Advancing Participatory Technology Development:

Case studies on Integration into Agricultural Research, Extension and Education

Editors:
Chesha Wettasinha, Laurens van Veldhuizen and Ann Waters-Bayer

August 2003

International Institute of Rural Reconstruction
ETC Ecoculture
ACP-EU Technical Centre for Agricultural and Rural Cooperation

Citation: Wettasinha C, van Veldhuizen L & Waters-Bayer A (eds), Advancing Participatory Technology Development: case studies on integration into agricultural research, extension and education. 2003. Silang, Cavite, Philippines: IIRR / ETC Ecoculture / CTA. 257 p.

International Standard Book Number (ISBN): 1-930261-07-1

Design and layout by: Celso Amutan

Cover photo: The Zimbabwean farmer experimenter Jane Mokgoko explains her soil and water conservation experiments to extension agents during a mid-season evaluation. Photo: Jürgen Hagmann.

Printed in the Philippines by: Twin A Printing, Incorporated

International Institute of Rural Reconstruction

The International Institute of Rural Reconstruction (IIRR) works with the rural poor in developing countries to improve their lives by building on their unique assets and strengths. IIRR achieves this through field research, training, publications and field programs with poor communities and in partnership with other development organizations. Rural reconstruction is a development strategy first advanced by Mass Education and Rural Reconstruction Movement founded by Dr. Y.C. James Yen in 1923. The strategy is sustainable, integrated and people-centered. IIRR is a recipient of various awards in recognition of its contributions to development. Among these is the Alan Shawn Feinstein's 1995 World Hunger Award in recognition of "IIRR's exceptional work to provide opportunities for small rural farmers throughout the developing world to prevent and reduce hunger and malnutrition in their communities." IIRR has also received the prestigious Ramon Magsaysay Award for International Understanding, an award considered to be the "Nobel Prize of Asia".

IIRR, Y.C. James Yen Center, Silang, Cavite 4118, Philippines (www.iirr.org)

ETC Ecoculture

ETC Ecoculture is a research and advisory group based in the Netherlands that promotes sustainable management and use of natural resources for secure livelihoods of people living in rural areas of developing countries. With its roots in the early 1980s, ETC Ecoculture is among the pioneers in studying, mobilising and spreading information globally on the impact of conventional intervention approaches, particularly in the fields of agriculture and natural resource management (NRM). It has worked over many years, in collaboration with both governmental and nongovernmental organisations in the "North" and the "South", in developing and spreading participatory approaches to research and development in sustainable agriculture and NRM, building on local knowledge and strengthening local innovation capacities. ETC Ecoculture is part of ETC Foundation, a not-for profit organisation that works together with an international group of ETC units in East Africa, India, the Netherlands, Peru, Sri Lanka and the United Kingdom.

ETC Ecoculture, POB 64, NL-3830 AB Leusden, Netherlands (ecoculture@etcnl.nl)

CTA

The ACP-EU Technical Centre for Agricultural and Rural Cooperation (CTA) was established in 1983 under the Lomé Convention between the ACP (African, Caribbean and Pacific) Group of States and the European Union Member States. Since 2000, it has operated within the framework of the ACP-EC Cotonou Agreement. CTA's tasks are to develop and provide services that improve access to information for agricultural and rural development, and to strengthen the capacity of ACP countries to produce, acquire, exchange and utilise information in this area. CTA's programmes are designed to: provide a wide range of information products and services and enhance awareness of relevant information sources; promote the integrated use of appropriate communication channels and intensify contacts and information exchange (particularly intra-ACP); and develop ACP capacity to generate and manage agricultural information and to formulate ICM strategies, including those relevant to science and technology. CTA's work incorporates new developments in methodologies and cross-cutting issues such as gender and social capital.

CTA, POB 380, NL-6700 AJ Wageningen, Netherlands (cta@cta.int)

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Acronyms

AGRITEX	Department of Agricultural, Technical and Extension Services
AHI	African Highlands Initiative
AME	Agriculture Man Ecology
AO	Agricultural Officer
APROSAMA	Association of Farmers, Foresters and Similar Producers in San Marcos de Cutris
ARAO	Regional Association of Organic Farmers
ARC	Agricultural Research Council
ASARECA	Association for Strengthening Agricultural Research in East and Central Africa
AS-PTA	Assessoria e Servicos a Projetos em Agricultura Alternativa
ASSP	Agricultural Services Support Programme
ATC	Advisory Training Centre
BASED	Broadening Agricultural Services and Extension Delivery
BoA	Bureau of Agriculture
BRA	Buisplaas Residents' Association
CBO	Community-Based Organisation
CCAP	Centre for Chinese Agricultural Policy
CENAP	National Centre for Pastoral Action
CEOSS	Coptic Evangelical Organization for Social Services
CGIAR	Consultative Group on International Agricultural Research
CIAT	International Centre for Tropical Agriculture
CIPCRE	Cercle International pour la Promotion et la Création
CIP-UPWARD	International Potato Institute - Users' Perspectives with Agricultural Research and Development
CIRAD	Centre for International Cooperation in Agricultural Research for Development
CNP	National Council of Production
COMMOB	Community Mobilisation
COSECHA	Association of Advisors for a Sustainable, Ecological and People-Centered Agriculture
CRAE-ZN	Regional Committee of Farmer Experimenters in the North Zone
CSO	Civil-Society Organisation
CTA	ACP-EU Technical Centre for Agricultural and Rural Cooperation
CTE	Technical Committee for Experimentation
DA	Development Agent
DARD	Department of Agriculture and Rural Development
DARLIVE	Darfur Livelihood Integrated Project
DGIS	Directorate General for International Cooperation
DHRN	Regional State Office Huetar North
DoA	Department of Agriculture
DWC	District Working Committee

EARO	Ethiopian Agricultural Research Organisation
EMBRAPA	Brazilian Federal Agricultural Research Institute
ETSP	Extension and Training Support for Forestry and Agriculture
EU	European Union
FAO	Food and Agriculture Organization of the United Nations
FARM-Africa	Food and Agricultural Research Management-Africa
FE	Farmer Experimenter
FEO	Field Extension Officer
FFS	Farmer Field School
FO	Farmer Organisation
FP	Farm Plan
FPR	Farmer Participatory Research
FRP	Farmers' Research Project
FSR	Farming Systems Research
FSRD	Farming Systems Research and Development
FYM	Farm Yard Manure
GDP	Gross Domestic Product
GFAR	Global Forum on Agricultural Research
GFR	Farmer Research Group
GO	Governmental Organisation
GoI	Government of India
GTZ	German Agency for Technical Cooperation
HRD	Human Resource Development
HUAF	Hue University of Agriculture and Forestry
IARC	International Agricultural Research Centre
ICRAF	World Agroforestry Centre (formerly: International Centre for Research in Agroforestry)
ID/OS	Institutional Development and Organisational Strengthening
IDRC	International Development Research Centre
IFAD	International Fund for Agricultural Development
IIRR	International Institute of Rural Reconstruction
IK	Indigenous Knowledge
ILEIA	Centre for Information on Low-External-Input and Sustainable Agriculture
IPM	Integrated Pest Management
IRAD	Institute of Agronomic Research and Development
ISWC	Indigenous Soil and Water Conservation
ITDG	Intermediate Technology Development Group
JA	Jalal Abad
JMRDP	Jabal Marra Rural Development Project
KAES	Kutum Agricultural Extension Society
KAKUFAG	Kedjom Ketingoh Union Farmers Group
KSAP	Kyrgyz Swiss Agricultural Project
KSCS	Kebkabiya Smallholders Charitable Society
KSP	Kebkabiya Smallholders Project
LBL	Swiss Centre for Agricultural Extension
LDU	Land Development Unit
LEISA	Low-External-Input and Sustainable Agriculture
LINKS	Linking Indigenous Knowledge Support
MAG	Ministry of Agriculture and Livestock
M&E	Monitoring and Evaluation
MARD	Ministry of Agriculture and Rural Development
MASL	Mahaweli Authority of Sri Lanka
MCaC	Farmer-to-Farmer Movement
MDP	Mahaweli Development Programme
M-IPI	Multi-Institutional Project Initiative

MNC	National Farmers Board
NA	Naryn
NARI	National Agricultural Research Institute
NGO	Non-Governmental Organisation
NRM	Natural Resource Management
OD	Organisational Development
ODI	Overseas Development Institute
PADETES	Participatory Demonstration and Training Extension System
PCaC	Farmer-to-Farmer Programme
PCD	Participatory Curriculum Development
PEA	Participatory Extension Approaches
PM&E	Participatory Monitoring and Evaluation
PMHE	Promoting Multifunctional Household Environments
PNVRA	National Programme for Agricultural Extension and Research
POFT	Participatory On-Farm Trial
PRA	Participatory Rural Appraisal
PRGA	Participatory Research and Gender Analysis
PRIAG	Regional Program for Reinforcing Agronomic Research on Basic Grains in Central America
Prolinnova	PROmoting Local INNOVAtion in ecologically-oriented agriculture and natural resource management
PTD	Participatory Technology Development
R&D	Research and Development
RAAKS	Rapid Appraisal of Agricultural Knowledge Systems
RADS	Rural Advisory and Development Service
RADSF	Rural Advisory and Development Service Foundation
RLP	Resource-Limited Producers
RMT	Research Management Team
RPA	Resource-Poor Agriculture
RRA	Rapid Rural Appraisal
SADP	Sustainable Agriculture Development Project
SDC	Swiss Agency for Development and Cooperation
SFSP	Social Forestry Support Programme
SHG	Self-Help Group
SMS	Subject Matter Specialist
SNNPRS	Southern Nations, Nationalities and Peoples Regional State
SNV	Netherlands Cooperation Service
SRL	Sustainable Rural Livelihoods
STR	Union of Rural Workers
SWOT	Strengths, Weaknesses, Opportunities, Threats
T&V	Training and Visit
TNU	Tay Nguyen University
ToT	Training of Trainers
TSG	Technical Support Group
UAF	University of Agriculture and Forestry
UM	Unit Manager
UNDP	United Nations Development Programme
UPPROCCHI	Small-Scale Farmers Union of the Canton Los Chiles
VDC	Village Development Committee
VEA	Village Extension Agents
VP	Village Promoter
VS	Village Specialist
WSDC	Western Savannah Development Corporation
WWF	Worldwide Fund for Nature

About this book and those who made it possible

While participatory approaches to agricultural research and development (R&D) are being increasingly applied in individual projects, it is a challenge to integrate these approaches on a wide scale into the regular operations of agricultural research, extension and education institutions. A study culminating in a workshop in September 2001 at the International Institute of Rural Reconstruction (IIRR) in the Philippines brought together a variety of experiences in trying to "institutionalise" Participatory Technology Development (PTD) approaches.

The major insights generated during the "Advancing PTD" study-cum-workshop were synthesised in the booklet Participatory Technology Development for Agricultural Improvement: Challenges for Institutional Integration, edited by Sophie Lizares-Bodegon et al and published in 2002. This included the abstracts of the 19 case examples that had been documented for analysis and comparison. A CD-ROM was also produced, containing the text of the booklet and the complete case studies prepared for the workshop, as well as some further resource materials on PTD.

All these materials are also available on the website www.prolinnova.net that has been set up to support continuing communication and information exchange under an emerging Global Partnership Programme Prolinnova (PROmoting Local INNOVAtion in ecologically-oriented agriculture and natural resource management). Prolinnova is an initiative of non-governmental organisations (NGOs) encouraged by the Global Forum on Agricultural Research (GFAR) to build partnerships between the various stakeholders in agricultural R&D in support of farmer-led experimentation and local innovation.

Despite the fact that information from the Advancing PTD study-cum-workshop is available via electronic media, it was realised that a large number of people and organisations in the South, especially in Africa, have limited or no access to computer and Internet infrastructure. CTA (ACP-EU Technical Centre for Agricultural and Rural Co-operation) therefore agreed to support the workshop participants' suggestion that the case studies be made available in a more easily readable form to researchers, extensionists and educators in the South.

The present book includes a selection of 12 selected cases of "institutionalising" PTD approaches in Africa, Asia and Latin America. The term "institutionalisation" refers to integrating PTD into the day-to-day operations, decision-making and culture not only

of large formal institutions of agricultural research, extension, development and education, but also of NGOs, farmer organisations and artisan associations. All of these studies were originally written for the workshop in 2001. In some but not all cases, the authors were able to update the cases by reporting on developments in the ensuing two years.

IIRR and ETC would like to thank all of the contributors to the study-cum-workshop, as well as their colleagues, for taking the time to document their cases. During the workshop, the participants drew out the main lessons from the comparison of cases. The first chapter of this book reflects these lessons, and we gratefully acknowledge the contributions to the discussions by Kwasi Ampofo, Carlos Basio, Marisa Espineli, Kennedy Igbokwe, Ejigu Jonfa, Julian Gonsalves, Tim Hart, Ursula Hollenweger, Hoang Huu Cai, Scott Killough, Sophie Lizares-Bodegon, David Meneses, Mohammed Majzoub, Y. D. Naidu, Ashraf Naseh, Chris Opondo, Gonaduwage Perera, Pablo Sidersky, Yiching Song, Ueli Scheuermeier and Piroge Suvanjinda. In addition, case studies were contributed by Roland Bunch, Stephan Joss, Kachkynbaev Nadyrbek and Ian Cherrett, who could not manage to reach the workshop in the immediate aftermath of the events of 11 September 2001.

We thank the members of the workshop secretariat at IIRR - Tom Limpo, Angelita Poblete-Algo, Luningning Reyes and Annie Gasic - who were extremely efficient in documenting the outputs of the workshop on a daily basis and ensuring that everything ran smoothly. This allowed the rest of us to focus entirely on the content of the discussions.

Financial support from the following organisations made it possible to carry out this study and to document these inspiring case examples: Rockefeller Foundation, CTA, Misereor (Germany), the NGO Committee of the Consultative Group on International Agricultural Research (NGOC-CGIAR) and the Netherlands Directorate General for International Cooperation (DGIS). In addition, the Swiss Agency for Development and Cooperation (SDC) supported dissemination of information via CD-ROM. Norman Uphoff from the Cornell International Institute for Food, Agriculture and Development (CIIFAD) and Ueli Scheuermeier from the Centre for Agricultural Extension in Lindau, Switzerland (LBL) helped in brainstorming and developing the ideas for the study-cum-workshop. We extend our heartfelt thanks to all.

We hope that this book will mark a milestone in a journey toward fundamental change in the people and institutions involved in supporting agricultural research, development and learning. It was a journey that started slowly many years ago by pioneering individuals and small organisations, often NGOs, who are now joining forces and gathering momentum to promote participatory approaches to developing innovative technologies and systems. Therefore the title: "Advancing PTD".

IIRR, ETC Ecoculture

Advancing PTD: making our way towards institutional integration[1]

Laurens van Veldhuizen, Ann Waters-Bayer and Chesha Wettasinha[2]

Introduction

This book brings together 12 cases from different corners of the world that were prepared for the "Advancing Participatory Technology Development" (Advancing PTD) study initiated by the International Institute of Rural Reconstruction (IIRR) in the Philippines and ETC Ecoculture in the Netherlands. The authors of these case studies - indeed,

Photo by: IIRR

Participants giving their share of inputs during the workshop held in September 2001 at IIRR in the Philippines.

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[1] This chapter builds on van Veldhuizen L , Waters-Bayer A, Killough S, Espineli M & Gonsalves J (2002).

[2] ETC Ecoculture, POB 64, NL-3830 AB Leusden, Netherlands (l.van.veldhuizen@etcnl.nl ; ann.waters-bayer@etcnl.nl ; c.wettasinha@etcnl.nl)

everyone who was involved in the Advancing PTD study[3] - are convinced of the need to integrate PTD into institutions of agricultural research, extension and education so that these can be effective in increasing agricultural productivity, reducing poverty and safeguarding the local and global environment.

Many of the organisations involved in the Advancing PTD study had initially been practising PTD on a fairly limited scale. Having realised that their efforts would have much greater impact if PTD could be made part of the day-to-day work of agricultural research and development (R&D) in their countries, these organisations had taken up the challenge of trying to "institutionalise" PTD. This chapter analyses their experiences. It refers primarily to the evidence presented in the case studies in this book and in the other cases documented during the Advancing PTD study. The analysis benefits considerably from the discussions by participants in the workshop on "Advancing PTD" held in September 2001 at IIRR in the Philippines (Lizares-Bodegon *et al* 2002), as well as from subsequent consultations and reflections when the workshop results were presented at international meetings.

The cases in this book are concerned with the integration of PTD into a variety of institutional settings:

- national or international research organisations - Hart and Isaacs[4] in South Africa and Opondo *et al* in an Eco-Regional Programme of the Consultative Group on International Agricultural Research (CGIAR)
- large governmental extension organisations - Hagmann *et al* in Zimbabwe and South Africa, and Perera and Sennema in Sri Lanka
- institutional settings that combine research and extension - Tchawa *et al* in Cameroon and Joss and Nadyrbek in Kyrgyzstan
- universities - Hoang *et al* in Vietnam (and, to some extent, Tchawa *et al* in Cameroon)
- local organisations of artisans - Majzoub in the Sudan
- farmer organisations - Sabourin *et al* in Brazil and Hocdé and Meneses in Costa Rica

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[3] From the following organisations: African Highlands Initiative (AHI), Uganda; Agriculture Man Ecology (AME), India; Agricultural Research Centre (ARC)-Infruitec-Nietvoorbeij, South Africa; Assessoria e Servicos a Projetos em Agricultura Alternativa (AS-PTA), Brazil; Centre for Chinese Agricultural Policy (CCAB), China; Coptic Evangelical Organization for Social Services (CEOSS), Egypt; International Centre for Tropical Agriculture (CIAT), Tanzania; International Potato Institute - Users' Perspectives with Agricultural Research and Development (CIP-UPWARD), Philippines; Association of Advisors for a Sustainable, Ecological and People-Centered Agriculture (COSECHA), Honduras; Farmers' Research Project, FARM-Africa, Ethiopia; International Centre for Research in Agroforestry (ICRAF) / Landcare, Philippines; Indigenous Soil and Water Conservation (ISWC) Project, Cameroon; Intermediate Technology Development Group (ITDG), Sudan; Kyrgyz Swiss Agricultural Project (KSAP), Kyrgyzstan; Lempira Sur-FAO, Honduras; Promoting Multifunctional Household Environments (PMHE) Project, Sri Lanka; Regional Program for Reinforcing Agronomic Research on Basic Grains in Central America (PRIAG), Costa Rica; Sustainable Agriculture Development Project (SADP), Thailand; and Social Forestry Support Programme (SFSP), Vietnam. In addition, numerous other resource persons and organisations provided valuable inputs.

