Rural Innovation Institute

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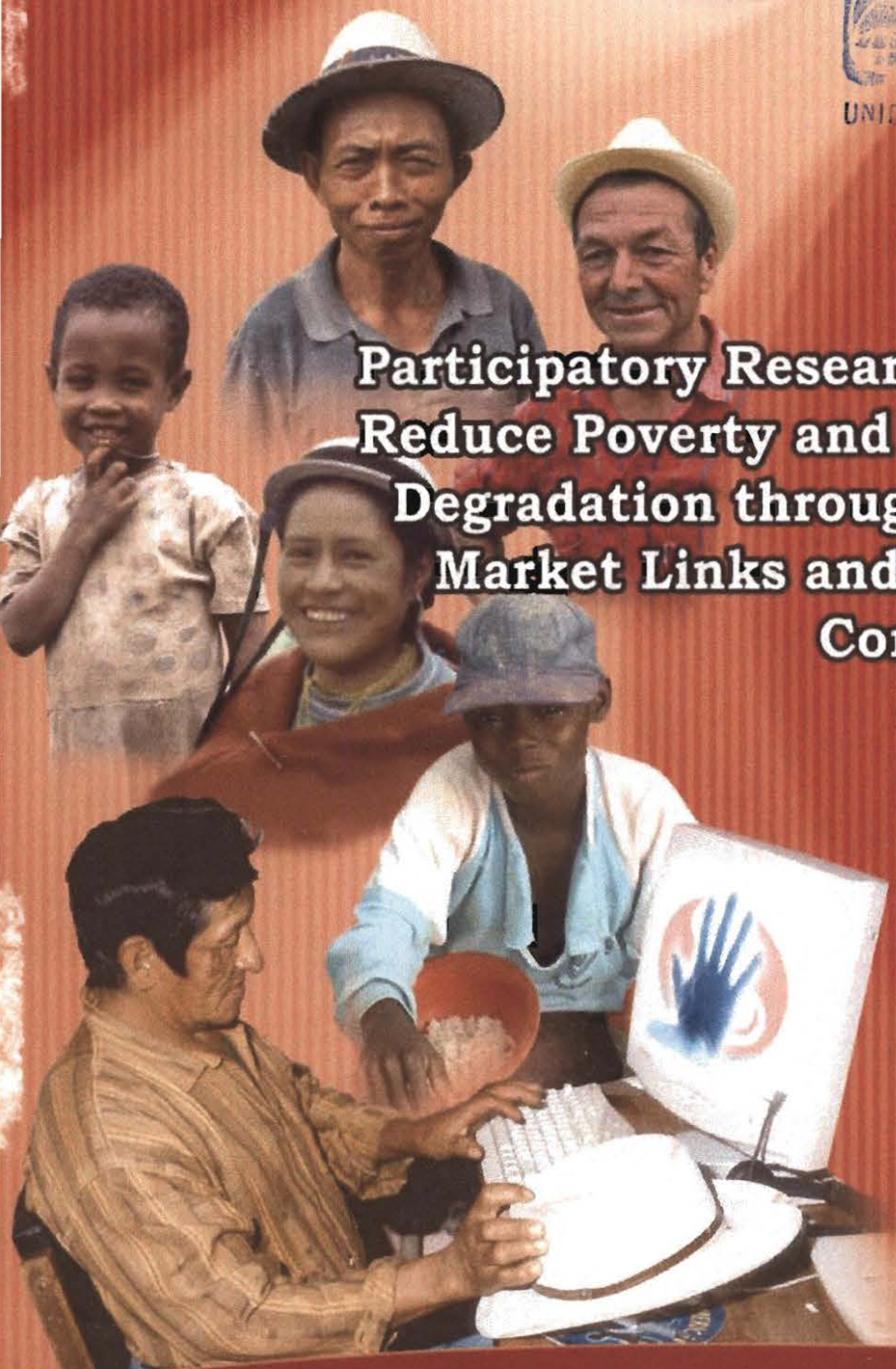

Project SN-3: Participatory Research Approaches to Reduce Poverty and Natural Resource Degradation through the Creation of Market Links and Social Control of Community Projects

VOLUME II

Annual Report 2005

Rural Innovation Institute

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Contents

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Project Description

Objective

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

Outputs

1. Participatory approaches and methodologies for strengthening farmers' organizations and rural innovation systems to accelerate and institutionalize demand-driven innovation in production systems, researched and disseminated
2. Organizational procedures, institutional mechanisms and policies for using participatory methodology in the co-development of technologies, designed and tested with national and local innovation systems in Latin America (LA) and Africa
3. The resource-to-consumption (ERI) framework developed, tested and applied to strengthen farmer organizations and rural women's capacity allowing transition from semisubsistence to competitive market-oriented production in Africa and LA
4. Methodologies for establishing community-managed participatory monitoring and evaluation systems (PM&E) tested, applied and widely disseminated
5. Institutional and organizational capacity of R&D partners in development and adaptation of PR methodologies, strengthened

Gains

- Users involved at early stages in decisions about innovation development
- New and better links between farmers' groups and local markets
- Adaptation of PM&E systems in Bolivia and incorporated in their technological innovation projects (PITAs), enabling the farmers to exercise greater control over their projects and then give feedback on their execution to the project suppliers
- Online tool based on database development with information input from our partners based on results from different CIALs and second-order organizations in five LA countries
- The knowledge management approach to extension work tested in 10 different sites in 4 agroecological regions of Bolivia with 9 different crops and species, and proven to be highly effective in technology appropriation by farmers
- First volume on the Bolivian experiences in applying PR methodologies and tools, delivered to various suppliers and farmer-technicians
- Manual to train knowledge managers validated with 40 professionals and farmers in 8 training courses

- A 22-minute video that shows how knowledge management is practiced in Bolivia, including principles, methodological processes and testimonies of farming communities
- Over 500 people trained or influenced by the Pro-poor Knowledge Management Methods project in Bolivia
- A capacity-development program agreed upon with the Centers for Learning and Knowledge Sharing (CAIS), focusing on five technological components
- A first course on five technological components carried out for 30 representatives of CAIS from 8 LA countries
- A methodological platform to evaluate (CIP) initiative for the W.K. Kellogg Foundation, established and agreed upon with users throughout Latin America
- A complete set of analytical tables and charts to collect and synthesize information coming from CIP partners
- A small seed enterprises manual validated with Haitian professionals and tested on farms with several groups
- A French version of the small seed enterprises manual published and distributed among NGO partners in Haiti
- A cassava production manual tested, published and distributed among NGO partners
- A collaborative project proposal approved by FAO to carry out trials in cassava and beans
- Over 200 R&D personnel trained on establishing and implementing PM&E systems; 20 projects in 5 Kenya Agricultural Research Institute (KARI) centers with PM&E systems; over 37 farmer groups (approx. 700 farmers) trained on implementing community based PM&E systems, who have developed indicators, collected data on the indicators, analyzed and use them for their decision-making
- Two videos produced, documenting experiences with Kasungu farmers in Malawi and Katwemukye group in Masindi, Uganda, and giving them voice to share their experiences with a much wider audience
- Two handbooks published based on the progressive field experiences, results and lessons accumulated in implementing the "Enabling Rural Innovation" (ERI) with several partners in Uganda, Malawi and Tanzania: "The Power of Visioning: A Handbook for Facilitating the Development of Community Action Plans" and "A Market Facilitator's Guide to Participatory Agroenterprise Development."
- Scientific publications, briefs, a brochure and a Website developed and applied to raise visibility of ERI in Africa in a broad research strategy implemented with 7 PhD and 5 MA students, who are analyzing various aspects of farmer-market linkages across diverse social organizational levels and their effect on rural livelihoods, HIV/AIDS, empowerment and gender equity, and investment in natural resource management (NRM)
- Evidence of scaling up and institutionalization of ERI approaches and methods: partnerships increased from 3 to 13 R&D partners in 3 countries and expanded to 7 new ones (Mozambique, Zimbabwe, Rwanda, Kenya, DR Congo, Zambia, Ethiopia)
- The effectiveness of the CIAL methodology, the extent to which the problems addressed by the CIAL are relevant to the community, and the benefits of the CIAL to its members as well as to the community, assessed in terms of developing appropriate technologies and who benefits from the innovations in Colombia and Honduras
- Prototype methodology developed for mapping, strengthening and monitoring networks of small rural groups

- Adaptation of the innovation history method for identifying and communicating policy lessons
- First draft completed of a methodology for the participatory construction of impact pathways in 32 CPWF projects
- Project funded to develop the impact-pathways methodology further and implement it in 3 CPWF basins in Phase I and the remaining 6 basins in Phase II

Milestones

2004

- Capacity of national partners to implement and support PM&E and PR processes established within R&D institutions in at least two countries in LA and another two in East Africa.
- Lessons from R-to-C framework tested and validated in at least two countries in LA
- A methodology for conducting impact assessment of PR methods developed and tested in at least two countries in LA
- Impact assessment analyses to derive lessons and impacts of PR methods on livelihoods, conducted in at least three countries in LA

2005

- Capacity of national partners to implement and support PM&E and PR processes established within R&D institutions in at least 2 countries in LA and another 2 in East Africa.
- Capacity of partners to apply ERI approaches and methods scaled up to at least three new countries
- National team of trainers/facilitators trained and scaling up PM&E and PR processes at national level
- The innovation history method adapted and applied in Africa and Asia

2006

- Local capacity enhanced to identify demands and develop projects that respond to these demands and that feed into Bolivian national agricultural research and technology transfer systems
- Three participatory methodologies researched and tested by at least two national programs in LA and Africa
- Organizations and actors involved in rural innovation processes; e.g., IARCs, NARS, NGOs, private sector companies.
- Rural innovation systems strengthened through institutional learning and change
- Better targeted and more efficient management of rural innovation processes leading to improved sustainable livelihoods
- ERI approaches and methods scaled up and being applied in at least 4 new countries and at least 8 new partners
- Participatory construction of impact pathways of 17 CPWF projects in the Mekong, Volta and Karkheh basins, completed
- Prototype methodology to map, strengthen and monitor networks of projects, NGOs and second-order organizations, developed and tested in Africa, Asia and LA

Users

This work will benefit small-scale, resource-poor farmers, processors, traders and consumers in rural areas, especially in fragile environments. IPRA has a strong focus on supporting rural women and the poor in order to build their capacity to generate and use agricultural technologies to their own advantage. R&D service providers will receive more accurate and timely feedback from users about acceptability of production technologies and conservation practices. R&D planners will profit from methods for conducting adaptive research and implementing policies on natural resource conservation at the micro level. The national agricultural innovation systems are a target of the Project's activities. Strengthening their capacity to link local demands with service providers is being addressed by our Project in Bolivia.

Collaborators

Within CIAT: Inputs to: PE-3; PE-4, IP-2, IP-3, IP-5, SN-1, SN-2, SB-2, SB-3, BP-1. Outputs from: IP-2, IP-5, BP-1, SN-1, SN-4, PE-3, PE-4, TSBF.

Outside CIAT: In Latin America: Honduras: Escuela Agrícola Panamericana-El Zamorano (EAP), Fundación para la Investigación Participativa con Agricultores en Honduras (FIPAH), Programa de Reconstrucción Rural (PRR), Centro Universitario del Atlántico (CURLA); Nicaragua: Instituto Nacional de Investigaciones (INIA), U. Campesina (UNICAM); Ecuador: Instituto Internacional para la Reconstrucción Rural (IIRR), Instituto Nacional de Investigaciones Agropecuarias (INIAP)-Programa FAO, Fundación Antisana, Proyecto MANRECUR; Venezuela: Instituto Nacional de Investigaciones Agropecuarias (INIA). Bolivia: Ministerio de Asuntos Campesinos y Agropecuarios (MACA), U. Mayor de San Simón (UMSS), Fundación PROINPA, Sistema Boliviano de Tecnología Agropecuario (SIBTA), FDTA-Valles, FDTA-Altiplano, FDTA-Chaco, FDTA-Trópico Húmedo, FDTA-Chaco, Proyecto INNOVA, Agua y Tierra Campesina (ATICA), Programa Nacional de Semillas (PNS), Centro de Investigación Agrícola Tropical (CIAT-Bolivia), Servicio de Desarrollo Agropecuario de Tarija (SEDAJ), Coordinadora de Integración de Organizaciones Económicas Campesinas (CIOEC), Programa de Desarrollo Integral Interdisciplinario (PRODII), Centro de Apoyo al Desarrollo (CAD), Comunidad de Estudios Jaina, eight grassroots groups; Colombia: Corporación Colombiana de Investigación Agropecuaria (CORPOICA), organizaciones campesinas, U. Nacional de Colombia, Corporación para el Fomento de los CIAL, CORFOCIAL. ***In Africa:*** Uganda: National Agricultural Research Organization (NARO), Africare; National Agricultural Advisory Services (NAADS); African Highlands Initiative (AHI); Africa2000 Network, Vision for Rural Development Initiative (VIRUDI); Local government; INSPIRE Consortium; Network of Farmer Field Schools (FFS); Makerere U. Malawi: Dept. of Agricultural Research Services (DARS); Lilongwe Agricultural Development Division (LADD); Plan International Malawi. Tanzania: District Agricultural and Livestock Dept. Office (DALDO), Traditional Irrigation and Environment Protection Program (TIP), World Vision Sanya Agricultural Development Program, Africa Highlands Initiative (AHI); Hai District Council (District Agricultural and Livestock Development Office). Kenya: Kenya Agricultural Research Institute; Community Against Desertification (CMAD); Extension Dept., Ministry of Agriculture; Kenyatta U. DR Congo: Institut National of Research et Etudes Agronomiques (INERA); Innovative Resources Management (IRM). Mozambique: National Agricultural Research Institute (INIA). 21 farmers' groups and communities, Uganda, Tanzania, Malawi, Kenya. ASARECA Network. Ghana: CSIR Water Research Institute. ***In Europe:*** Austria: Boku University. ***In Asia:*** India:

Indian Council of Agricultural Research (ICAR) Research Complex for the Eastern Region, India; Sri Lanka: Challenge Program on Water and Food (CPWF) Secretariat.

Regional Networks in Africa: East and Central Africa Program Agricultural Policy Analysis (ECAPAPA), Eastern and Central African Bean Research Network (ECABREN) and Southern Africa Bean Research Network (SABREN) of the Association for Strengthening Agricultural Research in East and Central Africa (ASARECA); African Network for Soil Biology and Fertility (AfNet) of Tropical Soil Biology and Fertility (TSBF) Institute of CIAT; Pan African Bean Research Alliance (PABRA).

CIAT: SN-3 Project Log Frame (2005-2007)

Project: **Participatory Research**
Project Manager: **Carlos A. Quirós (A)**

Narrative Summary	Indicators	Means of Verification	Important Assumptions
Goal To contribute to the socioeconomic improvement of rural communities through strengthening local and institutional capacities by means of participatory design, application and dissemination of approaches, methodologies and tools, emphasizing gender and equity issues	Results from the impact study of the interventions by SN-3 show: ▪ Better management of resources (e.g., human, economic, natural) in environments where participatory methods and tools have been incorporated ▪ Greater incorporation of the producers' needs in development plans supported by the State ▪ Active participation of community groups in decision-making about endogenous and exogenous initiatives ▪ Participating marginal groups enjoy socioeconomic benefits to a greater extent than similar groups where said decision-making has not been incorporated.	Projects, plans and reports of national public-sector entities, donors, NGOs and community-based organizations in the three reference sites and CIAT's mandated agroecosystems that refer to their use of project products	
Purpose Participatory research methodologies for organizational and technological innovation in agriculture, co-developed, tested and widely disseminated, to benefit poor farmer groups and their organizations, particularly ethnic minorities and women	▪ Set of at least five participatory decisions taken on technological innovation (PM&E, case histories of innovation, enabling rural innovation, evaluation of impact of technological innovation and knowledge management projects) evaluated and adapted for different contexts and stakeholder groups in marginal environments in Africa and Latin America (LA) ▪ At least three sets of new methods and tools (e.g., analysis of social networks, appreciative inquiry) that incorporate equity and gender developed, applied and disseminated at the level of members and stakeholder groups at the end of the third year (2007) ▪ A set of institutions not previously involved in the SN-3 activities implement, together with the project, co-development processes of decision-making and eco-technologies with a participatory approach. ▪ A set of institutions not previously involved in the SN-3 activities implement processes of integrated incorporation of participatory decision-making (i.e., Agroenterprises + CIALs + InforCom). ▪ The approaches and decision-making developed by SN-3 oriented toward. ▪ Evaluations of the performance of the project and its members show that they are in line with the mission and vision of SN-3 and CIAT.	▪ Impact study ▪ Institutional reports ▪ Publications ▪ Proceedings	▪ Institutional economic stability. ▪ Financing for training activities, publication and dissemination of materials. ▪ Institutions willing to prepare and support facilitators and share information. ▪ End-users—above all, farmers—willing to participate.

Narrative Summary	Indicators	Means of Verification	Important Assumptions
Output 1 Mechanisms, approaches and methodologies developed and disseminated for strengthening farmers' organizations and rural innovation systems to accelerate and institutionalize demand-driven innovation in production systems	▪ Methodology for evaluating the impact on the projects of agricultural and livestock technological innovation (PITAs) developed by the end of 2006 ▪ Impact of the CIAL methodology in Honduras and Colombia established by the end of 2005 ▪ Methodology for doing case histories on innovation developed by the end of 2006 ▪ Method for constructing and learning from innovation histories developed by end of 2005 ▪ Procedure for participatory evaluation of multipurpose forages validated in collaboration with the Forages Project by 2007 ▪ Effect of the CIALs in the communication networks established in pilot sites by 2006 ▪ Methodology for knowledge management at the local level validated and made available to the suppliers of technical assistance and member organizations ▪ At least 7 cases on the methodology of knowledge management systematized and shared with decision-makers by the end of the first quarter of 2006 ▪ Methodology for balancing supply with technological demand at the level of producer groups and suppliers of technical assistance services, ▪ At least 15 CIALs working on food security within the organizational structure of a government organization in Colombia ▪ Participatory methodology for studying and improving social networks prepared in 2007 ▪ At least one NGO using the methodology for improving social networks by the end of 2007 ▪ Participatory methodology developed for constructing project impact pathways by end of 2006 ▪ Participatory construction of the impact pathways of 18 CPWF projects in the Volta, Mekong and Karkheh basins	▪ Document on impact of the CIALs on communities' development in Cauca and Honduras (2005) ▪ Article submitted for revision and publication ▪ ILAC Brief on innovation history method published in 2005 ▪ At least 4 case histories on innovation published by 2006 ▪ Methodology for preparing case histories on innovation published ▪ Manual describing knowledge management available ▪ Final report of FIT-8 project ▪ Article on procedures for participatory evaluation of forages submitted for evaluation prior to publication ▪ FOCAM progress report ▪ Visits to the communities where CIALs have been established ▪ Records of CIALs established in the Cauca Valley in database (www.enlacecial.org) ▪ Thesis on participatory evaluation of multipurpose forages available ▪ Guide on methodology for studying improvement of social networks, published ▪ Guide to participatory construction of project impact pathways, published ▪ Impact pathway workshop reports, and individual project impact pathways written up	▪ Good coordination and integration among collaborators. ▪ Minimal conflicts for meeting demands. ▪ Full participation of stakeholder groups. ▪ Field staff fulfilling true facilitator roles. ▪ Data available from reference sites. ▪ Internet system functioning well.
Output 2 Conceptual and methodological frameworks for building institutional and local capacity of resource-poor communities, developed on the basis of an analysis of experiences in co-development in LAC, with emphasis on gender and equity issues; disseminated	Influencing policy: ▪ Partnerships with national and international entities for evaluating, adapting and disseminating participative decision-making methodologies ▪ Methodology for the co-development of technologies in an institutional context validated and disseminated by the end of 2007	▪ Documents on agreements, annual progress reports of the Kellogg-CAIS-IPRA/CIAT Project ▪ Methodological guide for co-development of technologies, published ▪ Technical reports on adaptation of technologies, decision-making and tool ▪ Annual reports of the Kellogg-CAIS-IPRA/CIAT project	

Narrative Summary	Indicators	Means of Verification	Important Assumptions
	▪ CIAT technologies, decision-making and tools adapted to the context of the Centers for Learning and Exchange of Knowledge (CAIS) in the second semester of 2007 ▪ Proposal for adjusting policies and/or regulations in a National System of Agriculture and Livestock Technological Innovation ready for presentation to stakeholders ▪ From 30-50% of the women in the communities exposed to the participatory methods and tools leading groups of farmers in technological innovation processes	▪ Document of proposal for adjusting to SIBTA regulations presented to the system's authorities	
Output 3 The resource-to-consumption (ERI) framework developed, tested and applied to strengthen farmer organizations and rural women's capacity to make a transition from semisubsistence to competitive, market-oriented production in Africa	▪ Five projects and programs applying the set of R-to-C tools (ERI) by the end of 2007 ▪ At least 30% of the producer groups exposed to new approaches for integrating participatory decision-making will have adopted mixed production schemes (subsistence and commercialization of surpluses) by the end of the third year of the project (2007) ▪ As a result of applying new approaches for local agricultural innovation, at least 30% of the producer groups will have changed their subsistence systems for subsistence and commercialization schemes in the Project's pilot zones in Africa and LA by the end of 2007 ▪ From 20-50% of the women will be participating in the farmer groups and holding positions of leadership ▪ Degree to which men, women and marginal groups are deriving socioeconomic benefits from applying participatory approaches ▪ Degree to which the participatory approaches developed by IPRA have changed gender relations in communities and families: women decision-makers in the communities	▪ Project progress reports ▪ Set of manuals for orienting the ERI, published and disseminated widely ▪ Two articles accepted for publication in journals	Institutions willing to prepare and support facilitators; funding available
Output 4 Methodologies for establishing community-managed participatory monitoring and evaluation systems (PM&E) tested, applied and widely disseminated	▪ PM&E systems functioning in at least 10 rural communities in countries of Africa and LA ▪ At least 6 private or public organizations will have incorporated this form of decision-making in their official R&D plans by the end of the third year of the Project. ▪ At least 10 grassroots organizations in Africa and LA have adapted and adopted their own versions of the PM&E system by the end of 2006. ▪ At least three teams of facilitators of participatory methods formed in Africa and LA by the end of 2007. ▪ Methodology for establishing and implementing PM&E processes at the grassroots community group level, validated and disseminated	▪ Reports on establishment of PM&E in Africa and LA ▪ Databases in which information of the established systems is recorded ▪ PM&E case studies, project reports ▪ Reports of the events held by the facilitators ▪ M&E reports and databases, impact studies ▪ Manual on PM&E available	Staff has time, suitable methodologies, and sufficient funds available.

Narrative Summary	Indicators	Means of Verification	Important Assumptions
Output 5 Institutional and organizational capacity of R&D partners to develop and adapt community-managed participatory research methodologies in R&D organizations effectively, strengthened	▪ Number of publications increased 50% for each of the three years in this planning period (2005-2007) ▪ A 50% increase in the number of entities trained to incorporate participatory processes in their plans and programs ▪ At least three new initiatives that integrate the three RII projects, terminated ▪ Andean users' network of participatory decision-making, managing tools and procedures generated by SN-3 ▪ Number of training events ▪ Second-order organizations qualified for providing support services to local development ▪ SN-3 information, follow-up and evaluation system, which supports the processes of technological innovation effectively, designed and tested at the end of 2006	▪ Project reports ▪ Publications of internal projects and other institutions ▪ Training manuals developed ▪ Andean network operating actively ▪ Reports of training activities ▪ Agreements made among second-order organizations and public and/or private entities ▪ Web page, databases, virtual work spaces, internal PM&E and publications	

Output 1: Participatory Approaches and Methodologies for Strengthening Farmers' Organizations and Rural Innovation Systems to Accelerate and Institutionalize Demand-Driven Innovation in Production Systems, Researched and Disseminated

Strengthening Rural Innovation *Ecologies*: Participatory Development of a Methodology for Strengthening Social Networks

Boru Douthwaite[1], *Andrea Carvajal T.*[2], *Elías Claros*[3], *Sophie Alvarez*[4], *and Luis Alfredo Hernández*[5]

Accomplishments

Development of a prototype methodology for mapping and strengthening the networks of small rural groups.

Abstract

Innovation is a social process of putting new ideas and technologies to work. A rural innovation ecology is a metaphor for the web of social communication and interactions that may foster and curtail rural innovation. This project researched and developed a participatory methodology to help make rural innovation ecologies visible, help identify interventions for strengthening social networks, and then help monitor and evaluate subsequent interventions. The research was carried out with two Committees for Local Agricultural Research (CIALs, their Spanish acronym): 'Fortaleza Carpintereña' (Morales, Cauca) and El Progreso (Piendamó, Cauca). CIAL members participated actively in the development of the methodology. We conducted the following steps with each group.

1. Exploring the nature and importance of social networks with participating groups
2. Designing a social network questionnaire
3. Mapping and participatory analysis of the networks
4. Designing and implementation of a strategic plan based on this analysis
5. Participatory monitoring and evaluation based on re-drawing the networks

The two groups are currently implementing their respective strategic plans. This project is a work in progress. This paper only addresses the design and implementation of a prototype of the tool, discussing the insights gained from its application in two communities. It still remains to be seen how this prototype may apply (or not) in groups different from CIALs, groups that do not have such an advanced *previous* interest in

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participatory research and monitoring techniques, and if the insights gained by the groups will translate into measurable interventions in the future. For now, the maps are being used as communication and fundraising strategies tools by the groups. Additionally, given the importance of Social Capital and Networks for these small rural communities, any insight into the concept and even a partial approximation of the status of these in the community is bound to be of help. Periodical remapping is the longer term objective of this study, step 5 will take place in six months.

For now, this prototype will be further developed and honed to apply in other cases, and presented to NGOs, so it can hopefully go into a further stage of collaborative research (between NGOs themselves and with communities).

Background

In the 1990s CIAT began working in the Department of Cauca setting up CIALs, usually with four members, to provide their a research service. At first CIAL research was largely aimed at addressing issues related to food security. Over time, however, many of the CIALs undertook other activities. CIAL Carpintero for example has a membership of 16 women who engage in chicken rearing, coffee production, bread-making, and social work with the elderly in addition to their CIAL research. CIALs are not the only type of small rural group (SRG) in Cauca. Other types of groups include those organized around coffee, sugar-cane and cassava production. Such small rural groups (SRGs) are motivated to better their own lot as well as working to improve their communities. They represent a powerful force for rural development.

In setting up and running activities and projects, SRGs often look for resources from outside, including knowledge and funding. Their success depends on their access to these resources. It also depends on group organization, communication and trust between group members, and communication and trust between group members and their respecitive communities. Access to knowledge, access to funding, communication and trust can all be represented by network maps.

Objective

To increase in rural communities their access and exchange of ideas, information and technology, to facilitate innovation process with more sustainable and equitable outcomes.

Methodology

Our main research hypotheses were that:

- Drawing network maps would help group members visualize networks of relationships that are important to them;
- Group analysis and discussion of these maps will help the group identify measures to strengthen their networks;
- Strengthening networks of relationships will help the group grow and prosper;
- Redrawing the network maps after a period of time will allow the group to monitor and evaluate interventions made to strengthen its networks.

We set out to test these hypotheses by undertaking action research to develop a participatory approach to social network analysis.

Our methodology has five (5) steps, they are:

1. Exploring the nature and importance of social networks with participating groups: We designed a basic workshop in which participants were able to build a social network definition like this one, made by Felisa Suárez, a woman farmer of the Carpintero rural community, located in Morales, Cauca, described social networks: "*It looks like to a parable of the Bible, where the fish is tcaught and the families have their daily food.... the networks are our hands and those of people that care about our needs and our dreams... Networks are a way of sustaining us.*"

It was possible through a simple but clear exercise done in this way: facilitators ask participants to answer two questions:

- From whom did you find out about today's meeting?
- What was the means through which you received the information?

  - Phone call
  - Someone told you
  - Was at a meeting and someone mentioned it
  - Another. Specify?

The flows of information linked the participants together in a network. We used wool yarn in a group exercise to depict these flows between people, with different colours to indicate the different ways information was received.

Once participants did this exercise, they discovered through a brainstorming session, the usefulness of a network mapping tool for groups of farmers or small producers organized in CIALs. Here are some ideas that came from this:

- We can see invisible threads and who connects them.
- We can visualize whom we need to contact to achieve our objectives.
- We can see the different types of networks that exist within the community (information flow, confidence, markets, etc.).

After that, we took into account previous process that these groups have developed with PM&E IPRA-Team, which allowed us to identify with participant these networks to study:

- Group membership
- Search for resources and strategic contacts
- Advice

- Training
- Marketing of group products

2. Designing a social network questionnaire: The surveys were designed taking into account the social networks of interest that were identified by each CIAL. Each question looks for information regarding a network. The questions were as follows:

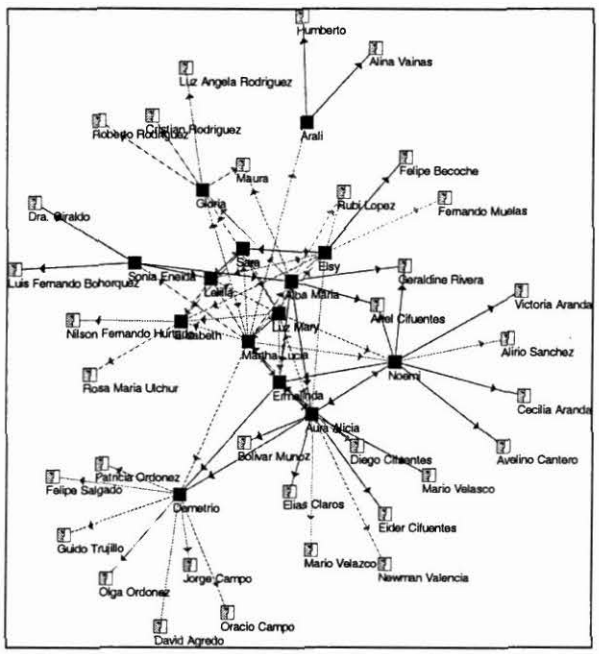


Figure 1. Network map done using Inflow 3.01.

Group membership: What groups are you a member of?

Search for resources: Name the people whom you have contacted, as well as those who have contacted you, seeking funding and/or resources in the last two years.

Search for advice: Name the people whom you have contacted, as well as those who have contacted you, requesting guidance or advice related to agriculture in the last two years.

Strategic contacts: Who are the key people you know at the different institutions with which your group works?

Marketing: What products do you sell? How important are they for your family income?

Although we designed this as a survey made of clear and common language, we decided to do it person by person to have opportunity to interact and to dialogue with participants more deeply about their networks and environments in where they were developing. Every interview took almost one hour to be done.

Once we did all surveys / interviews, we systematized all information in excel tables, it is previous step to use our software Inflow 3.01 in (Figure 1) which we draw all networks maps for these two CIAL groups.

3. Mapping and participatory analysis of the networks: Taking into account two ideas: first, every one of these social network maps is a kind of picture that could show sensitive aspect of internal dynamic in CIAL groups, and second that maps that came from interviews are not necessary the same perception of social network participants can have in their minds.

Because of that, the maps were printed out, poster size, and first checked with the CIAL leaders before presenting to the CIALs as a whole. The objectives of presenting the maps were:

- To share and explain the information contained in the maps.
- For the facilitators to assess how easy the maps are for group members to understand.
- To carry out a reality check on whether group members agreed with the information contained in the maps.
- To motivate participants to think about ways of strengthening the networks depicted

Some of the comments made during the participatory analysis indicate the usefulness of the maps. Comments included:

- You know you're there, but you don't know where. The map shows the location.
- The map serves as a guide.
- We work differently, but a map (of any type) can be used to locate oneself.
- Neither outsiders nor insiders should feel bad; each one to themselves.

There was important reflection about the importance of the roles other CIAL members play, who, despite not being leaders, help motivate and maintain the groups' internal networks.

There was reflection in one CIAL about the urgent need to redistribute leadership responsibilities among CIAL members. This helps ensure the continuity of the group and reduces the risk of the group disappearing if the leader is absent.

The maps helped group members to:

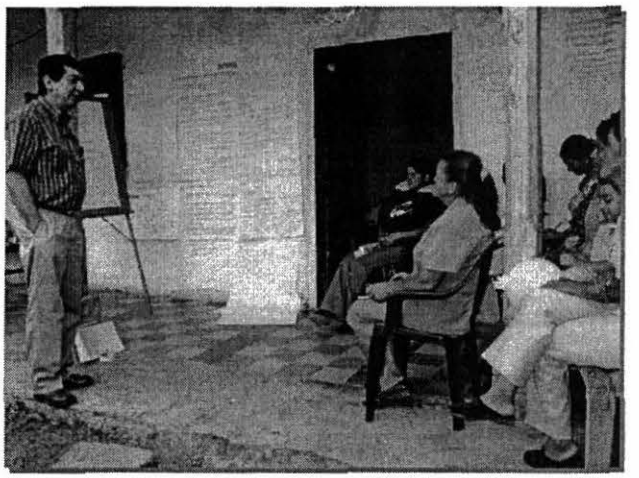
- Better understand how they are linked together within the group, and how they link to the outside to organizations such as CIAT, the municipal seats of government and the capital of the department of Cauca.
- Initiate processes of reflection and change around issues such as the allocation of leadership responsibilities within the CIAL.
- Better visualize the impact of the group on their respective communities
- Recall other links or relationships that they did not remember at the time of the interview and that will further enhance the social network maps, bringing them closer to reality.

An unexpected development was that groups wanted to use the maps to present themselves to outside organizations, to explain the way they worked and their impact.

In this phase, it means, through this process in which participants could analyze network maps, to discuss and to reflect about all those themes that were emerging during sessions, it was possible to identify what network these CIAL groups wanted to prioritize and to study more deeply towards to design interventions strategies.

Both groups chose to prioritize the networks related to: search for resources and links to strategic contacts.

4. Designing and implementation of a strategic plan based on this analysis: Two dynamics were employed to identify actions to strengthen the prioritized networks:



- Network maps were presented together with tables that showed the number of links that group members had to outside organizations. This helped the groups see how they might better share the work of building and maintaining these networks. It also showed how interactions might be better coordinated, and which links might need more, or less, effort.
- To help make the maps real the network maps were re-constructed using the individuals present. Bamboo poles were used to represent external actors. Coloured wool was used to represent links.

Using this dynamic, the CIALs of each network answered the following question: Does the network operate sufficiently well as to respond to the group's initiatives and projects? They were also asked if some actors were missing who should be present. Concrete actions were identified to strengthen the respective networks, which were prioritized using a secret ballot.

Both groups gave first priority to the idea of holding a workshop. To prepare these workshops, facilitators developed two previous meetings as follow:

First meeting

- To identify key institutions and people to invite: it was necessary take into account social networks maps, and also to design some criteria such us make decision power, affinity with CIAL groups project to undertake, influence zone and previous positive experiences between invited and CIAL groups.
- To build an agenda. In this case facilitators made this question to guide discussion, it was: What message do you want to delivery to invited?
  To answer this question implied a deep reflection about importance and relevance of every single activity inside of agenda, as well as logistics aspects and group preparation.

Second meeting

CIAL groups did a previous workshop in which all participants could developed their performance, It means, to do their own part inside of this workshop with opportunity to receive feedback from their partners and facilitators before to held real workshop.

Finally, the workshops took place in the 'Fortaleza Carpintereña' CIAL on 17 November 2005 and in the 'El Progreso' CIAL on 18 November 2005.

These events became opportunities for dialogue and each CIAL had the opportunity to present its projects and initiatives to participants and in turn they received comments and commitments for future support in terms of knowledge and resources.

5. Participatory monitoring and evaluation based on re-drawing the networks: In six months we will re-interview and re-draw the network maps to monitor changes.

Results

- Prototype methodology to apply in social network analysis, tested in two CIALs. The methodology proved to be useful in the strengthening of social networks considered key for the sustainability and continuity of target groups (search for resources and strategic contacts).
- The next step is to co-develop the prototype with interested NGOs. Interest has been expressed by the University of Cauca, CREPIC and CORFOCIAL.
- This pilot project aroused the interest of other CIAT projects, such as Institutional Strengthening of Centers for Learning and Knowledge Sharing (CAIS, its Spanish acronym) and Rural Planning, which decided to include it within their work agendas.

Conclusions

- Social network analysis helped the two groups we worked with better understand their networks and based on this understanding identify steps to strengthen them.
- The discussion of the meaning and the importance of network maps helped individuals in the groups better appreciate each others roles. Management issues, such as the over reliance on a group on certain individuals, were discussed.

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Learning about Partnership through Constructing Innovation Histories[6]

Boru Douthwaite[7], Alok Sikka[8], Rasheed Sulaiman[9], John Best[10], and John Gaunt[11]

Accomplishments

Adaptation of the innovation history method for identifying and communicating policy lessons

Abstract

This article describes an experience of adapting and using the innovation history method in India to draw lessons learned from experiences of working in projects that involved partnerships. The innovations studied were novel partnering arrangements and how they had formed. The article aims to show how a workshop provided space for people representing member organizations of each partnership to track and analyze the institutional changes that were required to make the partnerships effective, and then to communicate their findings to a policy audience.

Introduction

Constructing an 'innovation history' is a method for recording and reflecting on an innovation process. People who have been involved in the innovation jointly construct a detailed written account based on their recollections and on available documents. The process of preparing this history stimulates discussion, reflection and learning among stakeholders. Others can also learn, either by studying an individual case or by comparing experiences across several cases. Subsequent planning can build on the lessons learned, formulate a shared vision and act as a catalyst for change. Based on the initial detailed account of the innovation process, more concise information products can be prepared that summarize the innovation process for wider promotion or sharing of findings. These may include public awareness materials, policy briefs or articles in professional journals.

Innovation histories provide causal explanations for two outputs:

- An innovation timeline that sequentially lists the key events
- Actor-network matrices and maps that show the links among stakeholders at different points on the timeline, usually at the beginning and end of the history.

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6. This document is an output from a project funded by the UK Department for International Development (DfID) for the benefit of developing countries. The views expressed are not necessarily those of DfID.
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Constructing innovation histories usually begins with a start-up workshop in which participants work together to develop the first drafts of the timeline, network matrices and maps. The participants decide on which themes they wish to investigate; e.g., partnerships and their effect on the innovation process. The participants then identify whom they need to interview and what literature they need to collect. They elect a core group to manage the process, including sharing drafts of the innovation history as it is written and fostering discussion. This discussion culminates in a second workshop in which the lessons learned from the innovation history are identified and discussed; then the next steps are agreed upon and implemented after the workshop. The participants also agree on a strategy for publishing and disseminating findings at this workshop. A more detailed description of the method can be found at http://www.cgiar-ilac.org/downloads/Brief5Proof2.pdf

Partnerships as innovations

Working in partnership, when it allows for two or more organizations to leverage each other's comparative advantages, is now recognized as a successful strategy for improving livelihoods of the rural poor. However, to form functioning partnerships effectively can present a challenge. Partnership requires mutual recognition of each partner's strengths and, possibly, changes in organizational culture that reflect that such strengths are valued.

Both the Indian Council for Agricultural Research (ICAR) Natural Resource Management (NRM) directorate and the Department for International Development (DfID) Natural Resource Systems Programme (NRSP) have supported research projects that have directly challenged scientists to explore new ways of working, with some good results. This workshop was part of a project funded by DfID-NRSP (PD140), which sought to validate the lessons learned by such projects and explore ways to promulgate good partnering practices.

Workshop design

The workshop organizers saw an opportunity to scale up good partnering practices through the new World Bank-funded National Agricultural Innovation Project (NAIP) that will begin in 2006 with a budget of US$250 million. NAIP will set up 'consortia' of different types of organizations, including research, extension, public- and private-sector organizations, to work in partnership to foster rural development. The NAIP coordinator was interested in using the workshop findings to help NAIP understand what working in partnership means in an Indian NRM context and to take advantage of the lessons learned.

The workshop was held from 7-10 November 2005 in New Delhi. The objectives were to identify:

- the benefits of working in partnership
- enabling and constraining factors
- policy and research management strategies to foster partnerships

The workshop proposed to achieve these objectives through joint analysis of four NRM case study projects by resource people knowledgeable about their respective organization's role. The projects were selected on the basis of being innovative in their partnering arrangements (Box 1).

Box 1: The Case Study Projects

Case study A

Title:	Integrated management of land and water resources for enhancing productivity and Improved livelihoods through improved crop and soil management (two NRSP projects that merged)
Partners:	ICAR Research Complex for Eastern Region; IACR, Rothamsted, UK; and, Catalyst Management Services (CMS), Bangalore
Interventions:	(a) Delivery of rural services (b) Development of local institutional arrangements that enable rural men and women, specifically including the poor, to improve their livelihoods through land and water management.
Location:	Patna, Bihar and Eastern Uttar Pradesh.
Novelty:	The experience of ICAR researchers and international scientists in working in a full partnership with a private sector company specializing in community development. The project gave the community development specialists the space to develop and adapt their own methods to meet general goals, rather than being treated as subcontractors to work in ways prescribed by ICAR or international partners.

Case study B

Title:	Improved Livelihoods in Watersheds through Consortia Approach
Partners:	International Centre for Research in the Semi-Arid Tropics (ICRISAT), Hyderabad; District Water Management Agency; Central Research Institute for Dryland Agriculture (CRIDA), Hyderabad; M Venkatarngiya Foundation (MVF), Secunderabad, National Remote Sensing Agency (NRSA), Hyderabad; and farmers in Kothapally through the watershed association, watershed committees, user groups and self-help groups.
Interventions:	Increased agricultural productivity, improved water availability, employment generation and reduced soil run-off
Location:	Andrah Pradesh
Novelty:	The novel consortia approach to research required development of new arrangements within ICRISAT to allow decentralization of the project administrative functions required to support multi-stakeholder projects in different, widely spread locations.

Case study C

Title:	Rice-Wheat Consortia
Partners:	CGIAR Centers including the International Maize and Wheat Improvement Center (CIMMYT), ICRISAT and the International Rice Research Institute (IRRI); ICAR; private sector input and service providers, agricultural machinery manufacturers and NGOs.
Interventions:	Research on rice-wheat systems, participatory needs assessment, participatory validation and refinement of technologies, and technology dissemination
Location:	Andrah Pradesh
Novelty:	A strategic assessment of opportunities on the Indo-Gangetic Plains was used to target a consortia research and technology development strategy that included the private sector. Partnering arrangements have evolved: The consortia now work more with community-level institutions rather than lead farmers.

Case study D

Title:	Community Development in Gujarath by the Aga Khan Rural Support Project (India)
Partners:	Aga Khan Rural Support Project; Community Group (GVM); Bank; Farmers Federation; Milk Union; state departments dealing with agriculture, soil and water conservation, irrigation and forestry.
Interventions:	Joint forest management, soil and water conservation, and agroforestry; establishment of self-help groups; biogas; irrigation schemes; input supply and output marketing; dairy and micro enterprise
Novelty:	Long-term partnership with a community that went from being poorly organized and dependent on the AKRSP to being well organized and independent

We carried out the analysis of the case studies using adaptations of the innovation history approach. Due to time and budget constraints, an adaptation was made, dropping one workshop and asking participants to prepare timelines and network maps from their own organization's perspective ahead of time. Another input to this workshop was a report written by one of the authors based on a series of interviews of policymakers and senior research managers to document their questions and insights with respect to partnership in the context of NRM research and development. The workshop participants then analyzed the case studies and the policy study to identify lessons and principles.

The second adaptation was to design the workshop to "prepare for a policy panel." Participants carried out the analysis on days 1 and 2 and then became the resource people on Day 3 when peers joined to discuss the findings from the individual case studies and help identify policy implications and develop the presentation to the policy panel. The presentations to the policy panel were made on Day 4. The process and relationships between the various elements of the workshop are shown in Figure 1. Eight senior and mid-level policymakers were invited to form the policy panel to react to the workshop's findings, and their inherent policy implications. This was a strategy to begin dissemination of the workshop findings immediately. The other strategy was to pay for a professional writer to attend the workshop to produce a policy brief and partner resource from the workshop findings.

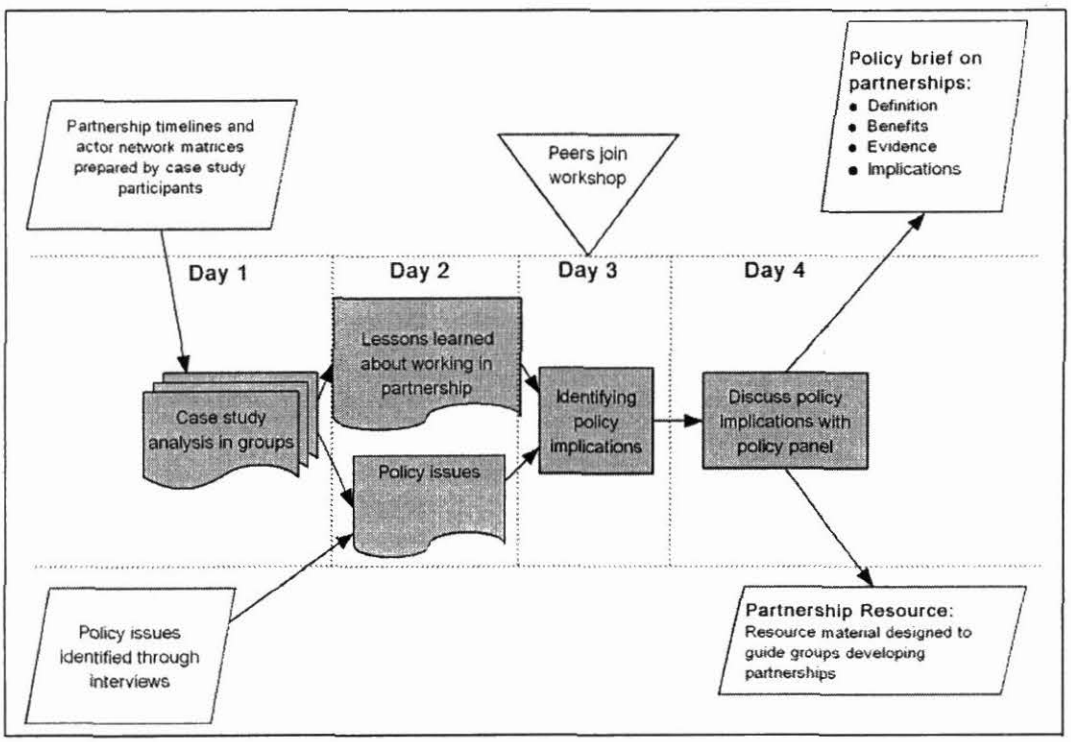

Figure 1. Organization of the Workshop.

