necessary. Generally, the interviewees were speaking as individuals rather than for their institutions, but we hope that the production of the Atlas has created a more open environment for information sharing and that the institutions themselves would freely exchange their data. Institutions now are more conscious of the value of information and need to share information, and there is more communication between the institutions.

The Atlas had a very positive impact on decision making largely because users were able to obtain information pertinent to their work. In many cases, the information in the Atlas indirectly supported decision making. Technicians, analysts, and decision makers alike perceived the Atlas as a useful tool. Tracking the precise pathway from information use to development impact needs to be carried out in future studies, if possible.

The Atlas could have had a greater effect had there been more publicity about its contents, how to obtain a copy, and the possibilities for successful use. Also, regular training sessions, every few months for new users, would have further improved its use and impact. While much of the Atlas use was directed to Mitch relief and response, about half of those interviewed in the survey cited uses unrelated to disaster management. Ideally, an updated version of the Atlas should be made, funding permitting, taking into account the suggestions from this evaluation and new data. Considerable political will and leadership will be required to continue bringing geographic information to bear on problems of hazard response, planning, and sustainable development in general, and hopefully, the uniting force of Hurricane Mitch for information sharing will endure.

Contributors: K Lance (PE-4), M Mendez (SOH Project), V Montes (consultant)
Collaborators: G Hyman (PE-4), G Giraldo (SOH Project), M Ayarza, G Leclerc, A Nelson (consultant)

4.2.3 Web-based decision support system for radargrammetry

Highlights

- ✓ Extensive content and Web-based user-friendly interface
- ✓ Translation of Canadian Centre for Remote Sensing (CCRS) Stereo Advisor
- ✓ Publication and demonstration of decision support system (DSS) during the IX Simposio Latinoamericano de Especialistas en Percepción Remota

Results

This DSS has in mind helping a Latin American user who is looking for information and expert advice for selecting Radarsat stereo pairs. It orients step by step the process of orthoimage and DEM generation, from fieldwork planning and image interpretation to quality testing, with ample information on the principles of remote sensing, both active and passive. Processing examples are given with PCI orthoengine software.

Radar imagery is highly useful for applications in the tropics, but the learning curve is slow. The DSS will help our partners with this all-weather imaging technology, for orthoimagery, DEM, and cartography generation. It can complement or even replace expensive training provided the user has Web access.

Contributor: G Leclerc
Collaborators: S Bolaños, C Perea, J Puig (PE-4); C Goodfellow, T Toutin (CCRS)

4.2.4 User-friendly Web interface to unit-level census data

Highlights

- ✓ Unit-level census data from two Honduras censuses loaded into open-source RDBM MySQL
- ✓ SQL queries to compute univariate statistics and compound indicators
- ✓ Web-based, user-friendly interface in PHP4

Results

For the MySQL database, the entire 1988 Population Census (4,255,105 records, and 49 fields), Housing Census (891,298 records and 42 fields, plus nine fields related to localization), and 1993 Agriculture Census (317,187 records and 161 fields, plus 14 variables on the farmer and localization) for Honduras were used. They were loaded in open-source RDBM MySQL. Two tables on population and 13 tables on agriculture occupy 790 MB. Tables are indexed through household or farm identification to speed up queries from linked tables.

Through a micro project from the Ecole Nationale du Génie Rural des Eaux et des Forêts (ENGREF) Mastère SILAT (Systèmes d'Information Localisée pour l'Aménagement du Territoire), a Web interface was designed to allow processing of unit-level data by a non-expert user. Functionalities include: summary statistics (mean, standard deviation, min, max) that can be computed for any of the census variables; headcount indicators (% of variable X with respect to variable Y); composite indicators (weighted linear combination of several variables); user-defined SQL query; help/tutorial; and metadata. To ensure secure information, aggregation levels range from *caserio*, village, municipality, and department; results are downloadable.

Students from the Mastère SILAT have been exposed to the problematic of a developing country such as Honduras. Because of the success of this project, we are invited to repeat the experience in 2002.

This interface was designed to demonstrate to our partners the feasibility of a low-cost, secure system to allow processing of highly disaggregated data by a non-expert. Census databases contain much more information than is published, and raw information can be managed and aggregated at several administrative levels, i.e., tailor made to suit ones' needs. For example, the interface would make it easy for Fondo Hondureño de Inversion Social (FHIS) to target their infrastructure investments by computing a village-level distribution of housing types based on a user-defined, housing-quality index from roof, floor, and wall type.

The combination MySQL-PHP4 is powerful, easy to implement, and a free alternative to Oracle version 8i for building, accessing, and processing very large databases. We are now in a position to help partners with a low-cost and proven open-source technology, and to demonstrate the concept of democratic access to data and the feasibility of customized queries.

Contributor: G Leclerc
Collaborators: N Bleuse (SILAT), S Vallejo, A Nelson (consultant)

4.2.5 Poverty targeting with local indicators

Highlights

- Poverty indicators based on local perceptions were computed for Honduras from unit-level census data and compared with ground truth
- Paper submitted to Environment and Planning Journal

Results

We computed a new (improved) set of well-being indices with SQL queries to an MySQL database of Honduras unit-level censuses. We re-examined the well-being extrapolation that was done with neural nets, to find that the algorithm classified villages in terms of the training set instead of producing a true extrapolation. This may be misleading for villages not in the training set, particularly for those where well being falls outside the range covered by the set. We opted for a simpler averaging that gives satisfactory results, based on comparison with interviews done randomly within 12 communities in 1999 (Ravnborg 1999[11]). We examined the possibility of determining the extrapolation domain for derived indicators, that is, finding villages outside the sample for which computed indicators are valid. At first sight this implies assumptions for classifying households and farms that are too arbitrary to be relevant for certain areas (such as the coastal or indigenous villages). The best approach would consist of enlarging the sample of villages and determining additional indicators that could then be obtained from the census for a true nationwide extrapolation

To widen the audience for a publication on the work, we extended the scope of the study (beyond that of methodological development) by exploring how the existing pro-poor policies are likely to be perceived by the poor in Honduras. We identified areas where policies are likely to be adequate, as well as areas with significant leakage (policy benefits to the wrong people), and

[11] Ravnborg HM. 1999. Developing regional poverty profiles based on local perceptions. CIAT, Cali, Colombia.

areas with undercoverage (policy not reaching the poor). We did an extensive literature review and the necessary quality checks for a peer-reviewed paper. The paper was submitted to the Environment and Planning Journal, chosen because it combines a high citation index with relevant content and scope.

This work represents a significant step towards harmonizing perceptions of poverty from the "top" (i.e., World Bank) and "bottom" (local) by providing a methodology for extrapolating locally derived indicators up to country level. New censuses will cover all American countries during 2000-2005, and can be used to produce updated poverty profiles. The paper produced is being translated into Spanish to explore the possibility of introducing this approach to improve targeting and policies of poor Latin American countries. The PROCES concept note aims at providing an environment to enable CIAT (and IRD our partner) to effectively contribute to improving in-country capacity to take advantage of these methodologies.

Contributor: G Leclerc

4.3 Strengthen capacity for management and use of information, tools, and methods (train, diffuse, and follow up the process)

4.3.1 Organize a workshop on results of the SOL in the reference sites

A workshop was held in Honduras from 29th to 30th of April 2001 to diffuse results of the SOL. About 40 representatives of institutions know research results (see Table 27, page 103).

4.3.2 Develop research by youth groups in food security and natural resource management using participatory methodologies and simulation models

Highlight

✓ Workplan designed for implementation of the project

Objective

- Contribute to the early involvement of rural youth in research leading to the discovery and/or adaptation of practices for better food availability and NRM

The area for this project is the Tascalapa River watershed in Honduras. The Instituto San Pedro is the local school located in Yorito where most of the research partners work. With this project the CIAT Community Management of Watershed Resources team expects to:

- Find out if the adoption pattern for research results can be improved through participatory adaptive research with youngsters;
- Develop in youngsters a sense of responsibility and ownership of their future; and
- Make them part of the development process taking place in their communities.

Planning by Objectives was the methodology used to design the working plan.

The initial meeting on 20 June 2001 took place at the Instituto San Pedro where all research partners and collaborators contributed to the identification of the target population. A committee was set up responsible for the implementation and responsibilities were assigned to all participants. The implementation committee designed a working plan that will be implemented during the first year of the project.

Contributors: S Humphries (University of Guelph), H Schreier (University of British Columbia), L Brizuela, MC Roa
Collaborators: Instituto San Pedro, CLODEST, IPCA

4.3.3 Include Guides in postgraduate course

The Facultad de Recursos Naturales y del Ambiente (FARENA) of the UNA is carrying out a postgraduate course called "Participative Environmental Management for the Integral Management of Hydrographical Watersheds". The course is being given to agencies that are co-executors of the Programa Socioambiental Forestal (POSAF) that will be carried out from 22 September 2001.

Within the postgraduate themes, three of the Methodological Instruments for Decision Taking in Natural Resource Management at Hydrographical Watershed Level were incorporated:
(1) Participative Mapping, Analysis, and Monitoring of Natural Resources in a Watershed (Guide 3),
(2) Methodology for Analyzing Groups of Interest for Collective Management of Natural Resource Management in Watersheds (Guide 4), and
(3) Developing Organizing Processes at Local Level for Collective Management of Natural Resources (Guide 9).