[4] All references without date refer to chapters in this book.

- multi-stakeholder platforms of research, extension, education and other stakeholder organisations - Naidu and van Walsum in India, Ejigu *et al* in Ethiopia.

The cases initiated from outside governmental spheres give evidence of the strong role of civil society organisations (CSOs) in advocacy for change within government institutions in order to make them more responsive to the needs of smallholder farmers and other land users. However, all of the cases also reveal the challenges that these institutions face in trying to incorporate PTD systematically into their regular programmes.

The first conclusion of the Advancing PTD study is that the experiences in integrating PTD in these various settings show many similarities. This synthesis chapter therefore focuses on the common issues, challenges and opportunities in institutional integration across all settings, with only a few remarks specific to particular settings.

PTD revisited

The term "Participatory Technology Development" (PTD), with reference to agriculture and natural resource management (NRM), encompasses efforts of development professionals - researchers[5], extensionists and other service providers - to collaborate with land users in developing and spreading improved farming and land-husbandry practices. In some approaches to "participatory development", collaboration implies involving farmers in programmes and activities that are still largely controlled by the development professionals and their organisations. In contrast, PTD - as presented in the cases of this book - gives a central role to farmers and other land users in defining the R&D agenda and in planning, implementing and evaluating the activities. PTD aims specifically at increasing the R&D capacities of farmers and other land users.

Activities, methods and tools in PTD are usually summarised under six headings that, together, form the basic framework. This framework was drawn up after comparison of on-the-ground experiences in developing technology with farmers that were discussed at a workshop organised by ETC Netherlands and its project ILEIA (Centre for Information on Low-External-Input and Sustainable Agriculture) in the Netherlands in 1988. It was first published by ILEIA (1989) and again by van Veldhuizen *et al* (1997) but has since been adapted to include new insights. The six core elements of PTD can be summarised as follows:

- **Getting started**
  Building relations of confidence and trust with stakeholders at the local level; making an inventory of relevant organisations, e.g. through RAAKS (Rapid Appraisal of Agricultural Knowledge Systems); establishing PTD partnerships

[5] The term "researcher" is often used in this chapter and in other chapters in this book to refer to formally educated scientists who conduct research. In no way does this imply that farmers are not also researchers in their own right. In some chapters, e.g. Ejigu et al, there is specific reference to farmer researchers.

- **Understanding problems and opportunities**
  Looking at local innovation dynamics and innovators to recognise directions for change; joint analysis of the local situation, farming systems, bottlenecks and opportunities; engaging in PRA (Participatory Rural Appraisal)

- **Looking for things to try**
  Identifying relevant formal and local/indigenous knowledge; screening and selecting topics for development, using criteria that lead to sustainable agricultural and land-husbandry systems

- **Experimentation**
  Jointly designing and carrying out experiments or other learning activities and joint monitoring and evaluation (M&E) of their results and impact; building capacities of farmers and other land users to do this

- **Sharing the results**
  Spreading the experiences (both the process and the findings) to other local and scientific networks; farmer-to-farmer extension and cross visits; strengthening networks, using both traditional and modern means of communication and information sharing

- **Sustaining the PTD process**
  Creating favourable conditions for continued PTD; developing and lobbying for supportive policies; strengthening local R&D networks; integrating PTD into regular programmes for agricultural development and NRM.

By including the last element "Sustaining the PTD Process", advocates of PTD stressed right from the start in the late 1980s that attention must be given to ensuring that the PTD process can continue beyond the time limits of individual and time-bound projects. More than a decade later, the Advancing PTD study took a closer look at this particular element: the integration of the PTD approach into regular programmes and institutions concerned with agricultural development and NRM.

Basic premises for institutional integration

Institutional integration of PTD is understood as "making PTD part and parcel of the regular programmes and activities of relevant organisations". Of course, the proponents realise that PTD is not the only activity in which agencies of research, development and education will involve themselves. Alongside PTD, good research on station and in laboratories will continue to be necessary. Extension agencies will sometimes need to organise larger-scale information and awareness campaigns using mass media. Education and training institutes will need to offer a variety of courses in addition to those on PTD methodologies. However, to the extent possible, these other activities in research, extension and education/training should be linked to and/or inspired by an active PTD programme, in order to ensure their relevance and applicability at the user level.

Putting PTD in this perspective may, in itself, help overcome the resistance of some professionals in agricultural R&D to participatory approaches. The work to which these professionals have devoted themselves for many years is given value as one element in a wider range of interlinked R&D activities. One of the major institutional challenges is to link the continuing, conventional R&D activities led by scientists and extensionists to the emerging PTD activities led by farmers working in collaboration with scientists and extensionists. Effective mechanisms need to be created to feed experiences and results generated in PTD activities into other, often more commodity-oriented activities, and vice versa.

Participants in the Philippines workshop drew attention to the danger of "over-institutionalising" PTD. If this approach would be made compulsory for all professionals in all relevant institutions, if this approach were to be wrapped up with a long list of formal regulations and formats, then bureaucracy would prevail and the spirit of PTD would probably disappear. Effective PTD builds on mutual understanding and personal motivation, rather than on commands. It needs to balance rules and regulations, on the one hand, with freedom for creativity and room for manoeuvre, on the other. This implies finding a middle way between standardising steps and methods, on the one hand, and stimulating the responsiveness of researchers and extensionists to local, time-specific opportunities and needs, on the other. Instead of recommending a standard "PTD institutionalisation package", the workshop participants defined a set of basic elements that form the core content of any PTD training or institutionalisation effort:

- the main PTD principles: development based on farmers' needs, relevance of local knowledge and local innovative capacities, complementarity of knowledge from formal science, collaboration on the basis of equal partnerships
- the main clusters of activities of the PTD framework (see above), stressing the output to be achieved by each, not necessarily the specific methods to be used
- collection of methods from which to choose in different situations, and guidelines on how to apply these methods
- clear and simple case studies that show how PTD works in the field
- general practical guidelines for operationalising PTD.

Based on this, staff members should be encouraged to plan their own fieldwork (*i.e.* participatory planning within the organisation) on a weekly or monthly basis, supported and monitored by their peers and managers.

The concept of institutional integration is closely linked to, yet distinctly different from, the concepts of "scaling-out" (IIRR 2000) or "scaling-up" (Gündel *et al* 2001). These latter concepts refer to reaching more people more quickly, either through widening the geographic area and/or number of cases in which the approach is applied or through moving upwards to involve various levels in an organisation. Scaling-up is a necessary step towards institutionalisation, but a project can manage to reach into several levels of an institution yet still not manage to ensure that the work at these various levels continues after a project has ended, *i.e.* that PTD becomes part and parcel of the regular programmes and activities in the long term.

Institutionalisation refers to a process of change. The case studies reveal that an effective change process combines the following sets of activities:

- **Putting PTD on the agenda.** Motivation to change is identified (why would "they" want to change) and mobilised. This needs documentation and presentation of evidence on the importance and effectiveness of PTD and on practical possibilities to implement it, *i.e.* evidence that the approach contributes to agreed development goals. It includes activities for:
  - lobbying, advocacy, policy dialogue
  - documentation and learning
  - mobilising wider support, building coalitions/platforms for change, such as the PTD Working Group in Sri Lanka (Perera & Sennema).
- **Formulating policy and planning for change.** Policy statements of institutions are rewritten (who should be involved in the PTD activities, balance between PTD and other activities etc) and plans for integrating PTD are developed (where to start, how to expand), including a timeframe.
- **Actually integrating PTD.** The change programme itself usually has three major components that are closely linked:
  - PTD pilot activities in selected areas, their M&E and documentation, to develop locally applicable methods and tools, create evidence of effectiveness and provide a learning ground for all involved (Hoang *et al*, Sabourin *et al*)
  - Human resource development: training staff at various levels to develop competence in PTD, providing follow-up support and coaching; changing the dominant culture of the organisation (Hagmann *et al*, Perera & Sennema)
  - Internal institutional change: managers and other staff members review internal mechanisms, rules, structures, reporting formats, reward systems etc with a view to practising PTD and plan and implement the necessary changes (Ejigu *et al*, Hart & Isaacs, Perera & Sennema).
- **Monitoring and evaluation.** M&E of the efforts to integrate PTD not only helps the change agents keep track of what is happening in the institution(s) concerned; it also comprises a tool for learning and bringing about institutional change. The effectiveness of this learning will depend on wise decisions as to who will be involved in the M&E and on joint identification of the main criteria for assessing institutional change (Opondo *et al*).

Opportunities and challenges for institutional change

Analysis of the Advancing PTD cases revealed numerous motivations and opportunities for institutional change, but also key challenges that can create barriers to integrating participatory approaches into mainstream research, extension and education.

What mobilises institutions to integrate PTD?

In some cases, managers and other staff of the formal institutions began to consider the merits of integrating PTD into their regular operations because they felt frustrated in

their work. They had experienced:

- professional disappointment within their organisations on account of the lack of impact of past work: farmers were not accepting the "improved" practices promoted by the formal research and extension system
- disappointment among external actors (high-level policymakers, donors, international CSOs) on account of this same lack of impact, leading to the imposition of funding restrictions and conditionalities, particularly in the case of agricultural research
- reduction in funding for agricultural development, obliging the central government agencies to delegate more tasks to farmers and other land users and local organisations
- direct pressure from local stakeholders - the farmers, other land users and local CSOs - for improved agricultural services, a pressure expressed in part through lobbying and advocacy activities.

These push factors can stimulate individuals and institutions to consider trying alternative approaches to R&D. However, efforts to integrate PTD approaches are more highly motivated and have longer-lasting results if the push for institutional change is reinforced by positive experiences of the staff, such as:

- being directly exposed to the relevance, impact and cost effectiveness of PTD
- favourable responses from farmers and other clients, leading to improved working relations
- easier and more efficient implementation of other agricultural development or NRM programmes on account of the level of community mobilisation and organisation achieved through PTD.

What are the institutional challenges in integrating PTD?

In all cases, the institutions and individuals within them who were trying to integrate PTD into the day-to-day operations encountered numerous barriers. Institutional change to embrace PTD is difficult because it requires or implies:

- **Attitudinal change.** PTD implies that formally educated professionals respect the knowledge and experience - indeed, the research capacities - of farmers, yet the institutions of formal education nurture a culture of regarding farmers - especially illiterate ones - as "backward". Institutional integration of PTD requires attitudinal change among staff at all levels. There was consensus among the participants in the Philippines workshop that this attitudinal change is the most important part of the integration process.
- **Shifts in power.** Because PTD gives farmers a voice in defining agendas, choosing methods and using funds in R&D, it reduces the extent to which the staff in formal R&D institutions can influence the content of their work. Power is shifted from fieldworkers to farmers and from managers/supervisors to fieldworkers who are closer to the farmers. This is difficult for the customary holders of power to accept.
- **Interdisciplinary work.** PTD requires understanding of and attention to cross-disciplinary issues, including socio-economic and cultural aspects that have a bearing on management of crops, livestock and natural resources. Scientists and extension workers need to be able to look beyond their particular specialised fields. Fortunately, it is not necessary that all of them have this ability to an equally strong degree. In research institutes, for example, those scientists who are intensively involved in PTD need to be able to take a holistic view and work in an interdisciplinary way,

while other scientists who are more specialised can support the PTD activities from their specific fields of competence.

- **High time inputs in the field with farmers.** In PTD, more time must be spent in the field than in conventional agricultural research. This requires a shift in budget to allow more funds for operations, transport, meetings etc, and also requires a change in work culture to move scientists off the station and away from the office. A larger part of programme funds may be used for activities carried out by farmers themselves and under their control. If research funding remains constant, this means that fewer financial resources are then available for professional staff in the formal institutions.
- **High social competencies among professional staff.** Practising PTD requires social skills such as listening, probing and facilitation of dialogues, workshops and multi-stakeholder platforms. These social skills are just as important as technical skills, yet most staff of research and extension organisations have not been prepared for this in the course of their professional education.
- **Institutional collaboration.** If PTD is to be effective, partnerships need to be established between various types and levels of organisations that are accustomed to working more or less independently, rather than collaborating with each other.
- **Breaking through hierarchies.** Institutions of agricultural research, development and education - including the larger development-support NGOs - usually have strong internal hierarchies that allow little room for internal learning and experimentation with new approaches. Internal communication within the institutions is often limited and usually flows from the top down. In such bureaucracies, there is a tendency to standardise methods, but this may extinguish the spirit of PTD.
- **Dealing with local power games.** Governmental R&D in agriculture and NRM is increasingly being decentralised and privatised, making these services more vulnerable to local political pressures from powerful individuals and/or to commercial interests that may run counter to the philosophy of strengthening the influence of weaker groups among the local resource users.

The case studies in this book describe how proponents of PTD have managed to mobilise the potentials for change while addressing the inevitable factors of resistance.

The multiple dimensions of institutional change

Institutional change processes are always complex. This is certainly the case when institutions of agricultural research, development and education try to incorporate PTD into their regular operations. PTD is not merely one of many different methods; it implies a fundamentally different way of working with farmers, as well as internally with colleagues, managers and employees.

Tichy (1982) proposed a framework for examining and planning complex institutional change processes in a systematic way. Attention is given to three main elements of institutions - the mission/mandate, the structure and the human resources - and this at three levels: the administrative (workshop participants called this the "nuts and bolts"), the political (power and decision-making) and the sociocultural level (identity and behaviour). The complexity of institutional change can be summarised as in Table 1.

Table 1: Matrix of elements and levels of institutional change*

	Mission / mandate	Structure	Human resources
Administrative: the tangible "nuts and bolts"	**Operations:** planning and implementing action plans, M&E, budgeting	**Tasks and responsibilities:** levels, positions and tasks; procedures and instructions; information and coordination systems	**Expertise:** quantity and quality of staff; recruitment and job descriptions; facilities and infrastructure; training and coaching
Political: the power game	**Policymaking:** developing policies and strategies; influence from inside and outside; role of management	**Decision-making:** formal and informal mechanisms; supervision and control; conflict management	**Room for manoeuvre:** space for innovation; rewards + incentives; career possibilities; working styles
Sociocultural: identity and behaviour	**Organisational culture:** symbols, traditions, norms and values underlying organisational and staff behaviour; social and ethical standards	**Cooperation and learning:** norms and values underlying arrangements for teamwork, mutual support, networking, reflection, learning from experience etc	**Attitudes:** dedication to the organisation; commitment to work objectives and to partners/clients; willingness to change

* After Tichy (1982) and Groverman & Gurung (2001)

This proved to be a useful framework for analysing efforts to integrate PTD across the wide variety of institutional settings discussed during the Philippines workshop. The remainder of this chapter is therefore structured according to the three levels of institutional change outlined in the matrix: the administrative level that is most obvious on the surface, the political level that lies beneath this and the sociocultural level at the very heart of an institution. A much more detailed matrix of elements of institutional change, based on the specific experiences of the workshop participants, is reproduced in the booklet that synthesises the workshop outputs (Lizares-Bodegon *et al* 2002).

Changing the nuts and bolts in the organisation

Mandate analysis and planning

In efforts to integrate PTD into large organisations, attention is usually focused initially on the "nuts and bolts" at the operational and administrative level. These include the formal mandate and mission of the organisation, the division of tasks and responsibilities within the organisational structure, and the expertise within its staff. Deliberate steps need to be taken to re-examine the mandate of the organisation and, if necessary, adapt it so that PTD can be accepted as an important approach to fulfil this mandate. Is engaging in farmer-led experimentation a task for a research organisation? If so, what is the role of the research organisation and what is the role of other organisations involved, e.g. farmer organisations? Is developing technology with farmers part of the mandate for a government extension service? If so, what is its main role in this activity?

Once PTD has been accepted as part of the organisation's mandate, the next step is planning - and this at two levels:

1. **Planning for PTD.** First of all, PTD needs be included in the annual and multi-year plans of the organisation so that adequate resources can be allocated to it. In the spirit of PTD, this means that the cycles of planning, budgeting and M&E allow real involvement of farmers and other stakeholders, thus increasing the accountability of the organisation towards the people it is meant to serve. Planning for PTD includes making funds available to build partnerships with other agencies and to support farmer-led experimentation. A key strategy to make PTD work is locating the responsibility for such funds as close as possible to the farmers and multi-actor platforms or consortia directly involved in the PTD activities. Planning and budgeting needs to allow for a certain amount of "free rein" in allocating staff time and other resources (e.g. innovation funds).

   Process issues related to PTD should be included in the organisation's M&E formats, so as to gain information not only about the technical parameters of the research and development activities but also about issues such as change in level of researchers' and extensionists' awareness of farmers' needs and potentials, capacity of farmers and extensionists to experiment, and ways and extent of spreading and adapting technologies. Social scientists can contribute a great deal to developing and applying M&E of the quality of process and outcomes.

2. **Planning for institutional change to embed PTD.** At a second level, the stepwise introduction and integration of PTD into the operations of the organisation must be planned. Decisions need to be made on whether or not pilot activities will be set up and, if so, where; on mechanisms to learn from experiences; on mechanisms to scale out activities to other areas; on staff training and other aspects of human resource development (HRD); and on appropriate timeframes. A few people (possibly a "PTD team", see below) may be given main responsibility for facilitating the integration process, but mechanisms need to be put in place to involve other key players within the staff, including the management, and to inform regularly the organisation at large.