The workshop

The first phase of the workshop brought together 25 representatives from each of the organizations involved in the case study partnerships. On Day 1 participants worked in case-study groups to analyze their individual case studies in detail, drawing on draft innovation histories and actor-network matrices, which they had prepared in advance and brought to the workshop. The initial plan had been for them to develop a single composite timeline for each case study on the morning of Day 1 and a similar composite actor network matrix in the afternoon. However, the group construction of the timelines generated more discussion than was anticipated as the stakeholders in each case-study group negotiated their differing views of what had happened. In case study A, for example, the participants gained insights during a discussion of the importance of leadership in managing differences between partners, which later proved highly beneficial for the project. In case study B, the participants identified the importance of budgetary flexibility in setting up and managing new partnerships among organizations; and they realized that there was a role for externally funded projects in allowing such flexibility. Such was the length and richness of the plenary discussion that the facilitators were able to extract enough partnership lessons to provide a basis for group work on Day 2 (Box 2). There was insufficient time for the network matrix exercise.

Box 2: Some of the Partnership Lessons Identified

Time

Significant time is required to build relationships (from 3-6 years).
Policymakers, donors, etc. don't take into account the time required.
It takes time to build trust among colleagues.

Flexibility

Working in new partnerships creates new potential for research and flexibility to respond to demands.
Mid-term corrections (e.g. all case study projects needed them) need to be considered.
Project management must be flexible.
Flexibility must be built into project documents.
Government institutions are constrained by guidelines and thus cannot be flexible.

Leadership

Champions (strong leadership) are Important for pushing for flexibility.

Conflict

Conflicts are inevitable and there need to be mechanisms to maintain communication to sort them out.

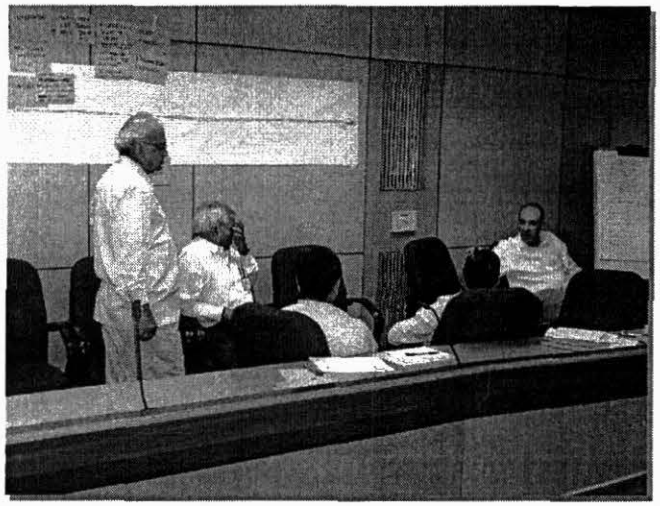

Figure 2. Case-study resource persons developing their partnership timeline.

On Day 2, participants (in two groups that mixed the original four case-study groups) worked to prepare the lessons learned in order to identify benefits of partnerships and how they could be measured. Presentations to be made on Day 3 were then prepared by participants, describing each case study and summarizing the findings of their analyses on days 1 & 2.

On Day 3 the workshop was joined by representatives of the target audience for the resource materials being generated from the workshop—NRM researchers and development professionals. Participants in the initial two days thus became resource people within the larger group (some 40 participants in all). Day 3 began with presentations of each of the four case studies, the lessons learned, and the main points from the policy discussion on the afternoon of Day 2. Before participants broke for lunch, we asked them to write the policy question they would most like to put to a senior policymaker on a card. During lunch the facilitators grouped the questions into categories. After some initial reallocation and consolidation, people were asked to sign up for different topics. There was then a final consolidation that resulted in two groups.

On Day 4, a panel comprising four senior and mid-level policymakers[12] who had contributed to the policy paper joined the workshop to respond to the findings of participants and discuss the policy implications. The policy panel was asked to address what needed to change in existing systems:

- Facilitate the formation of partnerships better
- Nurture existing partnerships
- Enable scaling-up of partnerships

Figure 3. Presentation of case-study findings to peers on Day 3.

Outputs from the workshop were:

- An initial preliminary feedback note for NIAP, prepared within 2 days after the workshop, which highlights the lessons of the case studies identified in the workshop as being of key importance (Box 3).

12. These were the National Director of NAIP; a member of the Agricultural Scientist Recruitment Board; the Assistant Director General (Integrated Water Management) of the Indian Council of Research; and a senior manager from the Andhra Pradesh Rural Livelihoods Program.

Box 3: Some of the Findings from the Case Studies

Time required for establishing and building partnerships

Significantly more time is needed than normally anticipated for establishing research partnerships in order to achieve buy-in to shared goals and to build trust and understanding among participants. Donors need to understand the reality that 1-2 years will be needed for most partnerships to begin to achieve impact.

Flexibility

Successful partnerships frequently revisit their overall goals and objectives, as well as the means by which those are meant to be achieved. Success is highly correlated with responsiveness to changing needs.

Dynamic leadership

Successful partnerships are characterized by vibrant leadership. Also, they usually embrace the principle of decentralized decision-making.

Complementarity and comparative advantage

The strongest partnerships are those that explicitly recognize and build upon the partners' strengths.

Building relationships with farmers

Successful partnerships depend on integrating communities in the planning and implementation of partnership activities

Public-private partnerships

Building formal and informal relationships among key public and private stakeholders can help agricultural research organizations achieve their goals and objectives.

Transparency

Successful partnerships are characterized by transparency in planning, decision-making and financial management.

- A policy brief published by NIAP called "Effective partnerships: Principles and practice," the audience for which is senior research managers and policymakers[13]
- A partnership resource document, designed to assist research practitioners as they form new partnerships to pursue NRM research and development objectives.[14]

13. ICAR-RCER, GYA and ICAR-NCAP. 2006. Effective partnerships: principles and practice. NCAP, New Delhi. www.ncap.res.in
14. ICAR-RCER, GYA and ICAR-NCAP. 2006 Partnering for impact: Learning from agricultural R&D in India. ICAR, New Delhi.

Feedback during and after the workshop

We sought feedback and reflected on how the workshop was progressing through a 'barometer' group meeting after Day 1 (facilitators and three resource-person volunteers), an after-action review carried out by the facilitators on Day 3, and an end-of-workshop evaluation at the end of Day 4.

What worked well? The workshop was successful in that it generated materials of sufficient quality to produce the workshop outputs. Employing a professional writer to attend the workshop and produce these materials contributed to this success. One of the policy panel members requested for an immediate briefing note after the workshop. NAIP has requested that the partnership resource be made available for use by their help desk.[15] This is an indication that the project outputs are relevant to the intended audience.

Participants liked the workshop's focus on working in partnerships and the fact that much of the work was done in smaller groups. They said they liked the workshop structure and the flexibility of the same, which they felt was conducive to real participation and a free and frank exchange of ideas. This was partly a result of ongoing discussion among the facilitators and key resource people about how the workshop was progressing, and long discussions among the facilitators late into the night to plan for the next day.

The policy study carried out before the workshop was useful input and created an awareness of the workshop and its outputs among the policymakers and senior research managers. The timeline exercise worked well. It stimulated dialogue among case study resource people, particularly those from different organizations, as to which were the significant events and why. Asking case-study participants to name the actors identified with each significant change encouraged people to think about partnerships without having to construct the actor network maps.

Having peers joining the workshop on Day 3 helped focus the work on days 1 and 2 in preparation for their arrival. Similarly, the workshop to prepare for a policy panel worked well by focusing participants' minds on a concrete output. Presenting the findings first to peers on Day 3 and then the refinement of the message for the presentation to the policy panel helped build ownership of the findings among the participants. The interaction with the policy panel itself immediately began the process of communicating the workshop findings to a policy audience.

What to change for next time? The main dissatisfaction voiced by participants was with the facilitation and attendance at the policy panel session. People felt that the discussion did not address the issues identified in the first three days of the workshop adequately. Some participants were disappointed that some of the more senior members of the policy panel were absent. Others were expecting a panel of the real "top brass."

Reflection among the facilitation team suggests that perhaps we need to explore participants' expectations better and clarify the purpose of the policy panel discussion. Our expectation (and the design of the workshop) was that the panel discussion would help workshop participants gain insights into policymaking and how it can be influenced in order

15. The NAIP help desk is being set up to provide support to teams proposing to establish consortia partnerships.

to refine the planned products. In this respect the workshop was successful. However, having strongly focused on policy messages and distilling key issues during the workshop, there was an expectation from some participants that the workshop would lead directly to policy change, and that the pathways to that change would be explored in the panel discussion.

A number of participants thought that the workshop could have been done in three days, instead of four. If the peers had not joined on Day 3, half a day of presentations could have been saved. This time could have been used to allow fuller discussion of the timelines and actor network matrices or the workshop could have been half a day shorter. On the other hand, the engagement of a wider range of practitioners would be lost.

Quite a lot of time and effort were spent on preparing individual timelines and actor network matrices before the workshop. The idea was that doing so would give people who could not attend the workshop a voice. Actual preparation of these inputs was patchy, plus they created a false expectation that individuals would have an opportunity to present their projects. More time and resources should be allowed for mentoring and following up the preparation of these inputs prior to such a workshop.

The facilities used for the workshop were excellent. However, the rooms we worked in had fixed tables laid out in a boardroom style, which Robert Chambers (2002) [16] describes as "among the worst patterns for participatory work." Breakout groups had to fit themselves either end of the big table in spaces that were not conducive to group work.

The panel members engaged with project before the workshop by giving their valuable time in preparation of the policy study. Panel members were invited personally to attend the workshop, both verbally and in writing. Despite the fact that they expressed their willingness and availability to participate, four out of the eight members did not attend. Several had competing commitments. This reflects one of the challenges that such a workshop faces. Strategies for better attendance in the future include more personal follow-up and engaging the organizations that the policy panel members represent to co-host the workshop.

Conclusions

The adaptation of the innovation history method to a single workshop was judged by workshop participants and facilitators as something that worked and was well worth repeating. It has the important advantage of being much cheaper and quicker than the full innovation history method, while still being able to surface and socialize lessons from innovative experiences. The innovation of having a workshop to prepare for a policy panel focused participants' minds and immediately began the process of communicating the workshop findings to a policy audience. In the same way, having participants join the workshop on Day 3 focused the work on days 1 and 2, and engaged a wider audience of practitioners with the workshop findings. The preparation of two sets of presentations for differing audiences (peers on Day 3 and the policy panel on Day 4) helped to refine the findings. This helped the workshop produce materials of sufficiently high quality to produce a policy brief and partnership resource materials. The joint construction of a timeline of significant partnership events prompted interaction and analyses, both within and between case studies.

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16. Chambers, R. 2002. Participatory Workshops. Earthscan Publications, London.

Impact Assessment of Research in the Challenge Program on Water and Food (CPWF)

Boru Douthwaite[17], Sophie Alvarez[18], Jorge Rubiano[19] (Land Use Project), and Claudia Ringler (IFPRI)

Accomplishments

- Development of the first draft of a methodology for assessing ex-ante impact of CPWF projects
- Project funded to further develop and implement the methodology in three CPWF basins in Phase I and the remaining six basins in Phase II.

Summary

The Challenge Program on Water and Food (CPWF) was approved by the CGIAR Executive Committee in October 2002. It is the largest international agricultural R&D program that addresses the water, food and environment nexus (CPWF Secretariat, 2005). The CPWF responds to a worldwide need for improving water-use efficiency, especially aiming at meeting the most pressing current and near future global challenge: increasing food production using less water.

On 1 October 2005, Phase 1 of the CPWF Impact Assessment Project (IA Project) began. It is a part of the Basin Focal Project (BFP) initiative and will work in the Volta, Mekong and Karkheh basins. Phase 2 will work in the remaining CPWF basins which are São Francisco, Yellow River, Ganges, Indo-Gangetic Basin, Andean System of Basins and Limpopo.

The IA project focuses on carrying out ex-ante impact assessment on work carried out by the CPWF projects in the basins. The basin-specific focal projects (Volta, Mekong, Karkheh and São Francisco) focus on more fundamental questions about the extent to which water can influence livelihoods and poverty, and as such are carrying out a different sort of ex-ante impact assessment.

The rationale of the IA Project is summarized in Figure 1. The CPWF needs a better appreciation of the existing and potential impact of research on water use in agriculture to justify current and future funding. At the same time CPWF projects would benefit from a better understanding of how and what impact they hope to attain, and a monitoring and evaluation approach that both fosters and tracks progress towards achieving impact. The IA project aims to contribute to both of these requirements.

The international public goods that this project expects to generate are methods for carrying out ex-ante impact assessment in complex programs, such as the CPWF.

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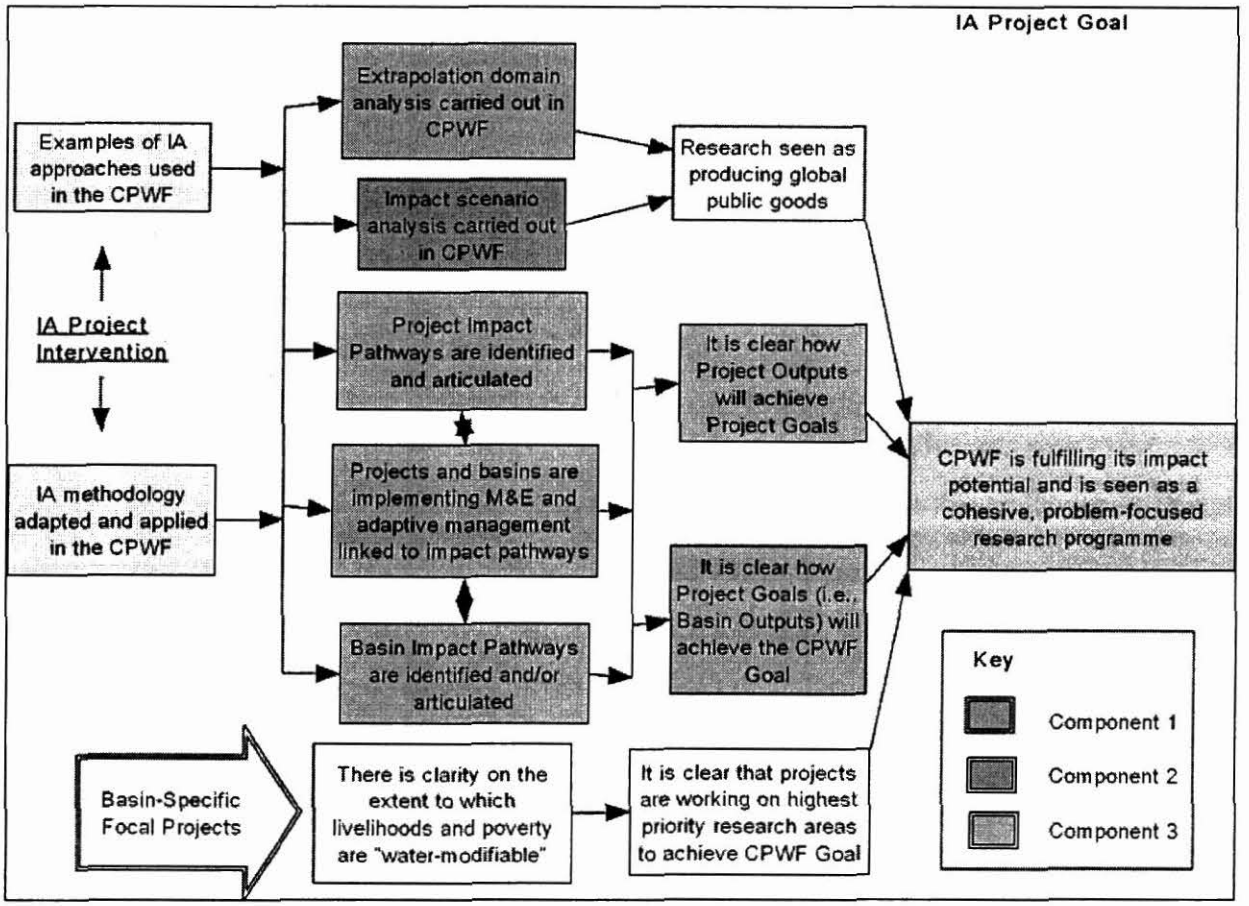

Figure 1. Objective tree for the CPWF-BPF Impact Assessment Project.

The IA project has three components:

- Analysis of the potential extrapolation domain (potential for scaling out and up) of selected project outputs. The CIAT-Land Use Project is responsible for this component.
- Scenario analysis that extrapolates the impact of selected high-potential research outputs to the global level. IPGRI is responsible for this component.
- Construction of impact pathways and narratives of CPWF projects and basins, and piloting of the Most-Significant-Change (MSC) approach to monitoring project progress along its impact pathway. CIAT-IPRA is responsible for this component.

A **project impact pathway** is (i) the causal chain of events and outcomes that link outputs to the goal; and (ii) a network map that show the relationships between project implementing organizations, boundary partners and beneficiaries that are necessary to achieve the goal. A **project impact narrative** describes the project's rationale. It describes the outputs, outcomes, assumptions, links and relationships shown in the project impact pathway. It weaves together the chain of outcomes with the evolution of the partner relationships (shown in the network map). It is quantified and substantiated by literature and expert opinion as far as possible. **Most-Significant- Change (MSC)** involves the periodic collection of significant change stories resulting from a project's implementation (following its impact pathway) and the subsequent selection of the most significant changes. The regular discussion and selection of change stories fosters an ongoing reevaluation of

what really contributes to impact in a project. The changes identified as significant beyond a local context are circulated within the project or program, thereby stimulating cross-fertilization of ideas and innovation (www.mande.co.uk/docs/MSCGuide.htm).

The way the project outputs relate to each other, the intermediate outcomes that we hypothesize will result from their production and how these will contribute to the final project goal are shown in Figure 2.

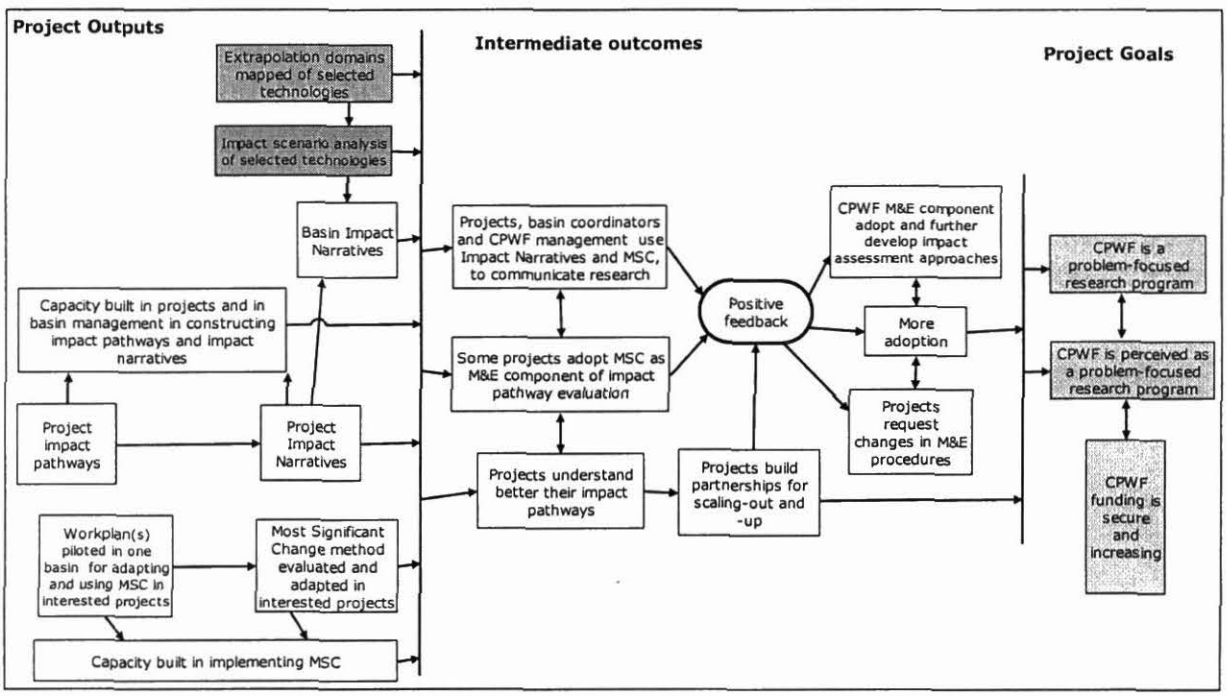

Figure 2. Part of the IA project impact pathway.

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Farmers' Participation in Land Degradation Assessment: The Case Study of Farmers in the Highlands of Southwestern Uganda

R.N. Muzira[20], P. Mbabazi[21], R. Bagyenda[22], P.C. Sanginga[23], and R. Delve[24]

Abstract

To reverse soil degradation in Uganda, active participation of the farmers is important in research process. Participatory land degradation assessment done in Kabale district found that approximately 65% of the land was under cultivation. Farmers' perception on soil fertility was that valleys were more fertile with deep soils (>80 cm) compared to the abandoned land that was considered infertile with shallow soils (0-30 cm) due to erosion. The soil loss was generally observed to be highest in Muguli B with 7.2 and 24.6 t h^{-1} and lowest in Habugarama with 0.1 and 0.3 t ha^{-1} on gentle and steep slopes respectively. In Muguli B it was the poor losing more soil (22.1 t ha^{-1}) compared to the rich (17.9 t ha^{-1}). Contrary it was the rich that were losing more soil in Karambo and Habugarama (19.3 and 0.2 t ha^{-1}) compared to the poor (11.0 and 0.1 t ha^{-1}) respectively.

Keywords: Degradation, participation, research, perception, fertility and soils

Introduction

The wide and high rate of soil degradation in form of soil exhaustion and erosion in the highlands of Uganda (Muzira *et al.*, 2004) have led to decline of crop yields in the recent past (Muzira *et al.*, 2003). Soil erosion is predominant due to steep and long slopes that favor high soil erodibility and erosivity (Mbabazi *et al.*, 2003). The high population pressure on the land has resulted into intensive cultivation in turn leading to deforestation exposing soil to agents of erosion (Bamwerinde and Place, 2000). Most of the marginalized areas have been cultivated and conservation measures such as grass bunds destroyed by farmers in search of fertile soils. Most of the hilltops are abandoned due to soil infertility associated with erosion and shallow soil depth (Raussen et al, 2002).

In this paper, findings of farmers' perception regarding causes of soil degradation, extent of the problem and possible solutions are presented as part of the land degradation assessment project initiated by African Highlands Initiative in Rubaya sub-county, Kabale district.

Materials and methods

Study site: Kabale district is located about 410 km from Kampala, capital of Uganda in the southwest. It covers an area of 1,827 km^2 and according to the 2002 population census results it is one of the most densely populated (350 persons km^{-2}) districts in Uganda. The relief ranges between 1,800 to 4,000 m.a.s.l and rainfall is bimodal with short rains in February-May and long heavy rains in September-December with annual mean of

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23. Rural Sociologist, Enabling Rural Innovation.
24. Soil Scientist, TSBF-CIAT - Faculty of Agriculture, University of Zimbabwe.

800-1000 mm. The participatory study was conducted in 3 parishes of Buramba-Mugandu and Kitooma watersheds in Rubaya sub-county.

Farmer participatory assessment process: Researchers guided community members to assess land degradation levels in the 3 watersheds. Focus Group Discussions in each community was used to get information pertaining land use, land degradation and soil fertility management. Members conversant with the community drew resource map showing location of the natural resources, areas with land degradation and need interventions. Transect walks were used to re-affirm what was in the community map drawn. More data was generated through field interview, discussion, observations and measurements in selected plots of the wealth and poor farmers as ranked by the communities. Soil loss determinations were based on methods described by Stocking and Murnaghan (2001).

Results and discussion

Farmers' perception of land use and management: The hills are extensively and intensively cultivated to the extent of encroaching marginalized areas leaving less land under fallow, woodlots and grazing (Figure 1). Woodlots are normally planted in already exhausted plots with shallow soils, which are mostly located on hilltops. Approximately 23% of the total arable land is under natural fallow for one or two season as a means of replenishing soil fertility. Most farmers prefer natural fallows due to its positive attributes compared to other technologies (Table 1). Where perennial crop such as fruits and trees are dominant, fallow is not used at all.

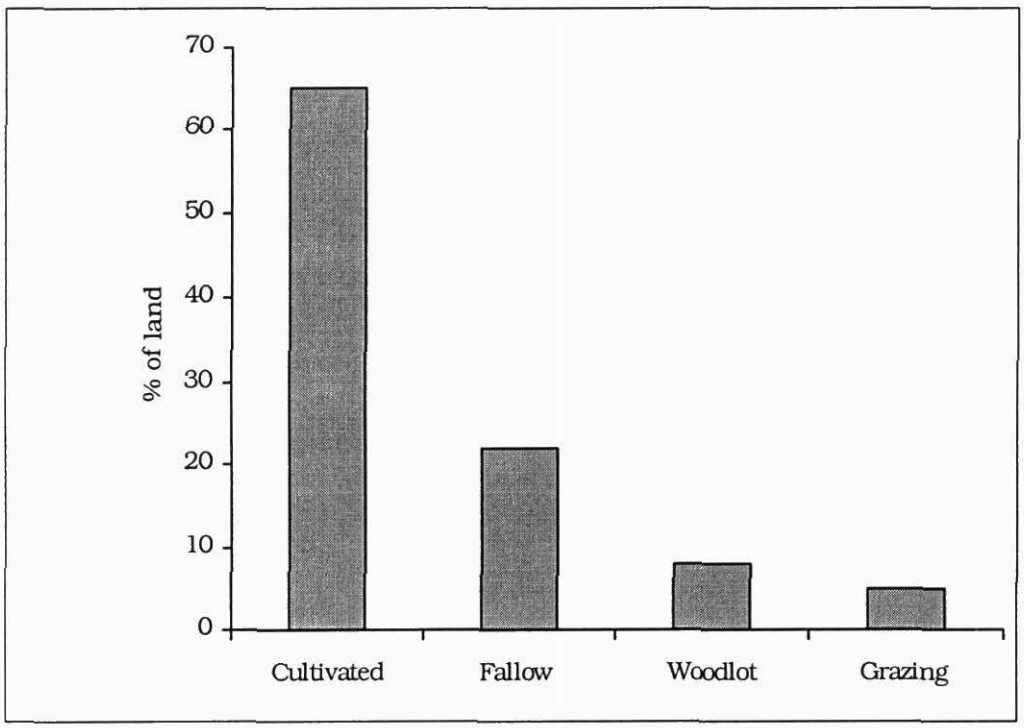

Figure 1. Farmers' perception of agricultural land use.

Table 1. Farmers' perceptions on soil fertility management technologies in the communities.

Soil fertility technology	Positive attributes	Negative attributes
Natural fallow	• Does not require seeds • Provide medicinal herbs • Does not require land preparation • Cheap to replenish soil fertility	• May lead to of noxious weeds • Requires much labour during land clearing • Short benefit of soil futility • Slow establishment may lead to erosion
Fertilisers	• Easy to apply • Quick plant response • Good for high value crops	• Not found within the communities • Easily lost from soil • Due to its high costs high value crops are given priority
Improved fallow	• Provide wood fuel • Fodder for animals • Provide stakes • Control of diseases and pests • Improves soil fertility	• Seeds are expensive to buy • Requires labor during clearing and incorporation of green manure • Seeds unavailable in community • Some are slow to establish • Requires labor for establishment
FYM	• Considered cheap • Used in fish pod • Good for low value crops	• It is bulky • Big variation in quality • May carry diseases pathogens for crops

However, households who depend more on non-farm activities in their livelihood are more apt to use of fallows. Fewer farmers engaged on commercial production of potato apply fertilizer less than 1 kg of a nutrient ha^{-1} on average. This has resulted into negative nutrient balance, as more nutrients are lost from the soils.

Farmers' perception on the extent of land degradation: Most hilltops have been abandoned due to lower returns to land and labour. Lower terraces are associated with fertile and deep friable soils as observed during cultivation. Due to declining soil fertility some farmers opt for bund destruction in search of fertile soils (Table 2). Bund destruction was also associated with heavy rains and livestock grazing exerting pressure on the bunds while others are destroyed due to increased heights attained resulting from soil accumulation. New ones are normally formed with help of trash lines.

Table 2. Estimates of plots with destroyed bunds.

Village	No. of households (A)	Total number of plots	No. of plots with destroyed bunds (B)	B/A (%)
Karambo	50	500	30	60
Kagyera	68	816	30	44
Habugarama	61	610	18	30
Muguli B	72	576	06	8

Nonetheless, Muguli B village in Mugandu parish had lowest bund destruction in relation to households compared to other communities. This could be attributed to the variation in effectiveness of community leaders in implementing the bye-laws. Due to excess soil erosion, surface runoff and continuous cultivation most of the farmers' plots have declined soil fertility (Table 3) associated with shallow septh.

Table 3. Farmers' perception on soil fertility variation on hill slopes.

Slope position	**Farmers' rating of soil fertility**	**Farmers' description of soil depth**	**Estimated soil depth**
Hilltops	Extremely low	Shallow	10-30 cm
Shoulders	Extremely low	Very shallow	0-10 cm
Back Slopes	Very low	Shallow	15 – 20 cm
Foot Slopes	Low	Fairly deep	50 - 80 cm
Valleys	Medium / Good	Deep	> 100 cm

Soil loss in individual farmers' plots: Soil loss was greatest in Karambo and Muguli B villages due to long and steep slopes resulting into high soil erodibility (Figure 2). This implied that very steep areas are not suitable for cultivation. Soil loss was mainly through rills developing in farmers' plots. In Habugarama in Kitooma parish with reduced slope angle and length experienced low soil erodibility and erosivity. This is contrary to the effectiveness of byelaws of the community. Byelaws should not only look at soil conservation measures in individual plots but keeping off steep slopes from being cultivated and planted with trees and grasses. Soil loss was mainly highest at the beginning of the rain season as there is normally low soil cover provided by crops. Soil loss was also closely associated with the crop failure. For instance bean crop destroyed by root rots do not provide sufficient soil cover leading to soil and nutrient losses within rain seasons.

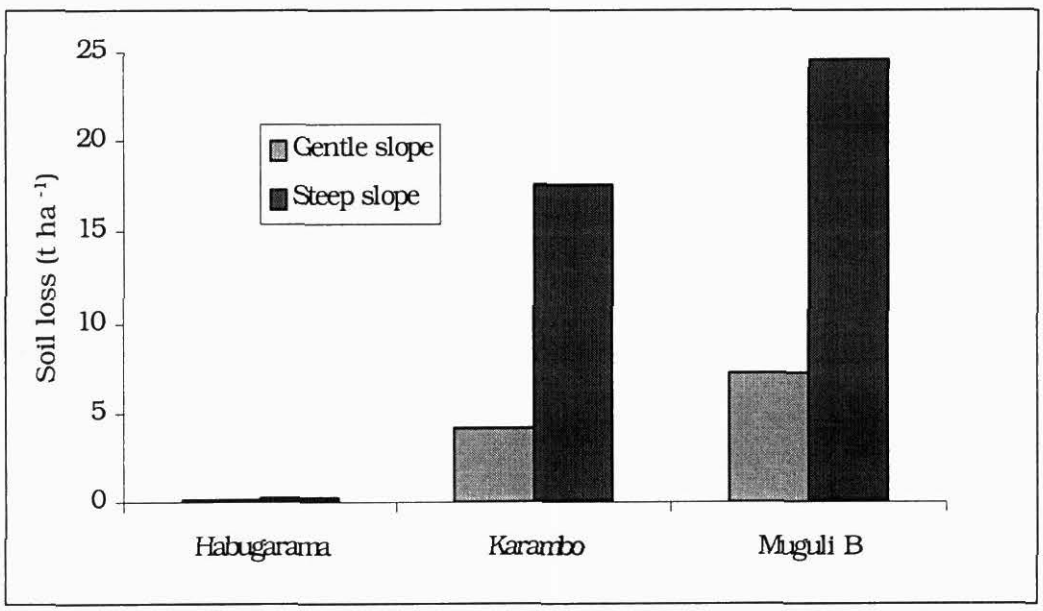

Figure 2. Variation of soil loss through rills with village communities.

It was also observed that the rich farmers lost more soils in Karambo and Habugarama though average soil loss was lowest in the latter community (Figure 4). This shows that less investment is done on soil conservation as the environment is exploited to improve household income. Muguli B the poor experienced higher soil loss than the rich though on average soils loss was highest in this community. The poor were mainly composed of the widows and female-headed household whose plots were mainly situated on steep slopes and could not afford the costs of soil conservation measure. Trenches are normally used to control soil erosion and surface runoff and yet they are labor demanding. This becomes almost impossible for the poor and weak to afford. Also farmers who manage to use trenches go further to de-silt every time they get filled up with the eroded soil implying that they are costly and time consuming.

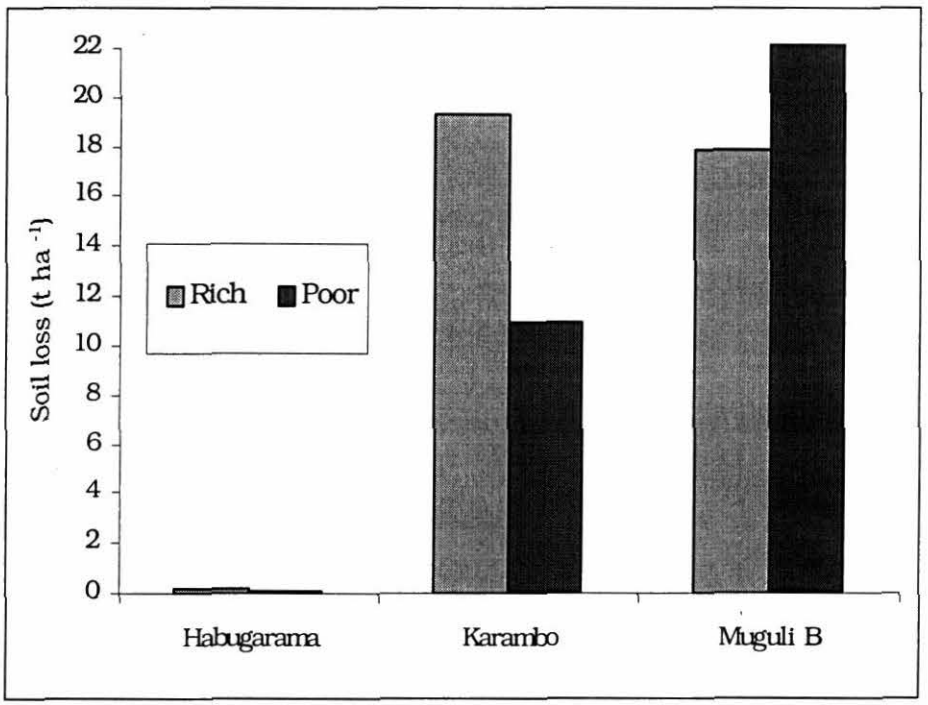

Figure 3. Variation of rill soil loss with wealth category of farmers.

Conclusions

Farmers have considerable knowledge about their ecological niches and therefore soils. Farmers' perception of specific land quality exists but land degradation is rather explained by crop responses. Farmers are generally aware of the causes of low soil fertility. In some cases, the possible solutions are known but various types of constraints limit application. Thus priority has to be given to solutions with low capital requirements. Addressing the problem of land degradation entails improving farmers education and development of high value crops that fetch high household incomes. This could reduce extensive cultivation of the land and therefore saving marginalized land from encroachments. Increased non-farm activities would reduce labor capital on land, which has led to intensive cultivation. Population pressure on land could be reduced through controlled population growth and encouragement of emigration from the highlands, thus reducing man's activities on the land. Private investment in soil and water conservation structures such trenches (ditches) and tree planting and promoting livestock production especially small ruminants such as goats and

sheep and poultry could be enhanced. Forages grown for livestock provides protective cover to the soil against rain splash and more rainwater could infiltrate through the soil hence reducing surface runoff and erosion.

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Participatory Research and Extension in Agriculture — Organization of Learning Approaches

Wouter Ton[25]

Introduction

Different approaches have been developed to facilitate the farmers' participation in the development of technologies to reduce poverty. These approaches facilitate interactive learning processes, where the farmers' knowledge is incorporated in the research and extension process and the farmers' agricultural knowledge and skills are enhanced, which in turn could be reflected in increased production. Learning is an intentional process that requires a designed learning event and a situation where learning can take place. Learning events come in many different shapes. Before the results for the organization and the farmers become visible, the farmers have to apply what they have learned. This research indicates that the characteristics of the organization determine the type of participatory research and extension (PR&E) used by organizations to increase farmers' participation.

Aims of this research

The purpose of this research is to determine the factors that influence the outcomes of different PR&E approaches on farmers and scientists. This will be done by answering the following research questions:

1. What are the characteristics of the organizations implementing PR&E?
2. What are the characteristics of the various types of PR&E?
3. What are the outcomes of PR&E on farmers and scientists?

Research methodology

This research will be conducted in three stages:

- Develop a framework for PR&E based on research of relevant literature.
- Survey the field staff and managers in research, development and extension organizations to investigate their perspectives regarding the different approaches in PR&E. A questionnaire was developed based on the model presented in Figure 1. The questionnaire includes 59 questions to investigate the different aspects that might have an influence on the outcomes of PR&E for farmers and scientists. The respondents indicate on a five-point Likert-scale whether they agree with statements indicating a positive attitude towards PR&E. When strongly disagreeing, a value of 1 is assigned, while 5 indicates that the respondent strongly agrees with the statement. To determine the influence of the characteristics of the organization on the PR&E approach, independent sample T-tests are conducted to compare the means of the characteristics of the PR&E approach and the outcomes of the groups formed by the characteristics of the organization. The questionnaire is distributed via e-mail and handed out during interviews of government organizations (GOs) and nongovernmental organizations (NGOs), dealing with input- or knowledge-based technologies.

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25. University of Twente, Enschede, The Netherlands.

- Carry out case studies in Uganda to collect information from organizations and farmers. The case studies consist of two parts: First 12 research, extension and development organizations were selected based on their size, objectives and funding. Then interviews were held with the management of these organizations to get a general view on PR&E in Uganda. Secondly, four organizations working directly with farmers were selected for an in-depth study, which focuses on farmers because they are the main intended beneficiaries of the PR&E approaches.

Results

Building a theoretical framework: The theoretical framework has three components: the characteristics of the organization and of the PR&E method, and the expected outcomes of the PR&E approach.

Characteristics of the organization: There are three main characteristics to describe an organization with:

1. ***Technology the organization is promoting:*** Technologies can be classified as input-or knowledge-based (Rogers 1995). Input-based technologies usually have direct outcomes on yield and depend mostly on the availability of a physical input. Knowledge-based technologies depend on farmers' learning biophysical principles involved in pest control and then applying the acquired knowledge to make better decisions. This type of technology is more complicated and requires a change in attitude.

2. ***Objectives:*** The organization's objectives can be research, extension or development. The orientation of the organization will have an influence on the type of PR&E.

3. ***Funding:*** The Government can fund an organization, making it subject to all its prevalent regulations. NGOs are organizations that supplement government tasks. They may work within government programs but are financed by outside donors. The donors exert substantial influence on the NGOs, which have to apply to the donors for funding their projects but get money when the project fits within the donor's policy.

Characteristics of PR&E methods: To describe the differences between the various PR&E approaches Probst et al. (2003) used four characteristics:

1. ***Types of participation:*** Johnson et al. (2003) have developed a system to classify the level of participation. They distinguished five levels:
   - Conventional: Scientists make the decisions alone.
   - Consultative: Scientists make the decisions but after communicating with farmers.
   - Collaborative: Decision-making authority is shared between farmers and scientists.
   - Collegial: Farmers make the decisions collectively after communicating with scientists.
   - Farmer experimentation: Farmers make the decisions in a group.

2. ***Stakeholder involvement:*** The selection of participants is important. When they all have the same background, the range of possible solutions is restricted because all participants have more or less the same knowledge. By exposing the members to new ideas from other group members, new solutions can be found. The selection of the group members can be done on different grounds: self-selection, based on efficiency, the community can select the participants, or the scientist may appoint them.

3. ***Roles of the facilitator:*** The facilitator's role is very important in the execution of the program because this person is the link between the organization and the participants. The facilitator is the one that has to implement the program and transfer the learning strategies. In a learning situation the facilitator will have more of a teaching function whereby the facilitator is seen as the expert providing knowledge to the participants. In a development-orientated PR&E method, the facilitator will have a more coaching role, thereby stimulating the participants' learning process.

4. ***Learning strategies:*** The organizational structure of the research and extension organization will greatly determine the design of the learning event. If the organization is centralized, it will have a top-down approach to learning. A decentralized organization will be more likely to seek involvement with the stakeholders. All PR&E methods take groups as learning units and actively involve farmers' groups in the learning process.

Expected outcomes

There are two main groups that will benefit from the PR&E. These are:

1. ***Farmers:*** The learning strategies are aimed at the participants' learning and therefore determine the success of the intervention. The technology is disseminated in a program to the participants who are supposed to learn. This learning is shown as a change in attitudes and increased skills. Applying these changes will result in a changed behavior, which should lead to better results.

2. ***Scientists:*** The expected results of PR&E for the scientists are a direct link between the farmers and the scientists, resulting in more valid research data. Through the farmers-scientists link, the latter will get feedback on their work in order to develop technologies that have a close fit with the farmers' needs. More appropriate technologies will enhance the farmers' adoption of the same. By involving farmers in the research process, the technologies can be tested under a wider range of conditions because more test sites are used so the validity of the research results will increase. The theoretical framework is summarized in Figure 1.

Results of survey of views of managers and field staff on PR&E

In total 37 people representing 23 organizations responded to the questionnaire. Table 1 gives the division of the 23 organizations, distributed by types.

Table 2 gives the average scores for the various aspects of the theoretical framework.

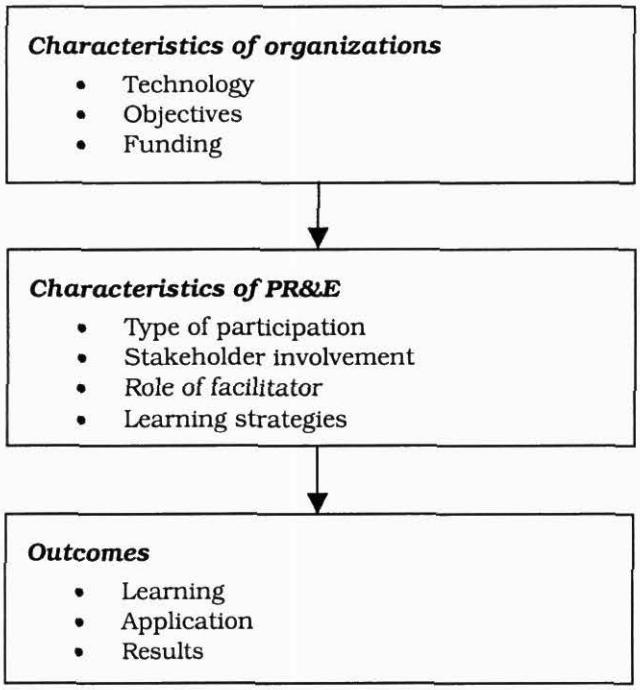

Figure 1. Characteristics of the organization, PR&E and outcomes.

Table 1. Number of responses for each type of organization.

Characteristics of organization	No. of Respondents	
	GO funded	NGO funded
Input-based technology	2	3
Knowledge-based technology	7	11
Development	0	6
Extension	4	2
Research	5	5

Table 2. Average scores for PR&E characteristics and outcomes.

	M	SD
Type of participation[1]	60%	20%
Roles of facilitator	3.64	0.70
Learning strategies	3.40	0.71
Learning	3.38	0.73
Application	3.66	0.56
Results	4.13	0.50

1. The level of participation is the percentage of all decisions taken by farmers; the other scores are on a five-point Likert scale.

Table 3 gives the influence of the three organizational characteristics on the level of participation.

Table 3. PR&E characteristics for different types of organizations.

	Technology		Objectives			Funding	
	Input	Knowledge	Research	Extension	Development	NGO	GO
	M	*M*	*M*	*M*	*M*	*M*	*M*
Type of participation	77%[1]	55%[1]	66%[2]	45%[2]	60%[2]	56%	53%
Roles of facilitator	3.72	3.62	3.86	3.45	3.51	3.58	3.69
Learning strategies	3.24	3.45	3.62	2.92	3.58	3.08[3]	3.61[3]

1, 2, 3. Significant differences.

If the organization is disseminating an input-based technology, farmers' participation appears to be less when compared to organizations disseminating a knowledge-based technology. The objective of the organization has a great influence on the level of participation. For funding it was found that government-financed organizations invest more in the learning strategies; thus they have a better result for learning and the application of the new knowledge.