Guides 3 and 4 will be assumed directly by Faculty teachers, and Guide 9 by CIAT personnel. For further information contact E-mail: Farena@sdnnic.org.ni

4.4 Provide technical support for decision taking

4.4.1 Support punctual training on the use of decision-making tools at the request of institutions associated with the project

At institutional request, CIAT's professionals supported all training activities. Local coordinators devoted time to plan for successful training events, accompanied training workshops, and conducted evaluations and prepared reports on the training workshops, the trainers' performance, and the suitability of training materials. Evaluations were used to introduce changes in the delivery of content and in the design of practical activities. Of great importance was the collection of information regarding recommendations on changes in the structure of the training guides. Reports on two trainers' meetings in Nicaragua present those recommendations, which will be highly useful when the opportunity to review them arises.

The national trainers in Colombia, Nicaragua, and Honduras are conducting training activities that respond to institutional initiatives from CIAT's monitoring efforts. Although we have no record of these activities, information presented by UNA in Nicaragua, accounts for nearly 200 people trained in the use of the DS tools. The Technical Institute of Roldanillo, Valle, Colombia, reported the integration of several tools to the curricula of several academic programs. Trainers in Honduras carried out training activities within their own institutions for people in other projects (CARE, for example), and rendered their services as trainers in courses in which they were called to participate.

Tables 21 to 24 show the number of people trained, the institutions covered, and the existing cadres of trainers in the three reference countries that we can account for at the end of 2001.

Table 21. Institutions and organizations that received training 2000-01.

Type of institution/ organization	Honduras	Nicaragua	Colombia
Governmental	8	4	2
Nongovernmental	17	13	2
Universities	2	5	
Other organisms	3	1	1
Total	30	23	5

Table 22. Trainers' teams in reference countries and their institutional affiliation, 1999-2001.

Institutions[a]	Country		
	Honduras	Nicaragua	Colombia
CIAT-Hillsides Project	5	4	4
CARE	3	-	-
SERNA	2	-	-
CASM	4	-	-
FAO Lempira Sur	3	-	-
ENA	12	-	-
FEPROH	2	-	-
SCD	1	-	-
SAG/DICTA	3	-	-
Thesis student	2	-	-
UCA	-	5	-
PASOLAC	-	1	-
CIEETS	-	1	-
UNA	-	7	-
PROCAFOR	-	2	-
CONAGRA	-	1	-
CEPRODEL	-	2	-
EIAG	-	1	-
UNI	-	2	-
UNAN	-	6	-
CORPOCUENCAS-CALI	-	-	1
Ecofuturo (Bolivar-Valle)	-	-	1
Universidad Nacional	-	-	1
Total	37	32	7

a. For acronyms and abbreviations used, see page 131.

Table 23. Number of people and institutions that received training 2000-01.[a]

Institutions:	Honduras
COHDEFOR	3
CIAT Yorito	1
World Vision	1
SERNA	2
Instituto San Pedro	1
IHCAFE	11
CASM	5
FAO	2
Proyecto Guayape	2
PROLESUR	8
CATIE	2
ITC Lempira Sur	1
PDA San Matias	2
PDA Trapiche	3
PDA Valle	3
PDA Morazán	3
PDA Reitoca	2
PDA Tierra Nueva	2
PDA Choluteca	3
PDA Siria	3
PDA Yoro	3
PDA Jocón	3
PDA Progreso	3
ENA	48
PRODERCO	1
CURLA	3
CARE	2
FEPROH	2
PAAR	1
Aldea Global	3
Total	129

Institutions:	Nicaragua
Proyecto Cuencas Matagalpa	1
UNICAFE	3
CNIS-UNICAFE	1
PCM	4
UNA	9
FADCANIC	1
PRODESSA	1
EAGE	4
PASOLAC	1
ACRA	1
UNAN-Matagalpa	14
UNAN-Managua	7
UCA	14
Solidaridad Internacional	2
DANIDA	6
AMCRE	2
Asoc. Campesina La Unión	1
Progr. Parroquial de San Nicolas	2
POLDEC Limay	1
Alcaldia de Limay	2
PESA	2
IMC	2
COEG	2
Total	83

Institutions:	Colombia
UMATAs	13
CORPOICA	12
CORPOTRIGO	1
UDENAR	1
Fundación Panamericana	1
Total	28

a. For acronyms and abbreviations used, see page 131.

Table 24. Gender distribution of end users and trainers.

		Honduras	Nicaragua	Colombia	Total
Users	M	106	53	21	180
	F	23	30	7	60
Trainers	M	28	16	6	50
	F	7	15	1	23

Contributor: V Zapata

4.4.2 The Intelligent Team Decision Assistant (ITDEA) version 2 ready for release

Highlight

- ✓ ITDEA version 2, improved version of the innovative strategic planning tool ITDEA, completed in Microsoft Access with new focus on strategic planning aid

Results

ITDEA version 2, an improved version of the innovative strategic planning tool, was completed in Microsoft Access. It now includes a help system, a dictionary to allow translation of each element of the forms between a chosen start language towards a new one, the possibility of adding free-form notes to each template with a date/time tag, several formatted reports, and links that start html forms to allow expansion by the user with no programming required. Suggested uses of these html forms include Internet links, indicators, manuals, guides, GIS viewer, etc. ITDEA is designed to be compatible with the Herramienta de Planificación Participativa (HePP) planning methodology tested with remote communities in the Colombian Llanos. The HePP and ITDEA share the same database and decision objects; HePP can be used for a rapid strategic planning, to be later refined using ITDEA. The database allows us to implement knowledge management and discovery techniques that could eventually be made operational via specialized agents. The entire "Plan de Ordenamiento Territorial" of Puerto Lopez, in the Colombian Llanos, which is now being expanded by the municipality into a more comprehensive Development Plan, has been loaded in ITDEA, and the database will be used for monitoring. The critical part of the methodology, which consists of helping a group of stakeholders define a shared vision of the future and therefore identify the strategic issues to address, will be addressed in a workshop on Envisioning to be organized jointly by CIAT and the University of Georgia in 2002.

To improve the clarity of the message, the conceptual bases of the tool were reinforced, and our focus is now more towards a comprehensive, strategic planning aid (analog to an electronic organizer), instead of straight DSS as in the past. It aims at replacing the Zielorientierte Projekt Plannung (ZOPP, or project planning by objective [PPO]) to help improve project design. The methodology is now structured around "organizing to build a common future". It is implemented as a collection of linked "decision objects" such as Strategic Issues (defined by a shared vision of the future), Goals or desired Future Conditions, Indicators, Forces, and Plan that can be assembled into user interfaces adapted to the situation (Figure 25). An example is the participatory planning tool HePP, which uses the same objects, but is accessed in a way that is more adapted to the situation of a remote community. Demonstrations were organized within CIAT in December 2000, Maison de la télédétection in January 2001, CIRAD-Département territories, environnement et acteurs (CIRAD-TERA) in February 2001, and Canadian International Development Agency (CIDA) and the Integrated Natural Resource Management (INRM) workshop in August 2001. About a dozen people from these organizations have showed great interest in testing the tool; it is part of a proposal by CIRAD-TERA to the European Union (EU) and of training workshops on Territorial Development to take place in France, La Réunion, and Brazil. Training is planned for Colombia municipalities in 2002.