   Financial resources must be allocated to cover the costs of the change process. Most visible are the costs related to HRD but more hidden costs may have to covered as well, such as those of staff time to develop new internal systems, new reporting formats etc. It is more difficult to plan for less obvious costs. The case from Sri Lanka (Perera & Sennema), however, warns against over-planning. Important progress was made in integrating PTD into the operations of the Mahaweli Authority of Sri Lanka (MASL) by being flexible and making use of opportunities as they presented themselves, such as appointing open-minded people into key positions that became vacant, engaging the PTD team in an already planned review of the internal M&E system, and bringing ideas into meetings and conferences organised by others. This case also shows how the change process can mobilise and involve sub-units within the organisation, calling on their specific expertise. Support to training-of-trainers among the staff of the MASL Training Department served to

build up "in-house" capacities to continue the process of institutionalising and scaling up PTD. The Planning and M&E Unit of the MASL was challenged to look critically at participatory M&E and its potential to strengthen existing M&E mechanisms.

Planning for institutional change to embed PTD requires the development and use of M&E mechanisms to assess the progress made. The cases in this book shed relatively little light on this important dimension of institutional integration. Feedback mechanisms and post-training studies are being used to assess the impact of PTD training. Only Opondo *et al* describe an attempt to develop and apply a system to monitor and evaluate the changes occurring, in this case, within research scientists. The way the scientists collaborate with farmers and their interest in farmers' concerns serve as indicators of the extent to which PTD has become integrated into agricultural research. This "outcome monitoring", in itself, helps put the issue of spreading PTD within the organisation on its agenda and creates an additional momentum in the process of institutionalisation.

Both levels of planning imply re-allocation of funds and a need for continuity of funding. To achieve this, considerable advocacy for PTD is required, also beyond the organisation in question. Overall funding for agricultural R&D is stagnating or declining in many countries and has become increasingly dependent on the frequently changing agenda of external donors. The process of institutional integration of PTD requires a long time horizon and, therefore, continuous dialogue with agencies that fund agricultural R&D.

Review of internal structures and implementation mechanisms

The analysis of case studies brought the workshop participants to the conclusion that, if the entire organisation is meant to embrace PTD, it is counterproductive to create a special "PTD Unit" to handle the PTD activities, while the rest of the organisation continues to work as before. However, there does appear to be a need for a "PTD taskforce" or "PTD facilitation team" that plans and coordinates the process of change, creates opportunities for training and learning, and facilitates links both within the organisation and with other organisations concerned with PTD. Initially, this team may itself be actively involved in PTD activities in the field, so that the institutional learning can be based on these experiences. Hart and Isaacs describe how a "virtual" PTD team was created by involving individuals from the relevant departments, without their having to leave their Departments and form a new structure.

A PTD facilitation unit that stimulates organisational learning can also be created to link several organisations, such as in the case from Vietnam (Hoang *et al*). Such a unit is given the mandate to facilitate networking and learning in a region or even an entire country. Initially, they are likely to depend on external funding. They will survive after project end only if they are set up as close as possible to local coordination and funding mechanisms.

The cases show that a great variety of internal mechanisms can be used, adapted or newly developed to support the process of integrating PTD. These include:

- Annual staff review and planning meetings, during which specific attention is paid to the R&D process, approach and methodology and to the quality of stakeholders'

participation rather than just technical outputs; and which are attended by all relevant levels in the organisation, as well as by farmers and other stakeholders;
- Internal staff exchange or peer meetings and seminars that reflect on development approaches and methods, farmer participation and the building of partnerships;
- Actively seeking other experiences in PTD and making these known within the organisation through distribution of brochures and publications, informal discussion, giving feedback to colleagues after visits to sites of PTD activities or related workshops or conferences etc;
- Seizing opportunities to invite people from other institutions to share and learn about each other's experiences in trying (to institutionalise) PTD;
- Creating a simple mechanism to encourage staff to come up with new ideas, even if they are not fully developed, to "think the unthinkable": such as identifying a place where these ideas can be collected and reviewing them occasionally (perhaps every six months) during a regular staff meeting.

Recognising and building capacities

Without exception, institutional change requires the training and coaching of the staff in new ways of working. It is therefore understandable that most efforts to institutionalise PTD initially focus on this dimension of the change process. Capacity development starts with a review of the roles and responsibilities of the different actors in PTD - the local resource users, the extension workers and managers, the research scientists, the educators and others - to identify the knowledge and skills that will be needed. Hagmann *et al* stress the importance of this assessment and of starting the training process with the areas of competence that have been identified in this manner.

With respect to roles of the different actors, the participants in the Philippines workshop responded specifically to the frequently expressed fear that, when extension services take a PTD approach with farmers, research scientists will be made redundant. The participants defined clearly the capacities of scientists that are crucial for the success of PTD: their analytical skills in differentiating between cause and effect, their ability to design experiments that lead to clear results, their knowledge (or link to knowledge) of fundamental processes underlying the results as observed by farmers, their skills in documenting results in a systematic way. To be able to contribute to PTD, research scientists need to be able to engage in dialogue, to listen rather than to lecture, and to cooperate rather than to give orders, but it is not necessarily their role to be the key facilitators of PTD-related activities.

Similarly when research scientists and farmers are direct partners in PTD activities, extension services sometimes fear that they will be left out. It is especially with respect to facilitating PTD processes - bringing the different actors together and linking them with sources of local or external expertise or other support - that the extension workers have a key role to play. Thus, neither researchers nor extensionists lose their roles through the introduction of PTD. Rather, they gain more satisfying roles that allow them to be more effective in supporting sustainable development. It is necessary to become clear about these roles and about the training needed to enable people to fulfil them.

Good experience has been gained in using a sequential approach to training in PTD (Kibwana *et al* 2000, Perera & Sennema, Hagmann *et al*). The trainees are guided through a series of focused learning sessions, interspersed with PTD-related assignments in the field (or in the organisation). Each session builds on what was learned in the previous one and during the work experience in between. An internal PTD facilitation team can play an important role in guiding and advising trainees between the formal learning sessions. Well-designed PTD training motivates staff members to listen to farmers and to appreciate their knowledge and capacity to innovate. This is best achieved through direct contact with farmers who are actively innovating and experimenting. Sessions providing for such interaction either in the training venue or, preferably, in the field are an important part of almost any PTD training event.

Building capacities of farmers and office bearers in farmer organisations is equally important, as shown by Sabourin *et al*. When these people - many of whom have little formal education - enter into collaboration with research and extension professionals, they often feel intimidated. Focused capacity building can equip farmers with an understanding of the PTD process, including the principles of experimentation and basic statistics, so that they feel confident to discuss and plan PTD activities with outside professionals. Farmers' involvement in successful PTD, complemented by specific capacity-building efforts, will empower them also to speak up in formal research and extension meetings and to lobby effectively for inclusion of farmers' issues in the R&D agenda.

Dealing with the power game

Influencing policy development

The power game at the higher level revolves around the issue of formulating policy for the organisation and the influence exerted on policy from both within and outside the organisation. Ways must be found to gain support for PTD from policymakers and high-level management. Allies within the organisation need to be identified and their support needs to be tapped. At the same time, it is important to listen to the concerns of those people within the organisation who are not in favour of PTD approaches, and to seek ways to alleviate their concerns, perhaps through adjustment in the approach foreseen or at least in the way it is expressed. One important question that needs to be asked is: who wins and, particularly, who loses power when PTD is applied widely in the organisation? The latter are likely to be a source of resistance and need to be addressed with a keen understanding of their position and motivations.

A key issue related to policy development and power is obviously the control of funds. This is a multi-dimensional struggle that can involve different layers in the organisation, donors and farmer organisations, as well as politicians at various levels within the country. Mechanisms need to be created to allow farmer organisations and other end-users of research results to exert influence on the policies of R&D institutes. One way will be through farmer involvement in decisions on the use of R&D funds.

Analysis of the case studies revealed that a two-level approach can be effective in influencing managers and policymakers: aiming directly at the "top" level and, at the same time, creating "bottom-up" pressure for change. The work at the "top" involves direct interaction with key decision-makers to convince them to introduce - or at least try on a pilot basis - PTD in their organisation, and includes activities such as those listed in Box 1. In these efforts, PTD advocates have learned the merits of focusing on the specific concerns at the higher levels in the organisation and adjusting their vocabulary to generate interest and allay fears at these levels.

Box 1: Ways to put PTD on the agenda of managers and policymakers

- Invite a key decision-maker to chair the body (within an organisation or a platform of several organisations) that has been tasked with implementing or overseeing the institutional integration of PTD.
- Create awareness of successful field experiences and the results, e.g. by organising "exposure" field visits for policymakers, to give them an opportunity to see and listen to experimenting farmers or communities.
- Feed field experiences into the regular planning and review meetings in the organisation and into strategic events concerned with agricultural R&D. For this purpose, the experiences need to be systematically documented and well presented.
- Include policymakers in international workshops or conferences on PTD, invite them to make opening statements or keynote addresses, and help them prepare these.
- Prepare and distribute policy briefs on the concepts and practices of PTD.
- Distribute strategically "easy-to-read" newsletters and books that present successful cases of PTD.
- Identify existing key policies, e.g. to achieve household food security, and demonstrate how PTD can contribute to achieving these policy aims.

The second part of the two-level approach is working upwards from the "bottom". This involves intensive interaction with interested staff members at the field level, organising training and coaching in PTD, facilitating implementation on the ground and thus creating examples of PTD within the organisation. These can then be used as cases for discussion and reflection, encouraging consideration of the implications of these experiences for the organisation as a whole. The field staff who have - through reflection on their own experience - become convinced of the relevance of PTD for sustainable development and who, moreover, derive greater job satisfaction from this approach as compared with the way they used to work, will than exert pressure from below for change at higher levels in the organisation. Hagmann *et al* used this approach in designing their "discomfort model" of training: starting with the training of field-level staff, who then knew more than their superiors who, in turn, became keen to be trained themselves.

Individual staff members or small units within an organisation that have field experience in PTD are advised to build wider partnerships and networks both within their organisation and beyond it in order to have a stronger influence on policymakers. After policies have been changed, at least on paper, there will still be a need for a "watchdog" function to monitor the progress in actually implementing the policy. While committed professionals within the organisation can play a role in monitoring progress in implementing policy that favours PTD, a major watchdog role needs to be played by stakeholders outside the organisation. This role may be played initially by NGOs, but

they should focus on strengthening the capacities of farmer organisations to interact directly with the R&D organisations and to monitor the degree to which participatory approaches are practised. With the present move towards decentralisation of government services in many countries, CSOs - be they farmer organisations or community-based organisations or NGOs - could lobby the local administration to lay down local ordinances related to technical or financial matters that support the implementation of PTD.

Creating room for manoeuvre and participatory decision-making

In its own operations, the management should seek opportunities to practise participatory planning, implementation and M&E. This means creating space and time to listen to the experiences being gained at field level, to review with relevant staff the lessons learnt and to use these lessons as a basis for future planning in the organisation.

To be able to achieve this, the "PTD facilitation team" or the key individuals who are the driving forces behind efforts to integrate PTD must be positioned at or have very good relations with top-level decision-makers within the organisation. Integration of PTD requires a commitment by key people at high levels to organisational learning based on principles of participation and equal partnership.

Staff incentives and disincentives for PTD

The individual motivation of people to engage in PTD is largely determined by the recognition and rewards versus the discouragement or even punishment that they receive when they take this course of action. This issue therefore needs to be considered carefully if PTD is to continue as common practice after the intensive introduction period is over.

Box 2: Some rewards and incentives for PTD

- Granting an annual award to one or more staff members for outstanding work that includes a PTD dimension; this is particularly effective if the award is given by senior management during a meeting of the entire organisation or during a major public meeting (A).
- Organising competitions to encourage researchers and extension / NGO staff to document cases of farmer innovation, such as in Ethiopia (Kibwana et al 2000); this generated interest and stimulated active involvement in PTD; prizes were given not only to the documenting staff but also to the top innovating farmers (A).
- Providing opportunities to combine continuation of discipline-based research with involvement in PTD through an internal matrix structure of the organisation (R).
- Most organisations have particular committees that decide on allocation of funds for proposals/ projects and on career advancement of staff. Targeting members of these committees for exposure to PTD may lead to inclusion of PTD-relevant criteria in committee decision-making (A).
- Making researchers involved in PTD aware of journals in which they can publish about this work (R).
- The system of making per diem payments can encourage staff to go to the field; on the other hand, it can also work the other way, because the non-availability of per diems on account of funding constraints may prevent staff from going to the field; therefore some organisations prefer to emphasise non-monetary incentives (A).
- For many development workers - once they have become involved in PTD - the positive response from and improved relations with farmers are rewards in themselves. Particularly the field-based extension workers find great job satisfaction in their new role and in the acceptance they enjoy from farmers (E).

The cases made clear that the incentives for engaging in PTD can differ across the various institutional settings. This is shown in the table of motivations of the farmer organisation, local leaders, NGO, university, research centre and project staff who were partners in PTD in Cameroon (Tchawa *et al*). Further examples of rewards and incentives that can motivate people to engage in PTD are given in Box 2, with an indication of the institutional setting in which the example is most relevant: (A) refers to all settings, (E) to extension settings and (R) to research settings.

A major concern of formal scientists is the right and opportunity to publish - a powerful incentive, as a scientist's promotion in most institutions of research and higher learning still depends on the number of double-referred publications of which s/he is the sole or principal author. Some scientists fear that close collaboration with others in PTD and regular sharing of progress and findings with peers and partners will endanger their sole right to publish the final results. These concerns must be taken seriously and there can be no standard response. In each situation, when researchers come together with other potential partners wanting to engage in PTD, these concerns need to be put squarely on the table and discussed openly, and clarification of rights and modes of publishing should be sought from the outset.

Changing the organisational culture

The cases in this book pay relatively little attention to issues at the third level of institutional change in the matrix, *i.e.* those that relate to norms, values and attitudes within the organisation. Confronted with this during the workshop, most case-study authors strongly confirmed the importance of organisational values and, particularly, the attitudes of research scientists, but admitted that these aspects had not received focused attention in their work. This does not mean that values and attitudes had not changed during the attempts to integrate PTD into their organisations, but it does indicate that strategies to achieve attitudinal change were not deliberately pursued, documented and assessed in most cases.

Organisational norms and values

Norms and values related to the mission and mandate of an organisation may refer, among others, to concerns of reducing poverty, alleviating hunger, being relevant particularly for the poor, or achieving technical innovation without negative social and environment impacts, as opposed to regarding innovation per se as good as long as it "works" for some people. Particularly within institutions of research and education, the norms as to what "good science" entails may need to be addressed before any significant internalisation of PTD can be achieved. The parallel issue within an extension/ development organisation is the change in quality norms for field extension from delivering scientifically well-researched technical "solutions" to assisting farmers to solve their problems. In farmer organisations, the general norms for their work may change from assessing quality according to the extent that policymakers hear farmers' concerns to assessing quality according to the extent that production constraints are actually addressed and farmers' own capacities to improve productivity and rural livelihoods are strengthened.

Norms and values to support PTD within an organisation may include the acceptance that problem solving - in agriculture as well as in the organisation itself - needs contributions from all involved, that no-one knows everything and no-one knows nothing, that listening and probing are as important skills as giving information. The workshop indicated that many of the measures that refer to the administrative and political levels within an organisation can contribute to changes in norms and values to support PTD. Managers who encourage and reward innovative actions by their staff contribute to a PTD-friendly environment. The workshop participants suggested that facilitators of efforts to institutionalise PTD could learn much from the experiences of sociocultural change in organisations related to other concerns (e.g. gender mainstreaming).

Attitudes

The issue of attitudinal change among individual staff members features more strongly in the case studies than that of change in organisational culture. Scientists' and managers' recognition of the value of farmers' and field-level extensionists' knowledge and experience, combined with a more modest view on the value of their own knowledge and experience, is of crucial importance. Situations need to be created in which mutual respect can be cultivated. Encouraging staff of research, extension and educational institutions to identify local innovation and informal experimentation is one way to do this. This can be followed by internal staff seminars to discuss and analyse the findings and what they mean for the way the staff is working. This approach has been applied successfully, for example, in the ISWC programme, especially in Ethiopia and Tanzania (Kibwana *et al* 2000). Staff at various levels in the organisation can be exposed to farmer realities and farmer creativity through field days, study programmes, farmer innovation markets (e.g. Tchawa *et al*), travelling seminars and involvement in Rapid Rural Appraisal (RRA) or PRA exercises. Attitudinal aspects need to be taken very seriously in PTD training programmes, which should include many of the above-mentioned activities. Designing some training sessions according to a Freirian approach to learning (Hope & Timmel 1984) helps to confront participants with their basic assumptions and creates a critical awareness as a basis for attitudinal change (for an example of this approach, see e.g. Chirunga & Veldhuizen 1997).

PTD partnerships

While it is possible for an organisation to embark on PTD on its own, almost all of the case studies in this book underline the great benefits that can be gained if PTD is undertaken in the context of strong partnerships with other organisations. These partnerships often bring together research units or centres, extension agencies, farmer organisations and groups from the private sector. Embarking on partnerships gives an opportunity for each to contribute what they can do well and to benefit from the strengths of the others. For example, extension agencies can focus on networking, facilitating training and learning events, and monitoring and supporting field experiments, while research groups can bring in their advice on experimental design, their knowledge on the fundamental processes underlying the farmers' experiments, and their analytical and writing skills. Farmer organisations can support the facilitation of PTD networking, training and experimentation; they can ensure that the agendas set for PTD have wider relevance; and they can contribute to farmer mobilisation. The private sector can organise larger-scale supply of inputs and/or marketing services. The participants in the Philippines

workshop agreed that effective PTD partnerships usually have the characteristics outlined in Box 3.