Results of interviews on PR&E approaches with 12 organizations

Table 4 gives an overview of the results of the interviews with the twelve organizations. The objectives, funding and the type of technology being promoted are indicated for each organization. An inventory was made of ten activities carried out by the organization during the research and extension process. Five of these activities can be labeled as participatory: participatory rural appraisal, community-based facilitators, farmers' involvement in evaluation, technology development by farmers, and organizations working with farmers directly. Nonparticipatory activities are a central demonstration plot and training. The remaining three activities— exchange visits, technology testing and on-farm demonstrations— are undetermined. To indicate the level of farmer participation in the PR&E approach, the total of the participatory activities is presented in the column "Level of participation"; e.g., BARNESA is working directly with farmers and evaluates with farmers so the level of participation is 2.

Results of in-depth study of four selected organizations

The four selected organization were A2N in Tororo district, ActionAid|ccc in Kapchorwa district, NARO (bananas) and VEDCO in Luwero district. In total 17 interviews with 135 farmers were conducted, representing 17 farmer groups (total membership 665) assisted by the four organizations. The groups for the interviews were selected by the organization.

Stakeholder involvement and type of participation: The farmers' level of participation in the design is determined by the organization's objective. In a research-oriented organization like NARO, scientists will do the design without farmers; therefore scientists and farmers will have a consultative relation (Johnson et al. 2003). In development-oriented organizations like A2N, ActionAid or VEDCO, the farmers will be more involved in the design and therefore their relation can be characterized as collaborative. The implementation is characterized by the range of activities that together form the PR&E approach. Depending on the type of activity, the farmers will be more or less involved. All organizations involved farmers in the evaluation.

Table 4. Activities carried out by the twelve organizations.

Organization				Activities											
				Participatory					Undetermined			Non			
	Technology	Objectives	Funding	Participatory Rural Appraisal	Community Based Facilitator	Working directly with farmers	Farmers evaluation	Technology development	Exchange Visits	Technology testing	On-farm demonstrations	Training	Central demonstration plot	Level of participation
Africa Highlands Initiative (AHI)	K	R	N			[4]	X							1
Banana Research Network for East and Southern Africa (BARNESA)	I	R	N			X	X		X	X	X	X	X	2
ActionAid	K	D	N	X	X	X	X		X		X	X		4
Appropriate Technology Uganda	I	D	N	X	X[1]	X	X		X	X	X	X		4
Africa 2000 Network (A2N)	I	D	N	X	X[2]	X	X	X	X	X				5
Environmental Alert	K	D	N	X	X[2]	X	X	X	X	X				5
Prolinnova	K	D	N			X	X	X		X				3
Volunteer Efforts for Development Concerns (VEDCO)	I	D	N	X	X[1]	X	X		X		X	X	X	4
National Agricultural Research Organization NARO (horticulture)	I	R	G			X	X		X	X	X	X	X	2
NARO (bananas)	I	R	G			X	X		X	X	X	X	X	2
NARO (postharvest technology)	I	R	G			X	X				X	X	X	2
ULAMP (NAADS)	K	E	G	X		[3]	X		X		X	X		2

I=input based, K=knowledge based, R= research, D=development, E=extension, N=NGO, G=Government.

1. Organization staff member facilitates groups and community-based facilitators;
2. Organization staff member facilitates first generation Farmer Fields School (FFS);
3. Second-generation FFS facilitated by community-based facilitators;
4. Implemented through existing government extension programs;
5. Implemented through GOs and NGOs.

Roles of facilitator: The facilitators often act as teachers. They organize the learning activities and provide inputs like seeds and fertilizers, and knowledge. There are three types of facilitators:

- *Facilitators from organization headquarters:* They are well-educated facilitators who train other facilitators and provide training to different farmer groups, but are not attached to a specific group.
- *Group-based facilitators*: They are attached to one or two farmers' groups and are paid by the organization. Their level of education is lower than the first group of facilitators. They often originate from the government extension service but start working for NGOs because of the better payment.
- *Community-based facilitators:* They are often members of the farmer group who has received training for some weeks to become a facilitator. They are not paid, but get incentives like a bicycle. The way they have been trained is determining the way they are interacting with the farmers.

Learning strategies: Each organization has its own PR&E approach consisting of a selection of learning activities like study tours to create awareness, training that includes practical components, trials and demonstrations, and printed support material. The farmers are not involved in selecting these learning activities. The PR&E approach is developed by the organization as part of its policy, based on beliefs within the organization as to the best way to engage farmers in the development process, the available resources and previous experiences. This approach is applied uniformly, regardless of the level of complexity of the technology being promoted. A2N is using a constructivist approach to learning. Observation and analysis form the starting point of the learning process. Possible causes and solutions are discussed. Farmers learn from each other's experiences; and where applicable, the facilitator's expertise is brought in. The other three organizations use a more technocratic way of teaching. Learning methods like explanation, questioning, exercises, presentations and practical work are employed. Demonstrations are used to create interest in the technology. Model farmers in the community show the possibilities of the technologies in the local context. Demonstrations and practical work are not really encouraging the farmers to apply what they have learned because these events usually consist of showing and telling. Working in a group assumes a uniform type of farmer with the same ability, needs and learning style.

Outcomes for farmers and scientists: The two main outcomes for farmers are empowerment and an increased income. All organizations are working on the empowerment of groups, but the groups are not yet equal partners in the development process. In the newly introduced demand-driven extension system in Uganda, farmer groups have to request assistance. To prepare groups for their new role, organizations invest a lot of time and effort in group development, aimed at increasing group cohesion. All PR&E approaches are leading to an increased income from sales of the surplus of food or cash crops.

The main outcomes for scientists are an improved technology-development process. Farmers from A2N and NARO are involved in technology development by carrying out experiments for the scientists.

Discussion

There are two main reasons that the reported results have a positive bias:

- The selection of respondents was not at random because the farmers and groups to be interviewed were chosen by the organization. The presence of a representative of the

organization during the interviews with the farmers will also have contributed to the positive results.

- The reported results cannot be attributed to PR&E alone. The personal characteristics of the learner and the learning environment are also important for achieving results (Baldwin & Ford 1988).

When the farmers and scientists develop technologies jointly, extension becomes superfluous because the farmers have learned the technologies during the development process, but only a small portion of the farmers are participating in the research process. This is excluding the farmers who have not taken part in the development process for learning the new technology.

Conclusions and recommendations

The survey and the case studies show that NGO-funded organizations with a development objective, promoting an input-based technology, have a higher level of farmers' participation, which leads to more learning and better results.

In this research it was found that participation increases the farmers' level of learning. For organizations to become more effective, they have to increase the level of farmers' participation. Their participation should not be restricted to the problem identification and evaluation stages. It should be incorporated in all processes like the development of technology, the design of the learning environment, and the implementation of the program. This requires a change in attitude on the part of both the farmers and scientists. The farmers must take up the role of partner in the development process. The farmers are no longer only providers of information and receivers of solutions; they are actively involved in developing the solutions. The scientists need to function more in the role of coach rather than that of teacher. Thus the organizations must develop programs to prepare the farmers and scientists for their new roles.

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Output 2: Organizational Procedures, Institutional Mechanisms and Policies for Using Participatory Methodology in the Co-Development of Technologies Designed and Tested with National and Local Innovation Systems in Latin America and Africa

Knowledge Management: A Participatory Approach to Farmer Appropriation of Technological Innovations

Vicente Zapata S.[26]

Summary

A Knowledge Management (KM)[27] approach has been applied through a project financed by DFID in Bolivia. Under the name of *Facilitating Technological Innovation* (FIT for its Sp. Ac.)[28] a series of action-research initiatives have been conducted during a two year period (2004-2006). One of these, the *Knowledge Sharing methodologies for Pro-poor Agricultural Innovation Project* has developed and validated a new participatory approach to conduct extension processes which promises to contribute to capacity development of three main SIBTA[29]'s actors: the Agricultural Technology Development Foundations (FDTA[30] Sp. Ac.), the agricultural technology service-providing institutions and farmer organizations, by improving their capacity to facilitate resource-poor farmers' access to agricultural innovation.

This Project proposes to re-train extension workers into "knowledge managers" who are experts in promoting technology appropriation[31] by farmers, through the application of a variety of farmer-centered "methodological arrangements". This KM approach has now been tested in ten sites throughout the four agro ecological regions of Bolivia with a variety of actors, commodities and rural contexts.

Research results render their impact as the different institutional and local actors assimilate the methodological approach. This project has undertaken to collect field-based evidence by means of numerous visits, on-site videotaping[32] of applications and testimonies from users and beneficiaries of this approach. Evidence will help SIBTA decision makers to reflect on the ways planning, contracting, monitoring and evaluation of agricultural technological innovation projects (PITA[33]s, Sp. Ac.) are carried out. Evidence is helping to

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26. Senior Research Fellow, IPRA Project – Rural Innovation Institute.
27. KM: Knowledge Management is a process, which has been defined and used in a variety of institutional contexts. In this project it acquires a particular definition as a participatory methodology, which has shown to improve technical assistance processes, as observed in ten different cases in Bolivia.
28. Facilitando la Innovación Tecnológica (FIT).
29. SIBTA: Sistema Boliviano de Tecnología Agropecuaria (Bolivian Agricultural Innovation System).
30. FDTAs: Fundaciones para el Desarrollo Tecnológico Agropecuario.
31. Technology appropriation: incorporation of technology components or technologies to the personal repertoire of farmers' responses to production and commercialization problems. This incorporation implies the ability of farmers to adapt and adjust technologies without external dependence.
32. A twenty-two minute video Hill be available on April 5, 2006.
33. PITAS: Proyectos de Innovación Tecnológica Agropecuaria.

build arguments in favor of the use of the KM approach in the implementation of these projects.

Background

The KM approach, as defined in this project, departs from a critical assessment of traditional approaches to technology transfer. These emphasize the role of deliverers and the importance of content-delivery in the dissemination of agricultural technologies. The so-called "technology transfer" process has been based on assumptions which have proved to hinder "technology appropriation". Assumptions refer to (a) farmers having the necessary resources to apply technologies, regardless the size and cost of inputs, (b) farmers and their communities not having the necessary knowledge or experience to manage their farming problems, (c) farmers understanding technical jargon and easily translating it to their local language as delivery takes place, (d) farmers accepting information based on the authority of technical personnel and quality of delivery (e.g. excellent delivery-support materials), (d) extension agents interpreting their role as lecturers and demonstrators, and farmers the secondary role of following their recommendations, (e) putting aside any efforts to improve farmers' abilities to learn.

SIBTA was also established under two assumptions that proved to be wrong: (a) the existence of a large national body of qualified agricultural technology transfer professionals, with expert knowledge of prioritized agricultural production chains, and (b) the existence of organized farmer groups able to identify and express their technological demands and exercise control over external interventions generated by the Agricultural Innovation Projects, (PITAs).

Several DFID funded projects such as FOCAM[34], have made important contributions to strengthen the capacity of different actors of the SIBTA system to match technological demand and supply. Much has been done in terms of improving the local capacities to exercise control over external interventions. Nevertheless, the interaction mechanisms and strategies among professionals and farmers for a true appropriation of technologies needs to be re-engineered, to incorporate endogenous knowledge and experience to the participatory construction of agricultural innovations.

FIT 8 has developed a glossary to describe the new methodological components of an approach that responds to identified weaknesses. Terms such as "knowledge managers", "methodological arrangements", "knowledge construction encounters", and "development of field competencies" have been introduced as research has evolved. On the other hand an intentional move away from terms such as "technology transfer", "extension", "technical assistance"; "training", "teaching" and "coaching" has been promoted among knowledge managers. It is not only new words, but also an effort to review and renew attitudes regarding the relationship between "facilitators and learners".

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34. FOCAM: Fomentando Cambios. A DFID funded project which has promoted the use of participatory monitoring and evaluation among Bolivian farmer organizations and local institutions. Carlos Arturo Quirós IPRA-CIAT is the current project manager of FOCAM.

Conceptual framework

The design and implementation of this project has been accompanied by a review of literature on critical aspects of extension methods and knowledge sharing methodologies and approaches: (Angel 1979); (Swanson y Peterson 1991); (Roling 1991); (Elliot 1994); (Berdegué 2001); (Engel 1995) and (McMahon y Nielson 2004), all of them providing ideas for a re-definition of the role of agricultural extension. Other insights on the most significant participatory methodologies such as the Participatory Rural Appraisal, (PRA) developed by Chambers et al. (Chambers, 1992); as well as other agricultural extension experiences summarized by Berdegué and Ramírez (1995); and others compiled by Jiggins, J. and De Zeeuw *et al.* (1997) have been reviewed. Other research experiences with farmer participation include the "Programa de Granos Básicos" (PRIAG), and the Participatory Development of Technology (DPT) (Reijntjes *et al.* 1992) and the Rapid Appraisal of Agricultural Knowledge Systems (RAAKS) developed at the University of Wageningen (Engel and Salomon, 1997). Other methodologies from which contributions were drawn for this project include the Local Agricultural Research Committees (CIALs for the Sp.Ac.) developed by the International Center for Tropical Agriculture (Ashby, 1998), the Farmer to Farmer Methodology (Medinacelli y Peigné, 1999), and the Farmer Field Schools (Okoth, 2003)

Agricultural knowledge systems

The so-called agricultural extension is a component of a larger system in which agricultural education and research are present. This triad is what FAO has called the AKIS/RD or Agricultural Knowledge and Information Systems for Rural Development, called by the OECD countries AKS or Agricultural Knowledge Systems. At the center of this triad is the clientele: farmers and other local actors who play important roles in rural-agricultural development, as is clearly the case in production postproduction and commercialization chains. These components are viewed by Eicher (2001) as involving complementary investments which need to be planned as a system. Nevertheless, the review of literature regarding AKS (Pray and Echeverría, 1990; Kaimowitz, 1990, Crowder and Anderson 1997) shows that integration of these three pillars has not been very successful.

Maguire (2000) suggests a change in the agricultural education subsystem in developing countries to make a clear emphasis on rural development and food security. Nevertheless the traditional view of education does not allow a closer linkage between education and extension. The same is true for research and extension. Even though, in the classical paradigm, agricultural research provides inputs to extension agents, the truth is that research institutions have agendas, which are not necessarily linked to farmers needs.

The KM project assumes ag-extension with a broad perception (Rivera, 1987), which is interpreted as not only taking from the education and research sub-systems inputs to deliver them to farming communities, but generating knowledge by means of a participatory merge of local experience and information with technical information coming from the research and education sub-systems.

Knowledge management

There are several interpretations of the term "Knowledge Management". Some call it the act of translating knowledge from one level of technical complexity to another to make it accessible to other clients. Others call it the process of collecting information and

experiences, organizing them in manageable clusters (paper, magnetic or digital collections) for people to find them when needed. Still others call knowledge management a process by which people make use of information -as well as wisdom and experience- to create new knowledge. In the organizational scenario, knowledge management is the process by which people make the best use of available knowledge in order to develop new knowledge.

Scholars have made a distinction between two different branches of knowledge management. "First generation KM" involves collecting information and experience so that it is available to users. The idea was to collect technological information, store it and retrieve it at will. This trend gave way to the so called "knowledge technologies". Essentially knowledge management implied developing sophisticated data analysis and retrieval systems giving little thought to how the information they contained would be used or further developed.

At the turn of the twentieth century, theorists became more interested in the ways in which knowledge is created and shared. Organizations were now seen as capable of learning. This idea gave way to a linkage between learning theory and management. At the same time, new organizational structures were responsive to continuous structural change to adapt to rapidly changing environments.

"Second generation KM" gives priority to the way in which people construct and use knowledge. It is closely related to organizational learning and recognizes that learning and doing are more important to organizational success than dissemination and imitation. These ideas from the second generation KM theory provided the motivation to prepare and develop this project. We have tested several ideas that stem from second generation KM.

The KM project has trained teams of "knowledge managers" who are groups of professionals and farmers, who have developed abilities to elicit tacit knowledge from farmers, validate it under the light of successful experience and current scientific theory and practice, and merge it with explicit knowledge in order to formulate a "new response" to overcome agricultural problems.

Participants in this project have learned to design learning strategies to carry out field experiences useful for farmers to develop "agricultural competencies", which are complex tasks involved in the application of a technology component or a technology. Appropriate performance of these tasks requires the development of an array of mental abilities, physical skills and attitudes, to which no attention is paid in traditional approaches to technology transfer.

Objectives

Development objectives: Development objectives go hand in hand with research objectives. In this highly meaningful activity CIAT has the opportunity to answer research questions regarding participation with an ample group of national partners, as it develops international public goods that can be assimilated not only by the Bolivian SIBTA but by other National Agricultural Innovation Systems - NAIS[35] in the Andes and Africa.

35. NAIS - National Agricultural Innovation System, an ample denomination of National Agricultural Research and Development Systems (NARDS) as traditionally called in the literature.

Development objectives for this project are:

- To build local capacity to adapt and appropriate technological innovations by re-training agriculture professionals and farmer-leaders to use the principles and strategies of knowledge management.
- To promote an institutional dialog about knowledge management, its applications and advantages in agricultural innovations to influence SIBTA decision makers to incorporate lessons learned from the application of the KM approach, into the system.
- To strengthen the capacity of FTDAs to monitor KM results and accompany innovation projects executing groups in the application of innovative learning methodologies.

Research objectives

Action research activities are geared to:

1. Make a theoretical and strategic contribution to the development of new knowledge sharing methodological alternatives
2. To provide the National Agricultural Innovation System with field-based evidence regarding the usability and efficacy of new methodological arrangements as to motivate their use in the development of agricultural innovation projects.

During the last phase of the project, a study was conducted to respond to the following specific questions:

- Were there previous experiences in the system regarding the application of the KM approach?
- Was the training provided to knowledge managers sufficient for an adequate performance in accompanying farmers in technology appropriation processes?
- What were the contextual and institutional factors, which facilitated or inhibited the application of the KM approach?

Evaluator Gabriela Silva[36] will present a final report on the answers to these questions in April 2006. Gabriela has worked with project participants in providing answers to research questions. A separate document on the methods used for this analysis is also presented in 2006 RII Annual Report.

Methodology

The project leaders, to achieve the stated objectives, carried out a series of steps, which are briefly presented in the following paragraphs:

Establishing the project's platform: The action-research process started by the socialization of the project among different stakeholder groups (FTDAs, technology service providers, MACA[37]) and the organization of the project platform which included the signing

36. Gabriela Silva is the Assistant to the FIT 8 Project at Fundación Valles.
37. MACA Ministerio de Asuntos Campesinos y Agropecuarios (the Bolivian Ministry of Agriculture).

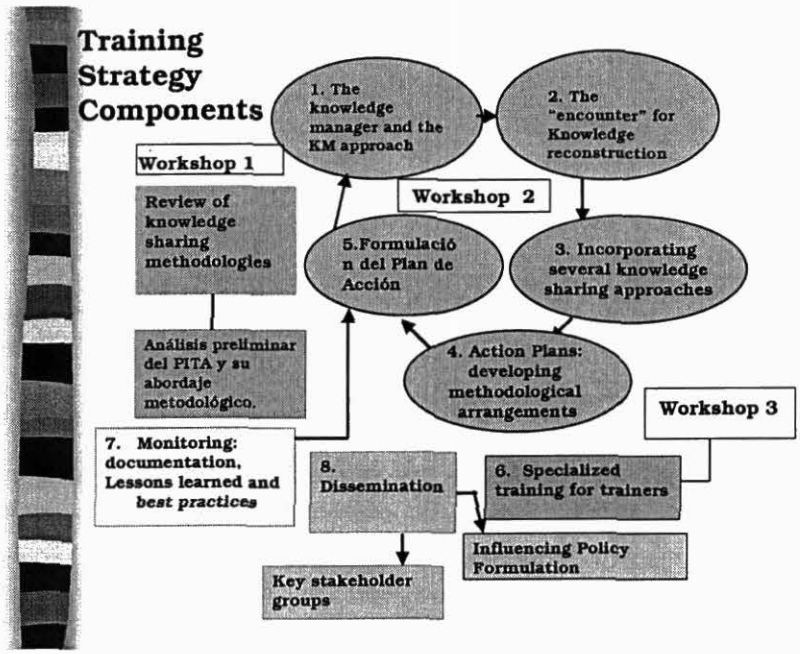
of contractual agreements with the Foundations and partners who were to incorporate the trials of various methodological arrangements within the KM approach while carrying out the agricultural innovation projects.

Training knowledge managers: Between the months of December 2004 and May 2005 a series of five workshops was carried out to train knowledge managers. More than 150 professionals from the four macro-eco-regions were trained. Workshops were carried out in Cochabamba (2) Oruro (2), and Tarija (1). Additional reinforcements were conducted in several visits to a variety of groups interested in the methodology to cover over five-hundred people influenced by the project in two years.

During the workshops, action plans to test the KM approach and specific methodological arrangements were prepared by participants, integrating them to the execution of innovation projects.

The training curriculum for knowledge managers is presented in a *Manual to Train Knowledge Managers* to be published in April 2006, along with a *Guide to KM: Basic Principles and Application*, a video that presents local evidence of KM applications and a CD with project's documentation to be released on the same month.

The following diagram shows the different types of training events carried out to train knowledge managers.



Training in participatory evaluation of technologies: Methodologies to improve communication processes must be evaluated under the light of the relevance of technologies supplied. This has to do with the appropriateness of a given technology in a particular context for a particular group of farmers. Knowledge managers need to be aware of the fact that a communication technology can be very effective to "sell" a technology that farmers, at the end, will not apply given the difficulties they face to use its technological components. A

resource-reach project may convey an impression on the feasibility of application. Once the project's resources are spent and the project closed, farmers may not be able to apply the technology for whose "transference" several thousand dollars were invested.

A CIAT expert was hired by this project to conduct two workshops (Tarija and Santa Cruz – July and August 2005) for knowledge managers and other technical personnel invited, on this topic. This additional reinforcement provided our people with new tools to conduct knowledge managing activities with a critical view of the viability of technologies being exposed by innovation projects.

Monitoring action plans: A total of ten action plans were monitored and results recorded for evaluation purposes (see Appendix 1: Action Plans). During the second half of 2006 twelve field-visits were paid to knowledge managers. In each of these sites videotape recordings of experiences were made. Feedback sessions were also conducted with knowledge managers to reflect upon their experiences and adjust means and ways to apply the approach.

Meeting the "accompanying team": The accompanying team for FIT projects -an initiative of the FIT Program Facilitator- is a group of people with expert knowledge and experience on topics related to the FIT themes. They are external to the particular interests and activities of projects and fulfill the function of providing advice to FIT Project coordinators to ensure good project performance.

These meetings were particularly interesting and helpful. Participants brought up issues to take into consideration, such as the need to involve universities in the topics dealt with in FIT projects. This idea, in the case of this project made the coordinator search for universities interested in a training program leading to a "diploma certificate" for a variety of potential users of the methodology, among them university professors. The proposal for such a program has been submitted to three Bolivian universities for their consideration.

Creating CIALs to improve a Farmer Field School performance: One of the most significant developments of the application of the KM approach took place in Sucre with a group of oregano growers, (Executing UNEC-Agrocentral[38]) by creating a Local Agricultural Research Committee - CIAL, in Sillani – Padilla. The training of UNEC professionals and oregano growers in the CIAL methodology conducted by a CIAT expert, the organization of the Local Agricultural Research Committee and the seed-money to start off with the first research topic (roya in oregano) were activities financed and accompanied by this project's coordinating team. One month later, the president of the newly appointed research committee reported progress made on six different treatments with three repetitions in one of the farmer's fields. The financial support provided to the CIAL committee was a motivating factor to encourage farmers in the region to start making contributions to support this service for the community of oregano growers.

This is a living example of a combination of methodologies: the existing farmer field school which was reinforced with the knowledge management methodology and with the CIAL, now in charge of responding to questions the farmer field school was not fit to answer.

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38. UNEC-Agrocentral is a cooperative of oregano growers in Sucre.

Participation in the FIT mid-term evaluation: By the end of May 2005, the FIT Program evaluators carried out a visit to one of the sites where the methodology was being experimented (Trópico Húmedo – La Guardia. Honey Extraction - Execution group: ADAPICRUZ). The perceptions from the evaluators (Jonathan Woodsworth and Pierre de Zutter) shared with this project coordinator were positive in general. It provided important pathways to integrate several FIT projects in the extension phase of the FIT Program.

Outputs

The following outputs can be reported at the end of the project's two-year period:

- Output 1: Project's institutional platform (Foundations, extension service providers and farmer participating grops) agreed upon including responsibilities of participants at each level, to ensure sharing of knowledge management strategies and results.

- Output 2: A digital document dedicated to knowledge sharing methodologies and their application in marginalized contexts published (April 2006). Document recollects experiences with ethnic grops (aymara, quechua and guarani communities).

- Output 3: A group of forty knowledge managers trained in the four agro ecological regions of Bolivia. These knowledge managers belong to nine extension service providing organizations in the country.

- Output 4: Ten different participatory methodological arrangements tested in the same number of sites with a variety of nine commodities and species.

- Output 5: National Agricultural Innovation System (SIBTA) leaders, Fpoudations' directors and technical personnel sensitized to the potential of the KM approach to improve extension processes in terms of higher levels of technology appropriation by farmers.

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Application of the Knowledge Management Approach in the SIBTA[39]'s PITA[40]s: A Progress Report

Gabriela Silva Andreu[41]

Achievements

The evaluation process of the Knowledge Management (KM) Project reported in this progress report intends to provide KM learners with (a) a synthesis of testimonies from people who applied the KM approach to extension work and (b) an analysis of success-case stories useful to FDTAs[42] and the SIBTA as a whole to evaluate the use of the KM approach in the planning, contracting, monitoring and evaluation of agricultural innovation projects. A complete study report will appear in April 2006, which summarizes an ample number of testimonies and evidence.

The KM approach has been successfully applied by ten different knowledge managers' teams, in a variety of cultural, social and geographic settings, in different agricultural market chains, dealing with a variety of agricultural and livestock development topics, within the four agro ecological regions in which Bolivia is divided for agricultural development purposes. Evidence suggests that the KM approach can be very useful to improve technical assistance and extension practices within the SIBTA system.

Summary

The KM approach to technical assistance takes the form of a variety of "methodological arrangements"[43] for knowledge sharing in agricultural innovations dissemination settings, which are (a) participatory, (b) based on local knowledge and experience, (c) client-centered for the development of field competencies and (d) reflexive –as they provide opportunities for practitioners of this approach to reflect on their experience and results and continuously improve methodological arrangements.

The Success-Case Method[44] was selected for it allows for a rapid, efficient and credible way to estimate the impact of a particular intervention isolating those aspects which really work from those that do no. Highlighted aspects become lessons learned for the organization. An assumption regarding the application of the KM approach was that some of the people trained in its use, would certainly apply it with positive results and others would not. The application of this method would allow us to clarify the reasons why the application had been successful or unsuccessful.

By means of a structured interview, applied to different groups of knowledgeable stakeholders, we could be certain that the KM approach had been successfully applied, with

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39. SIBTA: Sistema Boliviano de Tecnología Agropecuaria.
40. PITA: Proyecto de Innovación Tecnológica Agropecuaria.
41. Gabriela Silva es técnico para el Proyecto FIT 8 de la FDTA Valles y colabora en el desarrollo del proyecto de Gestión de Conocimientos a nivel nacional.
42. Fundaciones para el Desarrollo Tecnológico Agropecuario.
43. Methodological arrangements are sets of learning and knowledge sharing strategies designed to improve technology appropriation by farmers.
44. Robert O. Brinkerhoff, (2002) The Success Case Method.

different degrees of success, in all ten cases studied. As interviews were administered certainty about success grew. Then we proceeded to apply some of the principles and tools of the Most Significant Change[45] methodology. This methodology is a participatory monitoring and evaluation instrument, which involves gathering and selecting stories that tell about significant changes that participants (users, beneficiaries, and others) have witnessed or modification in perceptions or practice that have occurred, in this case, after the introduction of the KM approach in the development of agricultural innovation projects. Farmers, technological services providers and supervisors in the four FDTAs wrote concrete stories which were later classified by the type of stakeholder who wrote the story:

Farmers significant changes refer to motivation growing among participants in learning and applying a given technological component or technology, knowledge interchange, a difference marked with the traditional (what technical assistants did before), ease to learn and technology being easier to adapt.

Technical personnel most significant changes related to greater trust on the part of farmers, the deviation from traditional models to technology dissemination, the move away from the academic style and the possibilities to institutionalize the KM approach

Supervisors of field personnel from FDTAs, identified as most significant changes evidence that shows this approach promotes adoption and greater sustainability of technical assistance work due to the innovative and participatory character of this approach

Background

The Bolivian Agricultural Technology System – SIBTA, created by Decreto Supremo 25717, March 30, 2000, and hosed by the Ministry of Rural and Agricultural Affairs (MACA for its Sp.Ac.) is a governmental initiative, which pursues to promote and provide support to agricultural innovation and sustainable development of the agricultural sector, with an important participation of the private sector.

SIBTA is facing the challenge to facilitate agricultural innovation among poor farming communities. It has chosen to work through two different strategies: the chain-oriented Agricultural Innovation Projects (PITAs for their Sp. Ac.) and the Strategic Innovation Projects (PIENs, for their Sp. Ac.) which cut across regional boundaries to advance innovation in areas of national strategic importance.

The Department for International Development (DFID) of the U.K. decided to provide economic support a series of projects to strengthening the SIBTA, through the Program to Facilitate Agricultural Innovation (FIT for its Sp. Ac.). This program expects to develop new capacities in SIBTA´s actors to enable them to forge new innovation pathways for the benefit of poor farming communities. At present the FIT Program is providing support to six FIT projects and three consultantships for SIBTA. New methodologies, training processes, instruments and synergisms are being developed by these initiatives. Among these is the Knowledge Sharing Methodologies Project for Pro-poor Agricultural Innovation Project (FIT 8) which has been led by CIAT[46].

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45. Rick Davies and Jess Dart, The Most Significant Change Technique (2005).
46. CIAT International Center for Tropical Agriculture.

The KM project has presented the different SIBTA actors with a new approach to technical assistance (also called technology transfer and extension) that can be incorporated to the execution of the PITAs and other agricultural innovation initiatives. Through a systematic training process, the project has trained at least one professional of each of the four FDTAs and ten teams of knowledge managers composed by professionals and farmers, who, in turn have applied the KM methodology in ten different sites of Bolivia.

Two process components are the essence of this approach: (a) knowledge reconstruction, a process by which local and technical knowledge merge through active participation of farmers and knowledge managers taking advantage of encounters that take place among them in FFS, CIALs, FTF and other forms of sharing agricultural technology; and (b) the "development of field competencies" a process that departs from the identification of the key competencies expected form farmers to take a particular agricultural innovation in their hands (appropriation). These two components are used to design learning experiences. As competencies are analyzed, it is possible to identify the technical information that needs to be shared, the mental abilities and perceptual or physical skills farmers need to strengthen or develop in order to make an efficient use of technology. From this analysis learning objectives are designed, learning and facilitation strategies identified and evaluation instruments designed.

Knowledge managers are experts in the design of this type of methodological arrangements for knowledge sharing. Their performance and the perceptions of different stakeholders about this approach were the focus of evaluation. Appendix A is a list of the institutions that participated in training and application, the project in which the approach was inserted and the eco-region in which the PITAs were located. Participating PITAs were selected by FDTAs, using a variety of selection criteria.

Objectives

To evaluate the use of the KM approach, as proposed by the FIT 8 Project, in the PITAs developed by the SIBTA system.

Some of the questions we expected to answer were the following:

1. What are the methodological components of the KM approach which show to improve the development of PITAs?
2. What are some of the contextual factors, which facilitate or inhibit the application of the KM approach in different settings?
3. What positive and negative factors in the use of the KM approach do the SIBTA officers perceive?
4. Is the KM approach universally applicable to the PITAsof the SIBTA system and is this application sustainable?
5. Can an applicable and sustainable KM model be derived from experiences in the FIT 8 project?

Methodology

1. The Success-case Method: This analytic methodology, as presented by Brinkerhoff (____)[47] is an effective way to evaluate organizational change. It has been designed to analyze impact of project implementation and uses results of this analysis to introduce organizational change and in their learning capacity. The questions this method helps to respond are the following:

1. What are the results this project is generating?
2. What is that aspect which works better?
3. What are the factors, which facilitate implementation?
4. How can success factors be disseminated
5. What are the benefits for this organization?
6. What is the value added when using this approach?

The application of this method includes five steps:

1. To focus the cases and plan their study
2. To design the model for a success case
3. To apply a survey instrument to identify the best cases (and therefore those which are not best).
4. To interview and document successful and non-successful cases
5. To report results and draw conclusions and recommendations

2. The Most Significant Change Technique: Davies (2005) explains that the most significant change (MSC) technique is a form of participatory monitoring and evaluation, in which stakeholders are involved in deciding the changes that are to be recorded as well as the analysis of data. It is also a monitoring tool for it helps identify how a process is being implemented and it is also an evaluation strategy for it provides data about outcomes and impact to assess a project or program as a whole.

The methodological process involves the collection of significant change stories about what is happening on the field and the systematic selection of the most significant of these stories by panels of designated stakeholders. These people are in search of project's impact. Once the changes have been identified through stories, analysts read the stories and discuss about the value of reported changes.

Thorough implementation of this technique follows a series of ten steps, which can be reviewed by reading Davis' cited document. For this evaluation, only three steps were followed: (a) collecting the success case reports, (b) selecting the most significant of these reports and (c) feeding back the results to the project and to people who generated the reports.

3. Data Collection: Interviews were carried out to collect information regarding successful experiences. Even though there were not stories written for the higher level (Foundations) , the reporter collected valuable information based on a series of questions designed to elicit stakeholder evaluation of the KM approach. Three groups of stakeholders were interviewed: farmers who had participated in the knowledge management process,

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47. Brinkerhoff, Robert (____) The Success Case Method. CITA.

professionals who applied the approach and supervisors of field personnel in the FDTAs. The data collection was not an easy task due to the fact that interviewees were located in the four cardinal points of Bolivia and also that these type of data collection exercises are not highly valued by many.

The following table shows the different questions asked to stakeholders to develop reports on the application of the KM approach:

Farmers who took part in the PITAs where the KM Approach was applied	**Professionals who applied the KM Aproach**	**Supervisors who reviewed professionals' performance on the field**
What do you understand by "knowledge management"?	How can you describe your experience using the KM approach?	Does the KM approach responds to any demand at the FTDA?
What differences do you see between the performance of a knowledge manager an a traditional extension agent?	What are the most significant changes you have perceived taking place since the introduction of the KM approach?	What criteria did you (or the FDTA) use to select the project that was to participate in the KM project?
What are the most significant changes you have perceived taking place in the development of the innovation project in which you are participating since the introduction of the KM approach?	What are changes you may call "significant" in terms of what the farmers do, since the introduction of the KM approach?	What factors of any type have you found to contribute to the implementation of the KM approach in your FDTA?
If you have identified any changes, what are the benefits for farmers derived from them?	Looking at what is usually done in extension processes, can you make a parallel between this activity using the KM approach and using other approaches?	What are the key lessons drawn from the FIT 8 project and from the KM experience in terms of benefits for the FDTA?
Do you see it feasible for farmers to continue using this type of method for other projects?	How do you evaluate the future use of this approach in your organization?	How do you think this approach could be institutionalized at the SIBTA level?

4. Interpretation of Reports: Interpretation of reports pursues the identification of common themes across stakeholders. Even though each stakeholder group has a preferable way to express its perceptions about any issue, it is possible to identify themes that repeat along several reports. These constitute the key aspects of success-failure of a particular intervention.

Results

All stories obtained with the help of interviews are not here related. The evaluation study is still underway and a final report will be presented in April 2006. A couple of examples will demonstrate the type of perceptions the KM approach has prompted and the corresponding issues that are included in the stories. Producers and professional from the technology service providers were most active in the writing of stories. We expect to collect a series of reports drawn from a participatory analysis of interviews along with interviewees. Stories are kept in Spanish to maintain the original flavour of perceived changes.

Historia de un productor

"Mi nombre es Milton Perez, soy productor de uva desde hace 15 años. En estos últimos tres años la FDTA-Valles nos está apoyando con un proyecto para mejorar nuestra producción. Los técnicos que trabajan directamente con nosotros son los de AGRO XXI, algunos de ellos son hijos de productores de la zona que han podido ir a la universidad a estudiar y ahora nos vienen a enseñar como podemos mejorar.

El año pasado recién ha entrado el proyecto FIT 8 con la Gestión del Conocimiento. Yo nunca había escuchado de ese tema, pero he participado con otros de mis compañeros y los técnicos de AGRO XXI en talleres aquí en Tarija y otro en Cochabamba. A partir de estas capacitaciones que hemos recibido he visto que los técnicos más se esfuerzan para que nosotros entendamos lo que nos quieren enseñar, además también nos preguntan sobre lo que sabemos.

Hay muchas cosas que nosotros sabemos hacer y que hemos aprendido de nuestros abuelos, pero como nadie nos pregunta tampoco les decimos. Antes los talleres eran bien aburridores, ahora los talleres que vienen a darnos, esperamos todos impacientes, y el tiempo se nos va rápido, al final parece que el taller lo hemos dado nosotros los productores. Quiero agradecer a estos técnicos que han hecho unas maquetas de los sistemas de conducción que se han quedado en la escuela de mi comunidad y mis compañeros que me han convencido de cambiar mi sistema de conducción, porque estaba perdiendo platita. Yo quiero pedirles a mis compañeros que sigamos así compartiendo nuestras experiencias y vamos a crecer juntos, ya que uno piensa que callándonos vamos a ser los más beneficiados, pero no nos damos cuenta que lo que ustedes saben, yo no lo sé, pero hay cosas que yo sé y ustedes no las saben y si juntamos todo eso, podemos mejorar nuestra producción y tener más platita.".

Interpretation by the evaluator: This fragment of a story shows how motivation has grown among participants in the workshops coordinated by the PITA executing organization. Motivation is related to the importance given to participation of farmers to share what they know about the production of grapes. Another important aspect is the fact that the farmer has come to change his traditional ways of managing the cultivar to install a new conduction system, which is a technological component shared by the professional team. The farmer reveals that this change has been significant for him.

Historia de técnico oferente de servicios de asistencia técnica

"Mi nombre es Ricardo Paita, soy Ing. Agrónomo y tengo 10 años de experiencia realizando asistencia técnica. Actualmente me desempeño cómo coordinador del PITA: Manejo agronómico de los procesos productivos del cultivo de maní en la región indígena del Itika Guasú en la empresa CER-DET, con el apoyo de la FDTA-Chaco. Antes de recibir las capacitaciones en GC del proyecto FIT 8, yo desconocía totalmente el enfoque que se proponía. En todo caso, sí tenía algunos conocimientos sobre metodologías participativas, a partir de mi formación académica en la universidad y de algunos cursos y seminarios. Casualmente en la empresa en la que trabajo, el año pasado se contrataron algunas personas para que hicieran una sistematización y documentación sobre las metodologías que utilizamos los diferentes técnicos para homogenizar el uso de ellas y justo llega la propuesta del proyecto FIT 8 que encajó como anillo al dedo para el desarrollo de este PITA.

Me siento profundamente agradecido por habernos tomado en cuenta para estas capacitaciones, ya que el enfoque aprendido no solo nos sirve para ejecutar mejor nuestro PITA. Para mi caso particular, estas enseñanzas me han ayudado en mi vida personal, en mi forma de relacionarme con las personas, en mi forma de enfrentar la vida. Yo diría que es un enfoque de vida. Yo soy parte de un equipo de 4 personas que ejecutamos este PITA y a nombre de ellos puedo decir que el enfoque nos ha ayudado a replantearnos las actividades programadas y el tiempo que invertimos en las mismas. El enfoque nos ha permitido contar con la confianza de los productores, la cual, ahora no estamos dispuestos a perder. Nos sentimos profundamente comprometidos a seguir adelante con esta nueva forma de hacer asistencia técnica. Los resultados intermedios que se analizan en la ejecución del PITA han sobre pasado lo esperado. Conversando con mi jefe acerca de las razones de este éxito, es que él ha llegado a la conclusión y determinación de institucionalizar el enfoque y que mi equipo sea el líder para difundir nuestros conocimientos y experiencias acerca del enfoque de Gestión de Conocimientos"

Interpretation by the evaluator: This brief recollection tells about the benefits perceived by an extensionist. Trust-building is identified as a key component of the approach employed. A reflection about the new role of the extensionist is also presented. Traditional education did not make a contribution to carry out client-centered extension work. The KM project made a contribution that is recognized to have an impact beyond the working environment and enters the aisle of personal life. Another important issue is the perception of leaders in this organization (Agro XXI) to expand the use of the KM approach and institutionalize it.

Conclusions

Two-way knowledge sharing and interchange does not belong to traditional technical assistance models, non-participatory and vertical. Nevertheless, it is evident that, once this interchange is successfully practiced it contributes to a change of attitude supported by the idea that the two faces of knowledge (explicit and tacit) when taken together are the bases for greater interest in technology and its adoption.

Professionals from the technology service providing institutions express that the use of this approach is viable, simple and does not imply greater costs. It contributes to farmer motivation and greater appropriation of technology components by farmers.

Scaling out and scaling up of the use of KM approach depends on the decisions made by technological service providing organizations' leaders that gains are made in terms of efficiency, adoption and satisfaction of farmers by using the KM approach. Larger validation efforts might be needed to convince the more skeptical about the benefits of this approach.

Narratives and qualitative information regarding the use of the KM approach are valid means to demonstrate its usability in technology dissemination. Training of new knowledge managers will greatly benefit of these stories in terms of motivation and interest to use the KM tools.

New evidence and further analysis is required to have a better picture of the impact this approach is making at different levels of actors in the SIBTA system. New studies need to be undertaken to improve the quality of evidences to be presented to authorities to

influence their decisions regarding the use of new methodological approaches such as the KM methodological arrangements.

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Appendix A: Institutions, Projects and Corresponding FDTA Participating in the KM Initiative

Equipo Oferente	Título del PITA	FDTA
1. CEHERKA	Producción de semilla de para y MIP	Altiplano
2. SEMTA	Manejo Integral del Ganado Lechero	Altiplano
3. SEMTA	Mejoramiento de especies animales (llama)	Altiplano
4. ESERMA	Mejoramiento genético de la raza criolla de ganado porcino para APROMAP	Chaco
5. AGROXXI	Manejo del cultivo de uva de mesa	Valles
6. UNEC	Apoyo a la producción y comercialización de especias y condimentos en los valles de Chuquisaca	Valles
7. ADAPICRUZ	Mejoramiento de la productividad y rentabilidad de la colmena	Trópico Húmedo
8. GAIA S.R.L.	Mejoramiento de la productividad y rentabilidad de la colmena	Trópico Húmedo
9. CER-DET	Manejo agronómico de los procesos productivos del cultivo de maní en la región indígena del Itika Guasú	Chaco
10. COACO	Producción y comercialización de semilla de maíz en comunidades guaraníes del Itika Guasú	Chaco

Output 3: The Resource-To-Consumption (ERI) Framework Developed, Tested and Applied to Strengthen Farmer Organizations and Rural Women's Capacity Allowing Transition from Semi-subsistence to Competitive Market-oriented Production in Africa and Latin America

Farmer Participatory Market Research: Approach for Increasing Commercialization of Agricultural Products

Winnie Alum[48], *Rogers Kazikwera, Pauline Birungi*[49], *Pascal Sanginga*[50], *and Elly Kaganzi*

Introduction

Over the last twenty years, the speed of change in the global economy has accelerated dramatically. According to an ActionAid-Uganda report (2003) on agriculture and food security interventions, agriculture is an overwhelming sector of the Ugandan economy. It accounts for 43% of the gross domestic product, 85% of the export earnings, employs 80% of the population, provides most of the raw materials that are used in the agro-based industrial sector, and 85% of the population are rural based, where agriculture can be best practiced (Elshof 1998). Most people in Uganda are still engaged in direct consumption or subsistence–local production for local consumption, "you eat what you grow". The majority of Ugandans live in absolute poverty with an average income of one dollar a day. Toward the end of the year 2000, the Government of Uganda launched a Plan for Modernization of Agriculture (PMA) and Poverty Eradication Action Plan (PEAP). The primary aim is to transform subsistance agriculture into commercial agriculture and ensure sustained food security and household incomes.

The rapid growth of the urban population presents special challenges for small-scale farmers in developing countries. They are under increasing pressure to fulfill the new market requirements of powerful supermarket chains and agroindustry, which demand product quality, volume, and continuity of delivery. Most farmers in rural areas agree: "The worst pest we face nowadays is low prices, and researchers so far have not found adequate measures to help!" (Bernet et al.). The farmers must first know what to produce, when to produce, how much and for whom. This is where a participatory market survey becomes very vital to farmers because, together with their support institutions, market information is collected and analyzed to guide farmers' decision on the appropriate income-generating enterprise (Lundy et al. 2002).

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Methodology

The study area: Hoima is one of the districts found in mid-western Uganda. Like any other district in the Lake Albert crescent zone, it receives a bimodal rainfall pattern ranging from 800-1600 mm per annum, with peaks in May and September for the first and second rainy seasons, respectively. The majority of the people in this District are peasant farmers. The two farmer groups of Tukolerehamu and Tweimukye, found in Busiisi and Kitoba subcounties, respectively, are the major focus here.

Group identification and selection: Before any activity is started in a community, there is need to identify groups through which the activities will be channeled to reach the rest of the community members. A search for groups that are strong and representative and with good networking systems are selected to begin a project's activities. Group identification is important because innovations can be easily promoted in already-focused people who share some common objectives. Two farmer groups were identified in Hoima District: Tweimukye and Tukolerehamu youth groups. These groups were selected so as at a later stage they would be used to scale out the activities in which they are involved to the rest of the community by facilitating the formation of new groups and training them in all aspects in which they had been trained.

Community participatory diagnosis: The two groups did an exercise called participatory diagnosis. This consists of a combination and sequencing of participatory approaches and tools for enhancing a shared understanding and learning between the local communities and R&D team to enable the rural communities to identify opportunities and constraints in their community and plan for appropriate interventions to enable them to get out of poverty through their own innovations. This exercise is important because it is the entry point to any community where researchers would otherwise be treated as strangers. Here a dialogue is established between the community and R&D workers; and at this point trust is built as the R&D team gets to understand the farmers and the community at large. It is the starting point for involving farmers in research as in this exercise farmers mention all the assets that they have in their community and their importance to them.