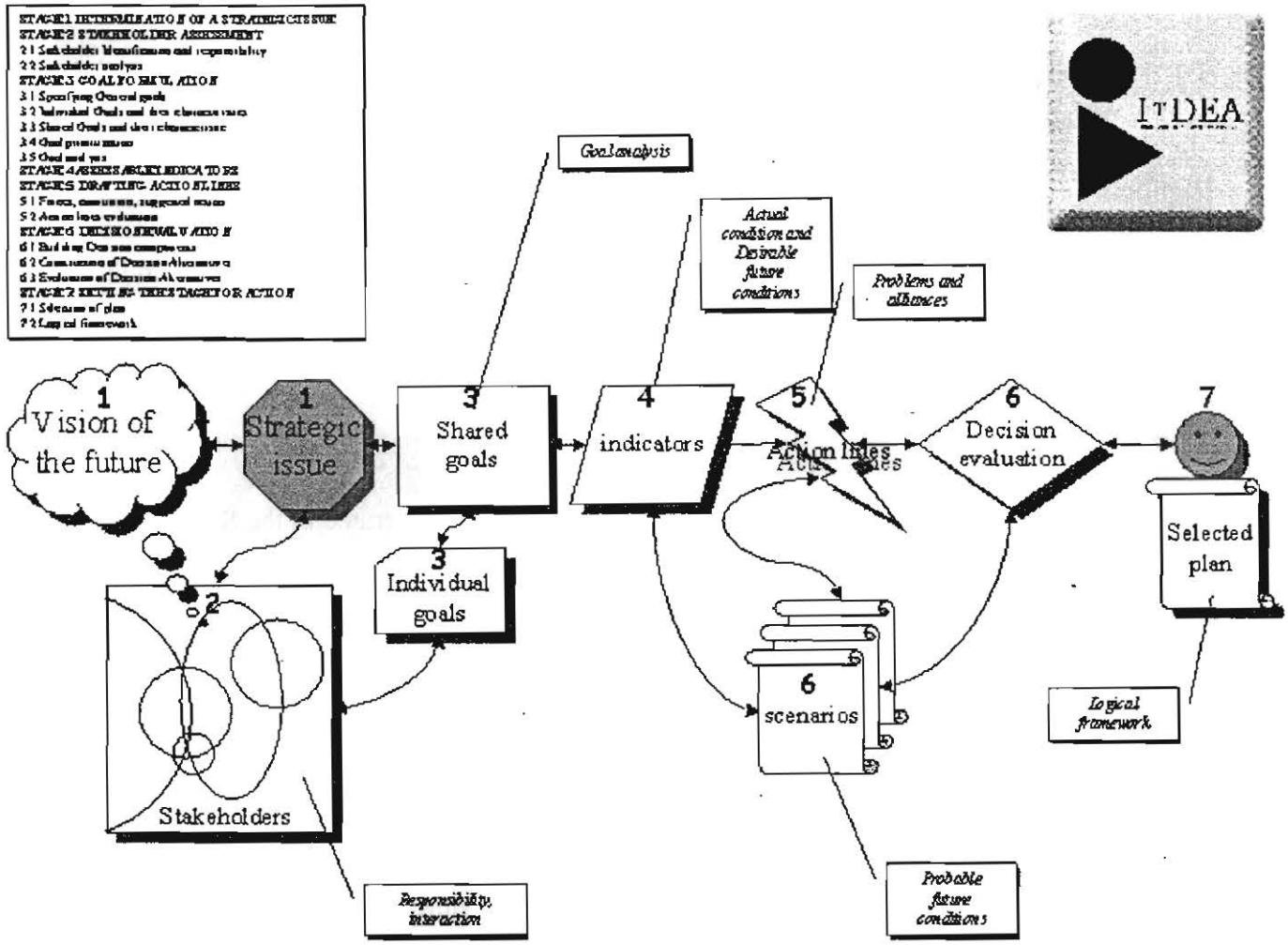

Figure 25. The Intelligent Team Decision Assistant (ITDEA) seven-stage framework (using Decision Objects).

We believe development promises in the rural tropics fall short mainly because development projects suffer from extremely poor design, a situation that ITDEA can contribute to change. However, impact of this tool will be much less than it could be if:
1) It is not distributed freely and widely, (2) there are no resources for technical support and improvements, and (3) CIAT does not use it as a replacement to the ZOPP or PPO, which was the original demand.

Meanwhile, testing by CIAT is planned for sites in Colombia and Nicaragua, and many partners have shown interest in testing, applying the methodology and tool, or developing it further. CIAT intellectual property rights (IPR) policy and software development strategy, however, still have to provide clear guidelines on the next steps to take.

Contributor: G Leclerc
Collaborators: G Narvaez, N Beaulieu, J Jaramillo (PE-4)

Output 5: Efficient, participatory project management

5.1 Foster the active participation of partners in the planning of project activities in the region

Highlights

- ✓ Exchange of research results has begun, and of germplasm exchange with partners in the reference sites in Honduras and Nicaragua
- ✓ The SOL Sites Network was implemented at the level of the Tascalapa River watershed in Honduras

Objectives

- Share with producers and institutions the results of research generated in the SOL sites
- Evaluate the degree of advance of activities planned by the SOL Sites Network

Honduras

The SOL of the Honduras reference site constitutes four sites: two in the upper part of the Tascalapa watershed (Mina Honda and Santa Cruz) and two in the lower part (Luquigue and San Antonio). The IPCA project and the group of producers "Tres de Marzo" manage the upper sites, and CIAT manages the others. All sites have their own work plan and count on systems of monitoring and participative evaluation to evaluate the degree of advance of their activities. The SOL of the Nicaragua reference site constitutes for the moment only one site (Wibuse). However, another SOL site is being implemented in a drier region within the watershed.

In each reference site a planning meeting is held and a meeting for presentation of results with the participation of members of the technical committee of the network, producers, and technicians of the different institutions. In these meetings lines of work and research protocols are defined. In the case of Honduras, the state of activities of the SOL Sites Network is evaluated through a participative system of monitoring. Table 25 shows the list of activities and results reported by each member institution of the Network. Details are found published in the workshop proceedings.

A similar workshop was carried out to present results to producer members of the CIALs, 70 producers of the villages of Yorito and Sulaco participated. A general policy for germplasm distribution was established in which every institution that is actively participating in the SOL Sites Network is able to freely acquire seed for verification trials of varieties. Only the advanced lines can be delivered individually. Based on this policy, 14 Comprabación de Variedades (COVAS) of bean were distributed in 2000. They were formed from four advanced lines and two checks. During 2001, the following COVAS were distributed: 22 soya, seven sweet potato, eight rice, and nine grains and legumes. The trials were established for the CIALs and institutions (partners) that give technical assistance. To have sufficient availability of seed at experiment level an agreement was established with the PES Asociación de Hombres y Mujeres Progresistas de Honduras (AMHUPRO) to multiply seed of maize, soya, rice, and sweet potato.

Table 25. Activities and results reported by partners in the Supermercado de Opciones para Ladera (SOL) Sites Network in Yorito, Honduras.

SOL site[a]	Activities[b]	Results
Mina Honda (IPCA)	VIDAC, ECAR, and COVAS bean trials	Promising materials for the upper part of the watershed
	Participative improvement of beans	
	Evaluation of five cassava materials	In process
	Evaluation of three soya varieties	In process
	Participative improvement of maize	Preliminary results
Santa Cruz (SERTEDESO)	Participative improvement of maize	In process
	Plans for improving the ecological benefit of coffee	Construction of a coffee-related process
	Validation of technologies for coffee	
Luquigue (CIAT)	Bean tolerance to drought	Materials selected
	VIDAC, ECAR, and COVAS bean trials	Materials multiplied
	Multiplication of promising bean materials	
	Resistance to rice blast	Results of evaluation
	Rice yields evaluation	
	Evaluation of earliness in maize	Results of evaluation
	Yield of five soya varieties	Preliminary selection
	Evaluation of 14 sweet potato varieties	Selection of three varieties
	Multiplication of 35 cassava materials	In process
	Evaluation of grain and legume forages	Multiplication of promising forage materials
	Selection of new systems rotation components	Strategies evaluation
	Evaluation of short-cycle cover systems	
	Limiting nutrients	
	Combination of organic and inorganic sources	Results of trials
	Evaluation of fallows	Results of trials
Luquigue (CIAT)	Live barriers	Results of trials
		Economic evaluation
San Antonio (CIAT)	Evaluation of germplasm under pasture:	
	Grains	Grain associations validation + legumes
	Herbaceous and bushy legumes	
	Soil conservation	Cover trial

a. IPCA = Investigación Participativa para Centro América, and SERTEDESO = Servicios Técnicos para el Desarrollo Sostenido.

b. COVAS = Comprobación de Variedades, ECAR = Ensayo Centroamericano de Apaptacion y Rendimiento, and VIDAC = Vivero de Adaptación Centro Americano de grano rojo

Until now only advanced lines of bean and several species of grains have been delivered to the organizations and associations of producers. On the average, 50% of the 2001 workplan has been developed. This advance is because of the good communications and relations among members of the committee that has permitted excellent coordination of activities.

After carrying out two evaluations of the participative M&E system, the general plan of monitoring was improved and we have general indicators to network level and specific indicators for each SOL site. Standardization of indicators at SOL-site level will follow when and where feasible.

The SOL research model is beginning to show positive results in the integration of activities among institutions and the generation of improved options. Several of the materials selected in the SOL are already in the hands of producers. The SOL Sites Network is being formed successfully. Nonetheless, the systematization of results and joint elaboration of proposals must be initiated. Also, follow up should be given to germplasm that has been distributed to begin measuring their impact.

Nicaragua

Table 26 shows the activities discussed with the workshop participants and the activities planned by them. This workshop was highly important to give an opening so that producers and institutions could give suggestions on the type of research that should be focused in the SOL.

Table 26. Results of the Annual Planning Workshop of the Supermercado de Opciones para Ladera (SOL). (For acronyms and abbreviations see page 131.)

Crop/ Theme	Preliminary results	Planned activities
Bean	The best four varieties of bean were PTC 9557-98, EAP 9508-41, PRF 9659-25B1, and EAP 9510-77.	Evaluate the four promising materials comparing them with a local check, DOR 364.
	Farmers selected the following varieties: EAP 9510-77, PTC 9557-98, EAP 9509-29, and PRF 9659-25B1.	In the second season, establish a trial with 32 materials tolerant to drought in a site selected based on this criterion (zones characterized as dry).
Maize	The best varieties in order of importance were SC3P76N, RPMxC17 x D-8043, SC3P73N, ACROSS-8243, and NB-8243.	Test the five best materials in the Wibuse SOL site (RPMxC17 x D-8043, ACROSS-8243, NB-8243, NB-9043, and SC3P73N), but compare them with NB-6.
	In the three participative evaluations the following varieties were repeated (RPMxC17) x D-8043, ACROSS-8243 and NB-8243, NB-9043 and SC3P73N.	Test these varieties in other localities of San Dionisio. Manage seeds of these varieties with INTA (CDT-Sébaco).
		Participants in this research will be INTA San Ramón, PCaC, AINDESC and the CIALs.
Rice	Three varieties were selected for their better agronomic qualities (IRAT-361, IRAT-366 and IRAT-367).	In the Wibuse SOL site, test the varieties originating from CIAT. These will also be established in other localities depending on the seed that arrives.
		INTA, ADDAC, CIAT, and PCaC will coordinate the activity.
Sorghum	Research has not been carried out, but there are community requests to initiate testing white varieties of grain.	Request white varieties of grain at INTA or CNIA of Sébaco and Managua. The varieties should have multiple uses.