Box 3: Characteristics of effective PTD partnerships

Partners

- share a common interest,
- agree on a common agenda,
- take time to clarify this early in the process,
- develop a joint understanding of PTD and their respective roles,
- respect these mutually,
- plan together,
- organise opportunities to meet regularly,
- and mobilise and manage resources in a transparent way.

From the case studies as well as the workshop discussions, a number of guidelines were identified that should be taken into consideration when starting up such partnerships. First of all, the objectives in the partnership need to be formulated relatively broadly if convergence of goals among all is to be achieved. Being rigid in very specific goals may not motivate others to enter into partnership. For example, if a research organisation wants to focus on a single aspect of a particular disease in a particular crop, the farmers and the development-support organisation(s) in a given area are not likely to be keen on partnership with research unless this particular aspect is on the top of the local farmers' agenda.

Inclusion of a certain amount of unallocated funds in programme proposals allows flexibility to draw additional partners into the PTD process, if critical issues arise that go beyond the competence of the actors already involved. Sufficient time and open mechanisms (including short workshops) should be foreseen for in-depth negotiation with potential partners, and staff members need the relevant skills for such transactions. These mechanisms will help overcome any mistrust that may exist between the potential partners and give them a chance to reach a mutual understanding. Depending on the extent and quality of existing collaboration, project proposals may have to include a start-up phase with sets of activities specifically for negotiating and building partnerships. Finally, agricultural development agencies - whether governmental or non-governmental - have to devote time to general networking so that others can become aware of their readiness to collaborate. This can include distribution of brochures and publications, but also participation in seminars and meetings organised by other organisations, as well as making informal contacts with people from other organisations.

Financing PTD

The longer-term sustainability of research partnerships remains an area of concern. While, in certain situations, the partnership may end when a specific research objective has been reached, there is a need for local innovation to continue and for research and extension to support these initiatives. This calls for structures in which farmers concerns' and research and extension interests in PTD can be brought together more or less regularly. Building such structures - in the sense of mutually agreed procedures for continuing interaction between the multiple stakeholders - is part of the process of institutionalising PTD.

Partnerships can be sustained if funds can be mobilised from "regular" - not project - sources, and from contributions from all stakeholders, not just one. In fact, a major

indicator of institutionalisation of PTD is when the partner organisations allocate part of their operational budgets to PTD-related activities. As mentioned earlier, it is more effective to include PTD components and budgets in most, if not all, regular programmes of the institutions involved, rather than to plan a separate PTD budget line. Involvement of farmer organisations in decisions on the use of extension and research budgets may help to create the necessary room for PTD.

Slowly but steadily, dependency on donor funding for regular PTD activities - indeed, for all research and extension activities - should be reduced. Financial resources could be mobilised also at levels closer to their use, *i.e.* at village or district level. Farmers and farmer organisations that benefit directly from the activities could play a role, as could local CSOs and local governments. The Advancing PTD case studies indicate that the decentralisation of government structures in countries such as the Philippines and Uganda, which is bringing responsibilities and resources for agricultural development down to the district level, may provide opportunities for local governments to become key sponsors for local innovation funds and PTD partnerships. PTD advocates may need to focus lobbying activities to policymakers at these more local levels in order to enlist their support or, at the very least, to prevent their interference in PTD implementation.

The Advancing PTD study showed the need to move towards decentralised decision-making regarding use and management of R&D funds. In PTD, the funds should be going primarily to the PTD teams that are active at the grassroots level, involving farmers and staff of various partner agencies, and should allow enough flexibility for the teams to react to realities in the field. Control mechanisms will, of course, be required to prevent misuse of funds.

At higher levels, the institutional integration of PTD - including the processes of awareness raising, internal and external lobbying, building capacities within the staff and the organisation as a whole, and negotiating and building partnerships - also requires financial resources. The partner organisations should be prepared to invest in the process and identify sources of funds to cover these costs. External donors can be useful to support a time-bound process of getting the institutionalisation process going, until it gains sufficient momentum to continue on its own. Total costs can be reduced if existing mechanisms within the organisation (regular meetings, internal newsletter, annual staff training) are used to the maximum for integrating PTD into the organisation.

References

Chirunga F & van Veldhuizen LR. 1997. Daring to learn: report of a training of trainers in PTD/PRA in Zimbabwe. Leusden: ETC Ecoculture.

Ejigu Jonfa, Pound B, Endreas Geta, Ousman Surur & Furgassa Bedada. 2003. Institutionalisation of Farmer Participatory Research in Southern Ethiopia: a joint learning experience (this book).

Groverman V & Gurung DJ. 2001. Gender and organisational change: a training manual. Kathmandu: ICIMOD

Gündel S, Hancock J & Anderson S. 2001. Scaling-up strategies for research in natural resources management: a comparative study. Chatham: Natural Resources Institute.

Hagmann J, Moyo E, Chuma E, Murwira K, Ramaru J & Ficarelli P. 2003. Learning about developing competence to facilitate rural extension processes (this book).

Hart T & Isaacs J. 2003. Transforming the South African Agricultural Research Council to engage in PTD with black smallholder farmers (this book).

Hoang Hui Cai, Felber R & Vo Hung. 2003. PTD in community-based forestland management to build up a farmer-led extension system in Vietnam (this book).

Hocdé H & Meneses D. 2003. The meeting of two worlds: constructing processes of PTD in the Huetar Region of northern Costa Rica (this book).

Hope A & Timmel S. 1984. Training for transformation: a handbook for community workers. Gweru: Mambo Press.

IIRR. 2000. Going to scale: can we bring more benefits to more people more quickly? Silang, Cavite: IIRR.

ILEIA. 1989. Proceedings of the International Workshop on Operational Approaches to PTD. Leusden: ILEIA.

Joss S & Nadyrbek K. 2003. PTD in the Kyrgyz Republic with special reference to the Rural Advisory and Development Service in Jalal Abad Oblast (this book).

Kibwana OT, Mitiku Haile, van Veldhuizen LR & Waters-Bayer A. 2000. Clapping with two hands: bringing together local and outside knowledge for innovation in land husbandry in Tanzania and Ethiopia - a comparative case study. Journal of Agricultural Education & Extension 8 (3): 133-142.

Lizares-Bodegon S, Gonsalves J, Killough S, Waters-Bayer A, van Veldhuizen L & Espineli M. 2002. Participatory Technology Development for agricultural improvement: challenges for institutional integration. Silang, Cavite: IIRR (full text available on www.prolinnova.net).

Majzoub Fidiel M. 2003. Participatory development of the donkey-drawn plough in Western Sudan (this book).

Naidu YD & van Walsum E. 2003. PTD for sustainable dryland agriculture in South India: balancing our way to scale (this book).

Opondo C, Sanginga P & Stroud A. 2003. Monitoring the outcomes of participatory research in natural resource management: experiences of the African Highlands Initiative (this book).

Perera GD & Sennema B. 2003. Towards sustainable development in Mahaweli settlements through farmer participation (this book).

Sabourin E, Sidersky PR & Marçal da Silveira L. 2003. Supporting agricultural innovation in northeast Brazil: the approach of Projeto Paraíba (this book).

Tchawa P, Nkapemin F & Diop JM. 2003. Participatory Technology Development in Cameroon: the route and milestones in the process of its institutionalisation (this book).

Tichy NM 1982. Managing change strategically: the technical, political and cultural keys. Organizational Dynamics, Autumn 1982.

Veldhuizen L van, Waters-Bayer A, Killough S, Espineli M & Gonsalves J. 2002. Institutionalising Farmer Participatory Research. In: Leeuwis C & Pyburn R (eds), Wheelbarrows full of frogs: social learning in rural resource management (Assen: Koninklijke Van Gorkum), pp 375-387.

Veldhuizen L van, Waters-Bayer A & de Zeeuw H. 1997. Developing technologies with farmers: a trainer's guide for participatory learning. London: ZED Books.

Learning about developing competence to facilitate rural extension processes

Jürgen Hagmann[1], Evison Moyo[2], Edward Chuma[3], Kuda Murwira[4], Joe Ramaru[5] and Paolo Ficarelli[6]

This paper analyses practical experiences in developing competence to facilitate processes of participatory community development and extension within government services in Zimbabwe and South Africa. It describes the demanding profile of extension agents who engage in process facilitation, which is a radical move away from technically based extension towards broader development of rural communities' capacities to solve problems, to innovate and to organise themselves effectively. Learning at cognitive, behavioural, attitudinal and emotional levels was enhanced to facilitate this change in individual competence. At the same time, capabilities at different levels in the extension services were strengthened through organisational development processes. The lessons learnt can be applied to many situations beyond the cases of Zimbabwe and South Africa.

Photo by: Jürgen Hagmann.

A farmer experimenter explains her experiments with vetiver grass.

[1] Independent Process Facilitator, Talstr. 129, D-79194 Gundelfingen, Germany (*jhagmann@aol.com*)

[2] Rural Development Consultant, Masvingo, Zimbabwe (*evismoyo@mweb.co.zw*)

[3] University of Zimbabwe, Institute of Environmental Studies, POB MP 167, Mt Pleasant, Harare, Zimbabwe (*chuma@africaonline.co.zw*)

[4] Rural Development Consultant, 15 Canberra Road, Westlea, Mutare, Zimbabwe (*kmurwira@zol.co.zw*)

[5] Limpopo Dept of Agriculture, POB 4645, 0700 Polokwane, South Africa (*ramarujm@agricho.norprov.gov.za*)

[6] GTZ-BASED, POB 13732, Pretoria, South Africa (*base.gtz@pixie.co.za*)

Background

Public agricultural extension organisations in many countries realised the need for participatory approaches after their potentials had been demonstrated by non-governmental organisations (NGOs). Acceptance and promotion of these approaches in hierarchical government bureaucracies and operationalisation through often low-paid and low-qualified extension agents have proven to be difficult. The organisations require a transformation from top-down teaching and a narrow production orientation to people-centred and learning-oriented extension approaches (Thompson 1995). Such a shift in the way of operating requires, in turn, substantial changes in the culture and structure of the organisations. At all levels, and especially at field level, there is a need for a deliberate change in attitudes and behaviour of extension agents and a growth in capabilities to facilitate social processes. Re-orientation and transformation of technically oriented extension agents necessitates a broader framework of human resources development involving training in participatory processes.

Such a process of transformation was undertaken by the Zimbabwean Department of Agricultural, Technical and Extension Services (AGRITEX) in the Ministry of Lands and Agriculture. With support from GTZ (German Agency for Technical Cooperation), AGRITEX piloted and experimented with developing the competence of field-level extension agents in participatory extension approaches (PEA) since 1995 in Masvingo Province. This was an integral part of wider change management through an organisational development (OD) programme geared towards improving service delivery.

From 1998 onwards, based on the lessons from Zimbabwe, the PEA approach was further developed and adapted to Limpopo Province in South Africa. This paper focuses primarily on the Zimbabwean experience in developing a learning programme for process facilitation, its large-scale implementation and the lessons learnt. The emerging lessons from the South African case complement the Zimbabwean experiences, and together, they give an account of almost a decade of learning.

A learning-process approach in extension delivery

Based on pilot activities in research and extension between 1990 and 1995, a participatory extension approach was developed iteratively, together with farmers, researchers and extension agents in Masvingo Province. In 1995-96, with the growing interest to integrate alternative approaches to service delivery into the government extension system, these experiences were synthesised into a common framework, named "Participatory Extension Approaches"[7] (see Fig. 1), which was increasingly accepted by the public extension organisation as a mainstream approach to extension.

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[7] The process of developing the approach, the emerging PEA framework and the experiences with this approach are published in Hagmann et al 1996, 1997, 1998, 1999, 2002, Moyo 1996, and in the set of PEA training and resource materials listed in the references.

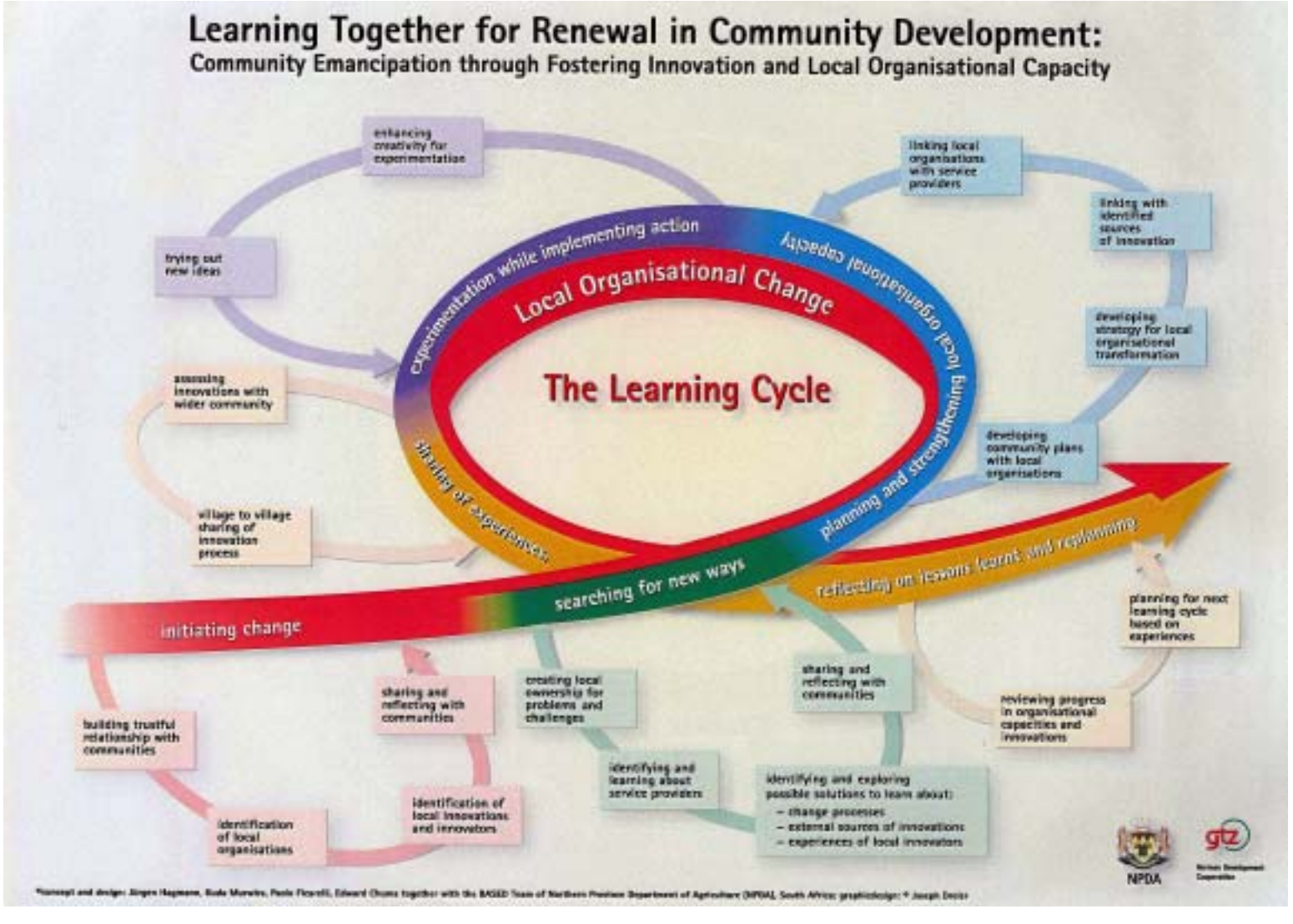

Figure 1: The PEA learning cycle with main process phases and related process steps

This framework was complemented by three years of experience in South Africa, which revealed that the aspect of local organisational development had to be a focus throughout all phases. An additional phase was added to the original "planning & organising phase" in the learning cycle and the field-level PEA approach was embedded into a broader frame of reforming the service delivery system. Thus, greater attention was given to linking communities to service providers and creating a well-functioning system involving a variety of service providers through facilitated platforms and coordinating fora.

Key characteristics of PEA

PEA, as developed and understood in Zimbabwe and South Africa, is an extension approach that involves a transformation in the way extension agents interact with farmers. Community-based extension, full community ownership of the process and joint learning are central to PEA. It reflects a social extension approach (versus "technical advisory" extension) that builds the foundation for effective service delivery in terms of enabling rural people to identify and critically analyse their real demand for services, to articulate it to service providers and to be better able to manage relationships with external agents in an emancipated way (accountable representation in negotiation with service providers, holding service providers accountable to community needs and helping them deliver services in an inclusive way). This fundamental "organisation of the demand side" is often lacking and, as a consequence, the extension services in form of "technical advice" can hardly be absorbed and are of limited success.

Some key characteristics of PEA are:

- focus on strengthening rural people's problem-solving, planning and management abilities both individually and collectively; this involves development of local organisational capacities and leadership (adaptive capacity)
- integration of social mobilisation of communities for planning and action in rural development, agricultural extension and research, fuelled by a social process of innovation
- equal partnership between farmers, scientists, extension agents and other service providers, who can all learn from each other, contribute their knowledge and skills, and build an effective innovation system together
- promotion of farmers' capacity to adapt and develop appropriate technologies / innovations by encouraging them to learn through experimentation, building on their own knowledge and practices and blending these with new ideas in an action-learning mode (usually these are agricultural technologies, but they can also be innovations in social organisation, health, water and sanitation, and other domains of rural development)
- recognition that communities are not homogenous but consist of various social groups with conflicts and differences in interests, power and capabilities. The goal is to achieve equitable and sustainable development and equal opportunities for all through the negotiation of interests among these groups and by providing space for the poor and marginalised in collective decision-making.