These two groups of farmers drew the map of their village and identified institutions, wooded areas, farms, major crops, markets, water sources, NGOs and CBOs and ranked them in order of importance for them. Constraints in the community that hinder the farmers from progressing in their struggle for food security and income generation were also identified. During this exercise, the farmers selected crops that they felt had the potential to generate income. Crops and livestock selected by Tweimukye group for income generation during the community participatory diagnosis were *nakaati*, tomatoes cabbage, chickens, pigs and goats; while the Tukolerehamu youth group selected beans, bananas, groundnuts, chickens and pigs.

The above items were, according to the farmers, very likely to bring them income, but this is where farmers go wrong, thinking that whatever they want to grow or have grown has a market demand. It was against this background that it was brought to the farmer's attention that whatever they have selected as options for income generation may not necessarily be demanded in the markets and so there is need to go to the markets and find out what sells, who is currently supplying the market, what quantity is demanded, quality issues, frequency of supply, terms and mode of payment and other questions related to

marketing of agricultural products such as the level of damage by weather and pests and disease attacks.

The participatory market research (PMR) process

Selection of market committee: The farmers were convinced that it could be true that whatever they had selected for income generation might not be demanded in the market so they accepted that a market survey be done to either confirm these selected options or to find other better opportunities. Prior to the market visit and because not all the group members could go for the activity, a market committee was selected by the group members. The committee was selected based on ability to read and write, speak confidently in public, ability to give correct feedback, good negotiation skills with the potential buyer, activeness in group activities, gender concerns and age were also considered. Each group selected two men and two women to form the market committee, visit the market and bring back correct feedback to the rest of the group members so a decision could be made on which option for income generation to go with. Before the market committee visits the market to collect information, the core facilitator makes prior arrangements with the market outlets to be visited to ask for permission from the management to bring the farmers, explain the objectives of the visit, and make an appointment as to when the farmers should go.

Training of market committee and pretesting: To get the committee ready for the market visit, they were trained on what information to collect about the product they are interested in. During this training, farmers also realized that information regarding transportation of the products to the market was worth finding out from the buyers. Their concern here was who would be responsible for the costs of transporting the products from their farms to the market.

Basing on the information gathered during the participatory diagnosis about the income-generating options that the farmers were interested in, the guide to the PMR was developed together with farmers as to what information should be collected about the options they had already selected before the market visit and also to find out information about others. The information to be gathered was to inquire whether the products they had selected were demanded in the markets and whether they could meet the supply conditions. In addition, farmers were also to ask questions related to exploring new opportunities in the market that had the potential of generating more income for them than the options selected earlier during the participatory diagnosis.

Other questions were about the most demanded products, the current suppliers, quantity of supply, quality, packaging, mode of payment and whether there was a possibility for the farmers to supply the market with some products. The farmers were also trained on how to ask questions, they were to be polite, start by greeting the buyer and ask questions in a manner that does not make the buyer think that they are collecting market information to throw him out of his business, but rather to make the buyer appear important and helpful in guiding them on the right products to produce for the market.

Sensitive questions such as, "how much profit do you make from these products" were to be avoided unless the buyer was willing to give the information on his own. The market outlets visited were in Hoima, Masindi and Kampala, and they include the Hoima central markets, and Kolping and Millennium hotels in Hoima, Lucky Seven supermarket, Masindi Hotel, Bijah Hotel, Masindi central market, Shoprite supermarket, Uchumi supermarket,

Nakasero market, AMFRI Farms and the NOGMU market. Before the farmers went to the markets for the survey, they had to pretest first to see whether they were well versed with the questions and to see the flow of questions. The pretest was done with the outlets in Hoima, after which mistakes were corrected before proceeding to other market outlets.

Analysis of information gathered from markets visited

Hoima market outlets: Four outlets were visited in Hoima District: the Hoima central market, Lucky Seven supermarket, Millennium and Kolping hotels. In the Hoima central market, farmers found out that there were a variety of products being sold such as tomatoes, onions, cabbage, groundnuts, beans, *nakaati*, bananas, pineapples, green peppers and so many others that the farmers could not exhaust the list. However, despite all the products that were being sold in the market, the prices offered to the farmers were very low.

The Kolping and Millennium hotels had similar demands. The menu served in these hotels include chicken (both local and broilers), pork, beef, *dodo* (amaranthus), tomatoes, green beans, *matoke*, rice, cabbage Irish potatoes, onions and fresh peas. These markets were not promising to the farmers because the quantity of the demand was too small, yet the supply had to be constant; e.g., these hotels consume 3-4 chickens per week, 5 small bundles of *dodo* a day, and 30 kg of pork per week. These hotels have a demand for the products that farmers could supply, but they buy too little, which makes it a risky market to rely on.

The Lucky Seven supermarket had a variety of products in stock. Some of the products the farmers were interested in from this market include watermelons, onions, bananas, pineapples, tomatoes and carrots. This supermarket was not, however, considered a potential market because the prices they pay were too low to sweat for.

Masindi market outlets: Three outlets were visited: the Masindi and Bijah Victory hotels and the Masindi central market. Masindi offered a lot to be supplied by the farmers, including spinach, garlic, carrots, tomatoes, Irish potatoes, pineapples and baby melons. However, the farmers could not ascertain conditions of supply (e.g., frequency of supply); yet the quantity demanded was small. One product did offer a better condition of supply and the cash return was quite encouraging: garlic. The farmers intend to supply this. In the Bijah Victory Hotel quite a few products were also demanded from the farmers. Some of the products demanded include tomatoes, watermelons, cabbage, onions, lettuce, pork, beef, young *moringa* leaves, *nakaati*, cucumbers, pineapples and chicken; but the conditions of supply also limited the farmers as very little is demanded but has to be supplied almost daily. Moreover, the prices offered are not encouraging. In the Masindi central market, watermelons, tomatoes and cabbage were the only products that attracted farmers' attention. However the market did not offer motivating prices to the farmers nor did the buyers show any interest in being supplied with their products.

Kampala market outlets: The market committee visited five places: Shoprite supermarket, Uchumi supermarket, AMFRI Farms, NOGAMU and Nakasero market. The supermarkets had almost the same products, but they were not very willing to give the prices at which they buy these products from the producers on the basis that this is an agreement between the buyer and the producer. The farmers were interested in the following products in the supermarkets: hot peppers, onions, cabbage, *nakaati*, lettuce, tomatoes, eggplants, ginger, white onions, watermelons, spinach, pineapples and vegetables in general.

The farmers also found it hard to produce and pack to meet the supermarkets' standards. Another challenge that the farmers faced from the supermarkets and the Nakasero market was the transportation cost since the suppliers themselves are the ones who transport their produce to the buyers.

The supermarkets expressed little interest in being supplied by the farmers, arguing that it is hard to deal with farmers because they are not consistent in their supply and that they circum to natural occurrences such as bad weather. Nakasero market had so many variety of products that were of farmers' interest. These products include Danial, tomatoes, onions, hot peppers, lettuce, *nakaati*, cabbage, white onions, garlic, carrots, sweet potatoes and many others that the farmers did not express interest in. This market had a lot to be supplied by the farmers, but the buyers never gave them straightforward buying prices, which discouraged the farmers to supply the market. On the other hand, the market is supplied early in the morning at around 6:00-8:00 a.m. This limited the farmers as it is a competitive market where sales are made based on how early one came and the quality of the products being sold. To the farmers, it appeared very unprofitable to supply such a market since they have no proper means of transport to rush and arrive in time for the sales in the market so it was ruled out although a few buyers were interested in being supplied.

Organic markets: The farmers visited two promising markets in Kampala: NOGAMU and AMFRI farms. These markets deal in organic products, both for export and home markets; and they offered exciting opportunities to the farmers including the supply of any of the following products: hot peppers, pineapples, ginger, bananas, avocados, passion fruits, papayas, mangoes, jackfruits, garlic, oranges, tomatoes, cabbage, sweet melons, green peppers, carrots and egg plants. However, these products have to be produced organically under strict supervision of the buyers. The advantage with the markets is that they offer transport to bring farmers` produce to their offices and also pay farmers a better price than the open markets throughout the year, even when there is a lot of supply. Another advantage of this market is that it buys all that the farmers have produced, irrespective of the size, as long as it is not affected by disease. To the farmers the organic markets were better than all the other markets and less exploitative.

What the buyers look for: Before farmers complain that there is no market for their produce, they should have reliable knowledge of what the buyer looks for before they commit themselves to supplying the market. As noted during the market visit, buyers normally look at the following:

- Well-sorted produce
- Farmers willing to supply the needed quantity of produce that the buyer wants at the time that he/she wants
- Produce packed in good-quality containers that will make the produce look attractive but not accelerate its perishability
- People who operate in a group because dealing with individuals will not let the buyer meet his/her target quantity
- Good quality of the produce; i.e., size and shape

Table 1. Summary of the major products and potential markets.

Market outlet & location	Product Name	Quality Required	Minimum Vol. Purchased	Frequency of Delivery	Present Origin of Products on Sale	Purchase Price	Mode of Payment	Possibility of Supply
Masindi Hotel	Carrots	Fresh	20 kg	Daily	Masindi market	2000 per kg	Check	Yes
	Garlic	Well dried	1 bag	Once a week	Kampala	60,000 per bag	Check	Yes
	Tomatoes	Big size, not very ripe	4 boxes	Once week	Masindi market	6000 per box	Check	Yes
	Spinach	Fresh	1 bag	Daily	-	15000 per bag	Check	Yes
AMFI Farms, Kampala	Pineapple	All sizes, but organically produced	300 kg	Once a week	Kampala, Mukono, Mityana	100–500 per head	Check	Yes
	Hot peppers	No patches	2000 kg	Once a week	Mukono	3000 per box	Cash	Yes
	Ginger		2000 kg	Once a week	Mukono	1800 per kg	Cash	Yes
	Bananas	Fresh and raw	2000 kg	Once a week		300 per kg	Cash	Yes
	Avocados	Fresh and raw, rough skin	1000 kg	Once a week		200–300 per Pc	Cash	Yes
	Passion fruits	Purple	1000 kg	Once a week		1000 per kg	Cash	Yes
NOGAMU, Kampala	Garlic	Well dried	1 sack	Thrice a week	Kampala, Mukono, Wakiso	3000 per kg	Cash	Yes
	Pineapple	Organically produced	30 pieces	Daily	Kampala, Mukono, Wakiso	700 per Pc	Cash	Yes
	Green peppers	Fresh	5 kg	Once a week		1500 per kg	Cash	Yes
	Egg plants	Fresh	10 kg	Daily	Kampala, Mukono, Wakiso	1000 per kg	Cash	Yes
	Tomatoes	Fresh	20 boxes	Daily	Kampala, Mukono, Wakiso	8000 per box	Cash	Yes

Table 2. Major problems faced by farmers in marketing agricultural products, ranked.

Problems	Rank
Low prices offered by buyers	1
Exploitation by middlemen	2
High cost of and unreliable transport	3
Changing market demands	4
Perishability of some products	5
Unpredictable weather	6
Lack of up-to-date market information	
Low, poor-quality yields	7
Individual marketing	8

Evaluation of market information and enterprise selection: Farmers need to be guided during the selection of the enterprises in which to invest. This is because farmers often get carried away by the operating market prices .It is common for them to base their decision on the products offering the highest price in the market and forgetting other factors that may affect the production and supply of such products. Before selecting any enterprise, a thorough evaluation of all the options has to be done with the farmers so that they are in a position to determine which products can be realistically produced without frustration in the long run.

Following the return from the market visit, the market committee presented their findings to the rest of the group members so that a decision could be made as a group concerning which products they could produce successfully as an income-generating option. Farmers also had to take into consideration market demand and supply forces and other external factors that could affect the production of the product they select. The following criteria guided farmers in selecting the enterprises that they later on chose and the markets to supply:

- Market demand
- Possibility of the profitability of the product
- The market price of the commodity
- Cost of transportation for farmers
- The time frame before the farmer will start realizing benefits from the product
- Knowledge of production of the product
- Land size
- Production costs
- Ability to supply the market constantly
- Knowledge of post harvest handling of a particular product
- Availability of technical expertise
- Ecological factors like the type of soils and weather conduciveness for the products
- Perishability

Enterprises selected by the Tukolerehamu youth group and Tweimukye group: Based on the above criteria for selecting income-generation enterprises, discussions centered on crops that had high demand, ready market and ease of production in relation to production costs such as transportation, labor and pest/disease management. The Tukolerehamu youth group selected the following crops: Hot peppers, pineapples, ginger and papayas. The Tweimukye group selected hot peppers, ginger, garlic and passion fruits.

Conclusions

It is important that market research be conducted before farmer groups or individuals embark on the production of a particular product. This guides the decision as to what should be produced, for whom, when and what quantity. The PMR is crucial as it helps farmers produce what they can sell rather than trying to sell what they have produced. Many times farmers produce blindly, stating that there are no markets for agricultural products; yet the market survey shows that farmers fail to meet the quantity and frequency of supply as demanded by the buyers.

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Comparative Analysis of Strategies for Linking Farmers to Markets: Is Gender Integration an Important Consideration? A Case Study of Malawi

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Background

Natural resources are a significant part of our environment, which, if used in a sustainable manner, could improve the livelihoods and food security for the majority of the rural poor. For many African countries, poverty and the lack of appropriate knowledge, technical backstopping and cash resources are major constraints to small-scale farmers' participation in different technologies for natural resource management (NRM) (I-LIFE 2004). In addition, lack of the necessary infrastructure and dispersed production have led to high transaction costs and poor market access (Mwalukasa et al. 2001; Estrada et al. 2005; Mattee et al. 2005), and the farmers' failure to reap benefits from participating in commercial farming.

Women produce from 60-80 percent of the food in most developing countries and are responsible for half the world's food production (FAO 2004). However, gender disparities, which are very common and widespread in African countries, undermine women's recognition and their contributions in agricultural technological innovations (Feldstein & Poats 1989; Rao et al. 1991; Barrett et al. 2002; Thangata et al. 2002; Gladwin 2003; Schmink 2003; Udry 2003; Pimbert 2004). Gender disparities affect African women and poor farmers in terms of access and control to livelihood resources (natural, human, social, financial and physical resources; agricultural inputs, food security, income, shelter and access to internal and local markets, and other resources that enhance their ability to make choices and informed decisions), production and consumption benefits (Amoloza 1998; Reij & Waters-Bayer 2001). Despite their vital role in agricultural production, African women and poor farmers are less secure in terms of these resources, and tend to be most vulnerable to impacts that undermine their economic resilience to shocks and their social support networks (Amoloza 1998; Niehof 2004). Lack of access to and control over productive resource limits women and poor farmers from participating in agricultural technological innovations (de Haan 2001; Njuguna & Valdivia 2005), thereby reducing their productive role and independent income. With regard to gender, the last two decades have seen a growing consensus on the need for more effective ways to work with local communities to improve agriculture and food security (Schmink 2003; FAO 2004), with an emphasis on livelihoods and the involvement of women and poor farmers.

On the other hand, recent studies have indicated the importance of reinforcing social capital (SC) in communities for successful community development and empowerment (Rouse 1996; Johnson et al. 2002; Krishna 2003). SC refers to the degree to which a community or society collaborates and cooperates through such mechanisms as networks, shared trust, norms and values to achieve mutual benefits (Krishna, 2003). SC is a resource, a propensity for mutually beneficial collective action that communities possess to different extents. Communities with high levels of SC are able to act together collectively to achieve diverse common objectives such as accessing and sharing information via networks of

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contacts, improving agricultural production, reducing transaction costs in contracting via trust, and sustaining capacity for collective action (Rouse 1996; Johnson et al. 2002; ICRAF 2004; Mtenga et al. 2005; NASFAM 2005).

The social networks, norms and trust that comprise SC are potential determinants of R&D outcomes and positive impacts for sustainable NRM (Rouse, 1996; Johnson et al. 2002; World Bank 2004). These informal networks and social relationships are particularly important for women and poor farmers in many African societies (Rouse 1996). To date the majority of farmers still rely on kin and social networks for access to livelihood resources such as knowledge/skills, land, labor, inputs and capital. However, different farmers in a community may belong to different social networks for different purposes. Hence the economic and social consequences of different development projects may impact farmers' SC, their organizational capabilities and empowerment in different ways.

Sustainable management of existing natural resources by rural communities offers potential for new livelihood benefits. However, this requires the development and strengthening of social and institutional capacity (Kaaria 2005), timely information and communication, appropriate policies and advocacy that explicitly integrate gender dimensions and decentralization of decision-making and management actions to local governance (I-LIFE 2005; NASFAM 2005). Mainstreaming gender represents an opportunity for identifying and enhancing vulnerable people's livelihoods. Intensification of marketable enterprises and products (e.g., agroforestry and fruit tree products) can also increase small-scale farmers' income (ICRAF 2004). Access to potential markets may increase farmers' incentives to participate in agricultural intensification through investment in better NRM (Boserup 1981; Ruttan & Hayami 1991; Barrett et al. 2002; Kaaria 2005). Small-scale farmers are likely to adopt and invest in NRM technologies that produce for the market; however, appropriate strategies and methods are required to ensure security of resource/assets (labor and capital, technology management and entrepreneurial skills, market access, etc.) for sustainable rural livelihoods.

In Malawi there are different organizations with strategies for implementing marketable enterprises for farmers' increased income and food security. This research aims to identify these strategies, summarize and analyze them to bring an understanding of some key lessons and potential experiences for strategies that directly benefit rural people particularly women and the poor.

Research objectives

- To identify and compare different strategies for linking farmers to markets that explicitly integrate gender dimensions
- To determine and analyze the extent to which women farmers participate in the market
- To determine what benefits women farmers derive from participating in the markets
- To analyze NRM decision-making/tradeoffs between food security and market enterprises

Research methodology

The research is divided into three phases; hence, different methodologies are used.
Phase 1 aimed to identify and compare different strategies for linking farmers to markets

(Objective 1). Phase 2 will cover objectives 2-4, which involve collecting and analyzing information from farmers to determine the extent to which women farmers participate in the market, types of benefits that women farmers derive from participating in the markets, and NRM decision-making/tradeoffs between food security and market enterprises. Phase 3 will involve organizing and analyzing data collected and dissertation write-up.

Research Phase 1: Phase 1 research was conducted from September 2005-January 2006. The major objectives were to:

- Identify organizations that link farmers to markets
- Compare and analyze strategies that these organizations have used to link farmers to markets
- Select a few strategies based on the foregoing analyses for a detailed study of overall research objectives 2-4, using structured methods and questions.

Data collection methods: This part of the research was built on the information obtained from a few strategies that were identified during the preliminary research work in June 2004, where such organizations as the Association of Smallholder Seed Multiplication Action Group (ASSMAG), National Smallholder Farmers' Association of Malawi (NASFAM), International Center for Tropical Agriculture (CIAT) and International Institute of Tropical Agriculture/Southern African Root Crops Research Network (IITA/SARRNET) were identified as having potential strategies for linking farmers to markets. However, at the beginning of Phase 1, it was noted that there were other organizations with potential strategies through which farmers have linked to markets. Based on this, formal interviews were conducted with key informants to obtain information on different strategies they used and also served as a means of identifying other organizations with strategies for linking farmers to markets.

After the interviews, key informants were asked whether they knew any other organizations with strategies for linking farmers to the market. Through this process, 14 organizations were identified. Their strategies were compared and analyzed using the institutional framework that was designed using important criteria such as the type of strategy used, integration of gender, community empowerment and NRM; scale of operation, type of support offered, and type of agroenterprises supported (Appendix 1).

Based on the analysis, six organizations were selected for further analyses: CIAT, ICRAF (World Agroforestry Center), NASFAM, World Vision, ASSMAG and RUMARK (Rural Market Development Trust). Informal discussions were conducted with farmers working with CIAT, ICRAF, World Vision and ASSMAG as a follow-up to see whether each of the strategies met the predetermined criteria for comparison at farmers' levels. Informal discussions will be held with farmers working with NASFAM and RUMARK by the end of February.

Two sets of checklists of questions were developed to collect information from key informants and farmers. These were pre-tested with a key informant and farmers working with CIAT and later on modified to capture the necessary information required for Phase 1 of the research. A follow-up was done with key informants through emails, phone calls and/or setting of additional appointment meetings with them to address specific questions that needed more information and clarification.

Research results: The research identified the following organizations with strategies for linking farmers to markets:

- CIAT
- IDEAA (Initiative for Development and Equity in African Agriculture)
- IITA/SARRNET
- NASFAM
- ASSMAG
- RUMARK, a CNFA affiliate
- I-LIFE DAP (Improved Livelihoods through Increased Food Security Development Assistance Program), a consortium including organizations such as Catholic Relief Services (CRS), CARE International/Malawi, the Salvation Army in Blantyre, Africare, Emmanuel International in Mangochi, Save the Children and World Vision.
- CARE International
- World Vision
- CRS
- ICRAF
- Concern World Wide
- Concern Universal, an IFAD (International Fund for Agricultural Development)-funded project
- International Crops Institute for the Semi-Arid Tropics (ICRISAT)

All these organizations have used different strategies to link farmers to markets, which are categorized into the following models:

Farmer-to-trader linkage
Most strategies used this linkage model. This is a slightly different model from that identified by FAO in Bangladesh and El Salvador, where traders and farmers developed markets together (FAO 2005). In Malawi farmers were assisted by their organizations to conduct market research and/or eventually develop potential agroenterprises to meet market demands. Most organizations that fall under this model facilitated farmers' linkage with traders; some assisted with contractual and price agreements for marketing crops and livestock products. Although the final decision for the actual price of the commodities was left to the farmers, this model brings an understanding of the role of these organizations in the whole marketing process. CIAT, CRS, IITA/SARRNET, ICRISAT-NASFAM, World Vision, CARE and ICRAF strategies have used this model to link farmers to the markets.

Linkage through a leading farmer (farmer-to-leading farmer)
This model was not extensively used in Malawi. IITA/SARRNET tested this model with a few farmers in Lilongwe district. In this model cassava production was organized through different small-scale farmers. These farmers sold cassava to one leading farmer-buyer, who in turn processed the raw cassava into chips and/or flour and sold these products to potential traders in Malawi.

Linkage through farmer associations (farmer-to-association)
Only a few organizations such as NASFAM had strategies that fall under this model. Within NASFAM, farmers were organized to produce highly marketable crops for national and international markets. Farmers sold to NASFAM, which in turn, sold the commodities to national and international traders through its Commercial Center. Farmers who worked with Concern World Wide were also linked to NASFAM. ASSMAG

and World Vision also used this model, where their farmers sold commodities through ASSMAG associations and the World Vision leaders Association clubs, respectively.

Linkage through specialized communication and market information centers
IDEAA was the only organization that used this model. Sellers and buyers of different commodities including agricultural inputs were linked through specialized market-information centers. Using computer networking and cell phone text messages, sellers and buyers accessed potential market information available each season. In addition IDEAA facilitated meeting of sellers and buyers for contractual and price agreement. Special radio programs were designed to reach majorities of farmers with potential production and marketing information to enable them to make informed decisions on the price of the commodities they needed to sell/or buy.

These strategies were analyzed using criteria such as type of strategy used, integration of gender, community empowerment and NRM; service providers' competence, capacity building of farmers to analyze their market, scale of operation (no. of farmers reached and geographic coverage), and level of support serviced offered. Appendix 1 summarizes the results from the comparative analyses of these strategies.

Conclusions

It was found that each strategy varied from one another, but all illustrated the potential for improving farmers' market access. Each strategy falls under different models identified by FAO (2005), by means of which farmers had linked with markets. A detailed analysis of these strategies is being finalized in a paper.

Based on the pre-determined criteria for comparing and analyzing these strategies, this research selected CIAT, ICRAF, NASFAM, World Vision, ASSMAG and RUMARK as having potential strategies for linking farmers to markets. Phase 2 will analyze these strategies to determine the extent to which women farmers participate in the market, type of benefits they derive from participating in the markets, and NRM decision-making/tradeoffs between food security and market enterprises.

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Appendix 1: Institutional framework for comparing and analyzing different strategies for linking farmers to markets[1]

Organization	Type of strategy	Service providers' competence	Building farmers' capacity to analyze market	Scale of operation (no. & geographic coverage)	Integration of NRM (sustainability of production)	Is poduction demand-driven?	Level of support services offered	Extent to which gender is integrated	Focus on community empowerment
CIAT	ERI	xx	xxx	x	x	xx	xx	xxx	xxx
IITA	Demand-driven	x	X	x	x	x	xx	x	x
ICRAF	Demand-driven	xx	xx	x	xxx	xx	xx	xx	xx
World Vision	ADP/ Holistic	xx	xxx	xxx	xx	xxx	xxx	xx	xx
NASFAM	Demand- & production-driven	xxx	xxx	xxx	xx	xxx	xxx	xxx	xxx
ASSMAG	Demand-driven	xx	xx	xxx	x	xx	xx	x	xx
Concern World Wide	Demand-driven	x	x	x	x	x	xx	x	x
IDEAA	Information-communication	xx	x	xx	x	x	x	x	x
I-LIFE	Holistic	xx	xx	xx	xx	xx	xx	xx	xx
CRS	Demand-driven	x	xx	x	xx	xx	xx	xx	xx
ICRISAT	Partner-trader-led	x	x	x	x	xx	xx	x	x
RUMARK	Demand-driven		x		x			x	

1. Index: x = low, xx = moderate, xxx = highest.

Output 4: Methodologies for Establishing Community-Managed Participatory Monitoring and Evaluation Systems (PM&E) Tested, Applied and Widely Disseminated

Human and Social Capital Impacts of Applying Participatory Approaches: A Study of Local Agricultural Research Committees in Colombia (CIALs)

V. Sandoval[53], *S. Kaaria*[54], *and N. Lilja*[55]

Introduction

Over the past decades, agricultural research has contributed to significant increases in world food production. Maintaining these productivity increases, as well as making progress on additional goals of alleviating poverty and protecting the environment, presents a major challenge to the agricultural research system. In order to maintain and extend the benefits of agricultural research, new ways of doing research may be necessary. One such method, participatory research (PR), seeks to involve the intended beneficiaries of research in the research process itself, based on the idea that user participation will lead to more efficient and effective design and targeting of technologies, thereby reducing diffusion time and helping ensure that the intended beneficiaries are reached with technologies suited to their needs.

In principle, the concept of PR has been widely accepted. Few scientists would consider doing adaptive research on agricultural or natural resource management technology development without at least some input from users. There are many types and degrees of participation, however, with very different implications for the costs-benefits of research. For example, asking farmers' opinions or inviting them to visit field trials is a type of participation; however it is very different from letting farmers make decisions about what kinds of technologies will be developed or training them to carry out research themselves. Because PR methods incorporate user perspectives in the research process, it is often claimed that they orient research more towards the needs of the poor and thus result in a greater impact on poverty alleviation than conventional research. It cannot be said a priori that participatory methods make research more pro-poor because this would depend on the extent to which the needs and priorities of the poor differ from those of the non-poor, and whether or not the poor are specifically targeted in the research process.

Whether PR makes research more pro-poor is essentially an empirical question. Therefore, in order to understand the relationship between PR and poverty alleviation better, empirical evidence is needed on what impacts participatory methods have had on poverty in the context of specific projects and participatory methodologies. This project seeks to begin to fill this gap. The study builds on results from an earlier study (Hincapié, 2003) and a survey done by the IPRA Project in 1998 (Ashby and García, 2000).

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The study built on results from an earlier study Hincapié (2003) and an impact assessment study conducted by the IPRA Project in 1998 (Ashby & García, 2000).

Study objectives

1. The specific objectives of this study were:
2. To identify characteristics necessary for a community member to participate in the CIAL (including well-being and educational level, gender, innovators, unusual, etc)
3. To assess social and human impacts of the CIAL to its members as well as the members of the community

Research questions:

(a) What are the characteristics necessary to become a CIAL member?
(b) How is participation in CIAL membership distributed across the different gender and wealth groups?
(c) Do CIALs improve the flow of information on technology demand between farmers/communities, to other communities and research and development organizations?
(d) What are the benefits of being a CIAL member (human capital and social capital)?
(e) What is the impact of the increased human and social capital among the members and communities?

Methodology

This study examined the impact of CIAL methodology, which incorporates farmer participation in the agricultural research process, through the establishment of local agricultural research committees (CIALs) in rural communities. This method was developed at CIAT in the 1990s and is currently used in approximately 250 communities of several Latin American countries. The community establishes a research committee with elected members. Each CIAL is supported by an agronomist or extension agent who trains the committee members in the research design (controls, replicates, systematic evaluation of results) and who visits their trials regularly to provide technical support. Support for the agronomist comes from the institution supporting the CIAL, usually an NGO, the national research or extension service, or some other institution involved in technology development and transfer. Costs of experimentation are covered by outside funds; however farmers are not paid for their participation or time. Research problems and priorities are set at the level of the community (by vote), but the experimentation is done by the CIAL on behalf of the community. Community members are able to visit the trials all along, and results of experiments are disseminated at the level of the community. If a series of experiments identifies a promising technology or practice, the CIAL will recommend it officially. Figure 1 illustrates the conceptual framework used to assess impacts.

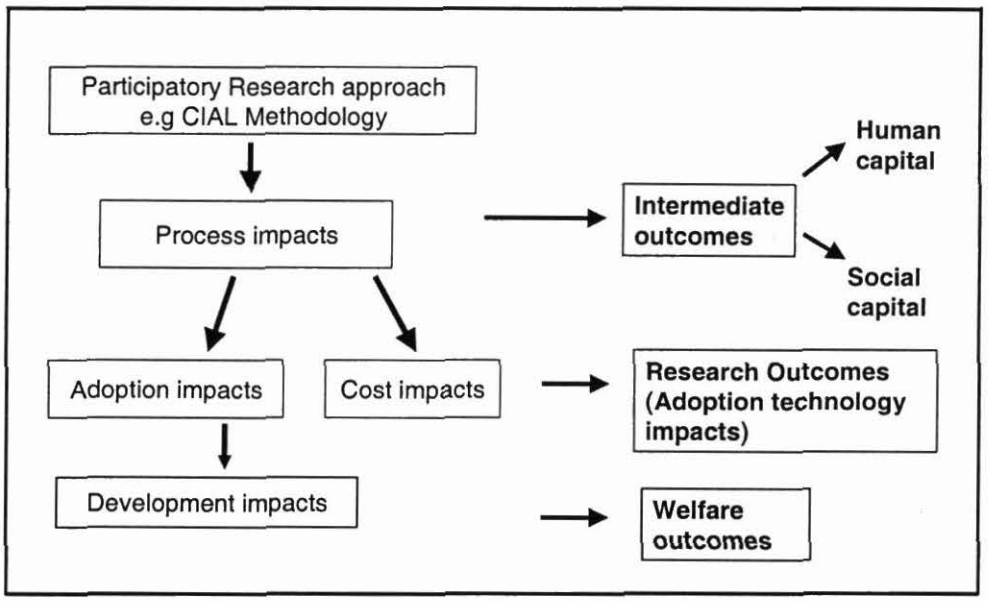

Figure 1. Conceptual framework for analysis.

The sample design: The study was made taking in count both levels: community with and without CIALs, and CIALs. Table 1 lists all CIALs included in the study. The sampling was done as follows:

1. ***CIAL level:*** The sample was selected from all existing CIALs in Cauca department that have more than 5 years. To ensure a representative sample, CIALs were also stratified by age and gender of membership. Thirteen CIALs in 12 communities in were selected. At the CIAL level, individual household interviews were conducted, and focus group discussions (FGDs) were conducted at the CIAL group level. All the CIALs included in the study and their description is included in Table 1.

2. ***Community level:*** In order to understand the impact of CIALs on individual members as well as on other community members, individual household interviews were conducted in six CIAL communities and four communities without CIALs. In each of these communities both CIAL and non-CIAL members were interviewed. In addition, both the male and female heads of household were interviewed. Four of communities selected: El Jardín, San Bosco, Tres Cruces and Cinco Días, were selected because they formed part of the study documenting the impact of the CIAL methodology (Hincapié, 2003), while the other two (Crucero de Pescador and Carpintero) had been in the impact study conducted in 1998. The information from these earlier studies formed the basis for the design of the surveys for this study.

3. ***Counterfactual (Non-CIAL communities):*** In order to control for changes in the communities attributable to the presence of CIALs, 4 counterfactual communities were also selected on the basis of not being neighbors and similarity in various characteristics.

Table 1. CIALs included in the study.

Name of CIAL	Locality	Age of CIAL	Households in community	Number of members		Sample size
				Men	Women	
Andalucía	Caldoso	8		4		
Betania 1	Totoró	12	33	6	8	
Betania 2	Piendamó	7	15	6	2	
Buenavista	Caldoso	10	47	13	1	
Carpintero	Morales	8	181	20	10	46
El Jardín	Caldoso	10	38	3	1	10
Las Cruces	Silvia	6	57	3	3	15
Pescador	Caldoso	13	66	5		17
San Bosco (Female)	Santander de Quilichao	5	58		9	15
San Bosco (Male)	Santander de Quilichao	12	58	3		
San Isidro (Male)	Santander de Quilichao	7	66	5		
Cinco Días (Female)	Timbío	11	205	2	13	52
El Diviso	Rosas	12	83	4	2	

Results and Discussion

(a) Characterization of the CIAL members: The objective of this characterization was to learn the differences between the CIAL members and non-members within the CIAL communities, and to assess whether CIAL members are representative of their community. The following socio-economic characteristics of CIAL members and non-members were compared: Amount of own land, if they work off the farm or not, educational level, whether the person hires labor or is hired (work days hired during the year), yearly availability of food and participation with community organizations. Tables of these results are found in Appendix I.

The results show that there is no significant difference between CIAL members and non-members in terms of of-farm activities, land ownership, whether the farmer seeks off-farm employment or not, and land size. However, there were significant differences between CIAL and non-CIAL members in terms of level of education, participation in other organizations, yearly availability of food and whether household hires labor or not.

The results show that a larger number of CIAL members (75%) hired labor during some time of the year, which contrasts significantly with the non-members (47.5%) who hired labor during the same period of time. In comparing the total months in which the household faced food scarcity in the year 2003 between the members and non-CIAL members, it was observed 30.6% of the CIAL members and 14.6% of the non-CIAL members, stated that there was no scarcity of food. This may imply that one benefit of the CIAL methodology is improved food situation, which is expected because a majority of the CIAL work focuses primarily on crops that are important for food security in the region, such as common beans and maize.

The rest (85.4% of the non-CIAL members and 69.4% of the members) stated that during some time of the year, there was insufficient food, which affected the quality of life of the community, although those belonging to the CIAL indicated they were less affected. Other results show that a higher percentage of CIAL members (30.6%) have had secondary education as compared to non-CIAL members (8.8%).

Additionally, CIAL members participate in many other organizations in the community. For example, comparing members and non-CIAL members in relation to their participation in community organizations, found that a majority of community members 86.1%, participate in at least one organization. On the other hand, of the nonmembers, 51.8% participate in 1-3 community organizations and 63.9% of the CIAL members participate in at least four organizations.

(b) How do CIAL members Benefit from Participation: This section analyzes the impacts resulting from participating in the CIAL. The CIAL methodology is based on the premise that participation will build human and social capital through the enhanced capacity to experiment with new agricultural practices (Ashby 2003). Strengthening human capital, which involves enhancing farmer's knowledge and understanding processes is seen as an important component for building rural people's capacities to innovate, and is probably more important than just involving them in developing the technology (Johnson, et al., 2002). Various studies show that strengthening group working processes and enhancing social capital, is an important asset that can provide a variety of supportive mechanisms for enhancing rural livelihoods. At the community level, strengthening the social capital of rural communities and their organizational capacity is critical for horizontal and vertical linkages among communities, and between communities and rural service providers (Sanginga, Kamuisha and Martin, 2005; Ashby et al. 2000).

In this study, human capital was measured by assessing: leadership potential, enhanced capacity to experiment with new agricultural practices, and the capacity to facilitate problem solving in the community. This study looked at the relationship between farmer experiments conducted outside the regular CIAL activities and new crops tested within the CIAL. The results showed that 23% CIAL members did not conduct trials outside of those done by the CIAL. Of the group that did conduct other experiments besides those of the CIAL, 92.3% experimented with new crop varieties. Ninety four percent of the CIAL members indicated that they had acquired new skills in: new technologies for crop management; doing research in agriculture; organizing and administering agriculture and livestock production; marketing; speaking in public; and organizing meetings with the community.

Another indicator used to assess change in human capital was the number of positions a person holds in the various community organizations. The study found that within CIAL members the capacity to organize and lead community meetings increased with number of years the person had been a CIAL member. On the other hand, when CIAL and non-CIAL members were compared in terms of participation in community organizations, the study found that there was no significant difference in participation in community organizations. However, a large percentage CIAL members (85.4%) were in leadership positions in the various community organizations, as opposed to non-CIAL members (15%). These results are supported by focus group discussions results, which found that leadership potential, responsibility and commitment to the community were part of the criteria used to elect members.

(c) Social and Human Capital Benefits at the level of the community: In the comparison between the CIAL members and the members of their community, this study found significant differences, in terms of new varieties tested, changes in the way of planting and in providing agricultural advice to someone outside the family, during the last five years. With respect to new varieties of crops tested during the last five years, 59.2% of the members tested new varieties at least once in contrast with the 35.0% for non-members. The CIAL members had tested varieties of traditional crops (common beans and maize) and nontraditional ones (fruits, vegetables, wheat, rice and sugarcane), whereas the non-members had concentrated only on varieties of traditional crops (coffee, maize, common beans and cassava). With respect to the change in the way of planting during the last five years, it can be observed that around 55% of the members have tried to change something with respect to the way of planting, whereas only 38.5% of the nonmembers have tried. In the variable "providing agricultural advice to someone outside the family," results showed that CIAL members provided twice as much agricultural advice as nonmembers (51 versus 25.9%).

Nevertheless, we expected to find these results. These differences can be explained by the activities of the CIAL methodology, the training, study tours and exchanges that these committees do. For the members, experimenting is an activity of the committee, and they have access to new varieties through exchanges with other groups and their relations with institutions. It should be highlighted that the nonmembers have also had interest in experimenting with new varieties and farming techniques despite the fact that they have not received the same training as the CIAL members.

In the analysis, we can see the existence of a group characterized by members that had conducted experiments beyond those that were part of the CIAL's normal activities, had also experimented with new crops, learned other skills, and had a higher level of participation in other community organizations. The foregoing is corroborated by the multiple correspondence analysis, which distinguishes the two groups: The first is characterized by low community participation, which could be associated with their not changing their level of commitment to the community, their low interest in acquiring new skills or in testing new crops. In the second group are people with a high sense of belonging to the community, which is manifested by their high participation in organizations and their change in commitment with the community. They have also acquired new skills, which could be related to their interest in testing crops other than those that they generally plant. Using schooling as the explanatory variable, we can say that the higher level of education with the second group. Therefore we can assume that the benefits of being a CIAL member are, to a great extent, reflected in the members with a higher level of education.

(d) Improvement of leadership skills in agriculture and recognition as leaders in agriculture: To analyze this indicator, the recognition of CIAL members by their communities as leaders, experts in agriculture, and as being capable of solving agricultural problems in the communities were studied. Figure 2 shows that CIAL members are being recognized by their communities as being capable of attending to a group of visitors that would like to know about agricultural matters in their communities. The foregoing indicates that their communities recognize that CIAL members have extensive knowledge about farming in their communities. These findings are also be corroborated by further results indicating that CIAL members are the farmers most recognized by their communities as agricultural experts. Figure 3 shows that the CIAL is one of the organizations to which belongs farmers recognized by the community as knowledgeable of community-related agricultural problems, and to whom a group of visitors could be taken.

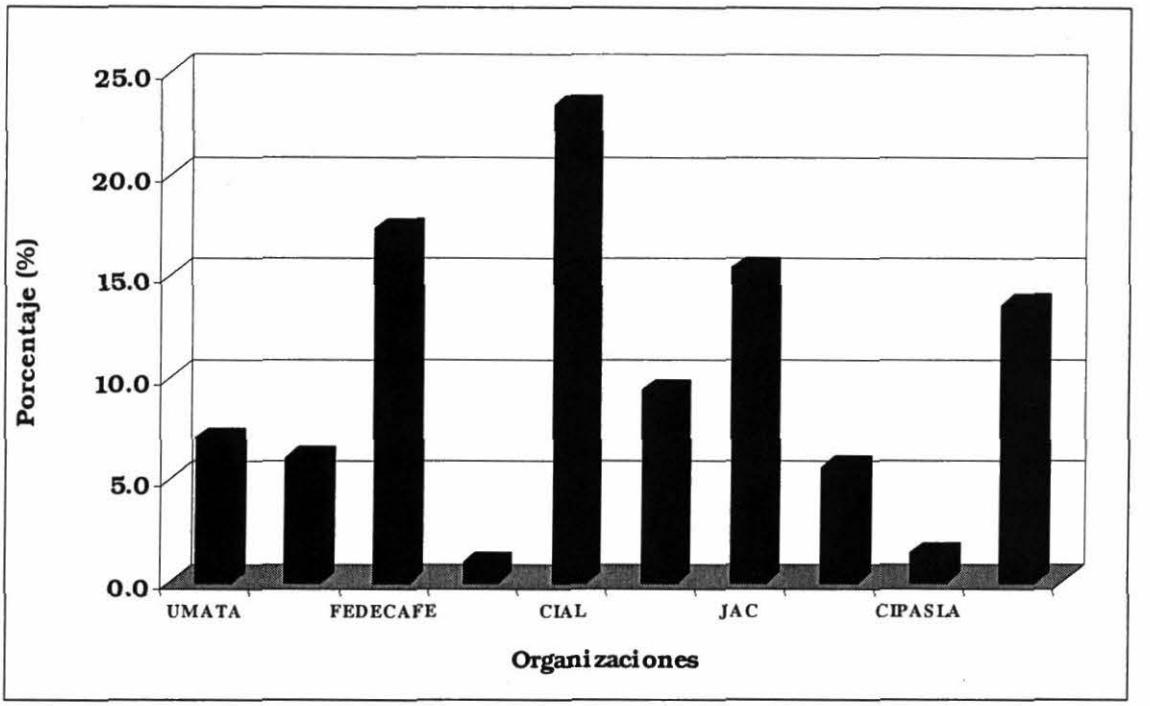

Figure 2. Organizations to which belong the farmers recognized by the community as knowledgeable of community-related agricultural problems, to whom a group of visitors could be taken.

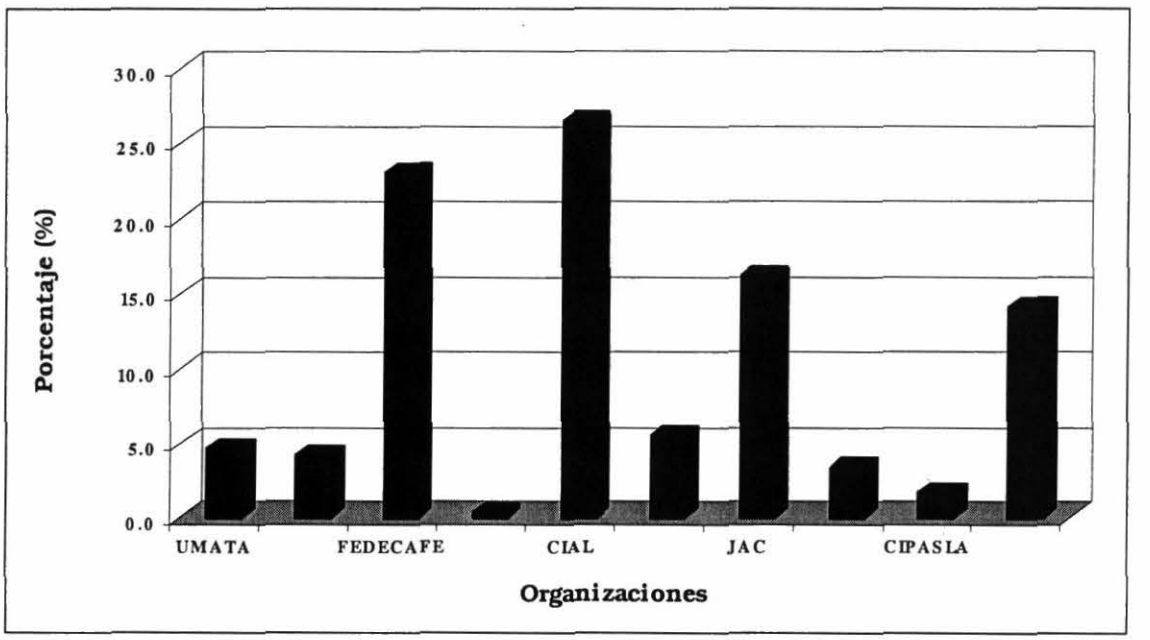

Figure 3. Organizations to which belong farmers recognized by their community as experts in agriculture.

Conclusions

The results show that CIAL members are representative of their communities in various aspects: of-farm activities practiced, whether the farmer seeks off-farm employment or not, and land size. However, there were significant differences between CIAL and non-CIAL members in terms of level of education, participation in other organizations, yearly availability of food and whether household hires labor or not. The study found CIAL members suffer less for shortages throughout the year as compared to non-CIAL members. This was an expected result because a majority of CIAL experiments focus primarily on crops that are important for food security in the region, such as common beans and maize.

The results also show that there are significant social and human capital benefits for CIAL members and their communities. CIAL members indicated that they had gained more knowledge about agriculture and were experimenting with new technology and were seen as agricultural experts and advisors in the community. Both results from the surveys and focus group discussions corroborate significant improvements in CIAL members communication and leadership skills. CIAL members experimented more with new crops, had learned other new skills, and had higher levels of commitment to their communities, thereby leading to a higher level of community participation. Communities acknowledged that CIAL members were experts in agriculture, were capable of attending to visitors and of solving agricultural problems in the communities. The communities indicated that they could consult CIAL members when they had agricultural problems.