Continued.

Table 26. (Continued.)

Crop/ Theme.	Preliminary results	Planned activities
Sweet potato	Only adaptation tests were initiated.	Establish a trial of 17 sweet potato clones in the Wibuse SOL site in coordination with INTA and CIP. Participating partners will be CIAT, INTA, CIP, CIALs, PCaC, and AINDESC.
Soya	The cultivars evaluated have a very long reproductive cycle that does not permit second season sowing. More short-cycle materials must be sought, but with the same or greater yield potential as those we already have.	Manage seed of new varieties with the characteristics mentioned previously. Establish a trial of new soya varieties in the Wibuse SOL site. Partners will be ADDAC, the CIALs, and PCaC, who will support women producers.
Improved fallow	At present CIAT is carrying out a trial in SOL to test the adaptability of five species of improved fallows. It is very premature to speak of preliminary results, but one of the species seems to present better development (*Sesbania sesban*).	CIAT will continue the evaluations.
Limiting nutrients	The combinations of NPK and NP were the best treatments. In their separate application, the P treatment was 40% better than the check (without nutrients), while N surpassed it by 20%, which indicates that the crop responded more to P than N.	Repeat the trial in the Wibuse SOL site, and in other localities of the municipality taking into account altitude and type of soils (high, medium, and low parts with different types of soils). Interested partners are INTA, CIAT, and voluntary farmers of the communities that attended the Agricultural Systems Workshop.
Multi-purpose forages	Forage trials are established in the SOL with cover plants, multi-purpose trees, grains, and herbaceous legume. There is also a pastures trial. Up to present, participative evaluations are being carried out with farmers in the localities of Wibuse, El Corozo, and Piedras Largas. We propose to continue with this activity in coordination with two local associates (INTA, PRODESSA)	Due to previous commitments with local partners to provide follow up to this activity it has been left to the participants. CIAT will continue in charge in the Wibuse SOL site, PRODESSA with CIAT in Piedras Largas, and INTA and CIAT in El Corozo.
Rotation systems	This trial was initiated this year. It seeks to identify more efficient crop systems in productivity and improvement of the soil.	CIAT will establish the trial, inform on advances, and give final results when obtained.
Crop rotation	This trial seeks to identify annual crop components to establish more efficient rotations in the use of the resources.	Because of insufficient time to discuss this theme it was agreed that the trial be carried out according to the results of the Systems Workshop and that CIAT will be responsible.

Contributors: Technical committee of SOL (CIAT, SERTEDESO, IPCA)
Collaborators: PP Orozco, JA Beltrán, T Reyes; J Bosco (consultant), technicians and producers

5.2 Actively and permanently coordinate the reference sites, projects, and individuals working in the region

5.2.1 Coordinate project activities with other projects in the region

This is an ongoing activity (see Table 27 for examples). The SOL Technical Committee takes into consideration work of other projects (see Table 27 for meetings).

At a meeting on the 3rd of August 2001, information was exchanged with the SDC and we gained information on SDC projects to 2010. Attendance at the National Forums of Payment for Environmental Services have kept us updated on experiences of national agencies and institutions.

A presentation was given at the annual congress with organizations working with participative methodologies in October 2000. We shared our experiences of the CIAL methodology. A workshop execution agreement was reached with organizations working with INTA.

5.2.2 Workshops for planning and evaluation of results with partners in SOL

Table 27 lists in date order the workshops, meetings, and events organized by the project and partner projects, first in Honduras and then in Nicaragua.

Table 27. Workshops and events organized by the project and partner projects in Honduras and Nicaragua. (For acronyms and abbreviations used, see page 131.)

HONDURAS

Type of event	Organizers	Date	Participating institutions	No. of participants	Results
Course on the Methodological Instruments in ESNACIFOR, Siguatepeque, Comayagua	CIAT	2000	CIAT, World Vision, Global Village	15	15 persons trained in the Identification of Well Being Levels methodology.
Participative evaluation of the trial of early maize, soya, and rice varieties	CIAT-Hillsides	31/10/00	CIAT	13 producers 4 technicians	Ordering of varieties according to producer preference and list of selection criteria.
Participative evaluation	CIAT-Forages	28/11/00	Luquigue producers	10 producers 3 technicians	10 interviews carried out and information tabulated.
Meeting of Technical Committee SOL Network	CIAT, Hohenheim Uni.	29/11/00	CIAT, IPCA,SERTEDESO	6 technicians	Monitoring system evaluated and corrected.
Participative evaluation	CIAT-Forages	29/11/00	Producers from Las Cañas	10 producers 3 technicians	10 interviews carried out and information tabulated.
Field trip	CIAT-Forages	7/12/00	Las Cañas producers		
Tour with professors	CIAT-Hillsides	12/1/01	University	2 technicians	
Meeting of Technical Committee SOL Network	CIAT	25/1/01		6 technicians	Table with possible activities to be developed this year.
Participative evaluation in ECAR trial and multiplication of accessions of sweet potato	CIAT-Hillsides	1/2/01	La Sabana de San Pedro producers	8 producers	Selection criteria to evaluate varieties of sweet potato
Workshop with local intermediaries to finalize coffee production chain	CIAT-Agroenterprises	Mar, 2001	CIAT, SERTEDESO Commercialization Committee, coffee producers, coffee intermediaries	25	25 producers and intermediaries know and improve the coffee chain
Course on the Methodological Instruments in the ENA, Catacamas, Olancho	CIAT	3-9/3/01	CIAT, ENA	30 students	30 students of the ENA trained in the Identification of Well Being Levels methodology.
Meeting of Technical Committee SOL Network	CIAT	7/3/01	IPCA, SERTEDESO	1 producer 6 technicians	Work plan of SOL Network approved by partners.

Continued.

Table 27. HONDURAS (Continued.)

Type of event	Organizers	Date	Participating institutions	No. of participants	Results
Meeting of Technical Committee SOL Network	CIAT	13/3/01	IPCA, SERTEDESO	2 producers 6 technicians	Workshop of presentation of results jointly planned.
Participative evaluation of multi-purpose germplasm in Las Cañas	CIAT-Forages	13/3/01	CIAT-SERTEDESO	11 producers 2 technicians	3 trials evaluated: Bushy legumes, Grains, Herbaceous legumes.
Participative evaluation in the SOL Project	CIAT-Forages	23/3/01	CIAT-SERTEDESO	10 producers 3 technicians	Interviews carried out and tabulated.
Workshop of presentation of research results	CIAT-IPCA - SERTEDESO	29-30/3/01	ASOCIAL, Inst. San Juan de Sula, PDA Yoro-Jocon, ESA Consultants, FUNDER, Inst. Jose A Ochoa	4 producers 36 technicians	40 representatives of institutions know the research results
Course on Identification of Market Options	CIAT-Agroenterprises	4/01	CIAT, PRODESSA	20	20 persons trained in market opportunities' identification.
Participative evaluation in Las Cañas, Sulaco	CIAT-Forages	10/4/01	CIAT, SERTEDESO	10 producers 4 technicians	Information tabulated
Participative evaluation in SOL project	CIAT-Forages	20/4/01		6 producer 2 technicians	Information tabulated
Statistical analysis course	CIAT-Hillsides	23/4/01	FUNDER, ESA Consultants, IPCA, SERTEDESO	15 technicians	15 technicians trained in the use of SPSS
Workshop on Systems of Monitoring and Evaluation with local organizations	CIAT-Hillsides	17-18/5/01	SERTEDESO, ASOCIAL, Dir of CLODEST, REDOLYS, agroenterprises	8 producers 11 technicians	Systems of monitoring in CLODEST, REDOLYS, and agroenterprises in period of establishment.
Workshop of Presentation of research activities 2001	CIAT	23/5/01	CIAT, SERTEDESO, IPCA , Inst. San Juan de Sula, CODESA	5 producers 26 technicians	Research protocols elaborated and discussed.
Field day	CIAT-Forages	26/6/01			
Training in verification of the taking of rainfall data	CIAT	28/6/01		9 producers 2 technicians	Producers trained in use of rainfall data to plan sowing and harvest times.

Continued.

Table 27. HONDURAS (Continued.)

Type of event	Organizers	Date	Participating institutions	No. of participants	Results
Workshop with local organizations to identify priority projects and to elaborate profiles of proposals	CIAT-Agroenterprises	Jly, 2001	CLODEST, CIAT, ACELY, AMCY, ASOCIAL, CIAT, Tascalapa and SERTEDESO rural credit associations	22	Seven projects prioritized and 22 producers of the zone know how to elaborate profiles of proposals.
Workshop with local organizations to present profiles of proposals for prioritized projects	CIAT-Agroenterprises	Jly, 2001	CLODEST; CIAT, ACELY, AMCY, Asocial, CIAT, Tascalapa and SERTEDESO rural credit associations	22	Five profiles of proposals elaborated and ready to present to donors.
Meeting to elaborate AOP of the project with youths	CIAT, Inst. San Pedro	23/7/01	CIAT, ISP, IPCA	5 technicians	Draft of the agreement between the San Pedro Institute and CIAT.
VI. Forum of Commercialization in Honduras	CIAT-Agroenterprises, CONASEL, PASOLAC, SAG, UPEG	25-27/7/01	CARE, World Vision, CASM, SNV, CIAT, SAG	300	300 persons informed of the agroenterprise project activities in Honduras.
Participatory evaluation in cowpea trial in SOL project	CIAT Forages	1/8/01	CIAT	11 producers 1 technician	11 interviews carried out.
Workshop with producers of vegetables	CIAT - Agroenterprises	Aug, 2001	CIAT, vegetable producers	33	33 producers of vegetables know how to elaborate the vegetable production chain and identify and prioritize the problems of the chain.
Workshop of participative monitoring and evaluation	CIAT-Hillsides, Hohenheim Uni.	2/8/01	CIAT, IPCA AFOCO	19 technicians	Index of contents defined for methodological guide of participative M&E to base groups level.