PEA integrates elements of Participatory Technology Development (PTD) as a means to generate innovations and learning through farmer experimentation, social development

approaches, experiential learning (Kolb 1984) and Training for Transformation (Hope & Timmel 1984). The PEA learning cycle and operational framework suggest a holistic and flexible strategy with process steps, into each of which a variety of extension methodologies and tools (including PRA tools) are integrated flexibly. For example, farmer-to-farmer extension or Farmer Field Schools can be part of the PEA framework. In isolation, these methodologies might address only a few farmers and even be used in a top-down manner. Within the community-based PEA framework, however, these methodologies can be more inclusive and effective because whole social entities are addressed. The fundamental difference of PEA vis-à-vis many other approaches is that the communities are regarded as organisational entities that need to be approached from an integrated organisational change and development perspective - similar to the facilitation of change processes in public or corporate organisations. The values and goals may differ, but the human behaviour, processes and patterns are very similar.

PEA is far more than a participatory methodology and distinctly different from PRA, which is essentially a toolbox. PEA is a comprehensive, iterative learning-process approach to rural innovation and problem-solving that enhances governance and civil society organisation in rural areas in which both farmers and extension agents / service providers accumulate knowledge and skills. Inclusiveness and community ownership of the development process are core values of PEA.

Role of extension agents: facilitators for change and innovation processes in communities

The role of the extension agent is to facilitate this process geared towards human development at local level and involves:

- ***a process of community strengthening leading to good local governance***
  - social mobilisation and local organisational development to enhance community management capacities and an articulated demand for services
  - community needs identification and analysis leading to high-quality demand for services (instead of wish lists) and action-planning processes
  - a process of community self-evaluation to review critically the successes and failures so that learning can become effective and be built into community development
- ***a process of collective and individual farmer learning about innovation (technical and social) to enhance the community's capacity to innovate***
  - engaging the different actors in learning and experimenting together in order to improve their understanding and management capacities
  - developing appropriate technologies and enhancing the farmer-to-farmer spread of solutions to farmers' problems
  - strengthening capacities to negotiate land use and by-laws for natural resource management (NRM). This involves social innovations that need to be negotiated often in conflict situations
- ***rural knowledge management***
  - identifying knowledge about given technologies as sources of innovation
  - linking various actors who have and seek knowledge to bring together their knowledge and experience

- documenting the knowledge to record learning and make it more widely available
- preparing materials to disseminate knowledge effectively (based on the generation of knowledge).

This new role of managing and facilitating learning processes implies special skills and competencies that are far from the present technical advisory focus of extension agents and therefore need to be developed.

The challenge: developing the capabilities needed to facilitate PEA processes

Core capabilities needed

Central to PEA is the *facilitation of action research and learning*. Process facilitation, as a non-instrumental form of intervention (Röling 1996), was basic to the learning process. Building up development workers' facilitation skills was a major challenge. Our experience has shown that good facilitation skills are more important than any particular tool or learning aid and also more difficult to learn than any other skill needed in the learning process. The core of reflective facilitation (Groot & Marleveld 2000) is about asking the "right" questions at the "right" time in order to enhance people's self-reflection and self-discovery without pre-empting the responses or pushing in a preconceived direction. These questions are meant to mirror back to people the patterns and consequences of their behaviour and possible solutions in the long run and thus lead to deep self-reflection and ownership of the problems they express.

The values of ownership, participation / emancipation and social learning were crucial in facilitating the construction of new realities. Local ownership was created through basing the interventions on local organisations that assumed full responsibility. Our intervention was geared towards strengthening of local organisations through enhancing accountability, improving leadership and facilitating critical self-awareness and self-discovery of inherent local (human) values. Values had probably the greatest influence in farmers' decisions in PEA. Through good facilitation, these were revealed and led to new social norms. In summary, facilitation breaks the entrenched patterns and focuses people on critical and systemic thinking, while critically exploring ideas, visions, solutions and people's own responsibility in development.

The main challenge is guiding the facilitation process, which requires several skills and conditions:

1. **Clear vision of the process goal.** The vision of development needs to be built on values such as participation, ownership, inclusiveness, people's self-development, openness, transparency and accountability. With this vision as a "guiding light", the facilitator can handle situations flexibly and pose the "right" questions to enhance learning. The facilitator needs to be a step ahead and lead the process, but not its outcome. Often, this vision can be enhanced through exposure to successful cases that provide real and concrete examples.
2. **Empathy and the culture of inquiry.** The facilitator needs to be able to empathise with the group members so that he/she can react appropriately. Empathy goes beyond

knowledge about group dynamics; it is a skill that depends on personality and emotional intelligence (Goleman 1988). Another skill is the culture of inquiry, which is the ability to question apparently simple things and to "unpack" them down to details. Often, the real problems lie in the details, which need to be disclosed before a solution can be developed.

3. **A clear understanding of process design, steps and dynamics.** In our experience, unless the design of the process is clear, facilitators have major problems in guiding it. Particularly beginners in process facilitation need a clear operational framework as a "rail" to guide them. Such a framework defines the objectives, key questions and issues, core methodologies and partners for each process step. Only after thorough training and experience in these process steps are facilitators able to understand and implement them confidently and modify them according to their own experience, empathy and common sense. Understanding the process with its usual ups and downs also helps to reduce the frustrations often experienced when things do not go in the desired direction. After having gone through a whole process cycle, facilitators know that these are part of any non-linear learning process and they can handle these situations by putting them in context.

These are core skills and conditions required for facilitating any learning process. Facilitating learning in the field of NRM also requires knowledge about ecological principles and practices. Here, specific learning tools play a crucial role (Hagmann *et al* 1997, Hamilton 1998, Hagmann & Chuma 2002).

Practical experiences during implementation of participatory processes in pilot activities from 1990 to 1995 provided deep insight into the critical capabilities that extension agents require to facilitate such complex and dynamic learning processes in communities (see Box 1).

In South Africa, extension agents who learnt process facilitation over three years in an experiential way with intensive guidance summarised the requirements for their own staff competence in four dimensions:

1. **Vision and values for themselves and for development:** Without one's own vision and strong values in life, it is impossible to be strong and clear enough to provide orientation for others, which is a major function in PEA facilitation. The extension agents created slogans: *"If you want to change others, you first have to change yourself"' and"If you do not manage change, change will manage you!"* Vision and values in development also imply having a strong sense of emancipative development.
2. **Self-development:** This refers to creativity and curiosity to learn, authenticity, critical self-awareness and openness, trust in people and groups, and the ability to stay in control even when insecure.
3. **Facilitation skills:** Besides facilitation techniques, these skills include the art of questioning and dealing with group dynamics, conflicts and organisational development issues.
4. **Technical and management skills:** This involves technical know-how in broader terms and certain specialist knowledge, depending on the field in which one is working. Management skills are also essential to deal with people and hierarchies in one's own organisation.

Box 1: Core capabilities needed by extension agents for PEA

- Full understanding and orientation towards a vision of participatory development processes in which human development - rather than technical development - is the ultimate goal of extension.
- Clear understanding and overview of a variety of extension approaches and methods as a pool from which ideas can be sought and combined, plus the entrepreneurial spirit to venture into different and new approaches and methods, continuously trying out and improving one's way of working.
- Deep conceptual understanding of learning-process and systems approaches as vehicles for self-development and the capacity to handle these approaches flexibly and to adapt them to situation-specific requirements (process management).
- Creativity to invent or adapt methods and tools to correspond to the requirements of the process (e.g. managing conflict).
- Excellent communication and facilitation skills based on a positive attitude towards clients and performance.
- Skills in communicating and sharing freely with others and in identifying effective linkages among people and institutions and also between technical disciplines, with the aim of "building bridges" and bringing actors together.
- Technical knowledge needed to advise farmers on topics related to solving their immediate farming problems so that they can manage their natural resources effectively and reach food security. This does not require deep specialised knowledge on certain commodity crops, but rather broad knowledge on issues such as farm management, soil and water management, basic crop production, basic animal production and new areas that are becoming more important (e.g. marketing and processing, urban agriculture). Specialised knowledge can be obtained externally, if required.
- Knowledge and understanding of management and organisation of extension, including organisational development towards an effective extension organisation (what is good management, leadership etc.) so that field agents know their rights and opportunities to claim support and to contribute to improving overall organisational performance.

This analysis revealed a much stronger focus on personality development than in Zimbabwe, and was crucial in the adaptation of the design of learning programmes.

How to get there? The foundation of PEA capability development

It is obvious that PEA demands a cadre of field agents who are professional and experienced. They need to be able to manage dynamic complexity, which is almost the opposite of the linear, mechanistic and rigid teaching schedule of the conventional extension agent. Competence development needs to stimulate and enhance the cognitive, behavioural / attitudinal and emotional levels simultaneously in order to build the capacity of individual personalities to act in a different way:

- **At cognitive level,** the major thrust is to open up minds to lateral thinking in terms of processes and systems perspectives. This shift can be facilitated by critical self-analysis and challenging one's own mind-set, and by exposure to various alternative concepts and paradigms. Creativity and mental flexibility need to be enhanced through experimentation with new ideas and social learning in action. Without a focus on creativity, people fall back into their old patterns of problem-solving, thereby creating the typical more-of-the-same situation, although the problems have new dimensions. Orientation towards a vision, development of guiding principles for interventions, conceptual and operational frameworks as mentioned above can inspire and help

people overcome their initial fear of the unknown by providing the understanding, security and confidence to engage in new ways of working.

- **At behavioural / attitudinal level,** prevailing values and social norms and expected behaviour need to be critically reviewed. For example, formal education is often valued much more than experiential, non-formal knowledge. This places farmers with their local knowledge and also the extension agents' common sense in a diminutive position. Overvaluing the external exotic inputs over the local intrinsic knowledge of communities often undermines the common sense and entrepreneurial spirit that drive development. This denial of one's own roots and knowledge creates enormous insecurity and inhibits an open dialogue. Thus facilitation of change means that social norms, values, attitudes and behaviour need to be made visible so that the extension agents can discover them through self-analysis. Such analysis should confront people with the consequences of the status quo so that alternatives can be considered and decided upon.
- **At emotional level,** confidence, self-esteem, "groundedness" and cultural identity are needed when managing complex social processes in communities, which are characterised by continuous uncertainty. The fact that *"the only thing that is sustainable is change"* requires a different way of dealing with uncertainty. Facilitators need to be secure in their own insecurity; otherwise they will be lost. A sound degree of common sense, empathy, self-awareness and self-regulation, in other words, *"emotional intelligence"* (Goleman 1998) and personality, helps the facilitator to *"read the process"*, thus reducing the uncertainty and creating a reference base for decision-making. Enhancing emotional intelligence and intrinsic motivation is probably the most difficult aspect of developing competence in process facilitation, as only gradual engagement in a process and experimenting with it can achieve this. While phases of insecurity are necessary to break old patterns in any change process, it is important to start a learning situation with small steps in which success is likely. This procedure allows confidence to increase relatively quickly, while the other factors develop gradually and at the same time - with all the ups and downs typical of processes in which an emotional involvement and often a motivational drive are inherent.

The three levels are integrally linked and strongly influence each other during the learning process. It is not a matter of addressing them separately, but of being aware when and how to deal with different aspects in an iterative approach. One-off events can trigger some awareness, but rarely lead to sustained change. Experiential learning through iterative action and self-reflection based on practice in the field as well as theory has high probability of leading towards ownership and internalisation of learning focused on personal / attitudinal development. Our experience has shown that this approach of learning by doing through intervals of training and practice periods, backed by peer-learning groups and coaching, has great potential to develop these skills gradually.

Conducive organisational climate: The capabilities of individuals were developed in the wider context of organisational development, in contrast to some other experiences with participatory approaches in which the capabilities of individuals have been developed without adapting certain variables within the organisation, e.g. management styles, incentives, procedures, clarifying individual roles. Details of this process are

described by Hagmann *et al* (1998). Without an accompanying process of organisational change, PEA could risk being a one-off ephemeral project experience.

Curriculum development through action research

In the first learning phase for competence development from 1994 to 1997, the principles and conditions discussed above were put into practice in a pilot learning programme over 18 months to develop an experience-based strategy and learning curriculum for PEA competence development with a group of 23 field extension agents (see Box 2). Based on these insights, a set of materials was developed and published to support large-scale training: a guide to the PEA approach, a training guide and a video (see references).

Box 2: Iterative learning programme in PEA

The sequence of large-scale training of field staff in PEA follows the action-learning and reflection cycle that was found appropriate during the pilot phase (details of the curriculum are described in the trainer's guide):

Phase 1 constitutes the initial training in PEA over a period of two weeks. It is based in the training centre and exposes the trainees to the guiding principles, core concepts and methods of PEA. Facilitators use the PEA video and written material as well as interactive small-group exercises, role plays and case studies to expose the trainees to different aspects of the approach. Sharing of trainees' experiences and field practise in selected participatory methodologies and tools are integral components of the course. At the end of Phase 1, trainees develop action plans to be implemented with communities / groups in their working environment.

Phase 2 is a six-month period during which the trainees try out several tools and techniques of PEA in the field, based on their action plans. The extension agents are encouraged to collaborate with one another in the field. This has proved helpful in enhancing individual confidence. Coaching by trainers is available.

Phase 3 is a one-week feedback workshop, during which trainees reflect on their individual and collective experiences, highlight the actual problems they faced, e.g. in handling intra-group conflicts, in applying specific methods and tools. Trainees collectively seek ways of overcoming such problems, and their capabilities are enhanced through training in other tools. Facilitators do not just impart purely technical skills; they continuously monitor and analyse trainees' attitudes, behaviour and perceptions towards local people. Phase 3 recapitulates conceptual issues, the principles of transformation, and aspects of farmer experimentation and innovation development. It is not as highly structured as the training in Phase 1, as it responds to the trainees' further training needs. In order to provide orientation and further exposure, a field trip is made to an area where PEA has been implemented successfully. At the end of this workshop, trainees develop a second action plan for implementation in their working environment.

Phase 4 is another six-month period of field implementation of the second set of action plans, in the same mode as in Phase 2.

Phase 5 is similar to Phase 3, whereby trainees again share their field experiences and are trained further in PEA concepts and tools. While this phase constitutes the final formal PEA training workshop, learning is a continuous process.

The fact that we started with training of field-level staff before higher-level staff created an interesting dynamic, as this meant that the field staff knew more about PEA than did their superiors. In general, the effect of this "discomfort model" of training was positive: many superiors were very keen to be trained themselves, as soon as they realised that they knew less than their subordinates. The usual hierarchy of training in cascades, with all its limitations, was interrupted and probably would not have been effective for such a demanding transformation of extension. In some cases, however, we waited too long and the distance grew too big, resulting in resistance of the superiors because they felt threatened of losing face.

The five phases followed in Zimbabwe were not sufficient in the case of South Africa and so we included an additional workshop phase. The coaching and mentoring system in South Africa also had to be more intensive, because the overall competence level of extension agents was, for historical reasons, lower than in Zimbabwe. Once the process skills had improved, technical training programmes were very necessary to equip the extension agents with technical ideas and understanding to support the innovation process at farmers' level. The PEA training proved to be very demanding, especially in the early stages when trainer competencies, organisational skills and adequate resource allocation are crucial.

Going to scale: training of all staff in PEA

With a staff complement of about 300 field extension agents in Masvingo Province, it became obvious that, if one relied on one or two external facilitators, it would take a very long time to train all staff in PEA. Training of trainers within AGRITEX-Masvingo was therefore chosen as a strategy to achieve fast and wide coverage. A total of 20 trainers were trained, and each of the seven districts of Masvingo Province now has a team of in-house PEA trainers. Most were recruited from the pilot group of 23 field extension agents, and their training skills were further developed through training and coaching by outside specialists. This strategy put the practitioners in the forefront of training, with the training specialist having a coordinating role rather than that of "expert".

This large-scale programme of developing competence in PEA demanded a substantial investment in terms of resources and time. By 2001, most AGRITEX- Masvingo staff had gone through the five major phases of learning, and other provinces in Zimbabwe had started. However, on account of political interference, the programme came to a standstill in 2001. Extension agents were mainly used for non-extension functions in the newly occupied and resettled areas, and the Department was completely restructured. The political situation no longer allowed facilitation of emancipative processes, as it would have been seen as subversive.

In South Africa, a scaling-up programme through competence development started in 2001. The trainers were recruited from the first group of experienced PEA practitioners, who were prepared to become trainers themselves - coached by experienced trainers. By the time of writing in 2003, more than 150 officers are engaged in on-going learning processes. The successes in Limpopo Province triggered a great interest in two other provinces, which are now also engaging in learning programmes.

Experiences, outcomes and lessons learnt

The outcomes of the pilot group and large-scale programmes in developing competence in PEA in Zimbabwe and South Africa were analysed at farmer and field-agent levels to derive lessons with regard to learning and organisational capabilities.

Outcomes of PEA implementation at farmer level

Farmers' response to implementation of PEA by the extension agents during their learning process was encouraging. Farmers have taken on ownership and responsibility and, in some cases, even paid the expenses for their own exposure trips and field days. This indicates that the process of self-organisation and development of demand-oriented extension is well underway. In a self-evaluation, extension agents in the pilot group set themselves performance criteria that showed their high degree of competence in PEA. In the practical interaction with farmers at the beginning of PEA facilitation, the extension agents faced severe challenges in the areas of leadership, cooperation and power relations in communities, as well as in the shallow and skewed results from initial identification and analysis of local problems and needs of different groups in the communities. The "problems" and "needs" turned out to be symptoms and were strategically positioned towards potential donor contributions. Certain groups tried to influence the needs analysis in their favour. These difficulties relate to the core of PEA aims and have always existed but were not dealt with. Now, they were recognised as stumbling blocks and openly addressed.

Photo by: Jürgen Hagmann

A subgroup of women discusses the changes and impacts they see as a result of Participatory Extension Approaches.

In South Africa, a detailed impact assessment in pilot communities revealed high impact in soft/process aspects such as self-organisation, social energy etc. and hard impacts in terms of technical innovations that yielded substantial benefits at individual and community level by creating economies of scale in input and output marketing. The impacts seen during exposure visits to communities were strong enough to convince senior management of the extension department to drive the process of integrating PEA as a mainstream extension approach in Limpopo Province.