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Appendix I. Data Tables

Table 2. Comparison between members and non-CIAL members in relation to land tenure.

CIAL Members	Amount of Land (ha)				Total
	< 1	1 - 3	3 - 5	> 5	
No	60	44	15	18	137
	43.8%	32.1%	10.9%	13.1%	
Yes	12	12	6	6	36
	33.3%	33.3%	16.7%	16.7%	
Total	72	56	21	24	173
	41.6%	32.4%	12.1%	13.9%	

Table 3. Percent comparison between members and non-CIAL members in relation to land size and seeking labor opportunities off farm.

CIAL Members	Work Off the Farm	Amount of Land (ha)				Total
		< 1	1 - 3	3 - 5	> 5	
No	No	26.3	23.4	7.3	11.7	68.6
	Yes	17.5	8.8	3.6	1.5	31.4
	Total	43.8	32.1	10.9	13.1	100
Yes	No	22.2	22.2	11.1	16.7	72.2
	Yes	11.1	11.1	5.6	0.0	27.8
	Total	33.3	33.3	16.7	16.7	100

Table 4. Comparison between members and non-CIAL members in relation to the Hiring/contracting labor (work days/year).

CIAL Members	Hire / Contract Labor (Work Days/Year)			Total
	Does not hire	1 - 6	6 – 12	
No	72	59	6	137
	52.6%	43.1%	4.4%	
Yes	9	19	8	36
	25.0%	52.8%	22.2%	
Total	81	78	14	173
	46.8%	45.1%	8.1%	

Table 5. Comparison between members and non-CIAL members in relation to scarcity of food in the year.

CIAL Members	Scarcity of Food (mo/yr)				Total
	Not scarce	< 3	3 - 6	> 6	
No	20	80	32	5	137
	14.6%	58.4%	23.4%	3.6%	
Yes	11	12	11	2	36
	30.6%	33.3%	30.6%	5.6%	
Total	31	92	43	7	173
	17.9%	53.2%	24.9%	4.0%	

Table 6. Comparison between members and non-CIAL members in relation to schooling.

CIAL Members	Schooling			Total
	No Education	Primary	Secondary	
No	17	108	12	137
	12.4%	78.8%	8.8%	
Yes	1	24	11	36
	2.8%	66.7%	30.6%	
Total	18	132	23	173
	10.4%	76.3%	13.3%	

Table 7. Comparison between members and non-CIAL members in relation to the number of community organizations in which they participate.

CIAL Members	No. of Organizations				Total
	Does Not Participate	1 - 3	4 - 6	> 6	
No	23	71	33	10	137
	16.8%	51.8%	24.1%	7.3%	
Yes	1	12	13	10	36
	2.8%	33.3%	36.1%	27.8%	
Total	24	83	46	20	173
	13.9%	48.0%	26.6%	11.6%	

Assessing the Impacts of Applying Participatory Approaches: A Case Study of Local Agricultural Research Committees (CIALs) in Honduras

L. Classen[56], S. Humphries[57], J. Fitzsimons[58] and S. Kaaria[59]

Introduction

Many practitioners recognize the importance of participatory initiatives in these marginal contexts for helping to generate locally appropriate technologies and in helping farmers to adapt technologies to their farm-specific needs (Korten, 1980; Chambers, 1994; Selener, 1997; Berdegue and Escobar, 2002; Van de Fliert et al., 1999). In particular, participatory initiatives that incorporate more broadly-based efforts to enhance the natural asset base, build local institutions and strengthen networking are showing potential to instigate long-term and sustainable innovation (Berdegue and Escobar, 2002). However, an ongoing challenge for participatory projects is demonstrating the value-added from local stakeholder participation (Aycrigg, 1998). Many of the most important impacts are related directly to the project *process* and are hard to anticipate at the project outset making them very difficult to capture in impact assessments. Practitioners are searching for comparative frameworks for measuring the impact and, more specifically, the 'sustainable' impact of rural development projects. However, it is an uphill climb when the primary common element among small farmers in developing world contexts is diversity.

This paper seeks to add to the growing body of literature on sustainability of agricultural livelihoods for the rural very poor and, in particular, the role of participatory approaches for promoting what Stockmann (1997) has referred to as innovation-oriented sustainability. It outlines the results of a recent multi-level impact assessment of the CIAL (Spanish acronym: Comite de Investigacion Agricola Local (CIAL) participatory agricultural research project in North-Central Honduras and it explores the implications of these results for comparative frameworks for measuring more social and participatory project outcomes. The paper examines the different context-oriented divisions of rural livelihoods used by Berdegue and Escobar (2002). Specifically it discusses the implications of the highly diverse livelihood contexts of asset poor farmers for developing reliable and comparable impact assessment (IA) frameworks for measuring innovation-sustainability. The paper culminates in a list of principles for IA's of agricultural research and innovation projects, which is meant as a launching pad for thinking about context-oriented approaches to sustainability and comparative frameworks for participatory rural project evaluations.

Relevant literature

Berdegue and Escobar (2002:11), assert that, "if we want to improve the performance of agricultural knowledge and information systems *vis-à-vis* poverty, it is time that we learned to deal with its diversity by means of customized approaches". They propose a tripartite categorization of rural contexts to provide some policy guidance for thinking about

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development goals and approaches for agricultural innovation initiatives. The three categories are: a) farmers in areas with a high asset position and with favorable production environments, b) farmers in a low asset position with favorable production environments and c) farmers in a low asset position with unfavorable production environments (Berdegue and Escobar 2002:8). They argue that strategies to improve conditions of rural poverty must recognize these different rural contexts and customize their approaches appropriately.

Farmers in the first two categories have medium to high agricultural potential and networks, and agricultural innovation is market-driven or at least market oriented (Berdegue and Escobar, 2002). Poverty reduction strategies may target these areas since improvements in agricultural production will have not only some direct effects but also a high potential for indirect effects on urban and rural poor who are the net buyers of surplus production (Berdegue and Escobar, 2002). In these contexts, where agricultural production is market-driven, 'sustainable agriculture' is often interchangeable with the concept of 'sustainable development'. Sustainable agriculture occurs where "farming seeks to make the best use of nature's goods and services whilst not damaging the environment" (Pretty, 2000: 7; and Pretty, 2001: 4; also see Altieri, 1995; Thrupp, 1996; Pretty, 1995b, 1998).

However, the reality is that the majority of the world's rural poor will derive only very limited direct or indirect benefits from conventional agricultural research. The Honduran farmers involved with the CIAL project fall into Berdegue and Escobar's (2002) third category, characterized by extremely marginal growing conditions and few assets aside from unskilled labor. They have very diversified livelihoods, often relying heavily on non-agricultural activities to support their families, rendering much of the formal agricultural research of limited relevance to their needs. It is in these contexts that we see a break down of the more conventional model of agricultural research- innovation–extension–adoption. In this context approaches to 'sustainable' development and appropriate interventions become much more complex. Here, 'sustainable development' and 'sustainable agriculture' cannot be used interchangeably. It is in this category that this paper will focus, where measuring impact for 'sustainable' development is the most complex.

For farmers living in a precarious political, social, human and natural environment, livelihood diversity exists not only across households, but also across time (reflecting changes both in the stage of growth of the household and environmental changes) for any given household. Shaxson, (2000: 10) recognizes that "discrete impacts are not usual, and impact happens at different points in the process, and in different ways for different reasons." Farming is heavily reliant on nature as well as political and market structures that are both equally unpredictable and unalterable by the rural poor. These farmers are obliged to adjust their livelihood strategies to adapt to these changes.

The appropriateness of new technologies/solutions in this context is impermanent and context specific over space and time. The assumption of "relative homogeneity and stasis" in these contexts has led to the demise of innumerable development initiatives in the past (Mog, 2004: 2142). Berdegue and Escobar (2002: 10) argue that in these contexts program strategies have to be broad-based, focusing on enhancing asset positions including education and access to credit and most importantly creating "local networks of social capital [which] play important insurance and solidarity functions." Mog (2004) also asserts that "to tackle adequately the full spectrum of challenges presented by sustainable development requires a great diversity and multitude of ideas that can be adapted locally"

(p. 2142). This context diversity therefore has important implications for defining 'sustainability'.

Background

Context: This study was conducted in conjunction with CIAL participants in the municipalities of Yorito and Sulaco in the department of Yoro in north-central Honduras. La Fundacion para la Investigacion Participativa con Agricultores de Honduras (FIPAH) supported 25 local agricultural research committees (Comites de Investigacion Agricola Local: [CIALs]) in Yoro at the time of the study. Twenty of these were mixed, two were all male and three were all female. Average membership per CIAL in the area was 9, with a range of 6-23 members. The CIAL methodology was developed in the late eighties by the IPRA team, led by Jacqueline Ashby, CIAT (Ashby et al., 2000) The overriding objective was to provide an ongoing platform for integrating local needs assessments, local decision-making, and innovation for *'sustainable agriculture'* among poor and marginalized farmers (Braun et al., 2000). The approach enables community-based research teams to look for their own solutions to local agricultural problems. CIALs test out new agricultural technologies/techniques against local practice(s) through the design and execution of simple experiments. These are evaluated and analyzed by the CIAL and, if successful, the technology is recommended to the community. Honduran agronomists were trained by CIAT in the CIAL methodology in 1996. There are five regional CIAL associations (ASOCIALs) in Honduras comprising around 900 farmers. FIPAH supports three of the regional CIAL associations. The largest concentration of CIALs is located in Yoro (ASOCIAL Yorito, Victoria and Sulaco, where the impact assessment was conducted.

Through the CIAL project, farmers learn how to plan, manage, evaluate and analyze experiments. In each participating community, the CIAL hosts a community meeting to discuss local agricultural needs and to prioritize research goals. Agricultural priorities identified by communities in Yorito and Sulaco have been largely oriented around the production of staple crops: maize and beans, reflecting the overriding concern with food security. Thus 79% all the agricultural experiments carried out by CIALs have involve varietal testing or management techniques associated with maize and beans. However, most CIALs tend to carry out more than one experiment at a time and new crops such as soybean, wheat and rice or new inputs, such as organic fertilizers and pesticides, are often tried out alongside research in basic staples. The CIAL groups in Honduras also provide a platform for requesting information, assistance and micro-credit loans. CIAL members learn about managing budgets, sewing, new recipes, nutrition and health, amongst other things. They also administer loans provided via the Second Order Organization (ASOCIAL). These loans are sometimes used by the CIALs to purchase materials for building grain silos, or committee meeting rooms but they also afford CIAL members the opportunity to take individual loans from their CIAL organization to buy seeds or agronomic inputs, to buy/produce extra grains to store against the hungry season or to help make ends meet when produce from the prior harvest season has diminished.

Methodology

The CIAL project in Honduras provided a rare opportunity to take the results of a long-term (with more than 10 years of work in the field) and on-going agriculture project and employ participatory methods to understand the connection between the visible impacts and project methods. In this research we combined alternative and participatory tools with more

conventional interview and survey methods in an effort to capture both process-oriented changes and product impacts - both anticipated and unanticipated. The livelihoods framework acted as a guide for ensuring attention was given to all five-asset categories, human, social, natural, financial and physical capital. Because of the important role of these more process-oriented 'enabling' factors for 'sustainability' specific attention was given to capturing the more social impacts in this research. The methodological process in this research was five-fold:

(i) Thirty-one initial interviews helped to identify impact categories that were later used for probing during focus group activities. In these interviews participants were asked to describe 'changes' since joining the CIAL in each of the five capital asset categories in the livelihoods framework. This information was used to guide focus groups with CIAL participants (Classen, 2003).

(ii) In the second stage project staff and local participants facilitated focus groups in seven CIAL communities. A number of active learning tools were employed during these groups that encouraged small-group brainstorming and discussion to encourage shy participants to provide input. [60] The information generated during these discussions was abundant and identified a number of unexpected project effects and impacts. Local participants also identified a number of quantitative indicators that helped explain and justify more qualitative changes. In particular, changes in gender roles were made visible, something that had not been captured by prior CIAL assessments.

(iii) Follow-up interviews were used to crosscheck the information gathered and were a good opportunity to further discuss points that were unclear during the group activities. They also captured certain negative aspects that did not come up during the focus groups (Classen, 2003).

(iv) In the fourth stage the changes and indicators of more social changes identified during the participatory activities, as well as those of interest to the project staff and researchers were incorporated into a survey that was delivered to over 300 randomly selected project participants and non-participants in project communities.

(v) Finally, the results of both the qualitative and quantitative analyses were brought back to the participants and more focus groups and small-group activities were employed to better understand the results and their implications for sustainability. These proved invaluable for explaining unexpected results of the survey. They also proved to be extremely useful for motivating and encouraging the project participants themselves who often exclaimed "this is the first of all of surveys we've participated in that has cared enough to bring the information back to us" and in many cases the participants immediately organized small group activities to address some of the concerns and challenges identified in the study.

The five areas of impact were defined: 1) Producing sustained improvements in agricultural production for food security. The other four are more social in nature and might be thought of as enabling factors for improving food security. These are: 2) Capacity building for ongoing innovation 3) Inclusiveness 4) Social capital construction for minimizing risk, and 5) Social capital and networking for institutional sustainability.

60. The active learning tool "think-pair-share" was found to be the most successful of for engaging all the participants in the discussions. See Stalheim-Smith, 1998 and Simons, 1997 for a discussion of active learning tools and their applications.

Results and discussion

Production and Food Security impacts for CIAL members: The results clearly indicate that the CIAL has had a significant and positive impact on food security for CIAL members. CIAL members had significantly shorter hungry seasons than non-members. Whereas the average annual period of severe food shortages, referred to as the hungry season, was as high as 5.6 weeks for non-members in CIAL communities, the CIAL members in those same communities experienced an average of 1.6 weeks of hungry season last year and many of the respondents found that the hungry season had been eradicated altogether in the past few years. This is a result both of technological innovations made available to CIAL members and human and social capital development.

CIAL members had significant increases in maize and bean yields compared to non-CIAL participants. Whereas maize yields increased for 61.2% of CIAL members and bean yields increased for 56.3% of CIAL members, only 29.4% and 32.4% of non-members experienced an increase in maize and bean yields respectively over the past five years. Thus improved yields for CIALs, as demonstrated below, are generally a function of multiple factors, rather than the simple adoption of new seed. CIAL members equate improvements in maize production to changes in farm management practices rather than new varieties. These activities include the better soil conservation techniques, better fertilization and planting techniques and, perhaps most importantly, better grain storage techniques. Many members explained that improved maize storage in grain silos introduced to the CIALs in 1998, along with planning for more effective estimation of food consumption, have been the most significant contributors to food availability during the hungry season. CIAL members had significantly higher levels of familiarity and/or adoption of the following 13 of 17 new technologies or management techniques investigated by this study: identification of diseases in bean crops, fertilizer use, seeding density, planting distances, planting along the contour, organic insecticides, selection of plants, seed selection, live barriers, incorporation of crop residues, live fences, in-row tillage, and food preparation techniques from soybeans.

Production and Food Security impacts beyond the CIAL: The extent of positive impact among CIAL members did not translate into widespread impact for non-CIAL members in CIAL communities. More complex techniques or complex combinations of management techniques and new crops however require much more learning and adaptation, effectively inhibiting adoption. The results show however, that that CIAL research is more relevant to their community needs than most other agricultural initiatives in their communities. When asked what kinds of things they would want an agricultural organization to do in their communities, 68% of non-participants in CIAL communities indicated that they liked the current work of the CIAL and would like to see the CIALs continue with many of the activities they are already engaged in. Eight-six% of the non-participating respondents find the activities and solutions presented by the CIAL so relevant to their needs that they would pay for their services, either through trade or cash.

Capacity building for ongoing innovation and experimentation: The CIAL members have a significantly higher capacity for problem identification, and appropriate solution development than non-members, which effectively enables them to find solutions to problems of food availability. When comparing participants and non-participants, the study found that CIAL members are doing more experiments on their own farms to look for solutions to agricultural problems. As a result of their capacity for experimentation and enhanced agricultural skills, and extensive bank of solutions, CIAL members are recognized as agricultural leaders in their communities. In CIAL communities, 76.2 % of CIAL members and 60.2% of non-members recognized a CIAL member to be the 'agricultural experimenter'

in their community. When farmers were asked where they seek agricultural advice in their communities, 78.1 % of the CIAL members said that they can rely on the CIAL to find solutions to agricultural problems and 31.0% of non-members said the same.

Inclusion of poor and marginalized: A common criticism of 'participatory projects' is that they do not necessarily ensure equal opportunities for the poor or minorities in the community. Poor, marginalized and illiterate people can often feel intimidated about joining local groups and decision-making within the groups is often controlled by local elites (Humphries et al., 2000). This *was* the case with the CIALs in Honduras at the outset and in 1999 a project assessment found that illiterate farmers and women were underrepresented and rather more outspoken farmers and community leaders or 'joiners' tended to dominate the CIAL groups (Humphries et al, 2000). This has the potential to limit the relevance of CIAL recommendations, excluding those 'most in need' in CIAL communities. Recognizing this, the CIAL project developed mechanisms to engage the poor and marginalized in the CIAL.

The CIAL project found that with persistent encouragement of people to participate within communities through motivation by effective facilitation, the CIAL could appeal to the more marginalized groups in the communities. Thus, since 1999 the CIAL program in Honduras adapted the methodology from that of being elected to the CIAL by popular vote only, to including everyone interested in joining. In particular, women have been encouraged to join the CIALs. During participatory research activities, many CIAL participants expressed the view that the CIAL offered the first and only opportunity for women to participate and gave them the first excuse to challenge gender roles in the household and begin to participate more actively in other activities, including agricultural decisions and household spending. Project staff have found that once poorer, more marginalized persons do join the CIAL they tend to be more committed to the CIAL over the long term because they have benefited least from national extension services and hence have the highest propensity to benefit from the CIAL.

Among the CIALs that had more than five years experience at the time of this assessment, all were representative of their communities in most measures of socio-economic status. It remains in Honduras that agricultural research is of limited appeal to the landless poor and this research showed that farmers with a basic level of literacy more readily joined the CIAL. However, no significant differences were found in total land area or cultivated land area between member households and non-member households in CIAL communities. The overall average size of total land owned is 3.1 manzanas (mz) or 2.17 ha and the cultivated land size is 2 mz or 1.4 ha. The median total land size for both member and non-member families was 2.0 mz or 1.4 ha. The median cultivated land size for member families was 1 ha and for non-member families was 1.4 ha. As well, this research found no significant differences between member and non-member households in primary crops, in both cases they were maize and beans, nor in the average percentage of land dedicated to coffee. Finally, the same percentage of families in each of the two groups hire farm laborers each year and the average number of weeks of off-farm work per family last year in the two groups was not significantly different (overall average of 21 weeks). In all measures of land size and farming systems, CIAL members are representative of their communities.

There are small but significant differences in animal ownership among CIAL member families and non-member families. The largest difference in the average number of animals owned was in the poultry category, with 14.32 for CIAL families and 8.79 for non-CIAL

families. There was also a small difference between the number of pack animals and pigs owned by member and non-member families. CIAL families own an average of 1.46 pack animals whereas non-member families own an average of 1.13. CIAL members also explained that some have recently acquired a pack animal because they have begun to use live grass barriers in their fields as a soil conservation technique with the CIAL and this provides enough food to sustain one pack animal. Non-CIAL families have not adopted live barriers to any large extent and therefore do not access to have this food source. CIAL member households also own 0.68 more pigs on average than non-member households. No significant differences were found in animals that indicate more traditional forms of wealth such as cattle (mean number owned is 0.64) and other ruminants (mean number owned is .20). Thus the small differences in poultry, pig and pack animals for CIAL members is a result of the recent acquisition of these animals rather than being an indicator of an initial higher level of socio-economic well-being.

There are also small significant differences in educational levels between CIAL and non-CIAL members. In the CIALs, 46.8% of the CIAL members have four to six years of elementary education compared to 23.5% of non-members. Likewise, 80% of CIAL members are literate compared to 64.3 % of non-members. Literacy is certainly not a pre-requisite for membership but it remains a limiting factor for initial attraction to the CIAL. The CIAL still appeals to *individuals in local households* with higher levels of education.

Impact of the participation of women: The participation of women in the CIAL has a significant impact on household dynamics, changing the perception of both men and women of men's and women's roles in society, often improving problem solving between women and men, and affording women more liberty to participate in the community and collaborate in household decision-making. As well, the participation of women played an important role in encouraging the adoption of soy, a new crop in the community as well as diffusing information learned in the CIAL beyond the group to non-participating community members. These effects are most often the strongest in households where both husband and wife participate together in the CIAL and less significant when only one of either the husband or the wife is a member in a CIAL.

The perception of both men and women of men's roles in the family and society changed significantly, particularly when both husbands and wives were CIAL members together. Eighty-eight percent of the respondents of households when both the husband and wife were members felt that the husband had become more responsible with the farm and the family. The latter often included a reduction of alcoholism (a common problem throughout rural Honduras), more participation in the community and, in a very small number of cases, becoming more helpful with children and household chores. When only one of either the husband or wife was a member of the CIAL over 60% of respondents still felt that the man's role had changed. In households where neither husband nor wife was a CIAL member, 37% of the respondents recognized a change in the men of their household.

Likewise, the perception of women's agency in the family and community changed in CIAL households. When both the husband and the wife were CIAL members together, 91% of both male and female respondents recognized that such women play a bigger role in community activities and organizations and/or participate more directly in agricultural activities and when only the wife was a member 81% recognized a similar change. In this case there was no significant difference between households where both the husband and wife are members and those where only the wife is a member. When only the husband was a

member, significantly fewer (61%) of the respondents recognized a similar change in women's activities or agency within the community and only 31% of the respondents recognized a change when no one in the family was a CIAL member.

Problem solving tactics between men and women also improved more often for CIAL member households than non-member with results reflecting those above. When both were members, 70% described changes in problem solving mechanisms between themselves and their partner that were more egalitarian than the situation five years previously. When *just the wife* was a CIAL member 86% recognized similar changes and only 50% indicated that problem solving had become more egalitarian when *only the husband* was a member or when no one in the household belonged to the CIAL.

Women's participation with the CIAL also had a significant effect on their empowerment. A significantly higher percentage of women who are CIAL members play a role in decisions regarding what and where to plant on the farm, which farm products to sell and when and what food to purchase for the family, than non-CIAL member women, regardless of whether their husband was a CIAL member or not. These women also explained that this had changed significantly over the past five years, most often attributing this to a change directly related to increases in decision-making and organizational capacity resulting from participation with the CIAL or other local organizations.

Minimizing Risk through social capital development: The third and arguably most important enabling factor that came out of this research is the minimization of risk. Poor farmers are constrained by livelihood and social risks. The functional relationships that evolved during the process of learning the intricacies of formal agricultural research as a group was one of the strongest factors enabling them to investigate new technologies as it minimizes the risks inherent in agricultural research.

Experiments with new technologies have uncertain outcomes and thereby carry high levels of financial risk for the resource-poor. Dedicating even a small portion of land to an experiment that fails could be detrimental to the food security of the family. In the same vein, where resources are scarce, time is also scarce and opportunity cost is a limiting factor to farmer research. The results of the impact assessment show that the CIALs have overcome many of the 'risks' by developing high levels of social capital among members and between CIAL groups and other institutions. In Honduras, conditions of social connectedness generally do not prevail. The development of civil society in Honduras has been impeded by extreme social inequality and repressive military regimes, which have acted to support the status quo during almost two decades of violent conflict throughout the region.

The CIAL methodology uses a group approach and works to develop high levels of social capital among and across CIAL members, which has minimized the livelihood risks of experimentation in several different ways. Most importantly, the CIAL experiments are run on a 'common land' area,[61] minimizing individual risk in the case of an experiment failure.

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61. In some of indigenous communities, the land is held in common by the community and the community generally permits the CIAL access to a plot of land for the experiments. In other cases, private land is rented by the CIALs. However, when the experiments are very small, as during an initial screening trial (140-300 m2), one of the members who has more land than others frequently lends it to the group.

The opportunity costs of learning to and performing research are also offset by the productive benefits of high levels of social capital. Besides agricultural experiments, the CIAL performs many income-generating activities. On land rented by the CIAL groups, the members plant "proyectos productivos" or productive plots to produce seed or grain which is either stored for consumption by CIAL members or sold to non-members during seasons of food shortages (at a price below the market). As well, CIAL members group together to do a number of other micro-credit projects including, bake sales, sewing of school uniforms for sale. The relationships people have formed allow for the exchange of goods, materials, and labor among participating families that is less likely among non-participants.

Saving through the CIAL enables the group to take out loans from the ASOCIAL.[62] In the survey 72% of CIAL members have taken individual loans via their CIAL over the past 5 years. All but one of the CIAL loans borrowed prior to 2003 have been repaid in full. While these loans may be used for diverse ends, they also help to offset the financial risks associated with experiments and allow CIAL members to undertake micro-level adaptations of new technologies on their own land.

As well, common quotes from both men and women were: "In the group we have the confidence and capacity to defend our rights" "We speak openly without problems in front of the CIAL group" "We have the confidence to work with other institutions" and "the women have confidence in their capacities." Participants explained that there is *love* among CIAL members, that they have become a *family* and they now borrow and lend things when someone is in need; this is different from the past, prior to the organization of the CIAL, "when no one trusted one another."

Social capital and networking for institutional sustainability: CIAL members argue that maintaining the group promotes 'sustainability', not only by offsetting risks associated with experimentation but also by creating an institution that will be capable of training new members and making the entire process of learning to investigate and innovate, a sustainable one. Evidence of networking and social capital for institutional sustainability is most apparent at the level of the second order organizations or ASOCIAL. The overarching goal of the ASOCIAL as described by its members is: "To encourage CIAL independence by supporting the CIALs and providing them with what they need to continue their investigations into the future, ridding them of their dependence on FIPAH." The group approach for the CIAL not only provides an environment for capacity building, and provides social and financial support offsetting the risks of formal agricultural investigation and innovation, as we have seen above, but it also provides an institution for teaching the CIAL methodology to other people and thus sustaining the process of capacity building and social capital growth itself. The composition of CIAL may change as new members are encouraged to join and the participation of some permanent members waxes and wanes with different

62. Each CIAL must accumulate savings before the ASOCIAL will provide it with a loan. These savings are held by the ASOCIAL and help to offset the risk of lending. Savings must be equal to at least half the amount of the loan and all previous loans to the CIAL must be repaid before another can be issued. Thus there is considerable pressure on individual CIAL members to pay back their portion of the group loan so that the group as a whole can access another one. The principle is similar to that used by the Grameen Bank. As discussed, the default rate is very low and defaults only occur when the whole CIAL dissolves and therefore the pressure on the group is removed since further loans will not be forthcoming. For this reason, loans are only likely to be made to CIALs that have achieved some level of stability, evident through the level of prior savings.

seasons and obligations. Nevertheless, there is consistency in the membership of the ASOCIAL , which provides a backbone to the CIAL organizations.

In a series of focus groups with the ASOCIAL de Yorito, the members described the ASOCIAL function to include a) providing workshops on facilitation skills, organization skills, capacity building for budgeting and financing and on machinery and technology, b) training and employing the CIAL facilitators in the CIAL methodology c) acting as communication transmitters between CIALs, facilitators and local NGO staff, d) creating direct contacts and requesting help, information and funding from other local and national institutions, e) providing conflict resolution to CIAL members, between CIAL members and community members, and among CIALs and facilitators, and f) providing and managing loans for the CIALs. These are all essential to providing ongoing sources of information and new technologies as well as continuing to train and support agricultural research by the local farmers in the future. The ASOCIAL has also recently implemented the following activities in order to make the CIAL process more sustainable: a) familiarize CIAL members with the ASOCIAL activities so that there will be people to take over when the current ASOCIAL members no longer wants to participate, b) require written (rather than oral) requests from CIALs in an effort to begin to coach CIAL members in the process of directly approaching institutions and requesting information.

Overall, the results of this study showed that the ASOCIAL has a direct relationship with three national organizations and limited relationships or contacts with 18 different national and international institutions. At the national level, the Association of Honduran CIALs (ASOHCIAL), links the five regional groups in a national CIAL federation. The ASOHCIAL recently received international funding to test different methodologies for scaling-up impact with a number of CIALs in each of the five regions.

Conclusions

The paper discussed a multi-faceted approach to impact assessment involving the collection of both qualitative and quantitative data using both participatory, as well as formal survey techniques. It advocates a context-specific approach to 'sustainability' finding Stockmann's (1997) innovation-oriented sustainability the most appropriate to the rural poor living in extremely marginal agricultural conditions. The research results showed a number of impacts that translated into improved food security for farmers participating with the CIAL project in Honduras. However, the most important of the results was the complex network of more social and human impacts that enabled the adoption of new technologies to occur

The results from the CIAL project in Yoro, Honduras support the value of promoting innovation-oriented sustainability for improving the livelihoods of the rural poor in marginal areas. The indications are that the CIAL project methodology is achieving innovation-oriented sustainability in rural Honduras. However, the complexity of these livelihoods combined with the nature of the technology produced to date also presents problems for scaling-out impacts of innovation-oriented approaches to non-project participants. As the results showed, non-CIAL members showed limited ability to readily adopt the solutions that CIAL members generated likely related to their limited capacity for technology adaptation. Much more research is necessary to understand how best to scale-out the impacts of participatory agricultural research. However, it seems from this research that a stronger commitment to capacity building for local level adaptations beyond the CIAL will be an essential component of successful diffusion of CIAL technologies.

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Strengthening Operativity of the Municipal Councils for Rural Development (CMDR) in Three Municipalities of the Cauca Valley Province, Colombia

Elías Claros Trujillo[63] *and Adriana Fajardo*[64]

Highlights

Support provided to the Provincial Ministry of Agriculture in the Cauca Valley for the capacity building of the Municipal Councils for Rural Development in three municipalities

Background

The Municipal Councils for Rural Development (CMDRs) are spaces for participation, created to reach agreement on policies and programs aimed at developing the rural territories in Colombia. The CMDRs facilitate the participation of the rural inhabitants in the decision-making that affects them; moreover it constitutes a space for exercising a committed citizenship in the management, execution, monitoring and control of rural development in their municipality (Piedrahita et al. 2000).

Nevertheless, although the CMDR and CONSEA (Sectional Council of Agricultural and Livestock Development) were created in the Province, the changes have not been accompanied by efficient management due to a shortage of economic resources, training on their role as instruments of development, and the absence of a culture of planning that governs the procedures and ensures the exercise of an efficient action based on an ample knowledge of reality as to what is involved. A USAID survey (USAID-Casals 2001) revealed the scant knowledge of the citizens about control mechanisms,[65] as well as the little knowledge of the rural people with respect to the CMDR.

In the Cauca Valley Province, there are 42 CMDRs constituted, of which a very low percentage operates efficiently. In general they do not have sufficient information and tools for planning, monitoring and evaluation (M&E) that enhance their operativity and let them continue with the planned activities, even if there are changes in the government administrations.

The Project, led by the Institute of Rural Innovation (IIR) at CIAT, has a double purpose:

- Promote favorable conditions so that the functioning of the CMDR is effective
- Develop a methodology that makes it possible to consolidate a strategy for action, strengthening the CMDR's operativity through training and transfer of tools and methodologies to support their decision-making.

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65. The survey was applied within the framework of the Anticorruption Program in the four largest cities in the country (Bogotá, Cali, Medellín and Barranquilla) at the end of 2001. A total of 2400 people were interviewed by telephone.

Innovation

The IIR, Rural Planning, Participatory Research with Farmers (IPRA), and Information and Communication for Rural Communities (INFORCOM) projects have designed a strategy in which participatory methodologies are combined, such as vision-action-demands (VAD), participatory monitoring and evaluation (PM&E) and social network analyses (SNA). The purpose is for the CMDR to adopt these methodologies and become more efficient and effective in participatory processes.

Methodology for implementing the project

The intervention has consisted, in the first place, in conducting training events, the objective of which is the collective construction of concepts and later the realization of days for accompanying the CMDR constitutive committees for the participatory construction of their operational plans through the utilization of the following methodologies: VAD, PM&E and ARS.

Parallel to this, an information and communications system will be implemented in order to provide constant feedback between the community and the CMDR and between the CMDR and other participatory spaces at the provincial and national levels. This will be followed by a training phase and finally the phase of accompaniment and strengthening.

The steps carried out this far are:

1. Diagnostic survey of the current situation of CMDR
2. Application of the VAD methodology
3. Socialization of the results of the diagnostic survey
4. Presentation of the legal framework of the CMDR
5. Exercise for conceptualizing ARS
6. Exercise for conceptualizing PM&E
7. Exercise of analyzing current and future situations, taking into account the following aspects:
   - Current problems and their consequences
   - General objective
   - Specific objectives
   - Goals
   - Activities
   - Indicators
8. Election of the different CMDR constitutive committees (inspection, technical assistance, infrastructure, health, education and environment, among others)
9. Analysis of the problem areas of the different CMDR committees
10. Workshop: "The Learning Organization: Teamwork and communications"

Lessons learned

- A planning exercise does not end with the design of a concrete plan; rather it is a dynamic process, subject to continuous readjustment and revision, with the purpose of adapting it constantly to the circumstances, and evaluating the results at crucial moments. This generates learning in the organization, promoting an environment of continuous improvement.

- The CMDR's principal role is to reaching agreements by means of which the different actors involved in the rural development of the municipality interact, manifest their diverse viewpoints, set common goals and assume commitments and responsibilities that permit their fulfillment for the collective benefit.
- Planning and M&E become alternatives that permit the local authorities and the rural population to define a shared future and maker a highly rational use of the scarce resources available.
- The CMDRs in the municipalities of Argelia, Bugalagrande and Palmira are not complying with the functions for which they were created. They operate as a source of information but not as scenarios for planning, M&E and management.
- The channels of communications among the CMDR members are very weak and vulnerable given that they depend on actors that at the moment they leave the CMDR network seriously affect its stability. This is the specific UMATAs case, which are in charge of communications channels.
- Many of the CMDR members do not have knowledge of its functions and responsibilities.

Outcomes

- In the process of accompanying and strengthening the CMDRs, three participatory workshops have been held thus far: diagnosis, legal framework and construction of concepts about planning, PM&E, the importance of leadership and teamwork.
- In the diagnostic workshop, the structure of the networks of participation, trust and representativeness were determined. The problematic areas of the CMDRs were also identified: the way in which they carry out the planning process and their management with respect to the rural development of the municipality. The degree of articulation among the different territorial instruments was also determined.
- Through the planning & PM&E workshop, the CMDR members were trained in the regulations of the CMDR's legal framework and its functions; and through practical exercises, the concepts of planning and PM&E were conveyed.
- The leadership workshop identified the elements for the effective development of the organization and the importance of teamwork in accomplishing goals.
- In the different CMDR committees, the process of constructing the operating plan has begun, identifying mechanisms for implementing PM&E.

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Participatory Analysis of the Rules of the Game in the Framework of the Bolivian System of Agricultural and Livestock Technology (SIBTA)

Edson Gandarillas[66] *and Rolando Oros*[67]

Accomplishments

- A participatory method was developed for analyzing institutions (rules of the game) within the framework of SIBTA.
- The bottlenecks (high transaction costs and risk) that inhibit or reduce the participation and competitiveness of the actors in the system were identified.
- The nature of the bottlenecks was identified in order to lay the foundations for minimizing their incidence.
- The foundations have been laid so that decision-makers can generate institutional innovations that take into account the perspectives of the different actors in the system.

Abstract

SIBTA, which is an R&D system based on the competitive mechanism of the free market, is governed by the Operating Regulations of the Competitive Fund for Innovation (RO-FCI) with respect to its Applied Technological Innovation Projects (PITA). In terms of the New Institutional Economy, this RO-FCI represents the rules of the game that govern the interactions among the different actors in SIBTA (FDTA, demanders and suppliers); in other words, they can inhibit, reduce or limit participation and competitiveness. The authors have called these factors, "bottlenecks of the RO-FCI," which are explained by the presence of high transaction costs and risk. The document presents the process of identifying the bottlenecks of the RO-FCI for the PITAs, facilitating the users' participation so that they can make known their perspective, in such a way that the emerging institutional innovations can contribute to reaching SIBTA's objectives. The work was done with 80% of the suppliers and demanders, holding 10 workshops with the participation of 170 representatives, selected on the basis of five different criteria. The results show that the bottlenecks are found throughout the RO-FCI process. The following steps stood out: selecting the PITA proposals, implementing the PITAs, payment of the counterpart funds by the demanders, and the monitoring and evaluation (M&E) system. The results varied according to the FDTAs (Valleys, Highlands, Chaco[68] and Humid Tropics). Experience shows that the bottlenecks, expressed as high transaction costs and risks, can have different origins. Such is the case of the relationships of power among the actors (both at the staff and organizational levels), the nature of the risks (e.g., the degree of vulnerability in the working zones and the institutional arrangements of the RO-FCI as in the case of contracting services), and the level of organizational development of the suppliers and demanders. Therefore, the perceptions about the transaction costs and risks would vary according to specific contexts.

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Background

The Bolivian Government created the Bolivian Agricultural and Livestock Technology System (SIBTA) to promote and support modernization of technology and the sustainable development of the agricultural, livestock, forestry and agroindustrial sectors, with an important private-sector institutional participation. To this end, SIBTA finances Applied Technological Innovation Projects (PITAs)[69] through the Foundations for Agricultural, Livestock and Forestry Technology Development (FDTAs)[70] in the Highlands, Valleys, Humid Tropics and Chaco, as well as National Strategic Innovation Projects (PIENs) under the supervision of the Ministry of Small Farmers and Agriculture and Livestock (MACA). SIBTA responds to the demanders[71] and administers a competitive process of awarding productive projects. Suppliers[72] of technology that respond to the demands of the beneficiaries participate in this competitive process through PITAs. By means of this strategy SIBTA seeks to meet the following objectives:

- Reduce rural poverty, improving the producers incomes and the population's food security
- Increase sectorial competitiveness
- Play a role in the use and sustainable management of natural resources
- Contribute to the modernity and institutionalization of rural producers' associations as basic authorities in the process of demanding technological innovation

Within the New Institutional Economy (NEI) the term "institution" refers to "rules of the game." these can be either formal or informal, "defining the incentives and sanctions that affect the people's behavior and their interactions" (Dorward et al. 2002, p. 5). Thus the organizations are the "game players," groups of individuals united by a purpose to accomplish common objectives. These organizations can be political, economic and social (North 1990, Dorward et al. 1998). Another important distinction within the NEI is between the institutional environment and its arrangements (Davis and North 1971; Stockbridge 2001). The former refers to the set of general rules with which the people and the organizations develop and work out specific institutional arrangements in a society. The institutional arrangements are forms of contract that were created for transactions among contracting parties that govern the way in which they cooperate or compete.

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69. According to the definition of SIBTA (2003), a PITA represents a set of activities with a focus on agroproductive chains and a vision of programs that comprises the validation, adaptation and transfer of technologies of process, product, management and technical assistance for their adoption with the objective of promoting integrated changes in the chain.
70. The FDTAs are private institutions of public interest, mixed in nature, without political party, religious or profit-oriented purposes, created within the framework of SIBTA. They enjoy autonomy of technical and administrative management and are in charge of administering and managing resources for financing PITAs from different sources, among which are those from the Bolivian Government and organisms of multilateral and bilateral cooperation. Their commitment is to promote the dynamic, competitive, efficient and participative system of technology development in each macro ecoregion, favoring the demands of the actors in the agrofood chains, which define intervention priorities.
71. Any organized actor from any of the links in the agroproduction chain that can benefit from a PITA
72. An organization, institution or business, alone or associated, with a technical and administrative capacity for providing Applied Technological Innovation services, that participates, in alliance with a demander, in the tender for the final design and execution of PITAs.

In the Bolivian case, SIBTA is considered an R&D system based on the competitive mechanism of the free market. Therefore, in terms of the NEI, SIBTA's rules of the game for its PITA component are governed by the Operating Regulations of the Competitive Fund for Innovation (RO-FCI). The economic agents that make transactions are the farmers (associations and the Territorial Base Organization - OTB) also referred to as demanders; the providers of R&D services (suppliers); and the respective FDTA. In the context of the PITAs the institutional arrangements are the contracts that are signed by the three agents when they reach an agreement to develop a PITA.

Given that this system is novel, there is a need for periodic institutional adjustments in its implementation, tending toward the greater participation of the beneficiaries, preventing exclusion, promoting equity and seeking greater efficiency and strength of the competitive market of suppliers in order to respond better to the demands of the small Bolivian farmers.

SIBTA has been functioning for five years; and its RO-FCI for the PITAs has been adjusted four times. Such adjustments are referred to as institutional innovations (Hall et al. 1998) that regulate the agents (FDTA, demanders and suppliers) so that the interactions among them are more efficient. However, the institutional innovations generated to date were developed within MACA so there was no participation of the other agents or actors within SIBTA (suppliers, demanders, FDTA staff, etc.). In this context this document presents the experience of the projects Promoting Changes (FOCAM)[73] and FIT-9[74] in the development and implementation of a participatory method for diagnosing the current performance of RO-FCI.

Objective

Identify the bottlenecks of the RO-FCI for the PITAs from the users' perspective in such a way that the emerging institutional innovations can support SIBTA's objectives

Methodology

The identification of the bottlenecks in the rules of the game of the RO-FCI for the PITAs initially merits their definition within the context of SIBTA: the institutional arrangements perceived by their users as restrictors (presence of high transaction costs and risk) that reduce the competitiveness of the suppliers and the participation of the demanders.

The sources of information for the analysis were the suppliers and the demanders of services. To identify the sample (80%) that would participate in the workshops for analysis, the following criteria were used:

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73. Promoting Changes is the short name for the project "Participatory Monitoring and Evaluation (PM&E) for rural innovation in Bolivia." FOCAM seeks to balance the demand for agricultural research from low-resource farmers with the supply of agricultural and livestock research so that this research responds more clearly to the low-resource population. FOCAM is supported financially by British cooperation (DfID) and is executed by CIAT- Colombia in partnership with the Imperial College of the University of London, England and the PROINPA Foundation.
74. This project carries out its actions within the framework of the Program for Facilitating Technological Innovation (FIT). It is financed by DfID and is operated by CIP and the PROINPA Foundation.

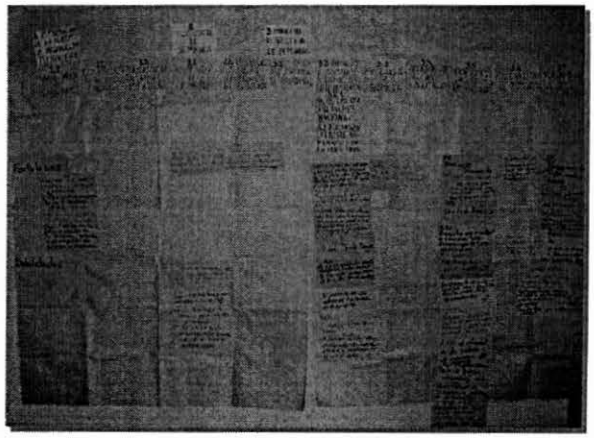
- Nature of the organizations. In the case of the demanders: associations, grassroots organizations, cooperatives, etc.; for the suppliers: consultants, NGOs, businesses, etc.
- Transversal coverage of actions vis-à-vis the FDTA's regions of influence. Suppliers that work with more than one FDTA or demanders that are located in more than one FDTA
- Experience of PITA's implementation. Suppliers and demanders that work with more or fewer PITAs.
- Topics of PITAs. Cattle-raising, apiculture, annual crops, etc.
- Length of experience with a PITA. At least 6 months

The diagnosis with the suppliers was done on the basis of the following steps:

1. Convening the service providers to the workshops for analysis. The FDTAs from each macro ecoregion convened the suppliers of technology identified by means of the foregoing criteria.
2. The workshops began with the explanation of the process that the RO-FCI follows and then responded to the participants' questions. The reason for this was to ensure that all participants had a minimum basic knowledge of the RO-FCI (minimize error of knowledge and pertinence) so as to relate their experience to the regulations.
3. Through the technique of brainstorming, the participants wrote down the bottlenecks that they had experienced on separate cards. All participants were urged to write down their experiences, emphasizing that the suppliers should be exhaustive in identifying all the bottlenecks that they had had.
4. The cards were collected and then each was placed along the chain of the RO-FCI. The text was read aloud; then with the aid of the participating group, the card was placed under the pertinent link.
5. When all the cards have been placed, there is an overall panorama of the chain; and it is a straightforward task to identify the links where the greatest density of cards is found. At these places the ideas are summarized, eliminating the repeated cards. Each idea is written on a different card.
6. Feedback was given for each card in the schema of the chain of the RO-FCI steps so that all participants understood the concepts, content and definition of the bottlenecks.
7. Finally, they proceeded to quantify the bottlenecks.

The procedure for the diagnosis with the demanders was done the same way as in the case of the suppliers, with the following differences:

1. The explanation of the RO-FCI was done through a sociodrama, where two neighbors from a community meet with an FDTA representative, who explains the development of the RO-FCI, using examples from the community.
2. The participants do not write the cards using brainstorming; rather they express their opinions, which are written down by the facilitators. With the help of the participating group, the card is placed in the corresponding link of the RO-FCI chain.



Schema showing flow of the RO-FCI chain for the PITAs.

Results

Ten workshops were held with the participation of 170 representatives of entities supplying services for four FDTAs. The workshops not only made it possible to locate the bottlenecks of the RO-FCI from the perspective of the suppliers, but also helped understand their nature, especially in terms of transaction costs and risks.