Table 27 NICARAGUA

Type of event	Organizers	Date	Participating institutions	No. of participants	Results
Presentation of experience in water appraisal experience in S. Dionisio	FARENA-UNA	12/9/00	CIAT, UNA students	25 students, 5th year	Knowledge of the methodology inserted in the framework of curricular subjects of FARENA.
Presentation in annual Congress with organizations working with participative methodologies (Matagalpa)	INTA	19-20/10/00	Rural agencies of development		Shared participative experiences of research with the CIAL methodology. Workshop execution agreement made with CIAL methodology to orgs. working with INTA.
Course-workshop on economic evaluation of soil erosion	MIS - IBSRAM	23-27/10/00	Inst. members MIS in Honduras and Nicaragua	22 technicians and professionals	Knowledge and practical methodology of economic appraisal of soil conservation imparted. Commitment made of applying the methodology in the reference sites. Case studies being executed in San Dionisio.
Training workshop on INRM (all the Guides) in Venezuela	INIA-FONAIAP	3-10/11/00	Municipal representatives of INIA	31 technicians and professionals	Eight Action Plans to be implemented with the CIAT methodologies in eight territories in Venezuela.
Meeting to evaluate training work with the Nicaragua national team	CIAT-UNA	12-13/12/00	UNA, CEPRODEL,UCA, CIEETS	12 trainers	Experiences revised on the process of training and proposals for the following year.
Training workshop on INRM in Nicaragua	CIAT-UNA	2-10/2/01	UNA/FARENA,UNAN-Managua, UNAN-Matagalpa, UNI, UCA	42 students	Training given to final year students of universities present. One Action Plan prepared.
I National Forum of Payment for Environmental Services	PASOLAC, MARENA	8-9/2/01	NGOs, state institutions and universities	22 agencies and national inst. and 11 independent consultants	Shared experiences and identified themes of presentation for the regional forum.
Workshop on management of data and statistics	CIAT	18-20/4/01	Partners (ADDAC, PRODESSA, INTA, UNA, PCaC)	10 technicians and professionals	Knowledge imparted of the statistical program SPSS to handle agronomic data.
Workshop on Participative Research (CIALs)	CIAT, INTA, ADDAC, PRODESSA	23-27/4/01	CIAT, INTA, ADDAC, PRODESSA	20	20 technicians trained in participative research methodology. Action Plans elaborated by INTA, ADDAC, and PRODESSA.

Continued.

Table 27 NICARAGUA. (Continued.)

Type of event	Organizers	Date	Participating institutions	No. of participants	Results
II Regional Forum of Payment for Environmental Services	SDC, PASOLAC, CATIE, MARENA, Austrian and Canadian cooperation	25-27/4/01	Institutions of research, education, and development of Central and South America	About 150 including expositors and participators	Experiences share and discussed. Advances on the theme of payment for environmental services made known to world level.
Specific workshop on Guide of well-being levels	UCA	4/5/01	2nd year students of UCA	50	Knowledge of the methodology included in UCA's Faculty of Technology of the Environment subject curricula. This is for the second consecutive year.
Training workshop on INRM in Nicaragua	CIAT, TROPISEC	28-31/5/01	EAGE, PESA, IMC, POLDEC-Limay, Alcaldía-Limay, DANIDA, AMCRE, COEG, S. Internac, A. Campesinos, Progr. Parroquial	25	Technicians were trained in using the tools.
Field day at San Dionisio with CIAT General Director	CIAT	19/6/01	CIAT, SDC	7	Presentation was made of activities of SOL, CIALs, and organizational processes.
Workshop on integral watershed management	CATIE, UNA/FARENA, INTA	2-3/8/01	CIAT, UNA, INTA,	25	Watershed management results identified. Presentation given on methodological instruments for decision taking in NRM.
Meeting of SDC projects	SDC, CIAT	3/8/2001	PASOLAC, FOMENTA, Postharvest	20	SDC gave information on its strategy to 2010. CIAT presentation given on work strategy to local, national, and regional, scales.
Interinstitutional meeting and of local organizations in San Dionisio, Matagalpa	Mayor's Office	6/9/01	CIAT-Hillsides, INTA, PRODESSA, ODESAR, PCaC, Mayor's Office, Campos Verdes, CIALs, UCOSD	17	Provisional Committee elected at municipal level. Baseline presentation made. Beneficiaries and creditors systematized.

5.3 Maintain an efficient information system of the project with its partners

5.3.1 Update project Web page monthly

CIAT-HQ
Highlight

✓ The CIAT Web site in Cali is being redesigned and updated with project information based on changes carried out by the Communications Unit

Objectives

- Make available project information to users, that is, the activities and the products that the project is executing and has generated to date

First we proceeded to organize the existing project information, listing it and converting the documents that exist in digital format to .pdf. Based on the design of the CIAT Communications Unit, we proceeded to organize the information so that what the project wants to show can be seen, trying to cover all possible fields. Revisions are being carried out and corrections of the work based on the general features of CIAT.

At present, the previous Web site is available; we hope that within 2 months the new site will be available. The Web page is divided into Products, Training, Information Resources, Research Areas, About Us, Annual Reports, and Related Web Sites. In the center of the page is the latest news, such as new work, thesis work, projects, new personnel.

Contributor: A Jiménez Nieto

CIAT-Central America
Highlight

✓ Partners in the region have access to the information generated by the project through a new Web page

Objectives

- Make available to users project information such as the activities and the products that CIAT generates
- Diffuse the information that CIAT-Central America has available in its offices and that can be consulted

We proceeded to organize all project information generated in the reference sites and converted the documents to .pdf format. Information was divided into sections so that the user can follow the project's steps in a logical manner. Then we initiated the design of the new Web page.

Several revisions were made and corrections based on the suggestions and recommendations of the CIAT projects in Cali.

The Web page (Figure 26) can be accessed at http://www.123.hn/ciathill. The page contains sections for consultation about project activities and products. Also included is a complete listing of all publications produced in the reference sites, and of project bulletins. A section is dedicated to special projects, links, and other news.

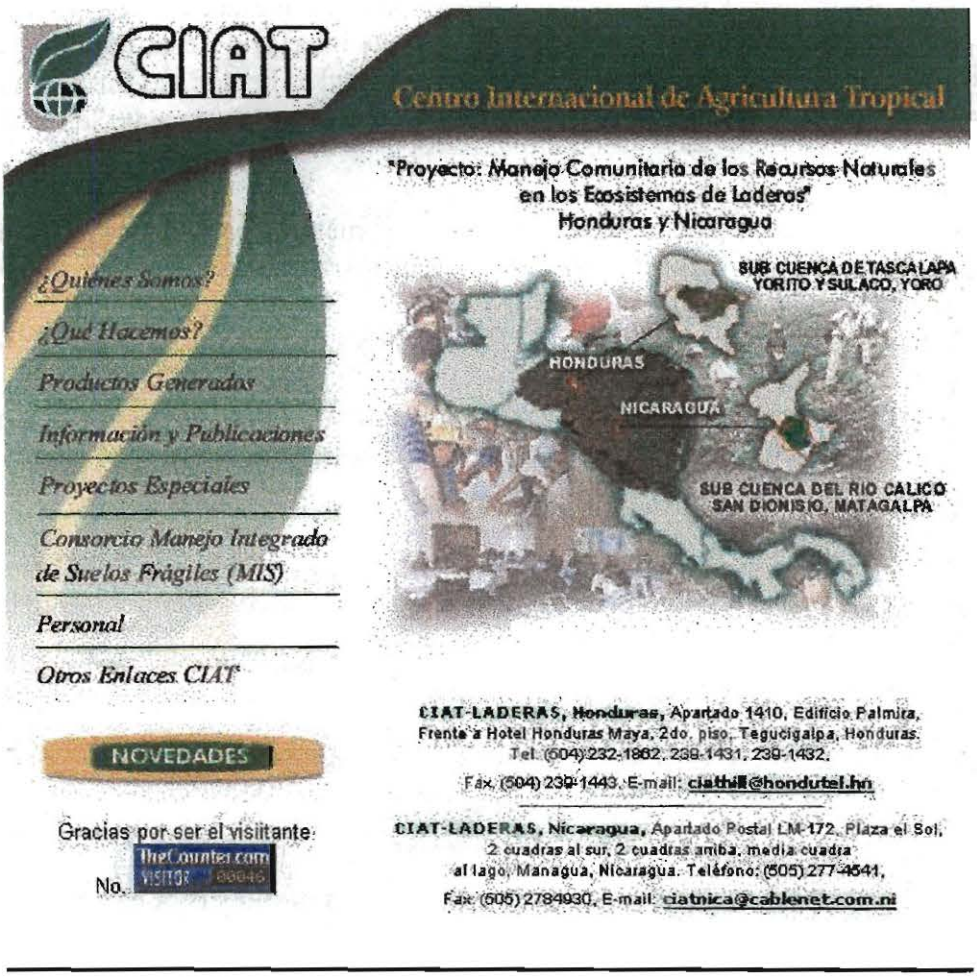

Figure 26. Web page of CIAT-Hillsides in Central America.