Outcomes in terms of individual and organisational transformation

With respect to the impact on the extension agents' competence to implement PEA, the results of the transformation process depended greatly on personality and were not uniform across staff. Some skills (e.g. facilitation of local organisational development, conflict resolution) proved to be difficult to master. The analytical skills, critical self-reflection, and culture of inquiry and questioning needed for facilitating PEA have developed slowly and not homogenously. Over time, these skills became stronger, but a shift from a non-questioning hierarchical culture to a liberal, self-responsible, performance-based culture probably takes more than 18 months. The same applies to developing lateral thinking and flexibility. However, it was encouraging to see the wealth of ideas generated by the trainees to solve the major problems. The attitudes of waiting to be told what to do and of inability to solve problems themselves have changed into pro-active development of solutions and mutual help to overcome problems. This indicates that the self-responsibility and problem-solving capacity of the extension agents was strengthened during the process of competence development.

Key issues emerged with regard to incentives for change, as there were no formal incentives for good PEA practitioners (e.g. better remuneration, promotion), neither within AGRITEX in Zimbabwe nor within the Limpopo Department of Agriculture. Often, the reward systems did not favour PEA at all, but focused on projects that extension agents had to implement. Nevertheless, there is great enthusiasm and commitment to the approach. In an evaluation, the pilot group in Zimbabwe defined their motivation to practise PEA as being value-based and emotional rather than driven by material incentives (see Box 3).

Another major motivating factor was linked to an increased recognition of the extension agents' work due to increased work output. They emphasised that, until recently, hardly anybody cared about their work, neither the "recipients" nor the superiors. Now that things are happening visibly, everybody becomes interested and suddenly their work is being recognised. This revealed that their work ethic is higher than anticipated *("we all want to do a good job")*. However, they need to have opportunities to show that they are able to perform and they need recognition from inside and outside the organisation. This is an incentive that does not cost anything, but requires changes in the attitudes and culture of the whole extension organisation. The initial "fire" and motivation of extension agents does not last more than one to two years. If it is not backed up with other incentives such as recognition by superiors, promotions and material incentives for performance, the PEA practitioners become frustrated and seek "greener pastures". As these individuals have developed highly sought-after competence, the best ones are quickly drawn away from the public service.

Box 3: Becoming active members of farmer-development teams as a source of energy for transformation

The responses in the evaluation by the pilot group of extension agents indicate that trying out PEA has created an intrinsic motivation based on better relationships and greater recognition of farmers' achievements. The improved relationships with farmers, now without tensions and friction, highlight how uneasy some extension agents felt when they had to impose their programme on farmers. Most of them obviously did not believe in their mission of *"educating farmers"* and had to operate in a schizophrenic environment. Farmers did not own the extension programme and, consequently, did not take active part in it. This disharmony caused work pressure and emotional stress among the extension agents. Accordingly, they perceived their workload to be higher than it is with PEA because now *"farmers carry out their own programmes with minimum assistance"*. The comment *"Shared responsibility is a relief"* points to the reduced stress. This was also expressed in other words: *"... before, we only used one brain and farmers' brains remained dormant; in PEA, we use all brains together"*. The increased ownership of the programmes by farmers was perceived as a positive change in farmers' attitude. The extension agents linked this with increased sustainability of the programme. They also emphasised that they are proud to see that farmers are more confident and self-determined. This pride reflects not only the relationship between farmers and extension agents; it also indicates that the agents themselves have gained cultural identity. The statement: *"I am now one of them"*, means that the schizophrenia has ended. Through recognising and valuing farmers' knowledge, the extension agents also value their own origin and cultural identity, as many of them are from peasant backgrounds. In this respect, the process helped them to gain strength and confidence in themselves, a fact that was reflected in the behaviour of the group in general. This personal development became one of the major incentives.

Lessons in terms of design and management of the learning process

The major success factor in competence development was the iterative nature of the learning and coaching process over 18 months, which made it possible to work within the reality and problems faced by the extension agents. The systematic follow-through of the sequence revealed a shift in the problems of extension agents with their increasing engagement in the process over time. While the five phases in competence development ended after 18 months, it was crucial to maintain back-up mechanisms for continuous, long-term learning to improve service provision (e.g. peer-learning groups and exchange fora at District level). Without a continuous learning mechanisms supported by superiors and peers, the quality of PEA implementation declined seriously over time. Thus, a quality assurance system in the form of peer coaching, competitions and performance management needs to be negotiated and implemented rigorously.

The importance of actively linking theory and practice to build the competence in process facilitation was confirmed. However, not everyone is a conceptual thinker or a flexible process manager. The appropriate mixture of structure and process in learning is one of the biggest challenges for the trainers. Provision of structural elements (e.g. stepwise procedures, tools) helps to create pathways for action but, at the same time, these structures should not become blueprints. Therefore, the mixture needs to be carefully monitored and flexibly applied. The piloting of competence development as a learning laboratory for testing, modifying and refining PEA through trial and error was crucial in the development of a high-quality learning programme. This needs to be on-going, as there is always scope to improve.

Lessons in terms of organisational capabilities for service delivery

PEA competence development was positioned within the framework of improving extension service delivery as a whole. Key factors for success in this organisational change were:

- **Allowing innovation within organisations:** Flexible development of an approach in pilot learning, as demonstrated in Zimbabwe and South Africa, needs flexible funding arrangements that allow time for experimentation and innovation before expecting any tangible results. Ideally, this can be taken on by projects that have a certain "venture capital" beyond line budgets. However, it is important that line budgets are put in place as soon as senior management has committed itself.
- **Using local pilot experiences in PEA facilitated by extension staff to convince senior management.** In both Zimbabwe and South Africa, exposure to the local-level impact convinced decision-makers of the need to scale up. Acceptance of the approach was particularly strong because it was grounded in concrete field experience of its own staff, and the know-how was within the organisation. Therefore, scaling-up became demand-driven, as senior management acknowledged the appropriateness of PEA and the need for all staff to share the same philosophy.
- **Building practitioners to become in-house trainers:** Training of trainers as in-house facilitators has been important in terms of know-how management and internalisation within the organisation. It also positively affected the organisational learning in the sense that competent practitioners - not academics - became the trainers. However, good selection of the initial learning group is crucial. To ensure a fast process of change, the group should consist of the most motivated and committed staff. In addition, the extra burden of becoming a trainer needs to be rewarded; otherwise, motivation will drop quickly.
- **Integrating competence development and organisational capacity building:** PEA competence development could be successful only because the organisational factors were dealt with through the OD programme. If problems with hierarchical organisational culture, bureaucratic procedures and management styles are not dealt with, any field-level motivation will be reduced in the long run. Therefore, a change process with OD and PEA as "delivery software" is integral in improving the performance of public-service organisations.
- **Developing high-quality competence enhances harmonisation of extension approaches:** The quality of the competence development and the comprehensive inclusive approach made PEA attractive outside of the extension organisations. Increasingly, other line ministries, NGOs and consulting firms are becoming interested in getting trained and adopting the approach. This offers a good chance to coordinate and harmonise service provision in the rural areas and thus to eliminate the often contradictory approaches (e.g. with regard to self-reliance and free handouts). This was an unintentional but important impact.
- **Building support and supervision structures and performance management for continued learning and quality improvement.** In South Africa, a specific success factor was the organisational set-up at District-level. We focused strongly on creating the support and supervision structure at this level with clear lines of reporting and accountability so that the PEA process became well embedded within the daily management of extension. This has been a major challenge that we did not pursue so strongly in Zimbabwe and that enhanced the process in South Africa.

Future challenges

The major challenge in the future is to institutionalise a continuous process of learning and optimising service-delivery approaches in the whole extension organisation and, together with other service providers, particularly in the Districts. This will be difficult if the managers in the organisation do not share the vision and philosophy of participatory and open management. Continuity is often another problem: when managers are re-deployed, and new managers not familiar with the process take over, they cannot support it. As the case of Zimbabwe has shown, sudden political turnarounds can easily derail such processes in a devastating way. In addition, PEA trainers are now attractive on the free market and gain better-paid jobs outside government organisations. This further threatens such processes if they depend too much on individuals and do not build enough competence within the organisation early in the process.

In general, the biggest challenge is to go full scale when large numbers of agents have to be trained in a short time, being aware that developing such competencies is a long process. Managers who prefer fast results and "quick-and-dirty" solutions over and above solid foundations through high-quality learning and competence development need to be fully engaged in the process, thus creating ownership on their part. At the same time, we need to explore other ways and strategies to scale up more quickly and efficiently. The learning programmes need to be focused even more on personality development, as being done in South Africa. With increasing knowledge about the factors that make such processes work, there is also scope to improve the learning system.

As soon as staff members have reached a sound level of process facilitation skills, they need to be re-focused in terms of the technical content of extension. New areas such as marketing and processing, in which extension has hardly had a stake thus far, need to be developed as technical thrusts for better service delivery. Also other issues such as farmer-paid services and pluralism in services need to be addressed. The key to making services responsive to clients in a sustainable way is to develop mechanisms for quality assurance and impact assessment by the clients. Such mechanisms need to be progressively developed by all interested groups.

Thus far, PEA competence development was carried out to re-orient existing extension agents. In future, one needs to look to the training institutions where new agents are educated. The curricula of agricultural colleges in Zimbabwe and South Africa are still largely reductionist and disciplinary, based on traditional syllabi focused on production and commodities. The primacy of extension and learning must be re-established in such centres of education - otherwise, we will live even longer with obsolete paradigms that do not include critical contemporary learning.

The professional profile required for field facilitators of PEA demands a radical turnaround from the present situation. Until now, field staff received the least attention and was the least paid, the least educated and often the least motivated. Using the analogy of a company, they would be the sales representatives who are not given a chance to succeed and who ultimately ruin the company. Now, if they are to become

true "sales reps" of their organisation, they need to be the most competent and service-oriented so that the company, or in this case the extension service organisation, can flourish and cope with the new challenges of rural service delivery. The two cases in Zimbabwe and South Africa can contribute some lessons to the "long march" towards this huge transformation.

Acknowledgements

We thank all teams of extension agents in Zimbabwe and South Africa for working in a spirit of great cooperation. Particularly the BASED (Broadening Agricultural Services and Extension Delivery) team in South Africa has contributed greatly to develop further the ideas taken from Zimbabwe. The comments of Mike Connolly and his contribution to the joint work in Zimbabwe are gratefully acknowledged.

References

Goleman D. 1998. What makes a good leader? Harvard Business Review, Nov/Dec 1998: 92-105.

Groot A & Marleveld M. 2000. *Demystifying facilitation in participatory development*. Gatekeeper Series 89. London: International Institute for Environment and Development.

Hagmann J, Chuma E & Murwira K. 1997. Kuturaya: participatory research, innovation and extension. In: Veldhuizen L van, Waters-Bayer A, Ramirez R, Johnson D & Thompson J (eds), *Farmers' research in practice: lessons from the field* (London: Intermediate Technology Publications), pp 153-173.

Hagmann J, Chuma E, Connolly M & Murwira K. 1998. *Client-driven change and institutional reform in agricultural extension: an action learning experience from Zimbabwe*. AgREN Paper 78. London: Overseas Development Institute (ODI). http://www.odi.org.uk/agren/publist.html

Hagmann J, Chuma E, Murwira K & Connolly M. 1999. *Putting process into practice: operationalising participatory extension*. AgREN Paper 94. London: ODI. http://www.odi.org.uk/agren/papers/agrenpaper_94.pdf

Hagmann J, Murwira K & Chuma E. 1996. *Learning together: development and extension of soil & water conservation in Zimbabwe*. Quarterly Journal of International Agriculture 35 (2): 142-162.

Hagmann J & Chuma E. 2002. Enhancing the adaptive capacity of the resource users in natural resource management. Agricultural Systems 73 (1): 23- 39. http://www.prgaprogram.org/pnrm/resources/pnrm_tools_author.htm#H

Hagmann J, Chuma E, Murwira K, Connolly M & Ficarelli P. 2002. *Success factors in Integrated Natural Resource Management R & D: lessons from practice*. Conservation Ecology 5 (2): 29. http://www.consecol.org/vol5/iss2/art29

Hamilton NA. 1998. Co-learning tools: powerful instruments of change in Southern Queensland, Australia. In: Röling NG & Wagemakers MAE (eds), *Facilitating sustainable agriculture*. Cambridge: Cambridge University Press.

Hope S & Timmel A. 1984. *Training for transformation: a handbook for community workers*. Gweru: Mambo Press.

Kolb DA. 1984. *Experiential learning: experience as the source of learning and development*. Englewood Cliffs: Prentice Hall.

Moyo ES. 1996. Re-thinking community-level planning and development (CLP&D): conceptual considerations for the future. Discussion paper, IRDEP, Masvingo, Zimbabwe.

Röling N & de Jong F. 1998. Learning: shifting paradigms in education and extension studies. *Journal of Agricultural Education and Extension* 5 (3): 143-162.

Thompson J. 1995. Participatory approaches in government bureaucracies: facilitating the process of institutional change. *World Development* 23 (9): 1521-1554.

Learning materials on PEA

1. Learning together through participatory extension: a guide to an approach developed in Zimbabwe
2. Learning together through participatory extension: a trainer's manual
3. Learning together through participatory extension: a video on an approach developed in Zimbabwe

Monitoring the outcomes of participatory research in natural resource management: experiences of the African Highlands Initiative

Chris Opondo[1] , Pascal Sanginga[2] and Ann Stroud[3]

The African Highlands Initiative (AHI) is an ecoregional programme that focuses on natural resource management (NRM) research in the densely populated highlands of Eastern Africa. Since its inception, AHI has made substantial efforts to promote participatory research as an effective approach to the development and dissemination of NRM technologies. Outcome monitoring is being used to characterise and assess in detail the changes in behaviour of researchers and farmers as they engage in community-based participatory research activities. The innovation in outcome monitoring shifts the sole assessment of technical outputs of research programmes towards focusing on the changes in the behaviour, relationships and actions of people and organisations required for implementing quality participatory research.

Photo by: Roger Kirkby, CIAT.

Farmers are choosing enterprises in Rubaya Sub-County, Kabale, Uganda. NARO and farmers' research findings provide technical information as a basis for choice.

[1] Chris Opondo, M&E Regional Research Fellow, AHI, Box 26416, Kampala, Uganda (chriso@infocom.co.ug)

[2] Pascal Sanginga, Rural Sociologist, CIAT/AHI, Box 6247, Kampala, Uganda (p.sanginga@cgiar.org)

[3] Ann Stroud, AHI Regional Coordinator, Box 26416, Kampala, Uganda (a.stroud@cgiar.org)

Introduction

Background

The highlands of Eastern Africa are characterised as medium to high agricultural potential and produce about 50% of the region's staple foods. They constitute about 23% of the total landmass in the region, yet house over 50% of the population, given their suitability to human habitation. Population densities have risen over the last fifty years to 100-200 people per km^2, resulting in critically small, often fragmented farms ranging from 0.25 to 1.0 ha for an average family of six (AHI 1998). The natural resource base is deteriorating, as indicated by lower yields and higher incidence of pests and diseases, resulting in lower incomes, fewer options for diversification and decreased local ability to cope (AHI 2001).

Relatively few technologies intended to improve and sustain productivity and the natural resource base in the highlands have been adopted widely. Limited adoption and impact were due to five major factors:

- Heterogeneous and dynamic socio-economic and biophysical conditions. Farmers operate in systems with varying levels of resources and enterprise mixes and they respond in a dynamic way to change in external circumstances - be it in weather, markets or alternative income-generating opportunities. Therefore, blanket recommendations promoted by the research and extension systems in a "package approach" do not work.
- Social aspects, such as local arrangements over resource management, gender and differences in resource endowment are not taken into account and addressed.
- Over-riding short-term concerns of smallholders and inability or unwillingness to make long-term investments that are required for a number of soil-improving technologies.
- External circumstances act as disincentives to uptake, such as lack of market, credit and input supply;
- Failure to address policy issues related to local bylaw definition and enforcement, communal resource management and national-level development support (Wang'ati & Kebarra 1993, Wang'ati 1994, Stroud 2000).

The African Highlands Initiative (AHI) was established in 1995 as an ecoregional programme to address these shortcomings. It focuses on natural resource management (NRM) and agricultural productivity issues in the highlands of East and Central Africa. AHI operates in benchmark sites in five counties (Kakamega in Kenya, Kabale in Uganda, Lushoto in Tanzania, Areka and Ginchi in Ethiopia, and Antsirabe and Fianarantsoa in Madagascar). The programme is under the umbrella of the Association for Strengthening Agricultural Research in East and Central Africa (ASARECA) and is convened by the World Agroforestry Centre (ICRAF). The purpose and outputs[4] of the programme that were fine-tuned in 1999 are shown in Box 1.

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[4] This framework was operational in 1998-2002 and has evolved during the design of AHI's Phase 3 to another structure, reflecting the dynamic nature of NRM research and development.

Box 1: AHI's purpose and five core outputs

Purpose: Small-scale farmers and R&D agencies have increased capacity to develop, adapt and use innovative approaches to develop and disseminate technical, social, economic and policy solutions to sustain and improve agricultural production.

Output 1: Approaches, methodologies and integrated technologies for participatory NRM research and development increase the resource users' capacity to innovate and manage their resources and agricultural productivity issues in a sustainable way.

Output 2: Selected cross-site research is conducted and syntheses are produced to improve decision making and priority setting for diverse stakeholders.

Output 3: Strategies for disseminating and scaling up NRM technologies and approaches are developed and tested.

Output 4: The capacities of selected NARIs, IARCs and other key partners to carry out integrated, participatory NRM research and development are enhanced across the ecoregion.

Output 5: Coordination, management and synergies are strengthened through strategic partnership building upon the collaborative advantages.