Figure 1 shows that many of the bottlenecks are located in the process of selecting the PITA proposals (Section 3) and the actual implementation of the PITA (Section 4). The results varied according to the FDTAs (Valleys, Highlands, Chaco and Humid Tropics). Such variation could be attributed to the FDTA staff and the way they operate the RO-FCI. For example, the negotiation of the PITA (Step 3.7 – this is code for the negotiation step in RO_FCI) in the FDTA-Chaco has a relatively high weight (24%) compared with the other FDTAs. According to the data obtained from the service providers, this could be caused by the person who is responsible for this process because this person "*likes to exercise his/her power with the service providers' staff.*" As a result, the negotiation takes more time and money, increasing the supplier's investment as well as the transaction costs and risk, consequently turning into a bottleneck of the process.

Similarly, the signing of the contract (Step 3.9 - this is code for the negotiation step in RO_FCI) in the FDTA-Highlands has a relatively high weight (27%) compared with the other FDTAs. According to the data collected from the service providers, this could be because the suppliers feel that the services contract represents a high level of legal insecurity for them. "*The contract strongly penalizes the failures in which the supplier could incur; in contrast, the contract does not penalize the failures of the FDTA or of the demanders.*" Therefore, the degree of uncertainty is increased, and the service providers think twice before deciding to sign the contract. It is important to mention that the Highlands is a very high-risk zone due to the prevalence of frosts, droughts, etc.; it is also considered the poorest zone in Bolivia because the farmers could not contribute the 15% counterpart funds required by SIBTA. Moreover, there are small supplier organizations in the process of formation that do not usually have the logistical means and financial stability that would permit them to continue working when there are delays in the FDTA payments. All these factors make the transaction costs and risks high, increasing the uncertainty for the service providers.

Other factors mentioned by the suppliers were primarily the form of payments to the suppliers (apparently there are delays in the FDTA payments due not only to the bureaucracy of the State but primarily to the fact that the regulations link the payment of the services to the demanders' approval, the contract punishes the supplier for failures of the demander but does not punish the FDTA for delays) and the M&E systems for the PITAs (given that the beneficiaries of the PITA do not evaluate the actions of the suppliers directly and that the FDTA does not have consolidated M&E systems).

Table 1 shows the results expressed as bottlenecks of the RO-FCI by the demanders of services. The demanders pointed out that given the short duration of the PITAs (18 months), the current RO-FCI does not take into account the PITA's activity in perennial crops such as fruit trees; thus technological innovation is almost impossible in these crops. Another aspect mentioned is the low percentage of investment (5%): "*The demanders' contribution is 15%, but the investment is so low that they do not recover what they invested.*"

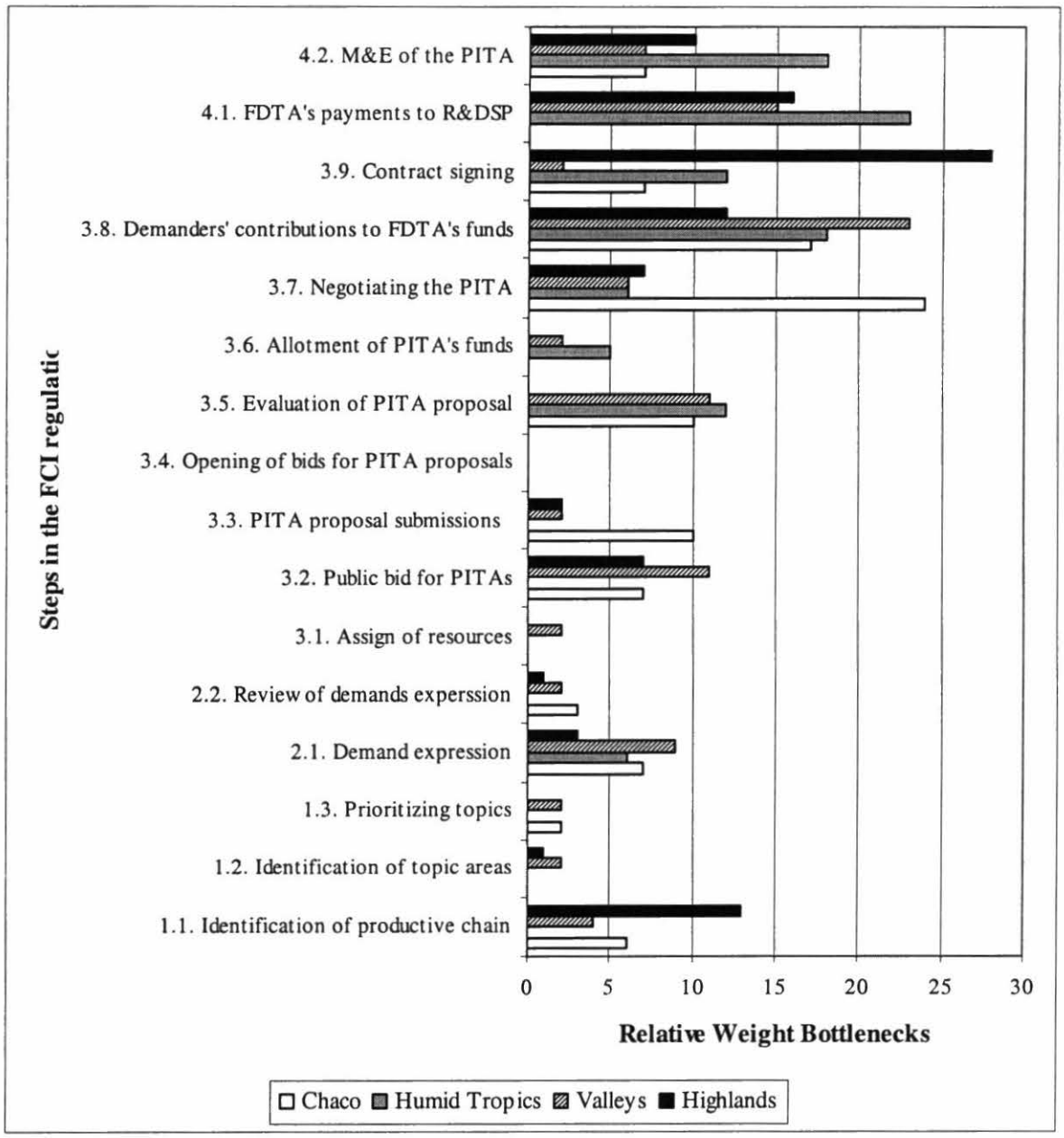


Figure 1. Location of bottlenecks identified in the RO-FCI by the R&D Service Provider (170 representatives of R&DSPs and four FDTAs), June 2004-Jan. 2005.

The amount requested by the FDTA as counterpart funds (15%) is apparently not in line with the demanders' financial possibilities as in all cases this bottleneck, which limits their participation, was mentioned. Finally, the low or nonparticipation of the demanders in the M&E processes for the PITAs was mentioned frequently, naming several difficulties (demanders' failure to pay, inconformities with respect to the suppliers' work, and prevalence of opportunism among both demanders and suppliers) as a result of this low participation.

Table 1. Bottlenecks of the RO-FCI from the standpoint of the demanders of SIBTA.

Stages of the RO-FCI	Bottlenecks
Determining the demand for technological innovation	• The duration of the PITAs is too short; e.g., for fruit trees, forestry, etc. • Lack of the demanders' organization makes it difficult to express demands and negotiate the PITAs.
Evaluating the proposals	• The demanders do not participate in the evaluation of the suppliers' personnel..
Allotting the funds	• Insufficient amounts for executing some PITAs. • The projects need greater levels of investment in the budget; 5% is too low.
Negotiating the project	• There are no methodological tools for adjusting the PITA after its approval. • The proposal cannot be negotiated with more than one supplier. • Negotiating with the FDTA is subjective, depending upon the person responsible for the process.
Contribution of the demander	• The demanders, especially indigenous groups and poor communities, are not in a condition to contribute the 15%.
Signing of the contract	• The issue of gender and indigenous groups disqualifies some projects where these groups cannot be included.
Supervising, M&E of the PITA	• There is no coordination with the demander or with the municipality, which contributes the 15% for the M&E. • The demander does not participate in the monitoring of the PITA • There is a lack of socialization of the PITA among the project's beneficiaries.

Conclusions

Experience shows that the bottlenecks, expressed as high transaction costs and risks, can have different origins. Such is the case of the relationships of power among the actors (both at the staff and organizational levels), the nature of the risks (e.g., the degree of vulnerability of the working zones, and the institutional arrangements of the RO-FCI, such as the case of contracting services) and the level of organizational development of the suppliers and demanders. Therefore, the perceptions about the transaction costs and risks would vary according to specific contexts.

Many of the bottlenecks make reference to the institutional arrangements (contract for services among the FDTA, demanders and suppliers). Apparently there is an issue of legal insecurity, which is heterogeneous for each of the signatory parties of the contract. This incomplete contract apparently causes high transaction costs and risk for each actor. Thus the FDTA and suppliers should invest more resources in the monitoring systems so that risks can be reduced. In the case of the demanders, this can result in opportunism (free riding), which causes difficulties in the execution of PITAs in the long term.

The information gathered in this process will be provided qualitatively to the decision-makers when they are adjusting the rules of the game for the PITAs and generating institutional innovations that are closer to the needs of the actors.

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PM&E and the Empowerment of Producers' Organizations

Juan Fernández R.[75] *and Edson Gandarillas*[76]

Accomplishments

- Participatory Monitoring and Evaluation (PM&E) has contributed to the empowerment of people and organizations because it has promoted active participation and has involved the organizations' members in all phases of the project and decision-making.
- PM&E is also improving the organizations' capacity for (a) representativeness and internal democracy, (b) participating effectively with proposals in strategic planning exercises, (c) negotiating with institutions and other actors, and (d) developing their sense of co-responsibility.

Abstract

The Participatory Monitoring and Evaluation (PM&E) system developed by CIAT was applied by the Promoting Changes project in the context of the Bolivian Agricultural and Livestock Technology System (SIBTA), prior adaptation and adjustments of the methodology for the different rural areas, characterized by having one of the highest levels of poverty in Latin America. The principles of PM&E are oriented towards contributing to the empowerment of the people, organizations and institutions. After analyzing the effects of applying PM&E in organizations, it was possible to determine that the methodology contributes to empowerment, primarily in the following aspects: Empowerment greater participation and levels of commitment of the beneficiaries in the projects; better performance of the service-providing entities as a result of the producers' evaluation; greater knowledge of the beneficiaries about the products, milestones and activities that the projects consider; and farmers' management and leadership capacity enhanced.

Background

Despite the fact that the Bolivian Agricultural and Livestock Technology System (SIBTA) was created around an approach centered on demand, which places a high priority on the participation of agricultural and livestock producers in the different phases of a project, the Operating Regulations of the Competitive Fund for Innovation (RO-FCI), which regulates the process of the Applied Technological Innovation Projects (PITAs), does not contemplate mechanisms that permit the participation of the beneficiaries during the process. The PITA's M&E system continues to follow a "traditional" approach, where project beneficiaries are limited to a passive role of providing information.

As a way of supporting SIBTA and other R&D programs, while contributing to the empowerment of producers' organizations, the Promoting Changes Project (FOCAM[77]) has promoted the implementation of PM&E in demander organizations of the PITAs, using "action training."

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77. FOCAM seeks to balance the demand for agricultural research from low-resource farmers with the supply of agricultural and livestock research through the implementation of PM&E in the market for national agricultural and livestock technology innovation. The PM&E methodology proposed by FOCAM was developed by the International Center of Tropical Agriculture (CIAT) (Hernandez et al. 2000) and adapted to meet the Bolivian context.

Empowerment is a process of self-determination, whereby the people or communities gain control over their own lives. It involves a process of conscientization (becoming aware of all the factors that influence people's lives) and liberation (gaining power to decide about their own destiny) (WHO 1998).

Studies carried out by PADEM (2003) regarding the empowerment of small farmers' and indigenous organizations (OC-I) formulate a series of considerations. Some indicators of empowerment proposed by this institution are the capacity of the organizations for:

- Strengthening themselves, developing their representativeness and internal democracy
- Participating effectively and with proposals in strategic planning exercises
- Negotiating with other institutions and actors to make decisions that favor not only their own sector but the others as well
- Developing a sense of co-responsibility and belonging to the municipality, which is expressed in the real and constructive exercise of social control of municipal management

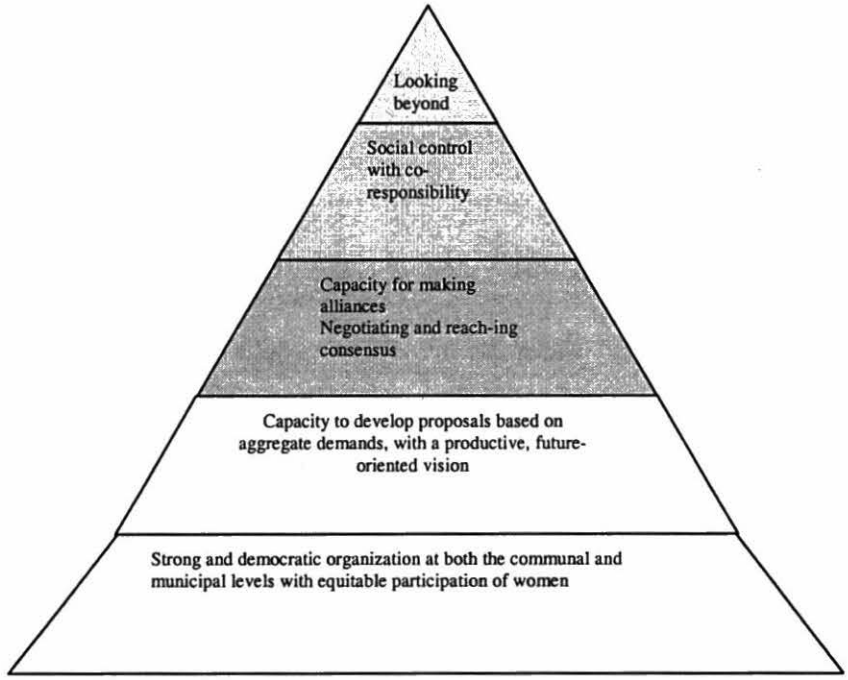

Figure 1. Pyramid of empowerment proposed by PADEM (2004).

The concept of empowerment is directly related to that of participation. At higher levels of participation, there are greater levels of autonomy and empowerment (Fig. 2).

Objectives

- Characterize the context where the PM&E methodology was implemented
- Determine indicators of empowerment
- Identify the relevant contributions of this methodology to the empowerment of small agricultural and livestock producers' organizations

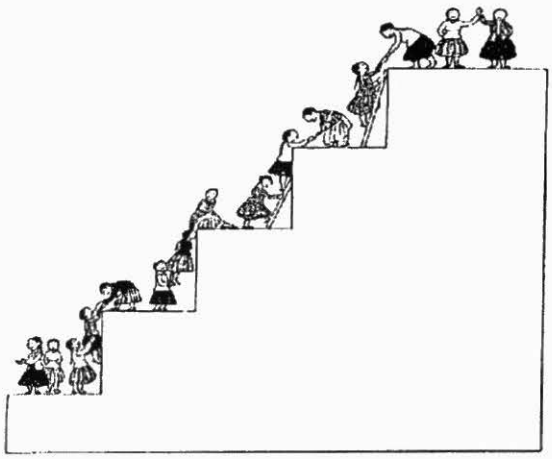

Figure 2. Ladder of participation showing levels of participation from the nominal to decision-making, equivalent to empowerment.

Methodology

This article is based on analyses of information about the progress made and results accomplished in processes of implementing PM&E in Small Farmers Economic Organizations (OECAs) that are demanders of PITAs, promoted by SIBTA and financed by the FDTAs (FDTA-Valleys) and in projects of the Services and Technical Assistance Program (PROSAT), supported by the Prefecture of the State of Chuquisaca, Bolivia.

Results

Social context: According to the Government of Bolivia (2001), the country has one of the highest levels of poverty in Latin America. In 1992 data from the Population and Housing Census revealed that 70% of the population did not have their basic needs met; and at the end of the nineties, 63% of the population had family incomes under the poverty lines (Table 1).

Table 1. Percent poverty and extreme poverty according to area of residence.

Area	Nov. 1999	Nov.-Dec. 2000	Oct.-Nov. 2001	Nov.-Dec. 2002 (P)
POVERTY				
Bolivia	**62.03**	**65.47**	**64.39**	**64.60**
Urban	51.36	54.47	54.28	53.94
Capital	46.36	52.03	50.54	51.01
Rural	80.12	84.54	81.06	81.99
EXTREME POVERTY				
Bolivia	**35.84**	**39.17**	**37.29**	**36.77**
Urban	23.51	27.93	26.18	25.71
Capital	20.66	25.69	22.28	23.94
Rural	56.72	58.66	55.60	54.78

SOURCE: MECOVI survey [78] (in Casazola 2003).

Poverty in the rural area characterizes 82% of the population; extreme poverty is 55%. In the rural area, poverty is explained in great part by the low productivity of the agricultural and livestock sector and the low value of the products on the market.

The social context of the demanders of projects where PM&E was implemented is characterized by the following aspects:

78. This information comes from a continuous survey of households/living conditions that forms part of the program for improving surveys and measuring living conditions (MECOVI); data gathered by the National Institute of Statistics (INE) (INE et al. 1999).

- The producers are small, their landholdings ranging from 2-8 ha.
- The principal activity is agricultural production.
- The level of formal education is low; the majority does not finish primary school.
- With respect to health, there are endemic problems such as Chagas' disease and malaria.
- The strongest organization is the agrarian *sindicato*.

To illustrate the foregoing, the socioeconomic stratification of a zone where PM&E implementation was facilitated, is provided: the municipality of Padilla, State of Chuquisaca, Bolivia (INE et al. 1999) (Table 2).

Table 2. Socioeconomic stratification in the Municipality of Padilla.

Strata	Percentage
A	20.5%
B	31.2%
C	48.3%

SOURCE: HECOP (2003).

Some 50% of the population in the municipality is found in Stratum C, the majority of whom are living in poverty. Stratum A corresponds to families that have more than 4 ha under production, more than 45 head of cattle, housing that has more than four rooms, and higher levels of formal education. The majority know how to read and write. Stratum B includes families that have the same assets as in Stratum A, but in smaller quantities and quality (Fig. 3).

Families from Stratum C generally have a production area of 0.5-2.5 ha, very few sheep (no more than 20) and their houses do not have more than 2 rooms. They generally correspond to young families in the process of consolidation, the majority of whom do not know how to read or write.

Figure 3. Doña Cristina Loayza and her three children represent a typical family from the average stratum of the rural area *of* the Municipality of Padilla, community La Ciénega.

Institutional context

Municipal Government: Given the level of poverty in the zone, the policies that form part of the Municipal Government of Padilla in the productive environment are to:

- Promote and drive the process of productive transformation
- Encourage the economic development of the municipality, making effective the concept of a productive municipality, allocating a greater proportion of public investment in the agricultural and livestock sector

- Promote research and technology transfer applicable to local conditions
- Open, repair and maintain roads to guarantee commercialization of the products
- Promote tourism and ecotourism in each of their stages

To accomplish part of its objectives, the municipality of Padilla is linked with the following schemas of rural development policies at the national level:

- The Bolivian System of Agricultural and Livestock Technology (SIBTA[79]): SIBTA is an interinstitutional system that seeks to optimize its technical, human and financial capacities around the planning, promotion and execution of activities of agricultural and livestock, forestry and agroindustrial technology innovation in the national setting and based on regional needs.
- The Foundations for Agricultural and Livestock Technology Development (FDTAs): Through their Competitive Fund for Technology Innovation (RO-FCI), the FDTAs finance the execution of Applied Technological Innovation Projects (PITAs). In the Municipality of Padilla the FDTA-Valleys (2004)[80] is financing two technological innovation projects in the chili peppers and peanuts agroproductive chains, at the request of a Small Farmer Economic Organization (OEC), the Association of Producers of Chili Peppers and Peanuts from the Municipality of Padilla (APAJIMPA), with support from the Municipal Government of Padilla.

PM&E and empowerment of the OECs: It would be an overstatement to assert that the implementation of PM&E empowers the organizations and the people; or said differently, that the people and organizations that use PM&E are empowered. PM&E is one element among many that contribute to empowerment.

In the case of APAJIMPA, they underwent a process of about one-and-a-half years to adopt PM&E. In this process the Association's leaders were committed to institutions and entities such as the Municipal Government, which provides the services, and FDTA, as well as to fulfill the objectives of both the PITA and the organization. In the Chaco[81] region, different from APAJIMPA, which had a "bottom-up" process, the executive bodies of the FDTA-Chaco, based on the successful application of PM&E in other settings, promoted the validation of the methodology in their context and contributed to generating mechanisms for its institutionalization.

Based on the information of the experiences regarding the effects of PM&E in different contexts, it was concluded that overall, PM&E contributed to empowerment in the following aspects:

- The organizations have begun a process of appropriating PM&E, in which their leaders have played an important role in training and disseminating it among the farmers.
- PM&E is permitting the supplier entities to provide a better service.

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79. SIBTA was created in March 2000 as a model of interaction between the country's public and private sectors, constituting a network that links up with the need for technology innovation of the actors from the agroproductive chains.
80. This is the operational branch of SIBTA for the adequate execution of the PITAS in the macro-ecoregion of the Valleys.
81. Hot, semiarid lowlands.

- PM&E is contributing to there being a better response and participation of the beneficiaries in the process.
- The producers in their different strata are informed about the characteristics and development of the projects of which they are beneficiaries.
- PM&E is contributing to improve the management and leadership capacity of the producer organizations' managers.

Conclusions

- PM&E contributes to the empowerment of the producers' organizations, basically because it promotes the active participation and involvement of the members of the organization in all project phases and decision-making related to their own development.
- The use of PM&E is contributing to a change from a passive (receptive) attitude to an active one (decision-making) on the part of the farmers. Thus it is improving their capacity for (a) representativeness and internal democracy, (b) participating effectively with proposals in the strategic planning exercises, (c) negotiating with other institutions and actors, and (d) developing a sense of co-responsibility.

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Participatory Methodologies Make the Processes of Technological Innovation Viable in Bolivia

V. Polar[82], E. Gandarillas[83], J. Fernández[84], J. Almanza[85], and INNOVA Project[86]

Accomplishments

- As a result of the process of implementing the methodology of participatory monitoring and evaluation (PM&E) and other participatory methods[87], gaps were perceived in the operating regulations that guide the process of executing technological innovation projects in Bolivia. These gaps were identified and confirmed through a process of dialogue and interaction with the different actors in the system.
- New participatory methodologies were generated to fill these gaps and are currently being implemented and adopted by the Bolivian institutions responsible for these processes.

Background

From 2003-2005 the FOCAM[88] project began a series of experiences related to the strengthening of the Bolivian Agricultural and Livestock Technology System (SIBTA) through the incorporation of participatory methodologies in the framework of Applied Technological Innovation Projects (PITAs),[89] tendered by the Bolivian Government through SIBTA. The purpose of the FOCAM project was to adapt the PM&E system to Bolivian conditions in order to bring about its institutionalization at the level of SIBTA, together with the other participatory methods that had already been tested in order to optimize the results generated by its projects.

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86. INNOVA is a joint project among the PROINPA (Promotion and Research of Andean Products) Foundation, the "Mayor de San Simón" University (UMSS), through its projects PROMETA and PROMMASEL (Project of Sustainable Weed Management on Hillsides), and the Tropical Agricultural Research Center (CIAT-Bolivia). It has financing from the Department for International Development (DfID) of the British Government, under the coordination of the International Potato Center (CIP).
87. Other participatory methods used by FOCAM include CIALs (Local Agricultural Research Committees), and Participatory Evaluations.
88. FOCAM, which stands for Promoting Changes, is the short name for the project "Participatory Monitoring and Evaluation (PM&E) for rural innovation in Bolivia." FOCAM seeks to balance the demand for agricultural research from low-resource farmers with the supply of agricultural and livestock research so that this research responds more clearly to the low-resource population. FOCAM is supported financially by British cooperation (DfID-RLD) and is executed by the International Center of Tropical Agriculture (CIAT- Colombia), and the Imperial College, University of London, England.
89. According to the definition of SIBTA (2003), a PITA represents a set of activities with an agroproductive chain approach and a program vision that comprises the validation, adaptation and transfer of technologies of processes, products, management and technical assistance for their adoption with the purpose of promoting integrated changes along the chain.

The PM&E methodology and other participatory methods that were to be institutionalized served at the same time as a framework for identifying a series of problems and shortcomings within the project cycle, giving rise to the generation of several tools designed to promote participation and equity in the processes developed.

In what environment was the proposal developed?

SIBTA was created with an approach centered on demand, prioritizing the participation of agricultural and livestock producers in the different project phases, based on two important assumptions:

- The producers are organized and have the capacity for participating actively—from the identification of their needs for technological innovation to the evaluation of project impact.
- There is a system for supplying technological innovation, capable of responding to the farmers' demands with efficiency and efficacy, using a participatory approach.

In practice it was perceived that except for a few cases, these two hypotheses were not achieved. Based on what was seen, there was a need to develop and/or strengthen the capacity of demanders, suppliers and administrative entities of funds in the use of participatory methodologies in order to make the full interaction among the different actors and their closer connection to the system viable.

A PITA is established at the petition of a demander.[90] There is a legal framework (Operating Regulations for the Competitive Fund for Innovation, RO-FCI) that should be clearly defined to establish the "rules of the game" for executing projects before the PITA can begin its activities.

How was the proposal born?

Based on previous work, the FOCAM Project proposed to insert the PM&E methodology and other participatory methods in the SIBTA framework so that their processes would take into account the perception of the end beneficiaries, seeking their satisfaction with respect to the products generated. As this process advanced, bottlenecks were perceived in the RO-FCI.

In order to learn the perception of all the actors in the process with respect to the functioning of the RO-FCI and to identify the bottlenecks clearly, the FOCAM Project, in coordination with the FIT 9[91] project, has been carrying on an open dialogue with the different actors. This analysis of the RO-FCI has resulted in the precise definition of gaps where there is a need to incorporate already tested participatory methodologies and generate other complementary ones that promote inclusion and equity, thereby contributing to optimize the results of the ongoing projects.

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90. Any organized actor of any one of the links along the agroproductive chain that can benefit from a PITA.
91. "Horizontal Learning" Project, which forms part of the Program for Strengthening Technological Innovation, financed by DfID and executed by PROINPA and CIP.

Objectives

Analyze how the participatory methodologies adapted and generated for the national context contribute to filling the gaps identified in the functioning of SIBTA's RO-FCI.

Methodology

Preliminary analyses conducted by the FOCAM Project to evaluate the process of adapting the PM&E, CIAL (Local Agricultural Research Committees), ECA and Participatory Evaluations of Technology methodologies resulted in the identification of concrete aspects that limited their adaptation and adoption in the national context. Later observations made it possible to relate these limiting aspects to the RO-FCI.

To counteract the problems identified and propose alternative solutions, strategic alliances were established, oriented toward making the generation, design and validation of new methodologies viable for their later dissemination and institutionalization.

Institutional alliances

Based on the underlying problems and with the purpose of strengthening SIBTA and the technology transfer processes being carried out, two strategic alliances were generated: one between the FOCAM and FIT 9 projects and the other between the FOCAM and INNOVA projects.

The FOCAM-FIT 9 alliance permitted an open dialogue with the different actors in the system, the purpose of which was to analyze the RO-FCI, identify bottlenecks or gaps, and then generate proposals for modifying these regulations in a way that would optimize the processes. A series of group analyses were carried out that resulted in a proposal for modifying the RO-FCI, which was presented to SIBTA's decision-making bodies for their consideration.

Parallel to the analyses of the RO-FCI facilitated by FOCAM-FIT 9, both the proposed modification and the gaps identified were analyzed within the FOCAM-INNOVA alliance in close coordination with the FDTAs, in order to generate a solution for the problems identified.

Generation, design and validation of methodologies

The generation of the proposed methodologies began with the specific demands of the FDTAs, detailing the problems identified and difficulties faced at the level of the PITAs. These demands were then analyzed from the standpoint of participatory principles by the FOCAM-INNOVA alliance in order to design methods of rapid and simple application.

Studying the demands in depth: Despite the fact that the legal requisites for an organization to be awarded a PITA are clearly established, there are some gaps that destabilize the process. These gaps begin with detecting the organizations' demands. There is no adequate methodology for this purpose, and it is not possible to determine how genuine these demands are. Although the operating regulations state that before beginning the project, the organization's legal representative should sign off (attestation of having no

objections), it is also clear that he/she is fully empowered to decide what the desired outcomes for the project should be. Moreover, there is no mechanism that transcends the legal stipulations that would permit greater interaction with the grassroots groups (Polar et al. 2004).

In addition to the foregoing, it is important to highlight that, as mentioned earlier, one of the assumptions on which SIBTA is based is the existence of a competitive technology supply and demand market. This assumption is incorrect, given that the market is highly heterogeneous, with very few large suppliers and many small ones that are not in a position to respond to the needs of their region. The capacity for investment, especially among the small suppliers, is very limited, making it very difficult for them to make the pre-investment disbursements required for looking into demand.

As a result of the foregoing, a new method was designed that seeks to study demand in depth according to the specific conditions of the demanders and considering the suppliers' limitations during the pre-investment phase. The "In-Depth Study of Demands for Preparing PITA Proposals" methodology facilitates formulating the bases of a project proposal, based on the identification and in-depth study of demands broken down by farmer type, taking into account the local development aspirations that the farmers have, as well as promoting a solid supplier-demander alliance.

Adjusting the proposal: One of the critical stages in generating a PITA is when a project is pre-selected in the classification process, after which it enters the negotiation and adjustment stage before the awarding contract is signed. According to the RO-FCI, the suppliers should make the adjustment in their proposal in close interaction with the farmers-demanders, leading to the definition of a baseline for the project (INNOVA-FOCAM 2005).

Nevertheless, despite the fact that the regulation identifies the characteristics of the product to be obtained at this stage, there are no tools for facilitating this process. It was also observed that the suppliers do not have the instruments to identify the expectations of different types of farmers within the same group of the project's beneficiaries, which would increase the possibilities of achieving the outcomes expected by each group. Consequently, the projects end up being implemented homogeneously with heterogeneous groups of farmers, resulting in the dissatisfaction of some of them. Moreover, this shortcoming in terms of instruments makes it difficult to formulate a baseline that reflects the producers' heterogeneous conditions, once again generating homogeneous information that does not necessarily reflect the project's initial conditions.

These gaps with respect to instruments and methods are the origin of the "Participatory Adjustment of Proposals" methodology. This instrument is used to explore the expectations of different farmers' groups within a group of beneficiaries in order to adjust, adapt and modify the project's products, activities and indicators before its final approval. Likewise, it contributes to the strengthening of the supplier-demander alliance, increasing the commitment of the beneficiary group toward the project to be executed. Moreover, by identifying the different farmers' groups and differentiating among their expectations, it is possible to define variables accordingly, oriented toward the construction of a focalized and relevant baseline.

Controlling the quality in the process: During the execution of the PITAs, the regulations stipulate that the corresponding FDTA should evaluate the projects' partial results. These evaluations are done based on the system for monitoring activities carried out and the milestones reached, based on the logframe of the proposal. The number of PITAs that are currently being executed has surpassed the capacity of available human resources and the time required for the FDTAs to implement this process with the desired levels of quality (INNOVA-FOCAM 2005).

On the other hand, the monitoring systems do not include explicit variables for determining the demanders' degree of satisfaction with respect to the project. This makes it difficult to formulate adjustments that could be made to the project later in order to satisfy the beneficiaries' demands.

These considerations inspired the development of the "Participatory Mid-Term Evaluation of PITAs in Execution, Based on the Satisfaction of the Demanders' Expectations" methodology. This method gathers information on the beneficiaries' satisfaction with respect to an ongoing project, using the financers' planning tools (e.g., logframe, milestones). The method also facilitates the identification of complementary actions required to achieve the project's results.

Controlling the quality when the projects end: As mentioned in the previous section, the FDTAs' difficulties in terms of resources are a limiting factor in executing processes of ex-post quality control of the projects. Moreover, the existing systems do not include explicit variables for determining the satisfaction of the demanders and/or information about their future perspectives.

The "Final Evaluation of Technological Innovation Projects" methodology is a tool that can be used to compile information on the demanders' satisfaction with respect to the projects of which they were beneficiaries. The method is based on the demanders' perception regarding the project's execution, as well as the performance of the different actors involved, the results obtained and the new knowledge acquired. It also helps identify the future expectations of the groups to ensure the continuity of the processes undertaken.

Dissemination: Once the methods had been designed and validated in different projects at the national level, they were systematized and presented to different actors in the system.

Results

The new methodologies generated were well accepted both within and outside SIBTA. Some of the applications were implemented directly by the FOCAM-INNOVA team while others were being done directly by the actors involved in the process. Table 1 presents details of the applications carried out by the team, which made it possible to validate and adjust the methodologies. It is important to highlight that at this time some of these methodologies are being applied in different FDTAs. Some of them have already been institutionalized while others are still in the process of being evaluated and adapted.

Table 1. Summary of application of the methods by the INNOVA-FOCAM teams.

Methodology	**Application**
In-depth study of demands	• Proposal presented for improving the quality of potato production in the Municipality of Umala by means of integrated crop management with emphasis on pest control • Proposal presented for improving broad bean crop production and commercialization in the Municipality of Colomi, Cochabamba • Three applications in response to demands for promoting the technologies validated and promoted by Working Group 3 of the INNOVA project. Three proposals were generated and included in the INNOVA project's POA.
Participatory adjustment of proposals	• Strengthening of the competitiveness of potato producers from Pocona and Morochata, linked to the market • Investigation of markets and commercialization strategies for chestnut producers from Pando • Training and technology change in the integrated management of South American Camelidae in the mountains of the Municipality of Batallas, Los Andes Province, La Paz State
Mid-term evaluation	• Biological control of the coffee berry borer in the municipalities of Caranavi and Coroico, La Paz State • Support for the commercial production of peanuts in O'Connor Province, Tarija State • Sustainable management of the woodlands with cattle raising and integrated herd management, Association of Cattle Ranchers and Rural Communities of the Municipality of Cabezas, Cordillera Province, Santa Cruz State. • Improving the opportunities and competitiveness of beef commercialization of the members of the Federation of El Chaco Cattle Ranchers • Technology transfer for providing feed and forages for beef cattle in Villa Montes, Tarija
Final evaluation	• Improving the quality of "Nuestra Tierra" peaches from Vallegrande • Improving technology for producing chili peppers in the region of El Chaco Chuquisaqueño

The new methodologies were disseminated through different training events sponsored by the 4 FDTAs, the Ministry of People's Participation, the "Mayor de San Simón" University and suppliers of technology. In these events representatives of the different sectors from the country's four macro ecoregions participated.

Conclusions

As a tool for organizational strengthening, the methodology of Participatory Monitoring and Evaluation brings groups together around a common dream or objective. In the life cycle of the projects, the PM&E framework covers the initial exploration of the demand to the evaluation of outcomes and the exploration of new demands. However, all these efforts are in vain if there is no continuity in the principles of participation, equity and inclusion. Some of the contributions of the new methods are described below.

In-depth study of demands: Some of the project proposals that arose from the application of the method are currently being executed. The real contribution of the method will be seen when the results and impacts of the PITAs are evaluated. Nevertheless, it can already be seen that the application of the method contributes to the proposals being centered on the farmers' demands and inspired in their vision of development, thereby contributing to the strengthening of the supplier-demander alliance and to the empowerment of the projects. The level of investment that the application of the method requires corresponds to the level of risk that the suppliers of technology have to assume in the pre-investment stage (INNOVA-FOCAM 2005a).

Participatory adjustment of proposals: Project proposals adjusted using the "participatory adjustment of proposals" methodology are currently being executed. Preliminary observations show that the application of the method has already contributed to differentiating among the expected outcomes of the project by type of demander. The process has also contributed to strengthening the supplier-demander alliance and promoting the beneficiaries' empowerment with respect to the project. It has also been observed that the information reflected in the baseline is focalized, pertinent and relevant to the outcomes expected by the demanders.

Mid-term evaluation: In the different PITAs where the method was applied, information was obtained on the degree of demander satisfaction with respect to the activities executed by the supplier, identifying causes and generating proposals based on the complementary actions required to achieve the expected project results. As in earlier cases, the method contributed to increasing the beneficiaries' commitment toward the project and strengthening the supplier-demander alliance.

Final evaluation: The methodology for the final evaluation provided detailed information on the actors' performance, the accomplishment of results, and the project beneficiaries' degree of satisfaction. It was also observed that the qualitative information generated complements quantitative evaluations implemented at a different level. There have been cases where the information obtained was used as the basis for expressing demand in the formulation of subsequent projects within the framework of a program's vision.

Global contributions of the methods: Tools such as the stratification of beneficiaries[92] in the methodology of participatory adjustment of proposals and the zoning of the area of influence in the in-depth study of demands can be used to propose specific technological supplies for the different strata and/or zones, thereby ensuring the inclusion of less-favored groups in the benefits generated by the projects.

The mid-term and final participatory evaluation methodologies, in addition to constituting an easily applied tool for compiling information on demanders' satisfaction, generate opportunities to communicate with the demanders and get feedback from them. Although the methods were designed for being applied initially within the SIBTA framework, their dissemination has resulted in the possibility of their being adopted in other systems of technological innovation at the national level, among which stand out the health and education sectors.

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92. Stratification of farmers is done using the methodology of "Levels of Wellbeing."

In all cases the challenge is to maintain the spirit of the methods in terms of promoting equity and the inclusion of the least favored in the development undertakings, thereby guaranteeing the achievement of the goals proposed by the national policies in terms of reducing poverty and development with equity.[93]

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93. The legal and strategic framework of the Institutional Strategic Plan of the Ministry of Agriculture 2005-2007 details the national policies designed to reduce poverty and bring about development with equity.

Use of Participatory Monitoring and Evaluation (PM&E) in the Chaco Foundation (FDTA-Chaco)

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Accomplishments

PM&E as a methodological tool applied in the context of the FDTA-Chaco has made important contributions to the market of technological innovation (suppliers and demanders):

- It has generated a collective awareness that the system's raison d'être is the productive organization; therefore the demanders now show their capacity and exercise their right to express their satisfaction for the service they receive.
- It constitutes an instrument that generates information about the execution of the activities; and based on this information, actions are taken with respect to improving the quality of the service.
- It is strengthening social organizations, permitting them to give their opinions and be part of the construction of their own development.

Abstract

This experience was implemented in the Bolivian Chaco macro ecoregion, where the Foundation for Agricultural, Livestock and Forestry Technology Development of the Chaco (FDTA-Chaco) operates and where the Promoting Changes (FOCAM) Project has the purpose of contributing with the implementation of Participatory Monitoring and Evaluation (PM&E) systems in the different Applied Technological Innovation Projects (PITAs) in order to strengthen the demanders' capacity in the suppliers' technology transfer processes. The PM&E methodology was developed by the International Center of Tropical Agriculture (CIAT) and adapted to the Bolivian context by FOCAM. The steps for using PM&E in the FDTA are: (i) implementation of the methodology, (ii) execution of the methodology by the demanders, (iii) use of the information and (iv) decision-making. Among the principal results at the level of the FDTA is that PM&E has made an important contribution to the market for technological innovation. It has generated a collective awareness that the raison d'être of the system is the productive organization; therefore the demanders now show their capacity and exercise their right to express their satisfaction for the service they receive. At the supplier level, they are beginning to use the information from the PM&E and apply corrective measures in time; moreover, greater institutional commitment is being stimulated by the project's success. At the demander level, the PM&E instrument helps transmit their

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suggestions to the suppliers and financers in order to optimize the projected outcomes for the PITA. FDTA has evidence that the methodology works; therefore, there is a willingness to include it in the institutional POA so that it can be applied in all the PITAs they finance.

Background

The importance of implementing a PM&E system in the Applied Technological Innovation Projects (PITAs) of the Foundation for the Development of Agricultural, Livestock and Forestry Technology for the Chaco (FDTA-Chaco) lies in the need for having a methodological tool that complements the FDTA's current M&E system.

From the onset and up to 2004, the FDTA-Chaco's M&E process was carried out by permanent staff and some technicians on secondment. As of 2005, a team of six supervisors was formed, among whom the PITAs in execution were distributed, so that the work would be more efficient. Nevertheless, the process ran into three main difficulties: (i) the insufficient number of staff (supervisors), (ii) the lack of an appropriate methodology for the monitoring and evaluation of projects, and (iii) lack of clarity in the staff's responsibilities.

From there arose the need for implementing the PM&E system, which complements the current FDTA system and which provides information on the quality of execution of the programmed activities in the different PITAs from the demanders' standpoint, thereby contributing to the accomplishment of the objectives of the different projects.

According to Aubel (2000), PM&E represents an opportunity for programs or projects to examine the quality of implementation of their activities, for measuring the progress made toward obtaining results, and for formulating the lessons learned. In this respect Reuben (2003) mentions that PM&E provides more complete and in-depth information, increases transparency and strengthens the commitment to implement corrective changes. The shared learning improves the performance of the institutions that deliver services and the effects of the same; and increases the sense of ownership, autonomy and organization.

Objective

Describe, learn about and analyze the contributions resulting from the use of PM&E in the PITAs and their effects on the different actors involved in the process—the FDTA-Chaco, service suppliers and demanders.

Materials and methods

Location and characteristics of the study zone: The Chaco is one of the four macro ecoregions of Bolivia, formed by parts of three states (Santa Cruz, Chuquisaca and Tarija), distributed in 17 municipalities.[99] The region has a population of almost 300,000 inhabitants, an Amerindian population of almost 80,000 among the Guaranies, Weenhayek and Tapiete, living on a surface of about 128,000 km^2 (20% of the South American Chaco).

99. Cuevo, Boyuibe, Camiri, Lagunillas, Gutiérrez, Charagua, Cabezas in Santa Cruz; Huacaya, Machareti, Monteagudo, Villa Vaca Guzman, Huacareta in Chuquisaca; Entre Rios, Yacuiba, Carapari, Villa Montes and the Bermejo triangle in Tarija.

This hot, semiarid region is traditionally dedicated to beef cattle-raising and swine. The main crops are maize, peanuts and chili peppers. Hunting and fishing are means of subsistence.

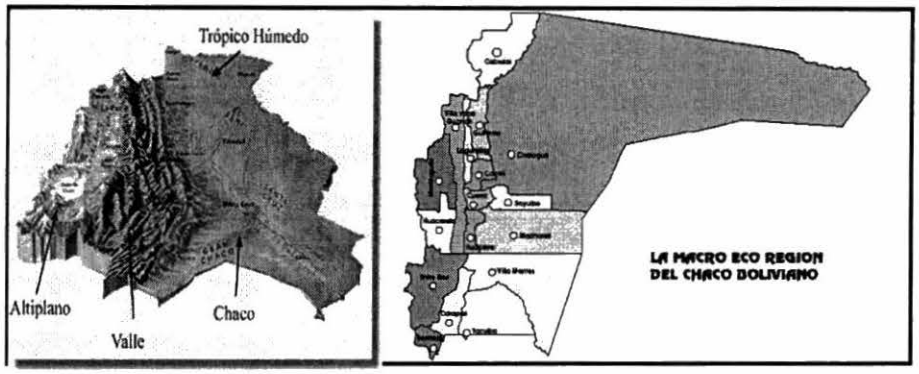

Figure 1. Geographic location of the macro ecoregion of the Bolivian Chaco.

The Bolivian Agricultural and Livestock Technology System (SIBTA) and the FDTA-Chaco: SIBTA is an instrument created with the purpose of developing and promoting agricultural, livestock, forestry and agroindustrial technology innovations in Bolivia. SIBTA consists of four Foundations for Agricultural and Livestock Technology Development (FDTAs[100]), defined according to the four macro ecoregions of the country: highlands, Chaco, humid tropics and valleys.

The FDTA-Chaco, through its Competitive Fund for Technological Innovation, currently finances the execution of 51 PITAs throughout the macro ecoregion in the agroproductive chains of bovines, swine, apiculture, peanuts, maize, chili peppers and subtropical fruits, with different types of demanders (e.g., associations, agrarian *sindicatos*). As of February 2005, the FDTA-Chaco, in an interinstitutional agreement with the Promoting Changes project (FOCAM[101]), agreed to implement PM&E systems in their PITAs.

Process of implementing PM&Es in the PITAs: The methodology used in implementing PM&E was that proposed by the Participatory Agricultural Research project (IPRA) of the International Center of Tropical Agriculture in Colombia (CIAT) (Ashby et al. 2001), with adaptations to the social context and the PITAs by FOCAM in Bolivia.

Methodological steps for using PM&E in the FDTAs: The process for using PM&E involved the following steps:

100. Private entities of public interest, formed by different sectors of demanders and suppliers of agricultural and livestock technology.
101. FoCam (Promoting Changes) is the short name for the project "Participatory Monitoring and Evaluation (PM&E) for rural innovation in Bolivia." FOCAM seeks to balance the demand for agricultural research from low-resource farmers with the supply of agricultural and livestock research so that it responds more clearly to the low-resource population. PM&E proposes to strengthen the capacity of the demanders (producers-beneficiaries of PITAs) in the overall process of technology transfer carried out by the suppliers so that the project is more effective in achieving the objectives of poverty reduction in Bolivia.

- *Implementation.* With the support of the PITA supervisor and a facilitator of the methodology, the PM&E system was implemented in a workshop that lasted about 4 hours. The participants were representatives of beneficiary communities of PITAs. The steps that were followed were: (i) motivation, (ii) conceptualization of PM&E terms, (iii) construction of the dream or group objective, (iv) construction of local indicators, (v) socialization of PITA's activities, (vi) filling out and applying formats, vii) election of person responsible for conducting the PM&E in his/her group.

Figure 2. Supervisor of the FDTA, implementing PM&E.

- *Execution.* The groups, with the support of their representatives who had been trained, execute PM&E for all the activities in which the supplier is engaged. This step is supported by the FDTA supervisor. The suppliers' participation in this step is vital; their role is basically centered on helping the demanders remember the realization of the PM&E after each activity has been executed.