Contributor: V Escober
Collaborators: M Ayarza, JA Beltrán

Consultation interface for research on Cabuyal River watershed
Highlight

- ✓ User-friendly interface available on Hillsides Web page for consultation on Cabuyal River watershed

Objective

- Compile and organize in a consultation interface the largest possible quantity of material on the Cabuyal watershed to facilitate its consultation and to promote its diffusion

Materials and Methods

The description of the interface's content and structure is summarized in the document overview.pdf, which is included in the introduction to the interface. Because of the heterogeneity of the type and quality of work compiled, access criteria had to be defined for the materials, which were assigned parallel to the process of installation of the interface in September 2001.

Three main categories were considered:

(1) Total restriction or access by request: constituted by material represented in primary data or semi-processed originating from CIAT or third parties as well as documents that can be edited in .doc and .txt format.
(2) Limited access to the projects PE-4 and PE-3: Includes material of interest for GIS users or hillside environment researchers.
(3) Unrestricted access: Tables of contents in HTML format, figures, presentations in Power Point and some public-type documents at present accessible on other Web sites.

Results

The final product of the work consists of an interface for visible consultation through a navigator for HTML documents installed at present on the Hillsides Project Web site.

The contents of the interface are summarized below.

- Layers of georeferenced data (vector and raster) at different scales of the Cabuyal area and bordering zones digitized from maps of third sources such as contour lines, rivers, lakes, roads, soils, climatic zones, global positioning system (GPS) control points, administrative divisions, ground cover, etc.
- Layers of georeferenced data products of spatial analysis of models of elevation, erosion, hydrology, vegetation, changes of ground cover, classification of remote sensing images (satellite and air photographs).
- Tabular data of biophysical (climate, soils, agricultural production) and socioeconomic information of the zone (1993 census and surveys of various types).
- Two doctorate theses and about five undergraduate and masters theses. More than 10 theses are in process of recuperation.
- Articles published in magazines and summaries of conferences and seminars.
- Presentations in Power Point used in conferences and seminars.
- Computer programs and/or information systems modules for hydrological simulation and changes of ground cover.

Once the interface was installed and the criteria of access assigned, the information was presented to a group of persons from projects PE-4, PE-3, and from Information Systems. The

objective was to explain the content and structure of the work and to collect ideas that could improve similar initiatives in the future.

Contributor: K Pallaris (consultant)

5.3.2 Circulate the project bulletin

During the present year two further bulletins were prepared and circulated. One was about the SOL, and the other on the diffusion strategy for the tools for decision making in the management of natural resources.

5.3.3 Prepare and publish scientific articles, technical documents, and proceedings of all workshops organized by the project

The most important set of documents regarding training and institutional support is composed of the reports written on each workshop held this year. The following training activities are thereby recorded:

- Training Course on the use of DS tools for FONAIAP, Barquisimeto, Venezuela, November 2000.
- Third National Course on the use of DS tools carried out in December 2000, at ESNACIFOR, Honduras.
- Fourth National Course on the use of DS instruments carried out for the National School of Agriculture (ENA), March, 2001, Catacamas, Olancho, Honduras.
- Training course for CORPOICA delivered in March 2001 in Pasto, Narino, Colombia.
- Training course for 11 NGOs associated with TROPISEC carried out in May 2001.
- Training Workshop for Nicaraguan NGOs, carried out in August 2000, in La Cartuja, Matagalpa, Nicaragua.
- Training Course for Nicaraguan Universities on the use of DS tools, carried out in El Crucero, Nicaragua in February 2001.

A full list of the project publications appears on page XX.

Contributor: V Zapata

5.3.4 Organization of information generated by the project

Objectives

- Compile and group in a single site, in digital form, all or most of the documents generated by the project since it began
- Put the internally available information in easy-to-use form

- Have this information available in the three countries (Honduras, Nicaragua, and Colombia) and in the reference sites

We began by compiling in paper form all the internal documents of the project since 1995, including theses, annual reports, operating plans, and what little there was in digital form. Then a database was created and a physical space that contains all this information, to have an easy search form and access, for example:

5. Farmers' decision making on land use - the importance of soil conditions versus other factors in the case of Rio Cabuyal watershed, Colombia. Ravnborg, H. M. and J. E. Rubiano (1998). Centro Internacional de Agricultura Tropical. Cali. Colombia

48. "A case of farmer adaptation and adoption of contour hedgerows for soil conservation." Fujisaka, S. (1993). Centro Internacional de Agricultura Tropical. Cali. Colombia

The database is simple, easy to use, and permits the adding of information as it is generated. As documents are generated in the project they are added to the corresponding folders and dispersed information is avoided. The three sites where the project works can have all the available information and the search for a document is done more easily.

All or most documents are found organized on the shelves and in digital form in folders. We have easy access to the documents, and the information can be lent both within and outside CIAT.

Contributor: A Jiménez Nieto, MA Franco (Information Systems), all the PE-3 team

5.4 Strengthen joint work with other projects and organizations

5.4.1 Circulate final information of the Seeds of Hope Project

In Honduras, a presentation of results was given to the Regional Offices of the donors, USAID and CIDA. At this meeting, NGOs that benefited from the seed distribution also attended. Copies of the report were sent to donors through the CIAT Projects Office.

5.4.2 Establish an FAO-CIAT agreement for the production of artisanal seed

Objective

- Contribute to improving food security of small-scale rural producers by means of improved artisanal production and commercialization and diversified vegetative material, adapted to each agroecological zone in necessary quantities and qualities

Eight NGOs are executing the project as listed below.

NGO	Site of operation
APS	Ocotepeque
Comisión Cristiana de Desarrollo (CCD)	Santa Barbara
World Neighbors	Santa Barbara
ICADE	El Paraiso
MOVIMONDO	El Paraiso
Grupo Guia	El Paraiso
CONSULUPE	Francisco Morazan
CISP	Colon

To develop the technical capacity of NGO producers and technicians, training activities were developed on the crops of bean, maize, rice, and sorghum. This training is first given to technicians and then to producers. The training deals with themes related to the agronomic management of the crops, interpretation and recommendation of an analysis of soils, postharvest management, quality tests, certification, markets, financial analysis, and varietal description. To date, eight NGO technicians and 24 producers have been trained on these themes; and 18 mz of maize and 9.7 mz of bean have been established.

Contributor: G Giraldo (Seeds Project)
Collaborator: R Pacheco (Seeds Project)

5.4.3 Establish an agreement with CARE, CRS, CASM, and World Vision to implement the Learning Alliances

The initiative of learning alliances was presented during a meeting to four NGOs in Honduras: CRS, CARE, CASM, and World Vision (see under 3.2.3). In the last meetings held with each, they informed us that they are socializing this information within their projects. Some of these projects are including these activities in their annual planning for next year beginning in October 2001 and finalizing in September 2002. Therefore the signing of an agreement of cooperation with these institutions in this area possibly will be carried out between November and December this year.

5.4.4 Facilitate the execution of Action Plans of the MIS

The objective of the MIS is to generate, adapt, and divulge technological options for the sustainable management of fragile soils in the Central American regions. During the present year, regional planning meetings and meetings on follow up by country were organized. In the regional meeting, the operative plan of the consortium was defined for the present year and a revision was made of the results obtained last year. This information is available on CD-ROM and on the consortium's Web page.

Various activities were carried out in Honduras and Nicaragua, for example the biophysical characterization of the MIS reference sites in Honduras (see under 2.1.1). Also, proposals are being financed related with the measuring of water quality, economic evaluation of soil erosion,

and processes of information systematization. The results of these activities will be reported in the Soil Water Nutrient Management program (SWNM) report.

5.4.5 Follow up undergraduate and postgraduate theses with students at educational centers at local, national, and international levels

The project maintains an active flow of students from diverse educational centers in Honduras and Nicaragua. Six thesis of *Ingeniero Agrónomo* were guided this year. They appear in the list of publications.

Three new postgraduate students were incorporated into the project. Rein Van der Hoek of the University of Hohenheim in Germany is working on the development of new methods of participative evaluation of forage-based technologies. The thesis of Kirsten Probst on methodologies of participatory monitoring is almost completed.

5.5 Establish a participative system of monitoring and evaluation of the project to monitor its performance and feed back to planning

5.5.1 Prepare 3-monthly reports-March, June, September, and December

The original scheme was changed to monthly planning meetings in each country. Results are available as meeting reports.

5.5.2 Carry out progress evaluation activities of the project to orient its future fulfillment

A highly important activity was developed this year with the participation of all members of the Hillsides Project in Montelimar, Nicaragua. For the first time in its history, the Project members had an opportunity to meet and reflect upon its mission, strategies, and activities. A summary of the workshop results, available from PE-3, provides a review of its objectives, the participants' needs, and workshop components. This was an opportunity to analyze external reviews (SDC-IDRC, and External Program and Management Review [EPMR]) as well as an internal self-evaluation.