Rationale for outcome monitoring

The need for a monitoring and evaluation (M&E) system in AHI was brought to the forefront during an internal evaluation workshop at the end of Phase I in 1997. One of the weaknesses identified during early implementation of AHI was the lack of a monitoring and assessment process related to desired changes and outcomes. Research teams were not able to systematically collect and analyse information that provided feedback on whether or not they were achieving what they set out to do, on the processes they were using, and whether these were relevant to their clients. Typically, researchers tended to collect technology performance information and were less engaged in documenting the participatory research processes[5].

The importance of outcome monitoring featured for pragmatic and strategic reasons. Shifts in AHI strategy were giving greater emphasis to processes and methodology development as key elements in the technology generation process rather than only the technologies themselves (high-yielding varieties, soil fertility recommendations, integrated pest management options). AHI's partners were becoming more concerned with the behavioural and institutional changes needed to be able to apply and/or adapt information, materials etc related to participatory research so that improvements in the research system can be sustained over time. Participatory research should essentially be a learning process. Outcome monitoring is a form of M&E that provides stakeholders with timely information about their progress and achievements, and is a basis for systematic and collective learning, reflection and corrective action. AHI obtained financial support in 1998 from the International Development Research Centre (IDRC)

[5] If researchers were more cognizant of the way they conducted research, there would be better-quality participatory research and therefore more impact and efficiency.

to use a participatory process to develop a framework, processes and methods to enhance M&E of participatory research outcomes in NRM activities. This paper analyses some of the experiences and lessons from this work (1999-2001) for improving research programmes.

Analytical framework of outcome monitoring

Kibel (1999) defines "outcomes" as changes in behaviour and interactions of those affected by development projects or programmes. To be effective, research and development (R&D) programmes must go beyond creating and disseminating information and technologies (Kibel 1999, IDRC 1997, Earl *et al* 1999). Monitoring means systematic collection, synthesis, storage and use of information about progress and performance. Outcome monitoring is a continuous activity that entails regular gathering and analysis of information. It helps researchers to check whether inputs, activities and outputs are proceeding according to plan and are leading to the intended outcomes.

Research outcomes are monitored and evaluated in order to assess the extent to which R&D actors in projects or programmes have contributed to transforming and influencing desired changes in behaviour, knowledge, beliefs and relations among the stakeholders. For example, human behaviour is important in determining whether newly introduced technologies are adopted and modified to improve livelihoods when undertaking participatory research. Information generated from outcome monitoring enables R&D actors to make informed decisions and choices for strategic investment and commitment of resources.

AHI (1999) recommended the introduction of outcome monitoring as a way to track progress in the process of implementing participatory research. Three strategies were identified as key towards achieving the desired outcomes (AHI's purpose): interdisciplinary research (integrated teamwork), use of a participatory research approach, and stronger linkages and partnerships with various development and policy actors. These are referred to here as the "learning areas" in which AHI and the individual researchers were and still are interested in assessing experiences in application. Researchers, like most farmers (Richards 1989, Holland & Silva 2000), do not deliberately systematise what they learn from "process experiments" but, if this is done, our hypothesis was that they would adapt their performance in the light of the results. Hagmann (1999) indicates that experiential learning is critical among the stakeholders involved in R&D so that they can adjust their strategies and context of operation.

Information needed to monitor achievements in the direction of these desired outcomes was identified and referred to as "progress markers" or performance indicators. Progress markers are similar to milestones and enable the users of the methodology to track progress being made in integrating the "new" working strategies in the short, medium and long term. The progress markers are statements that focus on describing how the behaviour, relationships, activities and actions of an individual, group or institution change over time in the process of using the new strategies in conducting research.

The key question was: How will the behaviour, relationships, activities and actions of researchers be changed by their interaction and use of "new" AHI research strategies?

The progress markers describe what one would expect to see the stakeholders doing if they paid attention to the AHI strategies, what one would like to see them actually doing, and what one would love to see them doing. They thus describe a pattern of behavioural change taking place over time to reach the desired state. Earl *et al* (1999) states that *"expect-to-see"* progress markers indicate passive learning by the stakeholders and are easy to achieve. The progress markers that indicate more active learning or engagement are listed under *"like-to-see"*, while those markers that are transformative and more difficult to achieve are in the *"love-to-see"* category.

Over the last three years, AHI has made substantial efforts to build researchers' capacities in multidisciplinary teamwork, participatory research and managing multi-institutional linkages, so that researchers can improve how they interact amongst themselves, with farmers and with other development partners for the benefit of farmers. Tracking the progress made in these areas - in particular, how they contribute to better implementation of participatory research processes - has been a critical component of the regional programme of AHI. At the end of the day, "proof" will be a greater number of innovations jointly developed with researchers and farmers, greater capacity of farmers to continue innovating, a greater diversity of households and clients benefiting, and feedback to the research system and other service providers that improves relevance of research.

Methodology: development and implementation of outcome monitoring

A general overview

In AHI's benchmark sites, research activities were undertaken with teams of scientists from National Agricultural Research Institutes (NARIs) in collaboration with government line ministries and non-governmental organisations (NGOs), with some input from International Agricultural Research Centres (IARCs) and university scientists.

The development and implementation of outcome monitoring followed several iterative steps (Table 1).

First, a regional workshop was organised with many of the implementing stakeholders in AHI in order to develop a common understanding and to define the mission, focus and purpose of AHI from the perspectives of the different stakeholders. They agreed on the core outputs of AHI (Box 1) and formulated crucial questions for evaluating performance.

Using the output from this workshop, a small group of resource persons ("think tank") from ICRAF, IDRC, AHI and the International Center for Tropical Agriculture (CIAT) consulted with NARI stakeholders to select the key interrelated strategies or "learning

Table 1: Chronology of events in developing and implementing outcome monitoring

Events	Stakeholders	Objectives	Year
Regional workshop	AHI Partners	Define the vision and outputs of AHI Performance evaluation criteria	1999
"Think tank" (resource group)	Resource persons from CIAT, NARI, IDRC, ICRAF & AHI	Define and elaborate the learning areas for M&E	1999
In-country workshops	AHI site teams	Familiarise site teams and partners with learning areas for monitoring Training in M&E and Participatory Research	1999 2000
On-site follow-up sessions	AHI site teams	Assess progress of teams in integrating monitoring components into their work	2001
Feedback meetings	AHI site teams Research Management Team[5]	Sharing of results from other sites Mentoring by regional resource person	2002
Regional synthesis	Research Management Team	Distilling regional lessons across sites	2002

areas" (interdisciplinary teamwork, participatory research and multi-institutional linkages) and to develop tools for monitoring them. Given the newness of the outcome-monitoring process and the recognised need to develop and test methods first, the group decided to start with only one stakeholder group - the researchers. Researchers had already been exposed to these strategies through workshops, and these strategies were key to success in research for development. These learning areas have stakeholder and gender analysis embedded in them. The "think tank" then developed an action plan, which was reviewed by AHI's M&E working group and its regional Technical Support Group (TSG)[6].

The next step was to organise in-country and on-site workshops in conjunction with annual planning meetings to familiarise the site teams with the newly developed AHI framework, to build a conceptual base for understanding M&E in a new context, and to

[6] The TSG was comprised of site coordinators and representatives from AHI working groups. It has been replaced by a Regional Research Management Team (RMT) made up of AHI regional researchers and site coordinators. Both the TSG and the RMT have functioned to technically steer the direction and implementation of research.

further develop strategies and steps for testing, adjusting and institutionalising the M&E framework. Eight workshops with a total of 112 participants were held over a period of 18 months. The monitoring of participatory research covered three impact areas: technology outputs, participatory research process and behavioural change (Table 2). Each site team defined the performance questions and identified performance indicators based on their research protocols and activities. The framework specified the types of information needed, who was responsible for obtaining it, and the timeframe.

It was then decided that these three areas - rather than technology generation and dissemination - should become focal points (as means to the end) for tracking desired change and new tools were designed for this purpose. These tools were tested in Kenya and Tanzania and then incorporated into site workshops held in the other countries. The following description provides details on the focal areas, drawing on the work of the site team in Kenya.

To start off the monitoring process, the researchers analysed each of the three learning areas during the first round of site learning workshops. They examined the following: (i) changes in current status and experiences; (ii) changes in their perception of the benefits and shortcomings; (iii) practical examples of the effects of using the approach on their behaviour, interactions and research; (iv) suggestions on how they, as research teams, could be assisted in improving the approach; and (v) future plans for using the approach (Table 3).

Use of this tool formed the main feature of the first site workshop held in Western Kenya. Teams at the other sites also used it, but in addition requested that more time be spent on improving their understanding of participatory monitoring and evaluation and the underlying concepts. This was built into subsequent workshops. Diverse methods were employed during the workshops: plenary discussions, group work with specific tasks, two-person buzz groups to define concepts, feedback sessions in plenary, process group sessions to look at what went well and what did not go well and to suggest improvements. The workshop participants then developed an action plan for follow-up and evaluated the workshop process and content.

Examples of the M&E tools and formats developed during the site workshops are:
- M&E framework for Kabale meeting in 1999
- Partnership-assessment tool
- AHI protocol checklist
- Outcome-mapping tool.

The information gleaned from each site workshop was compiled and discussed with AHI researchers in order to design the next set of tools. After the first round of workshops, follow-up sessions were organised at the research sites and at the regional level with the "think tank". These sessions assisted AHI and the site teams to understand the challenges being faced, the assistance needed and the progress that the teams were making in using the outcome-monitoring framework. In the second round of site workshops, the resource people shared the output from the initial workshops and

Table 2: M&E framework for participatory research evaluation of climbing bean varieties disseminated in Kabale (Uganda) by December 2000

Impact categories	Indicators	Information needs	By whom
Technical			
At least 3 varieties being produced in farmers' fields	At least 60% of target farmers grow one improved variety	Seasonal reports	Principal investigator
Increase in yield per unit area	Target farmers increase yield by 1500 kg/ha	File sampling and discussions	Farmers
Multipurpose trees planted	At least 40% of target farmers grow multi-purpose trees		NGOs in Kabale
Recommended practices adopted			
Process			
Seed multiplication	4 well-established seed multipliers	Farm records	Researchers, farmers
Farmer selection	Volunteers identified	Farmer registry	Researchers, extension, farmers
Farmer training	Curriculum developed	Training booklets	Researchers
Tree nursery establishment	4 well-established nurseries	Field reports, visitors book	Researchers
Follow-up visits	Visits organised		Researchers, extension
Outcomes (behavioural changes)			
Farmers positive on growing climbing beans	Enhanced knowledge and positive attitude to growing climbing beans	KAP (knowledge, attitude + practice) survey	Principal investigator, farmers, extension
Farmers willing to pay for climbing beans	Rapport among stakeholders	PRA	Site coordinator, researchers
Farmers plant beans in fertile portions of their land		Observation	Researchers, farmers, extension
Farmers re-use and buy stakes for the beans		Quality of reports	
Researchers hold joint consultative meetings		Case study	
Researchers and other stake-holders organise joint monitoring visits to farms			
Farmers conduct experiments on own			
Farmers adapt technologies proposed by scientists			
Increased autonomy of researchers and farmers to engage in participatory research			

developed a plan to monitor the learning area "interdisciplinary research" (Box 2). The resource persons encouraged the researchers to try new ideas and to modify the tools to suit their information needs.

This framework (Table 2) was used again, a year later, to assist the researchers in visualising progress (or not), done by comparing the current year's data with the benchmark of the previous year, and served to focus analysis, reflection and action.

Table 3: Example of the outcome-monitoring tool

Learning review	Status	Benefits	Short-commings	Changes in behaviour	Improve-ments needed	Lessons
Inter-disciplinary research						
Participatory research						
Multi-institutional linkages						

Box 2: Researchers' Action Plan from M&E of the learning area "Interdisciplinary research"

Name of the site _____

1. What aspects of the workshop do you realistically think can be integrated into your research activities and future plans?

Activities (indicate **O** if ongoing or **N** if new)	What tools, concepts & lessons learned are you going to apply?	Reasons	What new information do you expect?	How do you intend to use the new information?	Timeframe (indicate when you plan to use it)	Responsible and collaborator

2. What are the steps needed to execute your action plans?
3. What are the potential constraints you are likely to encounter in implementing your action plan?
4. What are the technical aspects of the workshop requiring strengthening or new areas for future learning?

Areas requiring strengthening	New learning areas
1.	
2.	

Researchers used the information collected to identify beneficial aspects of the strategies or learning areas and aspects that need strengthening or adjustment so as to optimise the benefits. To better link the information from monitoring of the learning areas to progress on the ground, the next stage was for researchers to collect information related to farmer feedback, farmer innovations, and adoption or adaptation of technologies. "Spillover" studies are helping to assess the extent to which the various innovations and technologies have spread in Tanzania, Ethiopia and Kenya beyond the participating farmers and initial pilot communities in the AHI sites. These studies will reveal farmer-to-farmer mechanisms, "who" picked what technology, how they integrated and used the technology and how it has changed livelihoods and local capacities in farm management and NRM.

Use of outcome monitoring focused on participatory research processes

This section presents preliminary results on the use of outcome monitoring related to participatory research processes and discusses key lessons learnt. The outcomes, such as those referred to in Table 1, provide the basis of these results and discussions.

Current status and experiences in participatory research

The research planning process for activities funded by AHI consists of: pilot site communities prioritise constraints; researchers, in consultation with farmers, design research protocols to address the constraints; these protocols are peer reviewed by NARI researchers and by the AHI RMT and other experts; they are adjusted for final approval. A protocol-writing checklist has been designed to guide researchers to consider farmer differences, systems context, and farmer involvement with the aim of improving quality and relevance.

In terms of general application of participatory research, the teams initially assessed that they had made significant progress, although to varying degrees, in incorporating all the three learning areas into their research approach. However, there were significant differences between the site teams' perceptions of their competency and needs in participatory research (Table 4).

While the site team in Kenya seemed to be more confident in participatory research, the site teams in Ethiopia and Tanzania felt they needed more exposure to such methods.

Table 4: Researchers' rating of the status of participatory research

Researchers' rating of the status of participatory research	Kakamega (Kenya)	Lushoto (Tanzania)	Areka (Ethiopia)
Alright as is	5	4	0
Needs more attention	2	8	6
Needs less attention	1	1	0

These differences may reflect differences in the perception of what participatory research entails, varying levels of adaptation, and history of use of participatory research. The Kenyan NARI has perhaps been more exposed to participatory research through various projects and its Farming Systems Research programme.

In an attempt to review the current status of the participatory research process, the researchers characterised trials into four types - contractual, consultative, collaborative and collegial - referring to the degree of farmer participation (Biggs 1989). Difficulties arose in trying to distinguish between the "types" because the understanding of what they meant differed greatly. The researchers noted that a single trial could include aspects of all four types, thereby making it difficult to categorise the activities in a generalised way. Nonetheless, collaborative trials were identified as the dominant type. This is where researchers indicated that they engage in a series of discussions and negotiations with farmers and fellow researchers during all the research stages. It was a change from the earlier, predominantly contractual approach in which research activities were designed by researchers in isolation.

The researchers also evaluated trial implementation details. They felt application was strong in some areas, such as participatory trial implementation and providing technological options for farmers to choose from (Table 5). They thought they were strong in participatory trial implementation because: 1) they involved the target communities in designing the research protocols; and 2) farmers responded by providing land and labour for the experiments and played a critical role in managing the experiments (planting, weeding, harvesting, monitoring and recording). The researchers said these outcomes benefited both farmers and researchers.

Nevertheless, they generally felt that research activities needed strengthening in areas such as participatory design and farmer evaluation of trials, adaptation of participatory research tools in general, and analysis of the outcomes beyond technology adoption and economic profitability. Referring to Table 5, the "zeros" against the components that researchers "never used" present other possible areas that require capacity building.

During the plenary sessions of the second round of site workshops, researchers reflected on the contents presented in Table 5, and much learning took place. One researcher described what he learned from community resource-flow mapping and nutrient flows. Another researcher, with a background in livestock production, explained participatory mapping and analysis tools to the rest of the group. This illustrated to his research colleagues that a livestock scientist had learned from social scientists, having gained skills through interdisciplinary interaction.

The researchers wanted to know more about the following aspects of participatory research:

- how to work with farmer groups in micro-watersheds
- how to involve farmers in evaluation of trials, especially in documenting and understanding integration of farmers' and researchers' assessment criteria
- how to experiment together with farmers as partners
- how to use participatory tools for improving the design of experiments

Table 5: Components of participatory research and their use by researchers in Lushoto (Tanzania)

Component	A lot	Sometimes	On a few occasions	Never
Work with farmer groups	11	4	0	0
Work with communities	1	5	3	2
Involve farmers in designing trials	1	7	2	3
Involve farmers in implementing trials	10	3	2	0
Involve farmers in evaluating trials	8	3	0	0
Provide options for farmers to test	9	3	2	0
Promote joint learning	7	4	3	0
Participatory tools (e.g. matrix ranking, wealth ranking) for diagnosis	4	6	1	2
Community resource-flow mapping	3	2	5	2

Note: The responses in the boxes above indicate the number of researchers that answered the questions. Although a total of 16 researchers attended this workshop, not all of them provided responses.

- what types of participatory research (when, where and why to apply them) are more effective for what conditions
- how to help farmers monitor and evaluate experiments on their own
- how to document socio-cultural dimensions of research outcomes
- how to facilitate technology evaluation, data collection and analysis with farmers.

Challenges of participatory research

The researchers discussed some of the challenges in trying to implement participatory research under the current research operating system. One difficulty is potential disruption in trial implementation if there is *delay in release of funds* or if *researchers become engaged in other research activities and meetings*. The participatory research process still relies heavily on research scientist inputs; if farmers were more self-reliant, the negative results of this "dependency" would not occur. Delays in release of funds can also damage the farmers' confidence in researchers if researchers do not communicate reasons for the delays. Usually funding sources are from ephemeral projects.