- *Use of the information.* The PM&E reports from the different groups or communities are compiled, systematized and inserted by the FDTA supervisor in the monthly informative formats for supervising the PITAs. These reports become the legal 'bearer' of the demanders' suggestions or recommendations.

- *Decision-making of the FDTA.* The information generated by the demanders is analyzed and discussed by the FDTA's executive body. Based on that information, this body decides the monthly actions to be taken jointly by the supplier and demander.

Results

The contribution of PM&E to the work of the FDTA-Chaco: The following paragraphs summarize the opinions expressed in interviews by the Director[102] of the FDTA-Chaco, and those responsible for the Organizational Strengthening and Technological Innovation units.

The use of PM&E during these months has shown the following advantages:

102. Edgar Rodo, Lic., Executive Director of the FDTA-Chaco.

- The methodology is participatory; that is, there is active participation of the demanders and/or project beneficiaries in the M&E of its activities.
- Upon executing the PM&E parallel to the activity that is being evaluated, immediate results are obtained. Thus the PM&E constitutes an early-warning system for taking corrective measures in the project so that it can reach its proposed objectives. The information generated in the PM&E report constitutes an important input for the FDTA supervisors.

Figure 3. PM&E meeting among suppliers and demanders.

- The PM&E has made an important contribution to the market of technology innovation (suppliers and demanders). It has generated a collective awareness that the razon d'être of the system is the productive organization; therefore the demanders are now showing their capacity and exercising their right to express their satisfaction for the service they receive.

The contribution of PM&E with respect to the service suppliers: The execution of the PM&E in the PITAs has generated changes in the service provided by the suppliers:

- The suppliers are beginning to use the PM&E information and are applying corrective measures in time, resulting in greater institutional commitment given the project's success.
- Likewise, PM&E has become a tool for finding out the demander's degree of satisfaction with respect to the execution of the activities; and based on this information, take actions in order to improve the quality of services.

According to the evaluations of the beneficiaries, these actions include optimizing the training sessions, the use of simpler terms and more graphics, as well as including more practice.

In this regard UNPFA (2004) mentions that PM&E is becoming a process that permits the different stakeholders to express their needs, interests and expectations. The process of dialogue and negotiation among the stakeholders that occurs in PM&E facilitates the conciliation of the stakeholders' divergent viewpoints.

The contribution of PM&E with respect to the demanders: With respect to the demanders (e.g., communities, associations, *sindicatos*, groups), using PM&E has shown that:

- The demanders feel committed to the project and have a positive attitude about contributing to it constructively.

- PM&E has become an instrument that helps transmit the demanders' suggestions to the suppliers and financers to optimize the outcomes projected for the PITA. An example of the application of PM&E is that shortcomings were detected in the execution of activities by some PITAs such as the prolonged absence of the technicians from the project, inopportune delivery of materials, and unjustified delays in activities. PM&E enables the demanders to resolve these problems in the shortest time possible, through agreements with the supplier.
- Likewise, the demanders learn to evaluate the quality of the services provided by the supplier and request improvements in them, thereby strengthening their capacity for analysis, reflection and decision-making to ensure the success of their projects. This has enhanced the demanders' organizational and management capacity.
- In this respect UNPFA (2004) highlights the fact that in participatory evaluations, the stakeholders themselves identify and resolve project-related problems, which strengthens their capacity for participating actively in the fulfillment of the project's objectives instead of remaining passive beneficiaries of development assistance. Self-evaluation can help strengthen the associations among different stakeholders and increase their comprehension of the program's processes and end results.

Perspectives of PM&E in the FDTA-Chaco: The FDTA executives reason that if they have had good results with the PM&E methodology, these are not the total expression of its potential; therefore much greater advantage should be taken of it. FDTA already has evidence that the methodology works; therefore there is a readiness to include it in the institutional POA so that it can be applied in all the PITAs whose degree of execution is below 50%.

The following actions would have to be implemented prior to that:

- Continue the process of training farmer-leaders to disseminate the methodology among the project's demanders.
- Promote the organizational strengthening of the demander groups that will be implementing the PM&E.
- Disseminate the methodology among the suppliers of technology, emphasizing the fact that the results of the PM&E reports are inputs for improving their services.

Principal difficulties: It is important to mention some difficulties that were encountering during the process of implementing PM&E so that they can be taken into account in future processes or interventions.

At the level of the demander

- The organizations lack the capacity to convene the meetings of the association and do not have sufficient leadership to motivate the beneficiaries to implement the methodology.
- The distance (in some cases it reaches 100 km) between the communities benefiting from the PITAs causes delays of both of the implementation of the methodology by the technicians and of attending meetings of the association or training events on the part of the demanders.
- The transfer of knowledge of the methodology to the demanders requires time for their becoming familiar with the methodology and being motivated to implement it.

- The PM&E activities overlap with the harvest period (2 months) and the full-time dedication of the producer.

At the level of the supplier
Some suppliers are not sufficiently interested and willing to implement PM&E.

Conclusions

- It is important to institutionalize PM&E among all SIBTA actors, which means incorporating norms for their implementation in its bylaws and regulations.
- The FDTA supervisors have appropriated the principle of participation and acquired aptitudes for forming groups and mediation in order to establish an effective dialogue and discussion among suppliers and demanders, oriented toward accomplishing the objective.
- In the process of implementing the methodology, it is essential to coordinate activities with the technical teams of the suppliers to join forces in the PM&E process.
- PM&E strengthens the social organizations (producers associations, communities, capitanías and other groups) by letting them express their ideas and construct their own development processes.
- In many cases the PITAS cover several communities; therefore, in order to establish PM&E systems, it is important to generate and adapt strategies to each context.

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Livelihoods, Social Capital and Participatory Monitoring and Evaluation Approaches

Luis Alfredo Hernández Romero[97]

Background

Participatory Monitoring and Evaluation (PM&E), Most Significant Change (MSC), Social Network Analysis (SNA) and Appreciative Inquiry (AI) could turn on important tools for strengthening social capital among others assets. This hypothesis remarks social relations and possible ways for its transformation through SNA and PM&E experiences in Colombia and others contexts in Latin America. This brief outlines five mechanisms through which social capital (SC) can potentially benefit livelihood outcomes.

Social capital and monitoring approaches

Regarding SC, the definitions vary according to the authors. As Chambers & Conway (1988) and Carney, (1998) put it, SC is a concept that tries to capture the essence of community life. They explain SC as one of the five capital assets (natural, financial, physical, human and social) required for a means of living. Putnam (1993) views SC as "features of social organization, such as trust, norms and networks, which can improve efficiency of society by facilitating coordinate actions." Mignone (2003) goes one step farther by subsuming "*communities' interactions*" under the term SC; thus communities work well or poorly based on the ways in which people interact. Higher levels of SC imply a culture of trust, participation, collective action and a norm of reciprocity. Higher levels of trust allow people to learn from each other, share information and enjoy more positive relations. Several researchers have written about SC in terms of the following five elements: social relationships, social networks, social norms and values, trust and resources.

All social relations have a potential for SC, but to be usable and to produce benefits they have to be transformed. Monitoring approaches such as PM&E, MSC, SNA and AI imply social relations or connections. These approaches can be used to study organizational change and community systems because they make visible who interacts with whom in the exchange of agricultural information and knowledge. Thus communities identify connections to others, opening doors to ideas, opinions and resources; that is, people and their connections provide a conduit for information. For example, MSC could be considered a form of PM&E. It is participatory because stakeholders are involved both in deciding the sort of change to be recorded and in analyzing the data. MSC has been likened to AI, and some people describe the way AI can be used in the M&E process too. AI is considered as a package of approaches used to study organizational change and community development. SNA depicts relations among 'actors'; that is, people or groupings of people in weblike diagrams comprised of points and lines (Singer 2002). Relations can be of any type; e.g., relations in rural communities, like PM&E committees or information flow among stakeholders. People who are central in an advice network are actively engaged in both helping others and mutual problem-solving.

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97. These ideas are part of my PhD thesis: " Selection of Tropical Forages: Development of Participatory Procedures."

According to the definition of PM&E (Patton, 1977), this tool offers a forum that allows different stakeholders to articulate their perspectives, to strengthen their organizations and promote institutional learning (evaluating process). In this context, PM&E leads to better work, encouraging a culture of trust, participation and collective action, which are features of social organizations with a high level of SC.

Entry points for monitoring approaches

According to Narayan and Pritchettt (1999), there are five entry points for interventions: more efficacious government, solving common-pool problems, diffusion of innovations, lowering transaction costs, and informal insurance (http://www.caledonia.org.uk/soc_cap.htm).

More effective government

(A CIAL can be defined as a "farmers-run research service that is answerable to the local community,...experimenting locally unknown and unproven farming methods, to compare them with established practice" ASHBY et al. (2000).

At the beginning of the PM&E process, CIAL members construct the overall objective and the first specific objective is almost always to achieve strengthened CIAL groups. In some cases that means that they have to increase participation, levels of trust, motivation, etc. (Hernández 2003). There are with PM&E established to monitor CIAL objectives and increase their commitment, sense of ownership and self-determination (e.g., Fortaleza Carpintereña, El Progreso and Santa María CIALs). The majority of CIALs with PM&E procedures have also established crucial relationships and networks, organized around common interests (see Fig. 1). There are CIALs organized to do research on common beans, cassava, sugarcane for panela, potatoes, raising chickens and hens.

Depending of their evolution, some CIALs begin interactions with external agencies for resources, training, or to influence polices. This is a clear example of how PM&E motivates government services to revaluate their objectives and attitudes through understanding and negotiating the perspectives of the CIALs (e.g., PITA, Applied Technological Innovation Projects in Bolivia). The presence of relationships allows for better monitoring of government services and likely improved government delivery. A visible social network will help monitor and evaluate the impact of interventions. These social networks can take on many forms: community-level and along market chains. SNA, an ongoing project in the Fortaleza and El Progreso groups, has generated maps that will facilitate designing concrete interventions. Those maps showed the need to create new bridging, bonding and linking ties. These groups will try to start a contact sharing and exchange effort with other CIALs in the area. Another result is the conceptualizing of roles: How can they go outside to enrich their network; and how the weavers can transmit their knowledge to other members and in this manner share the weight of making (and keeping) valuable connections (Álvarez, 2005).

In summary, government officials are immersed in civil society through these participatory approaches and thus become more responsive to the needs of society when relationships (bridging and linking SC) are stronger and more numerous.

Diffusion of innovations

As noted in the analysis, monitoring approaches build connections among people, which means conduits or channels for information. Flow maps, networks and discussion forums resulting from PM&E processes allow different stakeholders to strengthen organizations and promote institutional learning. With better information regarding innovation, stakeholders are able to obtain benefits of new technologies more quickly. My hypothesis is that the snapshots provided by the network maps across time show a picture of and explain existing innovation technologies in each community, which will permit the group to identify systematic differences between innovators and less innovators (as baselines). For instance, CIAL-La Union in Piendamó, Cauca Province, has been testing maize and common bean varieties. In this way farmers increase and spread knowledge about new technology options inside and outside the community. In this case the flow of information also involves a scaling-up process.

Lowering transaction costs

High transaction costs are often cited as a limiting factor in rural development. In the context of market chains, PM&E and SNA will be able to identify bottlenecks in the flow of price information; distribution of profits within the different segments of value-chain information; and agricultural commodities, which must comply with certain quality standards. Nowadays, some CIALs know price information regarding the market chain of sugarcane for panela and marketing sour starch from cassava. Both cases are related to networks constructed around a market chain. Scaling the networks would drive down transaction costs, which in turn drives scaling up of the network (my hypothesis).

Informal insurance

One important indicator of SC is diversity of membership in community groups and local organizations. We found that some farmers belong to several groups. In Fortaleza Carpintereña, we identified several groups and organizations comprising farming groups and mother groups. CIALs with bridging SC, involving relationships, networks and adequate information about outcomes, are in a better position to pool risk and create informal insurance mechanisms. Such mechanisms may allow CIALs to invest in riskier activities. (It is important to remember that from the onset a CIAL fund is established to help absorb research risks.)

Solving common-pool problems

PM&E offers a forum in which stakeholders can articulate their perspectives through collective action. This includes decisions about rotating exchange labor or group labor for a number of farm operations such as planting, weeding, harvesting, raising chickens and quails, etc. CIAL-Fortaleza shows a most significant change in terms of the women's role in agricultural activities. The women are working on different issues: medicinal plants, raising animals, diets for chickens, and care of older people, among other activities. The Fortaleza CIAL represents the community of Carpintereña with increasing levels of SC. Communities with higher levels of SC are more able to take actions that avoid exploitation or common-pool resources being taken advantage of. In this case, the visualization of links and people through social-network maps helps identify positive roles for individuals and other actors

around them, and to design strategies for improving the intensity and quality of these relationships.

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Participatory Monitoring and Evaluation for Stakeholder Engagement, Assessment of Project Impacts, and for Institutional and Community Learning and Change

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Background and Introduction

PM&E draws from 20 years of participatory research traditions including participatory action research (PAR), participatory learning and action (PLA), Participatory Rural Appraisal (PRA), and farming systems research (FSR) and farming participatory research (FPR). By the 1980s, concepts of participatory monitoring and evaluation had already entered the policy making domain of larger donor agencies and development organizations most notably the Food and Agriculture Organization (FAO), the United States Agency for International Development (USAID), the Danish International Development Agency (DANIDA), and the UK Department for International Development (DFID), the Swedish International Development Authority (SIDA), the Norwegian Agency for International Development (NORAD) and the World Bank. (Howes 1992). Outside the field of development, PM&E can also trace its beginnings in the private sector where there has been growing appreciation for individual and organizational learning (Raynard 1998).

PM&E involves stakeholders including local people in deciding how progress should be measured, in defining criteria for success and in determining how results should be acted upon (Guijt & Gaventa, 1998). PME strives to be an internal learning process that enables people to reflect on past experience, examine present realities, revisit objectives and define future strategies by recognizing differential stakeholders' priorities and negotiating their diverse claims and interests (Estrella et al., 2000). In these processes the local people are involved in developing indicators to measure change, in collecting and analyzing the data, and making a decision as to how to adjust the activities. PM&E is not a tool but a diverse constellation of approaches, methodologies and techniques. PM&E is not just a matter of using participatory techniques within a conventional monitoring and evaluation setting. It is about radically rethinking who initiates and undertakes the process, and who learns or benefits from the findings (IDS, 1998). PM&E systems provide a framework for collaborative learning and for involving project clients, participants and partners in the M&E process. PM&E produces important benefits including valid, timely and relevant information for management decision-making and project improvement within R&D institutions. It leads to improved accountability; examines assumptions on what is progress; can lead to contradictions and conflict; but can also be empowering by putting local people in charge, it helps in developing skills, and showing all stakeholders that their views count.

CIAT's approaches to developing a PM&E Systems

Community-Driven PM&E Systems: The CD-PM&E approach builds on the concepts and ideas developed by the Institute of Development Studies at the University of Sussex (Estrella et al., 2000; Guijt & Gaventa, 1998), the PIM concept developed by Germann et al. (1996), and more recently by Probst (2002). Probst's work focused on using PM&E as an

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instrument to support systematic reflection, learning, the generation of knowledge and process-oriented management at the community level. In community driven PM&E, community members themselves identify their own objectives and initiate activities to achieve these objectives. They develop their indicators for measuring progress towards achievement of the objectives; indicators to assess change, are in charge of the data collection and analysis, and finally use the PM&E results to adjust their activities. Community indicators are based on local experiences, perceptions and knowledge. The purpose of the community driven PM&E is to empower the local community to initiate control and take corrective action and to basically empower them to improve their social well-being. This type of PM&E approach is unique because of the emphasis on developing a system that is managed and supported by local communities, for their own purposes.

Community driven helps capture differences and different viewpoints from different groups within a community who may have different perspectives, aims and objectives. These differences may be due to their experiences, their social and cultural situations such as their wealth, gender among other things. By promoting participatory approaches, it gives the rural people a voice in their community. It is an important vehicle for increasing participation and improving accountability. Appropriate forms of PM&E help the local people manage their own affairs better, take more control of the projects and their aspirations and increase the likelihood that project-supported activities will continue after the project ends. It enables the community to look systematically at what they want to achieve by deciding their own goals, what they have done in that they reflect on their achievements, what they still need to do i.e. what action has to be taken and what changes they have seen by capturing differences and different viewpoints on their indicators. The amount of local control over the process can be assessed by considering who makes decisions (researchers or local people, and which local people or groups), who implements the activities, who analyses the information, and who is the research ultimately for- who will use the results of the research and how (McAllister, 1999).

Institutional level: At institutional level, different stakeholders involved in research and development projects including communities are involved in defining project objectives and activities, in deciding what should be monitored and evaluated. They contribute to the development of indicators to measure the achievement of objectives and the successful completion of activities. Roles for data collection and analysis are shared between the different stakeholders. Data and information collected is shared systematically by the stakeholders leading to learning and adjustment of activities and approaches and to the documentation of best practices. Within this institutional PM&E, communities or local stakeholders can be involved in various ways including during the planning stage,

This paper analyses experience with establishing project/institutional level and community-based PM&E in three countries; Uganda, Malawi, and Kenya and gives the results and changes that have been achieved at institutional and community level as a result of these systems. The objectives of this work were:

- To strengthen PM&E systems within R&D projects to critically analyze and understand the institutional learning and change process, to increase self-learning, cross learning, and to evaluate impacts;

- To establish an appropriate PM&E system at the community level that allows local people analyze and interpret change, to learn from their own experiences, to adjust strategies accordingly and to systematically evaluate progress and
- To develop strategies for the institutionalization of PM&E in R&D organizations

Methodology: The PM&E process

Figure 1 shows the steps that are involved in establishing PM&E both at community level and institutional level. The back and forward arrows between the two systems are steps were the two interface or feed into each other. Although the process is drawn as though it were linear, it is cyclical and the use of PM&E results lead into the planning process and into another cycle of monitoring. The reflection process occurs at most of the different stages of the PM&E process. As teams develop and agree on what to monitor, they are reflecting on past experiences and deciding what is achievable and what is not. Reflection at the end of the PM&E cycle enables the team to look at the key achievements and to plan a way forward. These steps are briefly described below.

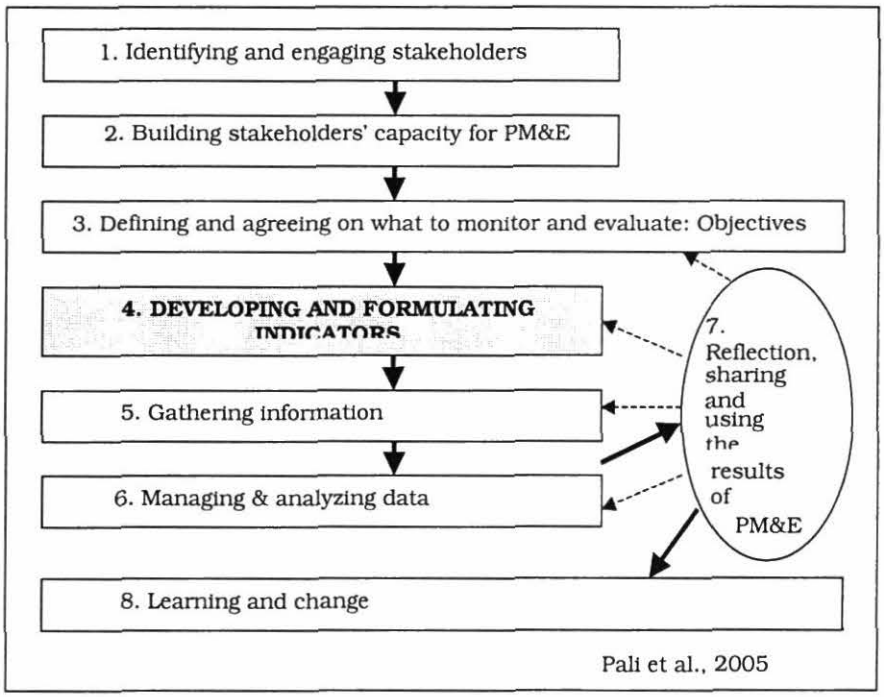

Figure 1. Steps in the PM&E.

Results and Discussion: Using the data from PM&E for Enhanced Decision-making

Stakeholder participation: Inclusion of different stakeholder perspectives in monitoring and evaluation: Through a direct participation in the monitoring and evaluation process, the PM&E process has allowed the different stakeholders involved in the projects project to better understand each other's views and values, and to design ways to resolve competing or conflicting views and interests. Scientists especially have benefited from getting community perspectives and contributions in terms of what their objectives and

desired expectations are as well as providing more qualitative indicators for measuring progress to supplement the usually very quantitative measures that they use for monitoring.

Through this process, differences in indicators have emerged between the different stakeholders, between farmers and scientists and amongst farmers themselves especially between men and women (see Table 2), youth and the elderly, between different wealth levels and cultural backgrounds. For example, in Kitale, Kenya where communities are relatively well off with larger land sizes and large numbers of livestock, the indicators of improved food security are diversity of foods available for consumption and quantity food that households have in storage. On the other hand, in Mtwapa, Kenya where households are relatively poorer, the indicators for improved food security are increase in number of meals per day from one to three and availability of food throughout the year (no emphasis is made on quality). Although these indicators are related, their expressions reflect differences in well being of the different communities.

Table 2. Differences in indicators between men and women.

Result: Increased incomes from sale of beans	
Indicators from Men	**Indicators from Women**
• *Income generating activities initiated* • Increased ceremonies in the village • Good clothing –*Men wearing suits* • Good housing with iron sheet roof	• More children being sent to secondary school • Good food (breakfast, good quality tea) • Women going to market weekly • Better clothing -- *women wearing new khangas, kodokodo,* • Increase in women membership in merry go-rounds (group savings and credit)

Some indicators are very specific to ethnic groups reflecting differences in culture and beliefs. For example, increased ceremonies are a common indicator of increased food availability among the Kenya coastal communities where ceremonies are part and parcel of their culture while this does not come up as an indicator with other communities. There were however still a lot of similarities in community expectations and indicators across different communities which provides an opportunity for a comparison of indicators across different sites and communities. Some of the differences in indicators between scientists and communities are that communities tend to focus more on the outcomes versus the specific outputs. For example, community indicators for improved soil fertility tend to differ significantly from scientists', whilst community indicators are more often related to increased yields rather than the nature of the soil itself. Community indicators combine both qualitative and quantitative measures while scientists' indicators are more quantitative and generic as the examples given in Table 3.

Table 3. Differences in indicators between scientists and farmers.

Outcome	Indicators
Improved soil fertility	**Quantitative** Nutrient levels (carbon, phosphorus, macronutrients) Increase in yields **Qualitative** *Perception of farmers on change in soil quality (-colour, -type & presence of weeds, -texture)*
Increased food security	**Quantitative** Amount of food stored and number of months with food / *Having Food throughout the year* Increased production (acreage and yields) **Qualitative** *Perception of men and women farmers of food availability and composition(e.g. Number of meals per day ,-Quantity of meals, Composition of meals, Maize purchases, Amount of relief, Farmers looking for casual for casual labour)*

Given all these differences in perspectives and expectations, one of the key roles of facilitation in the PM&E process has been to ensure that all these differences are not conflicting and do not lead to parallel monitoring systems by ensuring that they are negotiated, understood and integrated in the monitoring and evaluation process.

Community organization and learning: The path from knowledge generation to knowledge utilization is direct in CD-PM&E because the same actors are involved in all activities. Once PM&E information is collected and analyzed the next step is reflection process that enables the community to discuss and communicate their PME results; provide a forum for exchanging and evaluating information; allow community members to systematically review and look back to the start of their activities, comparing it with where they are currently and to understand what has changed; and to allow all members to reflect on the progress of the project and to adjust it as required. Different tools have been used in the data analysis and presentation. Simple graphs, tables, role plays help to enhance the community understanding of the progress made their achievements and what needs to be adjusted. This has enabled communities to e.g calculate profit and loss, improve participation, keep group members active, re-orient project implementation, recognize and acknowledge their achievements, and more importantly take action to improve their activities.

Institutional organization and learning: PM&E at the project and institutional level has led to increased learning and better organization in the way the institution manages the research-development process and in the monitoring and evaluation. Scientists identified several aspects in the way in which they are engaging with communities: (1) An important change noted was that before the initiation of the PM&E system, scientists would develop a project and then take it to the farmers for implementation, however, now scientists are discussing and prioritizing issues with communities. The scientists feel they are now more practical and realistic and are better addressing the needs of the farmers they work

with. This is also reflected in the level of community understanding of what the scientists are doing with them. (2) Through the development of the 'impact chain' the projects have become more impact oriented especially within the adaptive research projects. Scientists are beginning to use questions such as 'so what?' as a strategy of orienting projects towards impacts. (3)The sharing of roles and responsibilities in the process is creating openness and reducing the suspicion that sometimes exists between scientists and communities. (4) A systematic process for generating, managing, collecting and analyzing data has led to a more robust PM&E system at the project level, which has improved project management. For example in KARI Mtwapa, a similar activity reporting format has been developed which is currently being applied across 5 projects. This format ensures that a comparative analysis can be conducted across projects and information on progress of activities can be collated and aggregated in a systematic manner.

Targeting and improving the project implementation process: As a result of the reflection process and the use of PM&E information, project activities and outputs are reviewed periodically and adjusted where and when necessary. Our results indicate that the PM&E systems have led to changes in the project implementation process. These changes vary from aspects such as better targeting of the beneficiaries or stakeholders, to more complex changes such as the addition of activities, adjustment of methodologies, as well as revision of the project objectives. For example in a Soya bean project in Kitale, Kenya, an activity on community multiplication and bulking was included after the team including research, extension and the farmers realized that the activity was crucial to the achievement of the results (increased incomes from sale of soya beans and improved nutrition) during a reflection meeting. They realized that the activity was crucial to the achievement of results although it had not been planned for during the project development. As farmers define future objectives they are able to bring in new activities that help them achieve these expected results. They are able develop a strategy and a sequence of activities that are required to realize these objective.

Identifying indicators to Measure Empowerment: While it has been very easy and straightforward to develop indicators and measure benefits from technological options, the development of indicators for benefits of participatory approaches has not been always easy. One of the key results of participatory processes is empowerment. There have been some attempts to measure empowerment especially in studies that want to demonstrate the impacts of an intervention on empowerment (Kabeer, 1999). Through the results from our work in Malawi and Uganda, communities have identified different indicators to measure empowerment from their own perspective: Empowerment entails a process of change from the inability to make a choice to a situation where persons can make choices. Different types of empowerment stand out: social and cultural empowerment, economic empowerment and political empowerment. Another distinction is between choices that have to do with allocation of resources (both physical and the rules and norms that govern the allocations), and choices to do with the freedom of action, bargaining, or negotiation and capacity to define their life choices. These choices may be strategic choices or non strategic choices. The indicators vary across sites and countries and depend largely on levels of poverty, cultural traditions, region and status of women in the community. Table 4 gives some indications of indicators from men and women for different types of empowerment.

Table 4. Types of empowerment and their indicators from communities.

Type of empowerment	Common indicators across communities
Economic empowerment	▪ Women have small business of their own from which they can use money to fulfil their own needs (basic necessities such as matchbox without having to borrow) ▪ Acquire personal bank accounts for their money in their names ▪ Women can organise and establish revolving funds
Socio-Political empowerment	Internal (household and community) ▪ Equal representation in committees – having women who are active and effective in major committees in the community ▪ Women have the capacity to buy clothes or use their money without requesting for permission from their husbands ▪ Women being able to contribute and say their ideas in community meetings ▪ Women and the youth are involved in decision making processes at the household and in the community. Decisions are not only made by the elderly men and the village authority Links with others ▪ Capacity to approach the extension worker ▪ Capacity to negotiate for higher prices ▪ Self reliance in looking for services that the community members require e.g finding seed, market, and services from other organization ▪ Women and youth are to be found in key decision making bodies in the communities and outside
Access to physical resources and the rules and norms that govern them	▪ Women to have their own plots which they can deicide how to use. ▪ Ability to use their own money
Freedom of action, bargaining, or negotiation and capacity to define life choices	▪ Girls will be going to school and not for early marriages ▪ Women to be self reliant ▪ Women can go out to distance markets buy goods and come to sell in the community without any restrictions (freedom of movement)

Key issues, challenges and lessons

The PM&E process has shown that when stakeholders such as farmers and the extension are involved in all stages including the development of the results and activities to be monitored, the indicators that will be monitored, the type of data to be collected and how it will be collected, it leads to a more robust monitoring and evaluation. The involvement of stakeholders in PM&E however requires a lot of negotiation, prioritization of issues and strategic collection of data for PM&E. More often the question has been to what extent or at what level different stakeholders should be involved. There is however some key issues that requires consideration to make the PM&E process more effective. These include but are not limited to:

Promoting a culture of reflection and learning: One of the key objectives of PM&E is to promote learning and use of information for decision making. Learning is however not an automatic process in organizations. People can feel threatened by the results PM&E. It can affect power structures by giving more decision making to more disadvantaged and less powerful people such as communities or the disadvantaged within communities. As a result of this, a change in attitude from one of being protective to one of being open to learning should be cultivated. The process should be given time and should not be rushed. It also implies that PM&E should not be seen as a one off activity but as a culture and a way of doing things.

Scaling out the PM&E and impact assessment process: How do we reach more communities and more projects with PM&E? One of the approaches and the easiest is to integrate PM&E into methodologies and approaches that projects are using in their implementation of activities, for example integrating PM&E into the FFS approach or the FRG approach. This means that as project teams implement the FFS curriculum, PM&E is part and parcel of the curriculum. This will of course imply refining the PM&E process so that it is shorter and easier to apply. A second approach is to apply the indicators from one community into communities with similar characteristic (cultural, socio-economic, ethnic, etc) or use results and indicators from other schools with similar technologies and geographical area to introduce new schools to PM&E. This however has its shortcomings as the communities may not have as much ownership to the results "imported" from other schools or communities compared to if they developed their results themselves.

Integrating gender and equity into PM&E: With participatory research, gender and equity concerns are central to the implementation process. More often than not, gender and equity has not been reflected in the PM&E performance frameworks. Gender and equity issues including participation, empowerment, changes in gender relations need to be negotiated by both the project teams and the communities so that they become part of the PM&E process.

Negotiation and sharing roles for PM&E: Data collection needs to be a shared responsibility between researchers, extension officers and farmers. Teams however need to be careful so that none of these become overwhelmed with the data collection. For example farmers should not collect data that is not of interest to them but only to scientists. Information should also be shared across all stakeholders; for example scientists should share their information with farmers and vice versa. A common assumption with regards to data collection by farmers has been that once farmers know the indicators they should collect data on, they will get on with it. More often than not, the capacity of farmers to collect and analyze data has to be built. This should however not be taken to the extent that researchers give farmers long complicated forms or data sheets in which to record data as this may deter them from collecting the data.

Standardization and comparability: Indicators and questions from PM&E will differ between projects if they are defined in a participatory way, which may make it difficult to compare outputs and outcomes of different participatory approaches between projects.

There are many challenges in setting up and implementing PM&E systems. Ensuring that PM&E does not just become a technical process-develop results, indicators, collect data and analyze. The learning aspect of PM&E needs very strong emphasis so that there is a balance between focus on the implementation and on the learning and the use of PM&E data

to take corrective measures and make decisions. Establishing and supporting PM&E systems is an expensive process, both in terms of time, human capital and material resources for initiating and sustaining M&E, and also because of the intensive facilitation required in the initial stages. In most cases, organizations will not have the skills that are required to support the process and these skills may need to be built before the process can take off. Due to the involvement of different stakeholders, strategies need to be developed to involve these different stakeholders. For example for CD-PM&E the use of graphics, identification of local vocabulary for some of the technical terms should be done.

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Output 5: Strengthened Institutional and Organizational Capacity of R&D Partners in Development and Adaptation of Participatory Research Methodologies

Research Centers...Closer to the Producers

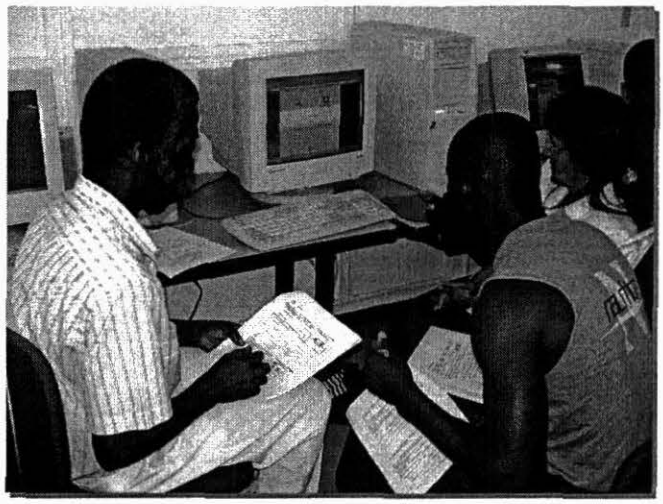
Jorge Luís Cabrera V.[99]

The information technologies facilitate the access to thousands of data, but it is ironic that most of those who work the land to produce food for their own and others' subsistence do not have the possibility to access that information.

The majority of the books specialized in agriculture are not written for the farmers. To facilitate their training, they need books, magazines or communications media that make use of a simple, enjoyable and easy-to-understand language for making their contents available to the producers.

Applying new technologies for communicating and disseminating information

Today the computers and the connection to Internet have become a part of the daily lives of millions of people, providing them rapid access at a very low cost. Thus mechanisms should be sought whereby farmers and technicians can access Internet and other modern communications media. Part of the solution to the difficult situation that the farmers are in is to put the information that they need so badly in their hands.



InforCom Project.

How are we solving this

The Participatory Research with Farmers (IPRA) Project is making an effort to lessen this problem faced by marginal people with little or no access to information. Part of the IPRA Project's strategy is its Web site www.enlacecial.org, which it is expected will respond to the demand, each time higher, for information by the farmers, technicians, local institutions and others, most of whom do not dominate the English language. The users can find documented information about prices of grains, availability of inputs, fertilizers, pesticides and seeds, among others. This Web site places at the disposition of its visitors all the research experiences and validation of technologies developed by the Local Agricultural Research Committees (CIALs) in seven Latin American countries during the last 15 years.

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99. Documentation Center – IPRA Project.

The challenge

The world in general is living a true information revolution although for many rural communities the use and access to information technologies and communications media are still a thing of the future. The challenge is to maintain an up-to-date supply of information of interest to technicians, institutions, students and farmers, among other potential publics, interested in methodologies and tools that facilitate their processes and projects.

Results

The IPRA Project Web site is one of the most visited as shown by the statistics for the period December 2004-December 2005:

- Web site in Spanish (http://www.ciat.cgiar.org/ipra/inicio.htm): average monthly visits, 959
- Web site in English (http://www.ciat.cgiar.org/ipra/ing/index.htm): average monthly visits, 720

Documents with greatest number of downloads

Documents, authors and number of times downloaded.

Document	**Author**	**No. of times downloaded**
Formulation of criteria for defining pilot areas	Margot Cabrera, FOCAM Project, Bolivia	2333
A dream made reality (case study)	Fanory Cobo, thesis student	1724
The community gets organized to do research	Jacqueline Ashby, Ann Braun, Carlos A. Quirós, Luis A. Hernández, José I. Roa	1561
Quinoa: Recovery of a tradition	José Ignacio Roa	929
CIAL handbooks	IPRA Project	520
Annual report	IPRA Project	215

Other valid options

On the other hand, there are rural communities that do not have electricity or a telephone line, which means that the only source of information may be traditional media including written or oral messages. Nevertheless, it is important to have alternative media that facilitate contacting and interacting with rural communities that are almost isolated.

This valuable work is being done by the technicians and/or CIAL Guides, who visit telecenters or Internet cafés to read or download information of interest, share it and exchange it with the communities with whom they work.

The CIAL link, as well as the technicians and CIAL Guides, constitutes the principal human and virtual strategies in the effort to close the gap that separates the rural communities from the rich and diverse knowledge and information that lie in media or channels such as Internet.

Participatory Evaluation of Technologies for Conserving Forages

José L. García[100] *and José I. Roa*[101]

Accomplishments

- Producers identified by stakeholder groups for thesis work: Farmers and/or cattle ranchers
- Partial outcomes of preliminary evaluations (open-ended interviews) with producers about the perception of conserving forage in the form of silage and hay.
- Literature reviewed with respect to using the legumes *Vigna unguiculata* (cowpeas) and *Lablab purpureus* (hyacinth beans) in silage- and hay-making processes.
- Preparing, clearing and sowing land with the two legumes (cowpeas and hyacinth beans)
- Doing follow-up in fieldwork, harvesting and obtaining fresh biomass in both materials
- Assessing the producers' preferences for the silage-making technology and materials in the field

Abstract

In the zone of Pescador, Northern Cauca Province (Colombia), there is a shortage of forage available in the dry season due to mismanagement of hillside pastures by the cattle ranchers. The purpose of this research work is to take advantage of the surplus forage material in the rainy season and store it for the dry season. Through participatory methods, the producers are involved in the planning, evaluation and decision-making. The participating farmers were formed into three groups: (1) 6 producers that own cattle, (2) 6 farmers that only grow crops, and (3) 6 producers that are engaged in both activities, referred to as the "combined" group. The partial outcomes of these participatory evaluations of techniques for preparing silage are being analyzed through logistic regression. Thus far all three groups prefer using a cylindrical metal drum as a 'silo' (good to intermediate acceptance) because it gives them more security (made from metal, easy to compact and store forage). The plastic bags had low-to-intermediate acceptance because they retained more air and were not sufficiently compact because the plastic material is too weak. The cowpeas have more uses so they were perceived as being more promising, while hyacinth beans were seen as being good as a cover crop.

Keywords: Participatory evaluation of technologies, silage making, promising legumes, in vitro digestibility

Background

Dual-purpose cattle-raising for small and intermediate producers forms part of the agricultural and livestock system in tropical countries. This system is characterized by a shortage of forage during the year, one of the principal causes being poor management of the grasslands including overgrazing with too high a stocking density, which promotes erosion.

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This damage to the natural resources can be reduced, maintaining a balance between this and technologies employed in improving the biological and economic production of cattle with correct management of the environment in the interaction (soil, animal, plant, producer) (Titterton, 1999); i.e., especially by using forage species (grasses and legumes) that tolerate soil acidity, well-adapted cattle, appropriate stocking density, grasses adapted for cutting and accompanying species (native shrubs). Consequently, during the rainy season the cattle reach their ideal weight; and during the dry season, they lose it again. Forage management and conservation are in the best interest of both the producer and the animal.

There are difficulties in using surplus forages, especially in zones where the supply becomes scarce in dry periods. Taking into account the forage potential that species such as cowpeas (*Vigna unguiculata*) and hyacinth beans (*Lablab purpureus*) have including very good agronomic characteristics such as high protein content, production of biomass, precocity, adaptability to different soils and climates, the producer has some good options available.

Objectives

General objectives

- Determine through methods of participatory evaluation with producers from northern Cauca whether it is feasible to conserve forage (a) in the form of silage[102] and (b) as hay[103]

Specific objectives

- Use a participatory research methodology with groups of farmers, cattle ranchers and a combined group to produce and conserve forage in northern Cauca
- Assess the level of acceptance of the use of hay and silage making by the farmers
- Determine which silage-making technology is better for the producers
- Evaluate nutritional quality with respect to in vitro digestibility of dry matter[104] and crude protein.[105]

Methodology

Conceptualization: A literature review was done including searches in libraries, newspaper collections, degree theses, books, electronic publications, fora and workshops, available at the International Tropical Agriculture Center (CIAT) and the National University of Colombia-Palmira campus, as well as electronic consultations made with zootechnicians and agrostologists (Agudelo 2005).

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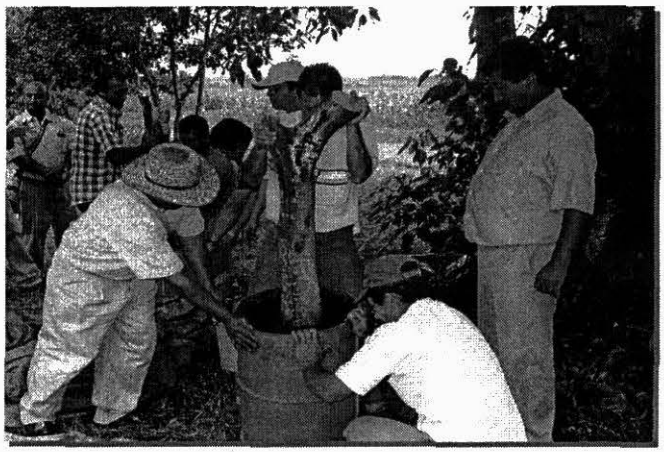
102. It is a process for conserving forages based upon anaerobic fermentation (no air) of the biomass so that the original quality of the forage at the time of the cut can be kept for long periods of time.
103. It is the process resulting from dehydrating the forage, which is a feed that contains 15% moisture content, being the most economical source for the animals, except for grazing.
104. Indicates indirectly how much feed will be retained in the gastrointestinal tract for digestion (in the rumen and intestines) and therefore do not appear in the feces.
105. All the compounds that contain nitrogen, urea, amines, amino acids and protein.

Contextualization: This work was done at the CIAT Quilichao Experiment Station located in the municipality of Santander de Quilichao, Cauca Province, Colombia (3°06' N, 76°31' W, at 990 m alt.), with an average temp of 24°C and 1800 mm bimodal rainfall yearly, distributed from September to December (Rosero 2005).

Identification of producers: The selection was done, taking into account the producers interested in using this type of technologies and that were currently working in agriculture and/or cattle raising. Three groups were formed that would contribute their diverse experiences, while we would learn from them and together form a work team (Producers-IPRA Project-Tropical Forages Project) to solve certain questions as to the different uses, forage conservation techniques and the evaluation of the same.

In-field evaluations of materials and technologies: Open-ended evaluation formats were used with the producers initially to obtain basic information about utilization and management in forage conservation so that they can determine which of the techniques is favorable; silage making in different-sized cylindrical metal drums or in plastic bags, as well as the field performance of the two forages (cowpeas and hyacinth beans).



Producers making the silage, CIAT-Santander de Quilichao.

Analysis of outcomes (partial): The data obtained from the surveys were tabulated, systematized and then analyzed using logistic regression in the analysis of preferences, an application for Excel v. 7.0 (Microsoft) developed by Hernández (2000).

Outcomes (partial)

Acceptance of the plastic bag technology was from intermediate to low, given that it is not very reliable (much air remains), and there is a perceived greater risk in the lower level of compaction achieved. In the cylindrical metal drums, on the other hand, acceptance is from good to intermediate because the form of storing the material represents more security and the silage is perceived as being more compact. They recommend that the drum be fixed to the ground so that it does not lift up and there can be better compaction and uniformity. They also suggested using other materials such as polypropylene drums to obtain more volume. Another group suggested a larger size container and doing a cost/benefit analysis.

In the field evaluation of materials, the farmers coincided with the cattle ranchers. Cowpeas were preferred for their diverse uses: the grains for human nutrition, animal nutrition, additional source of income, precocity (4 weeks), and the lower incidence of pests/diseases ("resistance"). The cattle ranchers were interested in the quality and quantity of the forage in order to improve their hillside conditions. In addition to the foregoing, the combined group was interested in learning about the potential market and its use as an economic alternative.

There were no differences for the hyacinth bean either; however the producers coincided in the fact that there was a high incidence of the leaf miner, which affects its production; thus its development was more delayed. The cattle ranchers mentioned that palatability is important to consider when taking a decision, an aspect that the other two groups did not mention. All groups mentioned that the hyacinth beans have very important traits: their capacity for regrowth, potential use as a cover crop, resistance and the absence of tannins, which affect the nutritional quality of any promising legume.

Conclusions (partial)

Both the cowpeas and the hyacinth bean were well accepted in work that results in the improved well-being of both people and animals. The technology of making silage in plastic bags had the lowest acceptance in the three groups of producers because the silage was more difficult to compact, the plastic bags can break, and it is more difficult to remove the air during the process. The silage made in the cylindrical metal drums had the best acceptance in the three groups because the drums are more resistant, and the air can be removed more easily.

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Diagnosis of the Use of Organic Wastes and Chemical Evaluation of Some Mixtures Used in Composting in the Area of Influence of CIPASLA, Pescador, Cauca

José S. Muñoz[106], Juan G. Cobo[107], Edmundo Barrios[108], and Carlos Quirós[109]

Accomplishments

- Information was obtained from farmers regarding the use of and management practices for organic wastes in the town of Pescador, Cauca.
- The use of compost as an organic fertilizer is contributing to increased crop yields and to improving environmental quality (e.g., utilization of waste products, recovery of soils, less incidence of pests and diseases, and fewer unpleasant odors).

Abstract

This project was implemented in the town of Pescador, Municipality of Caldono, Northeastern Cauca Province (Colombia), with the purpose of identifying the availability of waste products for use in compost and describing the experiences with composting that are currently being done in Pescador. Producers that implement compost practices and rural agroindustries with products common in the zone and that generate byproducts in their productive processes were identified. Two surveys were applied to document the detailed record of the local knowledge. In addition, the procedures applied by three farmers for setting up their compost piles were monitored. At the onset of the process, three compound samples were taken from each compost pile for chemical analyses. The results refer to the quantification of the waste products generated in each of the production systems, the periods of production, their uses, identification of the commonest proportions of waste products and substrates used in a compost system, and finally the chemical analyses of the nutrients. Emphasis is on the producer's assessment of the organic waste products, the importance of using compost to recover soils, and how to combine the waste products. Study tours are recommended for promoting the exchange of knowledge among producers who are familiar with these practices in order to socialize their knowledge and promote the generation of initiatives that facilitate their implementation and management.