Contributor: V Zapata

5.6 Establish an efficient and participatory administrative system within the project

5.6.1 Identify new opportunities of financing the project activities, prepare research proposals, and carry out follow up to these initiatives

Highlight

✓ Potential donors were identified for the project activities in the region, and the development of specific proposals was initiated

Objectives

- Maintain donor agencies informed on the activities and the products of the project
- Identify new financing opportunities for the project

Table 28 and 29 summarize activities and the results of follow up made to several agencies of cooperation. Great interest exists on the part of some of these in financing and/or jointly executing activities within or outside the reference sites. Good possibilities exist of obtaining resources for the project, especially through the European agencies of cooperation in Nicaragua. Already important steps have been made and we hope to crystallize results next year.

Contributors: M Ayarza, J Beltrán

Proposal for geographical information systems elaborated

Objective

- Develop a proposal to establish local systems of information

CIAT explored the feasibility that PRONADERS include a Municipal Information System in Watershed Management Program funded by IDB. This initiative would deploy resources to establish local information units in more developed municipalities identified by CIAT in the characterization of priority areas for this project. The bases for the establishment of these local information units was developed by CIAT Honduras and later incorporated to the PRONADERS module in the final version of the document for the Honduran government.

We expect that PRONADERS will call upon CIAT when this component of the module is to be executed. As part of this initiative, a methodological Guide will need to be prepared for training and dissemination purposes. So far, the most important achievement has been the inclusion of the local information system within the Priority Watersheds Program of Honduras.

Contributor: J Chenier, Programa Nacional de Desarrollo Sostenible (PRONADERS)
Collaborators: V Zapata, O Mejia

Table 28. Plan of follow up to donors in Nicaragua (for acronyms and abbreviations see page 131).

Institution	Contact person	Date	Activity	Results
Swedish Embassy	Peter Herthelius, First Secretary for agricultural and rural development matters	6 Feb 2001	Identify opportunities for CIAT	• Start of contacts with the consultant Merlinda FS Cuellar (ORGUT Consulting company AB) for design of the proposal for development in two agricultural municipalities and two cattle-raising municipalities. • Plan for visit of Peters Herthelius to CIAT on 23-25 April, CIAT interest strategy for Central America and Africa. • In May, terms of reference were delivered for the execution of various projects (pending their request).
DANIDA	Hans Henrik Sass, main technical advisor Iván Jerez Sánchez advisor ATP	Apr 20	Identify opportunities for CIAT Analyze seed project with INTA	• Seeds project under the leadership of INTA, postponed to end of year. • New meeting for April 20 on new themes for joint projects.
IDB	Mario Mejía, subrepresentative Denis Corrales, Environment Consultant	Mar 25	Identify opportunities for CIAT	• Pending meeting with other consultants for the environment and agricultural sector. • Delivery by Denis Corrales of consultative documents CIAT-CATIE.
Royal Embassy of Norway NORAD	ALF Friiso, Second Secretary		Since 2000 there has been the possibility of a project with CIAT, for the Mesoamerican biological corridor	• Delivery of a draft Concept Note • In May NORAD's permanence in Central America is defined for new projects. • New meeting pending in May.
MAGFOR	Miguel Angel Castellón S, Director General of Development Program Ramiro Ortiz, technology specialist	7-23 Feb	Identification of opportunities for CIAT	• Presentation of MAGFOR and CIAT (See report of V Zapata and JA Beltran). • Proposal to INTA on training strategy. • Pending meeting with Julio Solórzano, Director of the Project of Agricultural Technology.
FAITAN	Victor Blandón	26 Mar	Follow up to possible research proposals for the fund. Individual proposals up to US$80,000 and in strategic alliances US$250,000	• In this month, FAITAN and FLAT will give calls for research and development projects. • Elaboration of proposal for MIS.
SDC	Jurg Benz, Regional Coordinator Omar Palacios, Advisor agricultural programs	11 Apr	AOP Project activities	• Presentation of CIAT-Hillsides activities to the projects financed by SDC, 2 Aug. • Visit of J Ashby to SDC. • Visit of J Voss 18 Jun.
Mink´a Chorlavi Fund	Julio Berdegué	Sept	Elaboration of proposal by CIAT and Campos Verdes Association	• Sent proposal on Collective Action and Improvement in the Conditions of Life of the Rural Communities in San Dionisio, Matagalpa, Nicaragua.

Table 29. Plan of follow up to donors in Honduras (for acronyms and abbreviations see page 131).

Institution	Contact person	Date	Activity	Results
GTZ	Wilfred Liehr, Director German Cooperation for Development	11 Jun 2001	Identification of opportunities for CIAT	• Start of contacts to define strategic alliances between CIAT and GTZ. • Interest was shown in the area of commercialization and in watershed management.
ACDI	Denis Buteu, Official	11 Jun 2001	Forestry director and advisor	• Interest in the themes of watersheds and commercialization.
European Union	Blana Gil-Antuno	Mar 2001	EU-FAO-CIAT project for seed production	• The project is initiating.
Red Cross		Aug 2001	Support to the drought emergency in Honduras	• Possibilities of financing a project of seed production.
PAAR	Ricardo Arias,National Project Coordinator	Sept 2001	PES project	• Financing of proposal of Small Seed Enterprises (PES)

Hillsides Agricultural Program in Haiti (HAP)

This program is funded by USAID through Development Alternative Inc. (DAI), which is subcontracting CIAT. Our contribution to this project consists of a combination of outputs between germplasm (beans, cassava, and forages) and NRM projects (Hillsides and punctual contributions from other NRM projects). The project has been approved with funding of US$260,000 from September 2001 to September 2005.

5.6.2 Assign resources for approved activities in the AOP

The assigning of resources was oriented towards strengthening the activities of Output 1 in the reference sites and consolidating and finishing some activities in the other outputs. A rigorous analysis was made of the other activities, and resources assigned to those least affected by personnel leaving.

5.7 Establish a system of efficient administration

Highlight

✓ The project implemented in its Honduras and Nicaragua offices the measures recommended by Accounts to improve the financial control of resources

Objectives

- Improve budget control of all projects in Honduras
- Establish the pertinent changes in the Administrative Reports sent to Cali
- Watch over the good management of project funds, according to the norms established by CIAT-Cali.

In May 2000, the project was submitted to a review by an External Audit. Changes were suggested for improving the administrative management of the CIAT stations in Honduras and Nicaragua. In August 2000, we began to implement new measures of banking controls, check books, disbursements, management of petty cash and rotating funds, file of administrative information, better budget control, norms of personnel, and use of CIAT goods.

All the above was necessary to show transparency in the management of the funds that from 1994 until June 2001 have amounted to about US$2,281,458 in Honduras.

Contributors: V Escober, M Ayarza

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Book and Journal

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List of Acronyms and Abbreviations Used

Acronyms

ACDI	Agricultural Cooperative Development International, Colombia
ACELY	Asociación de Enlaces de Ladera
ACRA	Agencia de Cooperación Rural en Africa y América Latina
ADDAC	Asociación para la Diversificación y Desarrollo Agrícola Comunal, Matagalpa, Nicaragua
AFE	Administración Forestal del Estado, Honduras
AFOCO	Apoyo a la Forestería Comunal, Yuscarán, Honduras
ALCON	Alimentos Concentrados agroindustry, Honduras
AMCRE	Asociación Municipal de la Cuenca del río de Estelí, Nicaragua
AMCY	Asociación de Mujeres Campesinas de Yoro, Honduras
AMHON	Asociación de Municipalidades de Honduras
AMHUPROH	Asociación de Hombres y Mujeres Progresistas de Honduras
AOP	Annual Operational Plan
APS	Asociación para la Participación al Desarrollo, Honduras
ASOCIAL	Asociación de CIAL, Honduras
ASPPE	Apoyo al Sector Productivo y la Pequeña Empresa, Honduras
BANADESA	Banco Nacional de Desarrollo Agrícola, Honduras
CACTRIL	Cooperativa Agrícola Cafetalera Triniteca, Ltda., Honduras
CARE	Cooperative for American Remittances Everywhere
CARITAS	An organization of the Roman Catholic Church
CASM	Comisión de Acción Social Menonita, Honduras
CATIE	Centro Agronómico Tropical de Investigación y Enseñanza, Costa Rica
CCD	Comisión Cristiana de Desarrollo, Honduras
CCRS	Canadian Centre for Remote Sensing
CDMA	Centro para el Desarrollo y el Medio Ambiente, Nicaragua
CECAP	Centro de Educación y Capacitación, Nicaragua
CEPRODEL	Centro de Promoción del Desarrollo Local, Nicaragua
CIALs	Comités de Investigación Agricola Local
CIDA	Canadian International Development Agency
CIDES	Comité Interinstitucional para el Desarrollo de Sulaco, Honduras
CIEETS	Centro Intereclesial de Estudios Teológicos y Sociales, Nicaragua
CIMMYT	Centro Internacional de Mejoramiento de Maíz y Trigo, Mexico
CIP	Centro Internacional de la Papa, Peru
CIPASLA	Consorcio Interinstitucional para una Agricultura Sostenible en Laderas, Colombia
CIRAD	Centre de coopération internationale en recherche agronomique pour le développement, France
CIRAD-TERA	CIRAD-Département territories, environnement et acteurs, France
CISP	Comité Internacional para el Desarrollo de los Pueblos, Honduras
CLODEST	Comité Local para el Desarrollo Sostenible de la Cuenca del río Tascalapa, Honduras
CLOs	Comités Locales