Keywords: Compost, microorganisms, organic fertilizers, organic wastes, environmental quality

Background

For many years the waste products resulting from different production systems have been a life threat, due to the immense volume produced and the large pollutant load they generate as a result of the level of development that motivates consumerism. Thus the problem gets

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worse every day. To control and/or mitigate the increase in waste products, it is necessary to take urgent measures and thus prevent their negative impact (Bruzon 1996). Composting makes it possible to utilize organic waste products that would normally be taken to a garbage dump or, worse, in rivers. A substrate fertilizer known as compost is produced to improve the quality of the soils. The majority of organic wastes are generated in the rural zone, generally from agricultural and livestock activities: coffee pulp, waste products of sugarcane processing, chicken manure and cassava solid wastes, among others. It is in this zone where this management practice should be used at the farm level and taken advantage of to mitigate the impact caused by their incorrect disposal.

Objective

Evaluate the management of organic wastes used in composting by documenting the experiences in composting in the zone of influence of CIPASLA (Interinstitutional Consortium for Agriculture Sustainable on Hillsides) in Pescador, Cauca.

Methodology

The work was implemented in the town of Pescador, Municipality of Caldono, Cauca Province, located at 2° 50' 25.1"-2° 45' 0.9" lat. N and 76° 32' 35.1"-76° 29' 44.9" long. W and 1290-1970 m alt., classified as pre-Montane dry forest, a temperature under 24°C, rainfall from 800-2100 mm, and an uneven topography with very strong to moderate slopes. Producers that carry out composting and rural agroindustries that generate byproducts in each of their productive processes were identified in the zone. Two surveys were designed for the population in order to obtain a detailed record of the local knowledge:

- Compile information about the amount and availability of byproducts that could be composted and identify the producers that do composting
- Record the details and document the experiences in composting. Georeferencing of the farms of each producer was done, using a GPS[110] Garmin Etrex. The population sample was selected at random, visiting three (3-5) farms per village in CIPASLA's area of influence.

Local knowledge: The procedure applied by three farmers for setting up their compost piles was monitored (Fig. 1).

- *Sampling of compost for chemical analyses*
  The samples were air dried, ground (< 2 mm) and then taken to the Analytical Services Lab at CIAT in order to determine the C, N, P, K, Ca and Mg contents.

110. System of global positioning for navigating in time and distance, based on signals transmitted by the Constellation of NAVSTAR (Navigation Satellite Timing and Ranging) satellites. These signals are received by portable receptors on land and serve to provide precise geographic positioning in any part of the world (Garmin Ltd.© 2005).

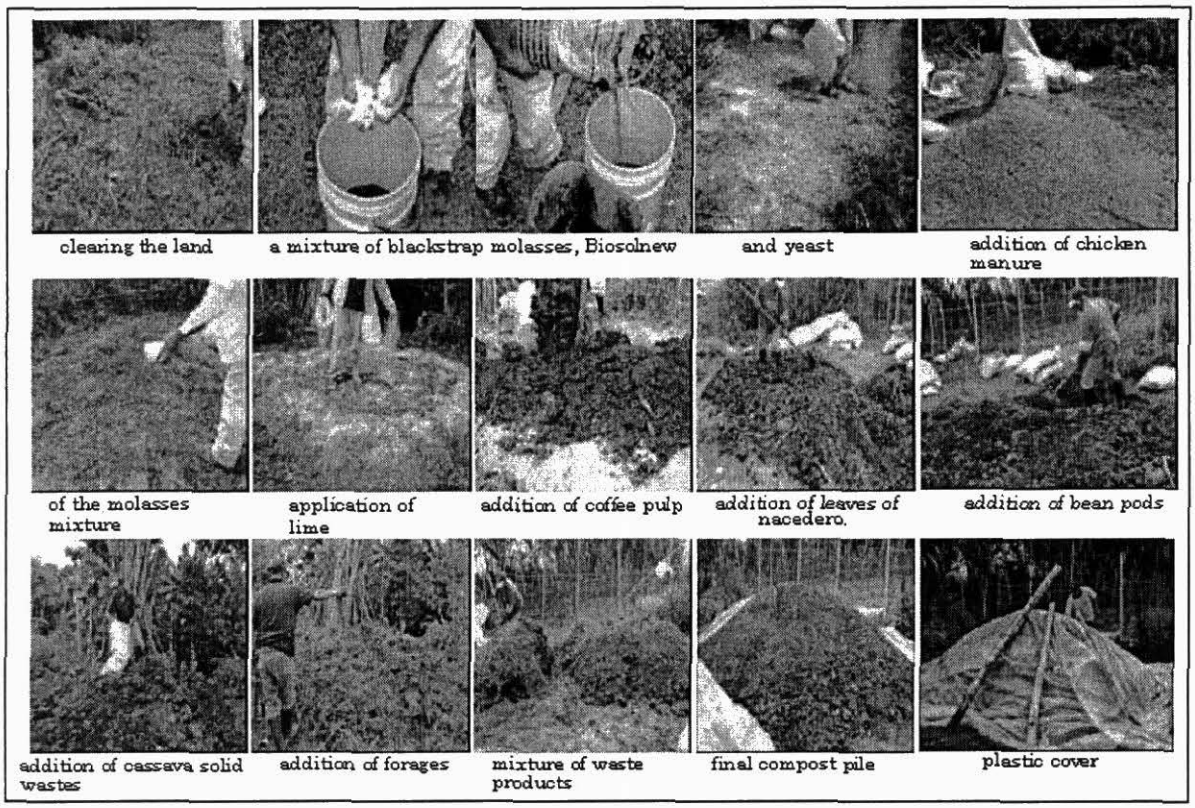

Figure 1. Steps followed by a producer in setting up a compost pile.

Results

Documentation of experiences:

Quantification of waste products

The producers surveyed produce waste products primarily from the kitchen (93%) and coffee pulp (89%). From 64-68% generated waste products from the garden and bean pods, 54% from maize hulls, 36% from cattle manure and 21% from chicken manure. There are other byproducts generated by less than 10% of those surveyed in nontraditional systems in the zone; e.g., cassava starch impurities containing protein, which are generated during the agroindustrial processing of sour starch, which is common in this zone of the Cauca Province. About 90% of the farmers in this watershed grow cassava (Hernández, 1996).

Cassava solid wastes, high in fiber content, are not a common waste product (only 7% of those surveyed produce it), but the amount produced yearly is high (average of 474 t/yr), which is also true for cattle manure (produced by 35% of those surveyed), with an average production of 7.9 t/yr. Although the waste products from the kitchen were the commonest (93%), the average volume generated by the producers surveyed was not high (1.4 t/yr). Most of the producers surveyed produced kitchen waste (93%) and coffee pulp (89%). From 64-68% of them generated waste products from the garden and bean pods, 54% maize hulls, 36% cattle manure and 21% chicken manure (Fig. 5).

Other types of waste products that are also generated (others in Fig. 5) include cassava starch impurities and solid waste, plantain bagasse, suckers or pseudostems, pig manure, ashes, leaf mold from the forest, chicken feathers, horse manure and guinea pig manure; but only a few of those interviewed (< 10%) generated such products. The byproducts referred to in the previous paragraph are produced in nontraditional systems in the zone. The exception is the cassava starch impurities, which are generated during the processing of the same on an agroindustrial scale and are common (90% of the farmers in this watershed) in this zone of Cauca Province (Hernández 1996).

Periods of waste product production

The production of coffee pulp is frequent; and it is one of the waste products generated in the largest amounts in the zone. The two periods of coffee production during the year are the main harvest from March-June and a second minor one from October-December. The maize hulls and bean pods are produced during the harvesting periods for this type of crops, and the frequency varies among producers, given the different periods selected for the planting. The periods of waste generation are probably concentrated in the rainy season when there is more agricultural production with short-cycle crops like common beans and maize. Waste products from agroindustry and the kitchen are generated daily. Chicken manure (only from operations with 50-250 broiler chickens) is generally produced semesterly, quarterly or every four months. Differences in the periods of production or generation of waste products depend on the dynamics in the production systems, the climate, rainfall/dry season periods

Commonest waste products and substrates used in the compost by the producers surveyed

Chicken manure is the waste product most used by those surveyed (93%), followed by coffee pulp and agricultural lime (79%); however, blackstrap molasses, waste products from the kitchen, yeast, soil, cattle manure, bean pods, ashes, cassava solid wastes and waste products from the garden are also used by 25-68% of the producers. Other waste products such as leaf mold from the forest, maize hulls and cane bagasse are also used, but by only a few producers (9%). The chicken manure, agricultural lime, blackstrap molasses and yeast are substrates purchased on the local market. These substrates are used to accelerate the decomposition and enrich the final product. According to INTEC (1999) these substrates contain a combination of microorganisms and important nutrients to initiate and accelerate the process.

Composition of a compost pile

Based on the information supplied, chicken manure and coffee pulp generally account for 20-40% (in weight) of the compost piles of the producers surveyed. In general, the producers feel it is necessary to use agricultural lime and blackstrap molasses, but they represent less than the 5% of the pile. The waste products from the kitchen are used in a proportion (based on weight) that ranges from 0-10%. Cattle manure has the greatest variation in the proportions used (0-40%). Few producers use waste products from the garden or yeast (0-5%). The other waste products are not much used by the producers.

Use and application rate of the compost in the different crops

The largest percent of producers surveyed use their compost on their coffee crop (22.2%); however it is also used frequently on common beans, plantain and maize

crops (18.1%, 15.3% and 9.7%, respectively. While it is applied in larger amounts to fruit, plantain and vegetable crops, approximately 3-5 kg compost/plant is applied to plantains; but a few producers use up to 50 kg/plant, which increases the variability in the data. The application rate in coffee ranges from 1-3 kg compost/plant. The average application rate for the other crops is low, without distinguishing between minimum and maximum amounts (0.2-1.5 kg compost/plant on the average). In the case of quarterly crops like common beans and maize and yearly crops like cassava, the amounts used are always constant (0.2-0.5 kg/plant). These three crops are planted in association. Costa et al. (1991) suggest that a suitable application rate for compost is from 20-50 t/ha for crops with a large need for humus and from 25-40 t/ha for forage crops. The application rates used by the producers are similar to the recommendations found in the literature.

Criteria for evaluating the maturity and stability of the compost
The producers that do composting have criteria for evaluating the maturity of the compost, which determine when it is possible to use it. The ease of managing the compost with respect to its texture is the most frequently mentioned criterion among the producers surveyed. However, other criteria such as stable temperature of the compost (same as the environmental temperature), low level of unpleasant odors, low percentage of moisture (dry compost), and the change of color (dark) also serve, according to the producers, to determine when the compost can be used. The producers' criteria are consistent with the parameters indicated by various authors; e.g., Costa et al. (1991) and Labrador (2001) consider that one of the most useful methods for determining the maturity and stability of the compost is observing odor, stable temperature, color and specific weight.

Advantages/disadvantages of using compost according to the producers
Among the advantages, according to the producers, the effect of the compost on increasing production stands out, especially in coffee and common beans (32% of the responses). The producers also consider that the compost is an excellent fertilizer. This criterion was taken into account by 10 producers (21.7% of the total criteria) and is consistent with what is stated Restrepo (1996). A few producers mention that the compost has some disadvantages, especially when there is inadequate management of the system. One important disadvantage is the low availability of the phosphorus in the compost obtained. The producers also assume that an important disadvantage is the low availability of phosphorus in the soils in the zone, which should be reflected in the compost. The lab analysis shows phosphorus levels within the range mentioned by Cubero (1994), from 0.1-1.6%.

Mixture, composition and production costs for a typical compost pile
With the cost estimates of the three producers and using 1 ton as a basis for the calculation, the production costs were estimated, assuming 30% losses during the process, leaving 700 kg at the end. In fact, García (2000) mentioned that from 12-50% reduction in materials can occur, depending on the materials used. With an estimated 30% losses, a value of $126.20 was reached, which is the cost for the producers surveyed to produce 1 kg of compost. The production costs of the compost are high, taking into account that this is close to the amount suggested by Gómez (2000) for commercial purposes ($150/kg). For organic fertilizers (products with an NPK content ± 4%). (Restrepo 1996, Bongcam 2003) mention that the prices for the chemical fertilizers, as compared with those for the compost, are low (approx. ratio of 1:10). For

this study, however, the ratio was 1:7.5 (i.e., 7.5 kg of compost per kg of chemical fertilizer).

Case studies

To establish a compost pile with the waste products, the three producers first clean the area where the pile is to be built. They prepare the waste products and substrates to be used in the system ahead of time. The coffee pulp, chicken manure, dolomitic lime, blackstrap molasses and yeast are used by the three producers; while the cassava solid wastes and Calfomag were used by only two of them. Other waste products and substrates such as agricultural magnesium sulfate, *buenazas*[111] Biosolnew,[112] rice husks, earthworm vermicompost, mature compost, bean pods and *nacedero* leaves were used by some individuals. The waste products are placed in layers. Generally the waste products of greater abundance are placed first. The blackstrap molasses and the yeast are mixed beforehand in a minimum of 10 lt of water. This mixture together with the lime is added as the layers are added.

The three producers' compost: The proportions of coffee pulp used by the three producers ranged from 22-32% of the total weight of the mixture. Chicken manure is used in proportions that go from 8-22%. To condition the moisture in the pile, the producers add water until the moisture is suitable, which they test with their clenched fist.[113] The blackstrap molasses is used in proportions of 0.4-0.6%. The use of the cassava solid wastes varies among the producers (23% of JB's pile versus 53.5% of CT's pile). However, both producers recognize the benefits of using the cassava solid wastes based on previous experiences, where they obtained the compost in less time (22-30 days) and better results in their crops. Other waste products and substrates also used include small percentages of nacedero leaves, bean pods, rice husks, buenazas, yeast, Biosolnew and agricultural magnesium sulfate—all used separately. The coffee pulp has ideal characteristics for compost as it has a high sugar content (source of energy), a good C:N ratio (25:30) and a suitable particle size (Restrepo 1996, Soto and Muñoz, 2002).

Chemical analyses of the composts

Carbon content

The analyses of variance showed significant differences for carbon contents in the compost; however, the compost systems had suitable levels (from 23-29%, Table 1). In general all the compost systems, independent of the waste products used, had an abundance of this element; thus they are considered organic amendments (Costa et al. 1991). However, it is important to clarify that the chemical analyses for the three systems of compost were done at the initial stage of the process, given the impossibility of carrying out a sampling at the end of the process. According to Gómez (2000) the amount of carbon is not constant in the compost process, varying considerably over time, especially if it has not undergone a good period of maturity. The percentages are given on a dry basis with respect to the total nutrient content.

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111. Mixture of plants that grow where they are not wanted, generally have no economic value and interfere with crop growth and harvesting, but are beneficial for this type of practice after pruning.
112. Organic soil amendment, ideal accompaniment for leaf and soil fertilization with both macro- and micronutrients, which helps assimilate the same given their power of chelation and complejation.
113. Consists in taking a fistful of the mixture and squeezing it; there should not be any drops of water between the fingers, but it should form a brittle lump (Restrepo 1996).

NPK contents

The analysis of variance showed highly significant differences ($p<0.001$) for said contents among the composts. RM had the highest NPK values (3.35%), while JB had the lowest values (2.84%) (Table 1). It should be noted that the NPK contents were within the ranges reported by Cubero (1994), who mentioned values from 0.4-3.5% for nitrogen, from 0.1-1.6% for phosphorus, and from 0.4-1.6% for potassium. Two of the systems evaluated (CT's and RM's) had P contents of over 0.5% despite having highly significant differences. The K contents ranged from 1-1.5% for the three compost systems, which is relatively low, considering that they can decrease during the process of stabilization or in the final stage.

Ca and Mg contents

The three composts had highly significant differences ($p<0.001$) for Ca and significant differences ($p<0.05$) for Mg. That of producer RM had the highest values for magnesium and calcium (1.3% and 4.73%, respectively). The high contents of exchangeable bases in RM's compost are apparently related to the proportions of dolomitic lime added to the pile and the additional use of agricultural magnesium sulfate (0.8%) and Calfomag (1.3%).

Table 1. Composition of nutrients in the compost analyzed.

	Nutrient Content (%)						Ratio	
	C	N	P	K	Ca	Mg	C/N	C/P
CT[2]	28.28 a[1]	1.22 a	0.61 a	1.20 b	1.64 a	0.31 b	23.09 a	46.34 a
JB	25.94 a	1.41 b	0.42 b	1.01 b	1.05 b	0.32 b	18.48 b	61.87 b
RM	23.12 ab	1.03 c	0.85 c	1.48 a	4.73 c	1.30 a	22.53 a	27.29 c
Prob(P<F)	0.0143	0.0016	0.0001	0.0103	0.0001	0.0001	0.0008	0.0001

1. Samples with the same letter are not statistically significant ($P < 0.01$) according to the ANOVA.
2. CT: Carlos Trujillo, JB: José Beltrán, RM: Rodolfo Muñoz.

C:N and C:P ratios

The C:N and C:P ratios also had highly significant differences ($p<0.001$) among the composts evaluated. The C:N ratio ranged from 18.48-23.09, the highest being in CT's compost and lowest in JB's (Table 1). The values of the C:N ratios for the three composts are not the best; in fact they fall below the average required for initiating the process. Labrador (2001) and Costa et al. (1991) mentioned that microorganisms generally use from 25-30 parts carbon to one of nitrogen. This ratio is considered optimal for materials that are going to be composted.

Conclusions

- Inorganic waste products are valued by the producers in the production of organic fertilizers as an alternative for replacing chemical fertilizers, achieving optimal results.
- The parameters that the producers took into account to evaluate and improve the functioning, efficiency and quality of the final product of a compost system were temperature, moisture, color and odor.

- In general, the producers mention that the use of the compost as organic fertilizer contributes to increasing crop yield and improving the environmental quality (recovery of soils, less incidence of pests and diseases, fewer unpleasant odors).
- The combination of cassava solid wastes and other organic wastes is important within the systems of compost evaluated, based on what was observed in the lab results. The compost that contains this waste product contributes the greatest content of nutrients and has the most efficient biological process
- The cassava solid wastes contribute excellent qualities including a variety of microorganisms and nutrients to the compost, which is reflected in the reduced stabilization time according to the producers (22-30 days) and to the higher nitrogen content (1.22 and 1.41%) with respect to the system that does not use this waste product (1.03%).
- In the compost analyzed, the C:N ratio was no better (18.48-23.09) and the C:P ratio registered values from 27.29-61.87. None of the composts evaluated falls within the optimal range for the two ratios, being lower than the average required for initiating the process (C:P 75-150:1 and C:N 25-30:1). Thus there is a need to increase the content of waste products rich in carbon to balance those ratios; e.g., add more vegetable leaves, harvest residue, wood shavings or ashes, etc.

Recommendations

- Build upon each producer's experiences with composting in an integrated and participatory process, given that everyone has criteria, which when considered together can generate viable and sustainable alternatives, contributing elements and criteria based on local knowledge, making the practice of composting much more viable among low-resource farmers.
- Promote study tours to exchange knowledge among producers that know about these practices, to socialize the knowledge and promote the generation of initiatives that facilitate their implementation and management.
- Agroenterprises that generate large amounts of organic wastes should use the composting technology, thereby contributing to minimizing the impact caused and generating a good-quality product that can be commercialized in the zone as organic manure.
- Given the simplicity of the practice of composting, it can be reproduced easily by farmers or agroenterprises in the zone and the rest of the country.

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Quinoa: Recovery of a Tradition

José Ignacio Roa V.[114]

Accomplishments

A series of innovations introduced by the members of the *Guambiano* Amerindian community in the Quisgo Reservation, Municipality of Silvia, Cauca, Colombia:

- The CIAL methodology
- Introduction of new varieties of quinoa (*Chenopodium quinoa*), an ancestral Inca crop of high nutritional value, adapted to the region, with a short period of only 5 mo to harvest
- A mechanical thresher
- Formed group of women leaders

Abstract

The Quisgo Reservation is inhabited by 800 families, with an estimated population of 3000-4000 people. Each reservation is headed by an Indigenous Council, which is the maximum authority. In the Municipality of Silvia, Cauca Province, Colombia, there are six reservations: Quisgo, Guambia, Jambalo, Pitayo, Quilcalla and Tumburao. This article illustrates how a group from the indigenous community organized themselves with minimum resources into a Local Agricultural Research Committee (CIAL), how they were capable of taking decisions about local research priorities, and how they have been able to develop a process of innovating through conducting experiments. In response to the foregoing, both governmental entities and nongovernmental organizations are providing support so that the process can be developed on a larger scale. The CIAL is a local research service where farmer-leaders assume the responsibility for this activity before the community that has elected them. The CIALs conduct research in order to adjust agricultural technologies to the specific conditions of their communities, communicate the results and disseminate those technologies that prove useful in the region.

Guambiano woman evaluating whether quinoa is ready to be harvested, CIAL Tres Cruces.

Background

In these communities there are always some difficult months when food becomes scarce. According to the CIAL (Local Agricultural Research Committee) members, the most difficult months are Febuary and March, when food becomes scarce because of the dry summer and April (Easter week) due to the rainy season. In September it is not so difficult because there

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is still maize stored from the previous harvest, which lasts depending on the amount planted and the consumption."*If we eat it every day, it won't last,*" says Esmeralda, Secretary of the Committee."*There are other foods that we vary so we eat other things. "The people whose maize does not last have to buy it in town, they get the money by selling firewood, milk or working as a day laborer.*

"In Easter week it is very difficult because of the rainy season and also the harvests have passed. What has been gathered, the maize and the common beans, have to be stored because here it gets very cold, and there are no options for planting something that will mature in 3 months, in other words, fast; it always takes time. For example, maize takes one year, the climbing beans almost one year as well, the bush types 4 months, peas 4 months; but they are not sure crops because if it is too rainy, they are lost and if the summer is too hot, they are also lost. So you have to play at both things, to lose or to win," says Esmeralda.

Esmeralda Solarte is a farmer, mother of three children; yet she finds time to participate in the Quisgo Indigenous Council in Tres Cruces, Municipality of Silvia, Cauca Province, Colombia, and is the Secretary of the CIAL. The leader of the CIAL is Mercedes Hurtado, who is single and lives with her mother, who is advanced in age. The Treasurer is Ángel Maria Hurtado and the Promotor, William Gonzáles. The Committee has created a new function, which is the Coordinator between the Indigenous Council and the Committee. The Committee works very closely with another eleven farmers.

The functions of the CIAL have been planning and coordinating the implementation of the trials on the farms of the local producers. They decide when, where and with whom to plant; the evaluations of the trials on the farms, the harvest and the analyses of the results. The Committee also organized a meeting after each harvest with members of the community to inform them about their activities and results. In meetings like those, it is when new ideas for conducting research with the CIAL arise; e.g., the trial with varieties of quinoa.

In 2000 the CIAL was invited to participate in an international seminar about participatory breeding in Quito (Ecuador), together with two other CIALs from the Cauca Province. The young farmers did not have any knowledge of quinoa at that time. Therefore Esmeralda saw it for the first time on her trip to Ecuador in zones similar to Silvia. The CIAL obtained seed from Ecuador via collaboration between the agronomists that support the CIALs in Ecuador and Colombia: Fausto Merino from the National Research Institute (INIAP) of Ecuador, and José Ignacio Roa from the IPRA Project at CIAT.

She explained: *"The idea of the quinoa was mine, after the trip to Ecuador, where we went to see their crops* [visit to INIAP's Santa Catalina experiment station]. *We had already worked with amaranth, which is very similar to quinoa. I had also heard of quinoa, but I had not had the opportunity to get some seed for planting. Then as a result of that trip, we had the opportunity and that was through you* [José Ignacio Roa, IPRA Project, CIAT] *who brought us the seed, which we planted here in Quisgo, The result has been really great."*

Objective

The IPRA Project saw the need to strengthen the local leadership in the communities and that was how it began to develop participatory methodologies through organized groups of farmers that like to do research (the CIALs). They investigate the causes that give rise to their problems and seek to solve them in order to improve their quality of life. They also seek to strengthen their degree of organization, development and sustainability so that in the end, the communities will be self-reliant in their own development processes. At the same time it is important that the communities recover their native knowledge under the leadership of their Committees to use it along with the new technologies that are produced by the research centers and that they evaluate them to learn which will adapt better to their specific conditions of soil, climate and cultural aspects.

The main objective of the CIAL Tres Cruces was to recover the tradition of planting quinoa, a millenary crop of high nutritional value, about 34% protein, and that the communities would begin to consume it again because it is a high-quality crop. Esmeralda commented that she has been looking for information on quinoa in collaboration with the UMATA (Municipal Unit of Agricultural and Livestock Technical Assistance) in order to share it with the community. Some of the older people commented that they had grown and eaten quinoa and that it was a traditional crop that was lost in the last generation. Quinoa has been one of the oldest traditional crops since the time of the Incas. The members of the Indigenous Council and the community in general are aware of the value of this innovation.

Methodology

In Ecuador the CIAL Flor Naciente has tested 15 varieties of quinoa supplied by the Legume and Tuber Program at INIAP (National Agricultural and Livestock Research Institute). Those varieties selected by the CIAL were then brought by the IPRA agronomist and delivered to the CIAL Tres Cruces. In 2000 the Committee planted a trial with the 6 varieties, following the steps of the CIAL methodology, first planting small plots to observe whether the varieties were adapted to the local planting conditions. All six varieties were planted on several farms at the same time, with the local planting system and fertilization in order to compare them.

The varieties rated as good by the CIAL were cooked and tested by the community in order to make the final selections and decide which would be replanted in larger plots called "Confirmation Trials." In this second round of trials they identified two varieties as the best: Cochasqui and Priotal. Then in 2003 the CIAL organized a field day with 30 women from 10 communities. "*We made cakes and salads, and served refreshments, all of them made of quinoa. What the people liked the most were the cakes,*" they said.
There was not sufficient seed available in the region. In 2004, the CIAL decided to plant three large plots of each of the two varieties on 3 farms. They still conserve the six initial varieties.

Results

Toward the end of 2004, four years after beginning the experiment, Esmeralda Solarte commented that almost 40% of the families in the Quisgo Reservation have planted at least one of the quinoa varieties selected by their Committee. *"The majority of the families in the*

*Quisgo Reservation had a small piece of land planted, not with much quinoa; now at least 300 families have planted quinoa"**

At present there are producers that have planted up to one-fourth of a *plaza* (1600 m^2) because they consider quinoa to be a new crop that still needs to be tested.

Cochasqui has a low level of saponin (a tannin that gives a bitter taste), which is white, better for cooking. The cakes look pretty, and they have a better flavor. The seed is being distributed in very small amounts among the producers.

The level of interest has been increasing. Esmeralda says that people have gone to her house, asking her to give them a little seed that they want to plant, or they trade quinoa for maize. *"I gave her half a pound, and she gave me 20 ears of maize. It takes only a little for a person to have enough to produce seed."* (the culture of bartering)

The farmers are planting quinoa principally as a subsistence crop to increase their food, and some are beginning to sell small amounts of seed. For example Mercedes Hurtado, leader of the CIAL, recently sold about 60 kg of quinoa as seed at Col.Ps.$2500 (US$1.00) to organizations and at $1500 (US$0.63) to the local farmers. The UMATA bought seed in mid-2004 to conduct an extension program with quinoa; by 2005 the farmers already had their seed.

The most important result is described by a CIAL member as follows:

"The idea is that all the families that live in the reservation plant it like they do maize, that they learn to consume it, and that above all, they give it to the children because it is a better food than maize.

"The idea is also to distribute the quinoa in the schools to replace the Bienestarina Bienestarina (made of wheat flour, milk, soy flour, vitamins and minerals) and given by the Family Wellbeing Institute (ICBF) because the quinoa flour is more nutritious and it is also medicinal."

Mercedes Hurtado commented : "*We have managed to decrease the incidence of tuberculosis quite a bit in older people and in children, thanks to the use of quinoa."*
At present they are not thinking about selling quinoa outside the region:" *First it has to be consumed in the reservation*"; in other words, they feel that after resolving their food security internally, they will think about comercializing quinoa, seeking new markets outside the region.

Quinoa is harvested manually. In order to cook it, a cuticle, a thin husk that covers the grain, has to be removed. The traditional procedure is to rub the grains between the hands. "*This is very hard work; many times my hands bled when there was quinoa in the region,*" commented an old indigenous woman who collaborated with the Committee.

The CIAL suggested getting some type of little "machine" to do this arduous work. The IPRA Project agronomist, José Ignacio Roa, and Mr. Humberto Muñoz, with extensive experience in building small machinery, created a prototype that was tested with very good results. The machine was tested on a field day attended by 30 producers, authorities of the Indigenous Council, UMATA technicians and CIAL members. They were impressed by the

benefits that they could get from the thresher and are planning to plant the quinoa on a larger scale and begin to support the CIAL so that it plants and disseminates the quinoa varieties.

Later, among the Municipality of Silvia, the Indigenous Council and CORFOCIAL (Corporation for Promoting the Local Agricultural Research Committees), which groups the CIALs from Cauca Province, the CIAL obtained the resources to buy the quinoa thresher. The machine is kept in Esmeralda's house, and the producers borrow it, taking it to their homes to thresh their quinoa. The plans for 2006, commented Esmeralda, are "to adapt a small motor to the machine because they get very tired and the amount of quinoa has increased." The Committee is aware that a very important goal is to socialize the values of self-reliance among young people. Mercedes commented: *"Our task is to teach the children so that they recover the custom of eating quinoa, given that the children, seeing and teaching it, can learn and get ahead."*

The leaders of the Indigenous Council have been somewhat skeptical of the CIAL's work because some of them do not understand why they are planting these new varieties on such small plots. Nevertheless, their way of thinking about the research on quinoa has changed over time. At the beginning they were distant from the process, considering it as something small, "*a group of women doing something of little importance and with an unknown crop.*" Esmeralda's husband does not oppose her participation in the CIAL. If she has to go out for an all-day-long meeting, her family cooks for themselves. Mercedes, the other member, has to find someone to take care of her mother when she has to go out to attend the meetings.

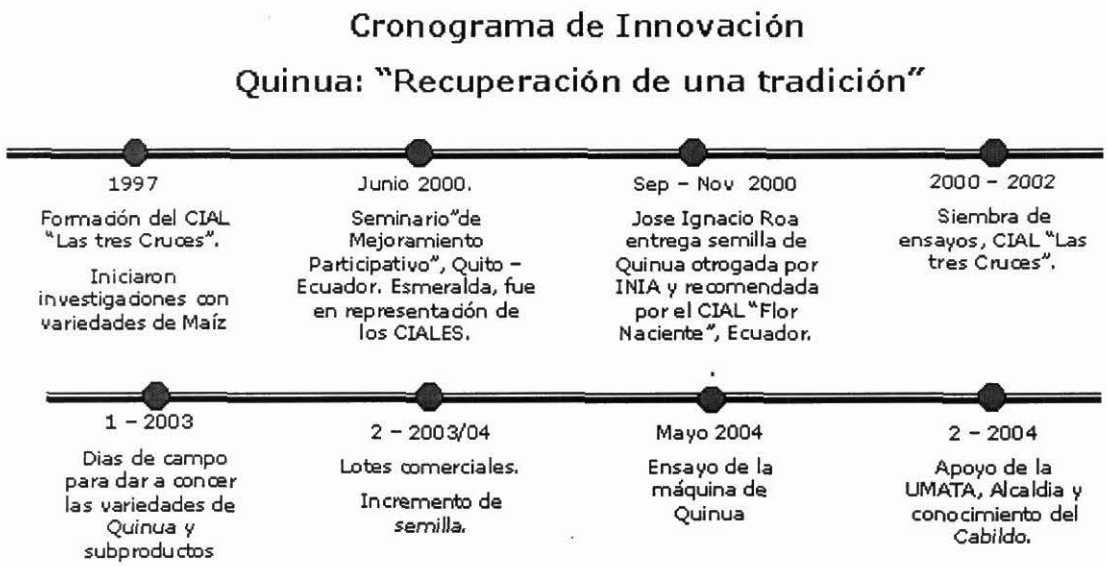
The Committee has increased its petty cash fund with the product of the sale of the seed from their experiment. Thus far they have saved Col.Ps.$220,000 (US$100), which they use to pay for the costs of their trials.

The CIAL is also visited by the UMATA, which has its office in Silvia, the capital of the municipality, population 13,000 inhabitants. The UMATA provides the CIAL with chicken manure, which is the source of organic manure to fertilize their trials. Their technicians observe the Committee's experiments. The UMATA is starting an extension program with quinoa in the five reservations of Silvia. It plans to give support to other producers for planting 10-20 ha of quinoa on a commercial scale, and the CIAL will have to produce the seed for this project. The Office of the Mayor has had a very important function: give support to the UMATA in this process by monitoring the harvests, visiting the trials and observing how the CIAL does its research.

CORFOCIAL's functions have been to facilitate the training in the CIAL methodology, provide access to the technical information, contact the CIALs and give support to the CIAL in the form of money for their petty cash fund and 50% for machinery.

The IPRA Project agronomist's functions are to monitor CORFOCIAL's progress, train or, if necessary, give support to the technicians in the research process and help CORFOCIAL to develop the CIALs in new ways. For example, the agronomist knew Don Humberto Muñoz, who designed and built the prototype of a thresher for quinoa, assuming the cost of constructing the first thresher. The agronomist brought quinoa from the CIAL so that they could test the thresher.

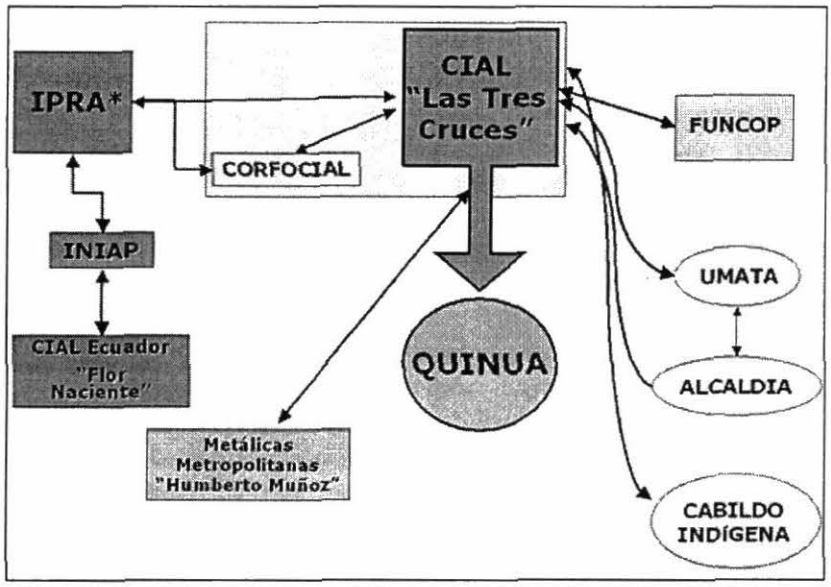
Mercedes Hurtado, member of the CIAL from Tres Cruces, identified the following as the most important lessons for other communities: *"I hope that our communities try to maintain our own native products because we know that our survival lies in growing the food we need and in conserving our native products and that while we have food, no one can make us leave our communities because we have a way to subsist, to survive."*



[Innovation Schedule of Activities // Quinoa: "Recovery of a Tradition // 1997 – Formation of the CIAL Tres Cruces – Began research on maize varieties // June 2000 – Seminar on Participatory Breeding, Quito – Ecuador. Esmeralda went in representation of the CIALs.] // Sept.-Nov. 2000 – José Ignacio Roa delivers the quinoa seed donated by INIAP and recommended by the CIAL Flor Naciente in Ecuador// 2000-2002 Planting of trials, CIAL Tres Cruces.

1 – 2003 – Field days to show the quinoa varieties and its byproducts // 2-2003/04 – Commercial lots. Seed multiplication// May 2004- Trial with machine for processing quinoa seed // 2 – 2004 – Support from the UMATA and the Office of the Mayor, and knowledge of the Indigenous Council]

[Ecuador CIAL..., Metropolitan Metalwork..., Quinoa, Office of the Mayor, Indigenous Council]



Network of stakeholders.

Conclusions

For a project to have continuity over time and enthusiasm by the communities, it is very important that the producers participate directly, from the initial selection of the problems to be addressed, to the planning of the activities that should be carried out with the objectives, to the evaluation of the varieties, to analyze the different stages and to keep the community informed so that they adopt the project as their own, which in this case is to spread the growing of quinoa to the other indigenous reservations.

All processes should be supported by training for the community and the leaders, as well as support for agricultural machinery if it is required so that in this case a greater number of indigenous communities can benefit.

Communication with the local organizations such as the Indigenous Councils, local government authorities (in this case, the UMATA) are also important so that they all support the project and feel like they are part of it.

It is comforting to listen to the words of CIAL member Mercedes Hurtado when she communicated in December 2005 that they had been able to reduce the incidence of tuberculosis in children and in the elderly in their reservation (Quisgo) due to the consumption of the quinoa.

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Appendix

Acronyms

A2N	Africa 2000 Network
AFRICARE	Nonprofit Organization, Specializing in aid to Africa
AHI	African Highlands Initiative (ICRAF-Uganda)
AKRSP	*Aga Khan Rural Support Project*
APAJIMPA	Asociación de Productores de Maní y Ají de Padilla (Bolivia)
ARDC	Adaptive Research and Development Center (Uganda)
ASSMAG	Association of Smallholder Seed Multiplication Action Group (Malawi)
BARNESA	Banana Research Network for East and Southern Africa
BFP	Basin Focal Project (CPWF)
CARE International	Cooperative for American Relief Everywhere
CGIAR	Consultative Group on International Agricultural Research
CIAL	Comité de Investigación Agrícola Local (CIAT)
CIAT	Centro Internacional de Agricultura Tropical (Colombia)
CIAT-Bolivia	Centro de Investigación Agrícola Tropical
CIMMYT	Centro Internacional de Mejoramiento de Maíz y Trigo (Mexico)
CIPASLA	Consorcio Interinstitucional para la Agricultura Sostenible en Laderas (Colombia)
CMDR	Concejo Municipal de Desarrollo Rural (Colombia)
CMS	Catalyst Management Services (India)
CNFA	Citizens Network for Foreign Affairs
CONSEA	Consejo Seccional de Desarrollo Agropecuaria (Colombia)
CORFOCIAL	Corporación para el Fomento de los CIAL (Colombia)
CORPOICA	Corporación Colombiana de Investigación Agropecuaria
CPWF	Challenge Program on Water and Food (based at CIAT)
CRIDA	Central Research Institute for Dryland Agriculture (India)
CRS	Catholic Relief Services
DANIDA	Danish International Development Agency
DfID	Departament for International Development (UK)
ECA	Escuelas de Campo de Agricultores Bolivia
FAO	Food and Agricultural Organization of the United Nations
FDTA	Fundación para el Desarrollo Tecnológico Agropecuario (Bolivia)
FEDECAFE	Federación de Cafeteros (Colombia)
FFS	Farmer field schools
FIT-9	Facilitando la Innovación Tecnológica – Proyecto Aprendizaje Horizontal
FOCAM	Fomentando Cambios (Bolivia)
GF	Grupos Focales
GTZ	Deutsche Gesellschaft für Technische Zusammenarbeit (German Agency for Technical Cooperation)
ICBF	Instituto Colombiano de Bienestar Familiar
ICAR	Indian Council for Agricultural Research
ICRAF	International Centre for Research in Agroforestry (Kenya)
ICRISAT	International Crops Institute for the Semi-Arid Tropics (India)
IDEAA	Initiative for Development and Equity in African Agriculture
IDEADE	Instituto de Estudios Ambientales para el Desarrollo, Pontificia Universidad Javeriana (Colombia)

IFPRI	International Food Policy Research Institute (USA)
IITA	International Institute of Tropical Agriculture (Nigeria)
I-LIFE DAP	Improved Livelihoods through Increased Food Security Development Assistance Program (multi-institutional consortium in Malawi)
INE	Instituto Nacional de Estadísticas (Bolivia)
INIAP	Instituto Nacional de Investigaciones Agropecuarias (Ecuador)
INNOVA	Fortalecimiento a los sistemas de Innovación Tecnológica en la agricultura basada en el cultivo de la papa (Bolivia)
IPRA	Farmer Participatory Research Project (CIAT)
IRDD	International & Rural Development Dept. (University of Reading, UK)
IRRI	International Rice Research Institute (Philippines)
JAC	Junta de Acción Comunal (Colombia)
KARI	Kenya Agricultural Research Institute
MACA	Ministerio Asuntos Campesinos y Agropecuarios (Bolivia)
MVF	M. Venkatarngiya Foundation (India)
NAADS	National Agricultural Advisory Services
NAIP	National Agricultural Innovation Project (World Bank funded)
NARO	National Agricultural Research Organization (Uganda)
NASFAM	National Smallholder Farmers' Association of Malawi
NEI	Nueva Economía Institucional (Bolivia)
NORAD	Norwegian Agency for International Development
NRSA	National Remote Sensing Agency (India)
NRSP	Natural Resource Systems Programme (DfID)
OTB	Organización Territorial de Base (Bolivia)
PEAP	Poverty Eradication Action Plan (Uganda)
PIEN	Proyectos de Innovación Estratégica Nacional (Bolivia)
PITA	Proyecto de Innovación Tecnológica Aplicada (Bolivia)
PMA	Plan for Modernization of Agriculture (Uganda)
PRGA	Participatory Research and Gender Analysis (at CIAT)
PROINPA	Fundación Promoción e Investigación de Productos Andinos (Bolivia)
Prolinnova	Promoting Local Innovation
PROMETA	Proyecto de Mejoramiento en Tracción Animal (Bolivia)
PROMMASEL	Proyecto de Manejo de Malezas Sostenible en Laderas (Bolivia)
PROSAT	Proyecto de Servicios de Asistencia Técnica para Pequeños Productores
RO-FCI	Reglamento Operativo del Fondo Competitivo de Innovación (Bolivia)
RUMARK	Rural Market Development Trust (CNFA Affiliate)
SARRNET	Southern African Root Crops Research Network (IITA)
SIBTA	Sistema Boliviano de Tecnología Agropecuaria
SIDA	Swedish International Development Agency
ULAMP	Uganda Land Management Project
UMATA	Unidad Municipal de Asistencia Técnica Agropecuaria (Colombia)
USAID	United States Agency for International Development
VEDCO	Volunteer Efforts for Development Concerns
WHO	World Health Organisation

Abbreviations

CBO	Community based organization
CB-PM&E	Community-based PM&E
CD-PM&E	Community-driven participatory monitoring and evaluation
FPR	Farmer participatory research
FSR	Farming systems research
GO	Government organization
IA	Impact assessment
M&E	Monitoring and evaluation
MSC	Most significant change
NGO	Nongovernmental organization
NRM	Natural resource management
PAR	Participatory action research
PIM	Participatory impact monitoring
PLA	Participatory learning and action
PMA	Plan for modernization of agriculture (Uganda)
PM&E	Participatory monitoring and evaluation
PMR	Participatory market research
POA	Plan Operative Annual
PRA	Participatory rural appraisal
PR&E	Participatory research and extension
R&D	Research and development
R&DSP	(Bolivia)
SC	Social capital
SD	Standard deviation
SNA	Social network analysis
VAD	Vision-Action-Demands

(p. 2142). This context diversity therefore has important implications for defining 'sustainability'.

Background

Context: This study was conducted in conjunction with CIAL participants in the municipalities of Yorito and Sulaco in the department of Yoro in north-central Honduras. La Fundacion para la Investigacion Participativa con Agricultores de Honduras (FIPAH) supported 25 local agricultural research committees (Comites de Investigacion Agricola Local: [CIALs]) in Yoro at the time of the study. Twenty of these were mixed, two were all male and three were all female. Average membership per CIAL in the area was 9, with a range of 6-23 members. The CIAL methodology was developed in the late eighties by the IPRA team, led by Jacqueline Ashby, CIAT (Ashby et al., 2000) The overriding objective was to provide an ongoing platform for integrating local needs assessments, local decision-making, and innovation for *'sustainable agriculture'* among poor and marginalized farmers (Braun et al., 2000). The approach enables community-based research teams to look for their own solutions to local agricultural problems. CIALs test out new agricultural technologies/techniques against local practice(s) through the design and execution of simple experiments. These are evaluated and analyzed by the CIAL and, if successful, the technology is recommended to the community. Honduran agronomists were trained by CIAT in the CIAL methodology in 1996. There are five regional CIAL associations (ASOCIALs) in Honduras comprising around 900 farmers. FIPAH supports three of the regional CIAL associations. The largest concentration of CIALs is located in Yoro (ASOCIAL Yorito, Victoria and Sulaco, where the impact assessment was conducted.

Through the CIAL project, farmers learn how to plan, manage, evaluate and analyze experiments. In each participating community, the CIAL hosts a community meeting to discuss local agricultural needs and to prioritize research goals. Agricultural priorities identified by communities in Yorito and Sulaco have been largely oriented around the production of staple crops: maize and beans, reflecting the overriding concern with food security. Thus 79% all the agricultural experiments carried out by CIALs have involve varietal testing or management techniques associated with maize and beans. However, most CIALs tend to carry out more than one experiment at a time and new crops such as soybean, wheat and rice or new inputs, such as organic fertilizers and pesticides, are often tried out alongside research in basic staples. The CIAL groups in Honduras also provide a platform for requesting information, assistance and micro-credit loans. CIAL members learn about managing budgets, sewing, new recipes, nutrition and health, amongst other things. They also administer loans provided via the Second Order Organization (ASOCIAL). These loans are sometimes used by the CIALs to purchase materials for building grain silos, or committee meeting rooms but they also afford CIAL members the opportunity to take individual loans from their CIAL organization to buy seeds or agronomic inputs, to buy/produce extra grains to store against the hungry season or to help make ends meet when produce from the prior harvest season has diminished.

Methodology

The CIAL project in Honduras provided a rare opportunity to take the results of a long-term (with more than 10 years of work in the field) and on-going agriculture project and employ participatory methods to understand the connection between the visible impacts and project methods. In this research we combined alternative and participatory tools with more