CNIA	Centro Nacional de Investigación Agropecuario, Nicaragua
CNIS	Centro Nacional de Investigación y Servicio, Nicaragua
COAMA	Comisión de Agricultura y Medio Ambiente, Honduras
CODESA	Consultores para el Desarrollo Sostenible, Honduras
COEG	Consejo de Organizaciones de Ex-Combatientes de Guerra, Nicaragua
COHDEFOR	Corporación Hondureña de Desarrollo Forestal
COMAL	Comercialización Alternativa, Honduras network
CONAGRA	Consorcio Comercial Agropecuaria, S.A.
CONASEL	Coordinadora Nacional de Agricultura Sostenible, Honduras
CONDESAN	Consorcio para el Desarrollo Sostenible de la Ecorregión Andina
CONSULUPE	Consultores Luchando Profesionalmente con Experiencía, Honduras
COPECO	Comisionado Permanente de Contingencias, Honduras
CORPOCUENCAS	Corporación Vallecaucana de las Cuencas Hidrograficas y el Medio Ambiente
CORPOICA	Corporación Colombiano de Investigación Agropecuaria
CORPOTRIGO	Corp oración de Productores de Trigo, Colombia
COVAS	Comprobación de Variedades
CRS	Catholic Relief Service, Honduras
CURLA	Centro Universitario Regional del Litoral Atlántico, Honduras
CVC	Corporación autónoma regional del Valle del Cauca, Colombia
DAI	Development Alternative Inc.
DANIDA	Danish International Development Agency
DGIS	Directoraat Generaal voor Internationale Samenwerking, (*Dutch Ministry for Development Cooperation*), Neths
DICOMCAFE	Division de Comercialización de Café, Honduras
DICTA	Dirección de Investigación de Ciencias y Tecnología Agrícola, Honduras
EAGE	Escuela de Agrícultura de Estelí, Nicaragua
EAP-Zamorano	Escuela Agrícola Panamerican-Zamorano, Honduras
ECAR	Ensayo Centroamericano de Apaptacion y Rendimiento
EEC	European Economic Community
EIAG	Escuela Internacional de Agricultura y Ganadería, Nicaragua
ENA	Escuela Nacional Agricola de Olancho, Honduras
ENGREF	Ecole nationale de genie rural des eaux et des forêts, France
EPMR	External Program and Management Review
ESA	European Space Agency
ESNACIFOR	Escuela Nacional de Ciencias Forestales, Honduras
ETHZ	Eidgenössische Technische Hochschule-Zentrum (*Swiss Federal Institute of Technology*), Zurich
EU	European Union
FADCANIC	Fondo de Desarrollo para la Costa Atlántica de Nicaragua
FAITAN	Fondo de Apoyo a la Investigación Tecnológica Agropecuaria de Nicaragua
FAO	Food and Agriculture Organization of United Nations, Italy
FARENA	Facultad de Recursos Naturales, UNA, Nicaragua
FEPROH	Fomento Evnagélico para el Progreso de Honduras
FHIS	Fondo Hondureño de Inversion Social

FOMENTA	Programa de Fomento a la atracción Animal, Nicaragua
FONAIAP	Fondo Nacional de Investigaciones Agropecuarias, Venezuela
FUNDER	Fundación Nacional de Desarrollo Rural, Honduras
GTZ	Deutsche Gesellschaft für Techische Zusammenarbeit (*German Agency for Technical Cooperation*)
HAP	Hillsides Agricultural Program in Haiti
HEPP	Herramienta de Planificación Participativa
IBSRAM	International Board of Soil Resources and Management, Thailand
ICADE	Instituto para la Cooperación y Autodesarrollo, Honduras
IDB	Inter-American Development Bank, USA
IDRC	International Development Research Centre, Canada
IFPRI	International Food Policy Research Institute, USA
IHCAFE	Instituto Hondureño del Café
IICA	Instituto Interamericano de Cooperación para la Agricultura
IITA	International Institute for Tropical Agriculture, Uganda
IMC	Instituto Mujer Campesina, Nicaragua
INCAP	Institut de Nutrición de Centro América y Panamá
INEC	Instituto Nacional de Estadisticas y Censos, Nicaragua
INFOP	Instituto Nacional de Formación Profesional, Honduras
INRM	Integrated Natural Resource Management workshop
INTA	Instituto Nacional de Tecnología Agropecuaria, Nicaragua
IPCA	Investigación Participativa para Centro América project
IPGRI	International Plant Genetics Research Institute
IPRA	Investigación Participativa en Agricultura/*Participatory Research in Agriculture* of CIAT
IRD	Institut de recherche pour le développement, France
ISNAR	International Service for National Agricultural Research
ISP	Instituto San Pedro, Yorito, Honduras
ISS	Institute for Social Studies, the Hague, Neths
ITDEA	Intelligent Team Decision Assistant
IWMI	International Water Management Institute
MAGFOR	Ministerio Agropecuario y Forestal, Nicaragua
MARENA	Ministerio de Ambiente y Recursos Naturales, Nicaragua
MIS	Manejo Integrado de los Suelos de Centro América consortium
MOVIMONDO	NGO for international cooperation and solidarity, Honduras
NORAD	Norwegian Agency for Cooperation for Development
ODESAR	Organización de Desarrollo Sostenible Agrícola, Nicaragua
PAAR	Programa de Administración de Areas Rurales, Honduras
PASOLAC	Programa de Agricultura Sostenible en las Laderas de Centro América
PCaC	Programa Campesino a Campesino, Nicaragua
PCM	Proyecto de Cuencas Municipales of CARE
PDA	Proyecto de Desarrollo de Area, Yoro, Honduras
PES	Productores Empresarios de Semillas Artesanales
PIIS	Productores Independientes e Innovadores de Sulaco, Honduras
PNUMA	Progama de las Naciones Unidas para el Medio Ambiente
POLDEC	Polo de Desarrollo Ecológico de Limay, Nicaragua

POSAF	Programa Socioambiental Forestal, Nicaragua
PPO	Participative Planning by Objective method
PRECODEPA	Programa Cooperativa de Papa
PRM	Programa Regional de Maïz
PROCAFOR	Programa Regional de Desarrollo Forestal Centroamericano, Nicaragua
PROCES	Proyecto Censo Estratégico
PROCIG	Proyecto Centroamericano de Información Geográfica
PRODERCO	Proyecto de Desarrollo Región Centro Oriente, Honduras
PRODESSA	Proyecto de Desarrollo de San Dionisio, Nicaragua
PROFRIJOL	Proyecto Regional de Frijol para Centro América, México y el Caribe
PROLESUR	Proyecto Lempira Sur, Honduras
PRONADERS	Programa Nacional de Desarrollo Sostenible
RAOS	Regional de Agricultura Organica de la Sierra, Honduras
REDOLYS	Red de Organizaciones Locales de Yorito y Sulaco, Honduras
RERURAL	Proyecto de Reactivación de la Economía Rural, Honduras
SAG	Secretaria de Agricultura y Ganadería, Honduras
SDC	Swiss Development Cooperation
SERNA	Secretaria de Recursos Naturales y Ambiente, Honduras
SERTEDESO	Servicios Técnicos para el Desarrollo Sostenido, Honduras
SILAT	Systèmes d'information localisée pour l'aménagement du territoire, France
SOH	Seeds of Hope Project
SOL	Supermercado de Opciones para Ladera (*Hillsides Options Supermarket*)
SPSS	Statistical Package for the Social Sciences software
SWAT	Soil and Water Assessment Tool
SWNM	Soil Water and Nutrient Management program
TROPISEC	Programa del Trópico Seco Nicaraguense
UCA	Universidad Centroamericana
UCR	Universidad de Costa Rica
UCOSD	Union de Campesinos Organizados de San Dionisio, Nicaragua
UMATAs	Unidades Municipales de Asistencia Técnica Agropecuaria, Colombia
UNA	Universidad Nacional Agraria, Nicaragua
UNALM	Universidad Nacional Agraria "La Molina", Peru
UNAN	Universidad Nacional Autónoma de Nicaragua
UNI	Universidad Nacional de Ingeniería, Nicaragua
UNICAFE	Union Nacional de Cafetaleros, Nicaragua
UPEG	Unidad de Planeamiento y Evaluación de Gestión, Honduras
USAID	United States Agency for International Development, WA
USDA	United States Department of Agriculture
VIDAC	Vivero de Adaptación Centro Americano de grano rojo
WEPP	Water Erosion Prediction Project of USDA and Makerere University
ZOPP	Zielorientierte Projekt Plannung

Abbreviations

DEM	digital elevation model
DS	decision support
DSS	decision support system
GIS	geographic information systems
GOs	government organizations
GPS	global positioning system
IPR	intellectual property rights
M&E	monitoring and evaluation
NARS	national agricultural research systems
NGO	nongovernmental organization
NRM	natural resource management
PCAP	per capita agricultural productivity
PM&E	participatory monitoring and evaluation
PPI	proyectos productivos integrados
RCBD	randomized complete block design