Dealing with *farmers' expectations and dependencies* created by past organisations or policies[7] is a big challenge. Although researchers explain to Farmer Research Groups that the support they are receiving from the research institutions is neither elastic nor long-lived, many farmers expect larger amounts of free handouts as the relationship unfolds. Researchers must constantly push for self-sufficiency and the value of information rather than material inputs to avoid dependency.

[7] Some government organisations and NGOs provide inputs to the farmers free of charge over long time periods. This creates high expectations and dependency of farmers.

The research teams noted that nearly all their trials were conducted in a collaborative mode and that they needed to learn more about how to manage and include other modes, such as collegial trials in their research programme. The AHI regional and site coordinators noted that *developing new roles and skills* requires continuous mentoring (rather than one-off training) and strong institutional support so that farmer-led research is accepted in the NARI's research review and reward systems.

Participatory research requires researchers to *accommodate different perspectives* of fellow researchers having different disciplines, who may have different ideas, methods and professional biases. For example, the biophysical scientists are learning to accommodate the views of agricultural economists; likewise, the agricultural economists are learning about other aspects (e.g. agronomy, pest and disease management) from the biological scientists. Learning to work together and build trust as a team takes time and requires open sharing of information and methods - previously seldom shared. It also means learning to accept more suggestions and personal critique from colleagues.

Participatory research requires *good communication skills and time to interact with farmers*. Researchers have to become more sensitive and eliminate jargon. Since farmers often tend to give only positive opinions of technologies being tested, researchers must learn to probe and find out what farmers really think. These communication skills take time to acquire, and some scientists do not feel comfortable in this mode of interaction.

Management of time and resources becomes more important when coordinating and operating in participatory research teams. Given busy schedules, many researchers found

Photo by: Ann Stroud, AHI.

A young farmer (foreground) with a small landholding in Gununo District, Southern Ethiopia, is experimenting with teff (*Eragrostis tef*) varieties and *sesbania* hedgerows. He finds that planting trees along boundaries answers his problem of land shortage and improves soil fertility.

logistics to be the biggest challenge and felt that participatory research is expensive, especially in terms of time and transportation, although exact cost-benefit was not calculated. Perhaps once trust and understanding are established between researchers and farmers, village-based facilitators could be engaged, making farmer-led experimentation less dependent on visits from researchers.

Although researchers knew in theory that there are *different target groups* of farmers (classified by gender, wealth class etc), participatory research has brought them into contact with farmers having different resources, preferences and circumstances. This has posed a challenge to the researchers and is resulting in changed R&D agendas. For example, Ethiopian scientists are now working on soil fertility practices for farmers with and without livestock.

Outcomes of using participatory research

Specific site outcomes

The major outcomes expected from using participatory research are related to behavioural change and skills resulting in benefits to farmers and in more relevant research contributions and impact. Outcome monitoring has brought factors related to managing the participatory research process to a more cognitive level, and provides researchers with a more structured system enabling them to reflect upon what they are doing, the way they are doing it and the results of their actions, and to readjust their actions - in other words, it accelerates the learning-reflection process which, in turn, influences behaviour. We are seeing some behavioural changes as a result of using participatory research methods, which contribute to making research more responsive to farmers' needs and will lead to adjustment of the research agenda to become more relevant. Some examples are:

- **First-hand appreciation of the diversity of farmers' problems**
  Four out of 12 researchers in Kakamega (Kenya) said they had greater appreciation of farmers' problems and, as a result, adjusted their research programmes to be more relevant and responsive to the farmers' needs, abilities and resource endowments. For example, the researchers initially provided farmers with striga-resistant sorghum varieties, but farmers had a strong preference for varieties that ratooned as a labour-saving strategy, particularly in female-headed or HIV-affected households. Breeders' selection criteria have been adjusted for these client groups.

- **Incorporation of farmers' criteria into technology design and evaluation**
  Farmers received three new bean varieties resistant to bean root rot to compare, using their own experimentation, with local varieties. The researcher realised during the farmer group meetings that the farmers judged the bean varieties using a number of criteria in addition to resistance, such as early maturity, seed colour, size and taste. End-of-season meetings that involved a larger group than the trial farmers are now used routinely to give feedback to researchers. Researchers have taken these other parameters into account in their selection programme.

- **Multi-disciplinary teams increase appreciation of socio-economic factors by biophysical scientists**
  In an experiment with high-yielding bean varieties, researchers collected data on the effect of the varieties on household labour sharing, post-harvest processing, utilisation and marketing in addition to measuring the usual yield variable. The biophysical scientists, who had gained appreciation by working with an economist, added these variables.

- **Recognition of indigenous knowledge and appreciation for the added value of farmer innovation**
  An experiment designed by researchers on farmyard manure (FYM) combined with Mnjingu rock phosphate changed significantly because farmers in Lushoto (Tanzania) did not have enough FYM. After discussion with farmers, the trial was modified to use tughutu (a local shrub that farmers have been using to enhance soil fertility) instead of FYM. Subsequently, researchers and farmers tested a wider range of uses of tughutu in mulching, compost making etc.

- **Expansion of integrated application of technologies through farmers' adaptation and use of system improvement principles**
  In Areka (Ethiopia), farmers were provided with several soil-improving legumes and through interaction with researchers, learned about nutrient cycling. They became aware of higher levels of nutrient concentration on their fields of enset (an indigenous staple crop) near the homestead and depleted levels in the outfields. As a result, they moved some of the enset to their outfields (a new practice), combined with use of soil-improving legumes as a strategy to enhance fertility and improve nutrient cycling. They hope to reduce the levels of inorganic fertiliser used and save money. This innovation came about through farmers' own initiative (Amede *et al* 2001).

- **Generation of win-win technologies (those that improve food, feed, income and environment) through farmer-led experimentation**
  In Areka, sweet potato - a major food source planted year-round as a sole crop or intercropped under maize - is damaged by the sweet-potato butterfly. Controlling the pest is one way to increase household food security. By planting sticky desmodium, a forage legume, around the sweet-potato fields farmers managed to reduce pest incidence. They have also used desmodium as a protein source for dairy cows (together with carbohydrate-rich elephant grass) and to improve soil fertility, as it is a nitrogen-fixing legume. This technology has become very popular among the farming communities (Amede *et al* 2001).

- **Improved chances for change through collaboration and synergies between farmers, development partners and researchers**
  Community-based and farmer organisations that collaborate with researchers provide them with structures to facilitate smooth entry into the community and to spread ideas and technologies being developed. A recent study that assessed impacts of participatory research in Uganda (Sanginga *et al* 2002) found that Farmer Research Groups are effective mechanisms for building human and social capital, for linking farmers to R&D organisations, and for dissemination of technology through farmer-

to-farmer extension. Similarly, research activities in Madagascar were linked to local organisations focused on improving water management. AHI supported the construction of microdams[8], which in turn increased local interest in working with researchers on technologies to improve soil fertility, after the farmers saw the benefits of harvesting water in their rice fields.

In summary, researchers have analysed the effects of participatory research on themselves, on their research programmes and on farmers, highlighting the impact of the increased interactions with their colleagues and with farmers. They all indicated that they had improved their skills in managing the interactions in the various stages of research (diagnosis, planning, M&E, end evaluation). In addition, researchers were enlightened about each other's disciplines; and this was reflected in the design of their research. They felt that interdisciplinary teamwork, although initially difficult, was paying off.

Another outcome, from the perspective of the farmers, is their increased involvement in research, including farmer-group structures that increase their visibility in making demands upon researchers. Some farmer groups have chosen volunteers from the community who experiment with new ideas from which the others can benefit. The group structure provides a forum for discussion and accountability of the experimenting farmers to the others. Now at some sites, such as Antsirabe, Madagascar, representatives from farmer groups express their needs to the benchmark site committee, which has NGO, research, extension and farmer representatives. A joint implementation plan is developed at the end of the site committee meeting and forwarded to the site coordinator.

Researchers' and farmers' roles in the research process as well as institutional relationships, in terms of who contributes or specialises in what, are changing dynamically in East and Central Africa. During a number of AHI site and regional workshops, participants discussed allocation of specific roles to international, regional and national scientists. In addition, debate is ongoing as to what roles farmers and researchers should play in what types of research and what the intellectual division of labour actually is between scientists and farmers.

General lessons learnt in application of outcome monitoring

- Previously, researchers had focused on biophysical aspects given disciplinary orientation and training, but as a result of reflection on how the participatory research process was affecting them, interaction with colleagues and farmers is now seen as important.
- Workshops and periodic meetings to review performance gave site team members an opportunity to openly discuss challenges in adapting outcome-monitoring tools and participatory research processes, and earmark areas requiring further capacity building and institutional support.
- When facilitated, researchers could highlight lessons learnt but had difficulty in changing their habits of limited documentation and reporting on these areas. Some

[8] Support included cost sharing, design advice and facilitation of local organisation.

confessed that they did not think it was important to report on the qualitative changes because these are not tangible and quantifiable.

- Organisational constraints that limit the use of participatory research approaches, such as logistics, availability of collaborators and expectations from the national programmes, were difficult to overcome given the current organisation of research.
- Joint identification of specific areas to be monitored during site planning meetings ensured commitment.
- This approach to monitoring helped demystify the negative connotation normally given to monitoring (as a policing function) and promoted dialogue that furthered fine-tuning and integration of new research strategies.
- The group approach provided an opportunity for joint learning and sharing among the researchers and with communities. Researchers lagging behind could learn from those that set the pace.
- Concept definition is important to create joint understanding and confidence among the team members.
- Implementation has to be flexible and allow for adjustments and modifications.

Conclusions

Application of outcome monitoring

Research teams recognised the benefits, problems and challenges of outcome monitoring in the learning areas of interdisciplinary research, participatory research and multi-institutional linkages. Initially, there were large differences in the understanding of key concepts and components of participatory research; therefore, team members needed to discuss, learn more about them and gain experience in applying them. The new concepts had to be clarified iteratively while practising. Workshops and interactions with site scientists were useful for developing and adjusting practical tools for monitoring progress made by researchers and for adapting the tools to suit information needs of the site teams. Researchers initially found it difficult to assess the effects of participatory research on themselves, their research programmes and their interactions with colleagues and farmers, because they had not yet realised that self-reflection and assessment of progress could assist them in developing and applying the new strategies. Gradually they began to recognise that the potential benefits and challenges of participatory research are important to monitor, to be able to draw lessons about performance and to guide application of new methodological tools. Tracking the progress was also important for understanding changes in researchers' behaviour, relationships, activities and actions, but required adequate facilitation.

Generally, scientists have tended to work within their commodity programme and to have minimal interactions with researchers from other disciplines. They tend to specialise in their own scientific fields, seldom consulting with colleagues, and work with only a few farmers, if at all. Teamwork and increased multi-institutional contacts have led to increased consultation among the team and partners. However, the fact that team members went to the field together did not necessarily result in interdisciplinarity. Teams are being encouraged to engage more deeply in interdisciplinary research by focusing on exchange and learning from each other when they come together for a specific task,

such as field days or joint field visits. The interrelated nature of problems in NRM calls for integration of efforts and is helping to bring people together. Since AHI is supporting R&D on NRM, the problems as presented by communities tend to support an interdisciplinary approach by researchers, although there is tension to "withdraw" into old habits.

Over time, the interaction between farmers and researchers has improved. There are many concrete examples of mutual learning and of farmers taking the lead in experimentation. Farmers and researchers feel that they are both gaining from the interactions, and they will continue working together because they can see the benefits. The challenge now is to scale up and institutionalise outcome monitoring within R&D organisations as well as farmer organisations.

We found that collecting feedback and reflecting on the usefulness of the tools and framework was extremely useful for making subsequent modifications. In addition, by involving a small resource group ("think tank") at regional level, site feedback results could be analysed and used to further refine the tools, ensuring that they were linked to the 1999 regional framework. The workshops provided space for collective assessment of learning area status on the basis of practical examples as well as individual assessment and documentation of experiences.

Towards institutionalisation of outcome monitoring

Ultimately, it is intended that the use of participatory research methods now being applied by individual researchers in a pilot mode will be incorporated and supported more broadly within their institutions.

AHI has been promoting participatory research methods for a relatively short time (since mid-1998 when Phase II started)with pilot research teams. Research outcome monitoring was integrated to improve reflection on the research process and has been coupled with a major emphasis on building researchers' capacities and helping them gain practical experience in participatory research, as a first step. Some examples of areas in which researchers' skills have been developed include:

- facilitating farmer organisations to improve themselves and enhance collective action in addressing their problems and finding solutions
- training Farmer Research Groups to manage research activities and linking them with new economic opportunities other than farming
- training farmers in experimentation and feeding back assessment of technology performance
- exposing farmers to new management techniques that they further adjusted and applied to their farms.

Researcher capacity development has been done using a mixture of:

- regional workshops[9] with a few representatives from each site

[9] These have included workshops on: participatory techniques in diagnosis and characterisation; enhancing farmer experimentation; planning, monitoring and evaluation; social analysis skills including aspects of gender and the poor; and Participatory Agroecosystem Management.

Photo by: Ann Stroud, AHI.

Dorcus, the chairlady of the Farmer Research Group in Emuhaya Division, Western Kenya, is experimenting with ways of improving soil fertility in her maize field.

- site-level workshops with broader groups of stakeholders, including sensitisation activities
- meetings, training sessions and tours for individual farmers and farmer groups
- end-of-season evaluation meetings for researchers, farmers and both groups combined
- quarterly meetings of the site teams and partner organisations
- annual planning and review meetings by the site teams and at national level
- providing literature on participatory research to research teams
- developing and using a checklist for writing research protocols for funding to help achieve clear involvement of farmers in the different stages of the activities
- fostering cross-site learning through regional meetings and field visits (twice yearly) to exchange experiences between sites, countries and representatives from research organisations
- two external reviews to encourage discussion and comments from independent experts, as well as internal dialogue.

The outcome monitoring concentrated on changes in behaviour, leading to changes in approaches and impacts on farmers' livelihoods. The outcome monitoring tools (in part illustrated in Table 3 and Box 2), coupled with facilitation of reflection by individuals and teams, were meant to assist the site teams and their managers in self-evaluation and development of a learning culture. The site progress reports were collated at the regional level by the then TSG and formed a basis for discussion at their meetings. They were also fed back to the site teams so that they could have a picture of what was happening in other locations compared to their own.

Conventional M&E (for the purpose of monitoring whether an activity was completed or not) and the use of logframes (logical frameworks) to show logical relationships between goals, purpose and outputs are not new to these organisations. Nevertheless, there is a upsurge in thinking that researchers and their organisations must take a longer

view geared to increasing impact and, in so doing, take stock of the approaches they are using. The outcome-monitoring framework deviated from the conventional logframe format that most researchers were using to formulate their research plans and activities, in that the conventional logframe does not capture process and behavioural changes, nor does it easily cross-link activities or have the flexibility to allow adjustment. The outcome-monitoring framework has the advantage of being more process-oriented and participatory and is used as a tool for critical analysis, self-reflection and learning.

Subsequent to this participatory technology development work, AHI is tracking technology spread and adoption in order to better measure the effectiveness of both the technologies and the approach. In addition, current participatory action research work is rigorously integrating monitoring and documentation of processes and approaches used by the research teams, in order to track development of approaches for integrated watershed management with the added dimensions of collective action and landscape issues. .

Ashley and Hussein (2000) contend that, in order to improve the impact of development and poverty-reduction projects, assessments must take a longer-term view of both intended and unintended consequences of the activities across a variety of livelihood concerns. Institutionalisation cannot be separated from issues of organisational change. Many of the NARIs are currently facing various challenges, notably:

- organisational culture (such as resistance to new ideas and limited emphasis on developing a learning culture)
- lack of incentives and rewards for the staff
- limited skills and competencies among the staff
- little attention to monitoring and evaluating research processes and approaches
- few resources committed to documenting and analysing methods.

Carney (1996) observed that, for institutional change to occur, the challenges that impede the transition process must be minimised. These challenges are indeed some of the big issues that AHI is grappling with in Phase 3 (2002-05) related to scaling up participatory research approaches. The current RMT realised that, in order to have a greater influence on the NARIs, institution-wide efforts would be needed, using whatever pilot examples there might be throughout the country, including what AHI was supporting. Therefore, a pilot initiative on institutional change in two NARIs (Ethiopia and Tanzania) has started with senior research managers and researchers. A process is underway to investigate the benefits of participatory research and to develop strategies for enhancing internal processes that foster good-quality research embodying participatory methods and self-management of these institutional change processes.

As part of this effort, various tactics being used to enhance and understand institutionalisation[10] of participatory research methods include:

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[10] Ashby and Sperling (1994) define institutionalisation as the process of mainstreaming a phenomenon within a specific context. Sperling and Ashby (1996) state that institutionalisation means that the process or aspect being introduced will have to be scaled up.

- develop and implement a capacity-building strategy for researchers, managers and farmer organisations;
- improve design and installation of a monitoring, documentation and reflection system (building the elements of a learning culture);
- improve links between managers and researchers, and between researchers themselves; and
- involve a wide range of stakeholders in planning, implementing and evaluating research, as well as in research budgeting.

This approach has been used in South America (especially in Ecuador), when participatory research was being institutionalised through inclusion of relevant stakeholders in the budget-setting discussions and planning meetings and creation of research-extension liaison units as nodes for training and coordination (Ashby *et al* 1989). Peer pressure and increased visibility by working in teams (research) and groups (farmers) has been instrumental among both researchers and farmers in encouraging sceptics to join in the change process. The regional nature of AHI provides unique opportunities to share experiences, to synthesise lessons for wider application and to promote learning across countries. Although time to evolve is required, conceptual growth combined with iterative practice and trial and error has proved to be important in the change process.

The need for a paradigm shift has been recognised by a number of AHI partners. Further development of methods to influence and build institutional learning cultures, both with farmers and with research organisations, will be a focal point of future AHI work. A more systematic and rigorous study has therefore been initiated, aimed at identifying and analysing the mechanisms that enable or inhibit effective institutionalisation of new research approaches within the various levels of the NARIs (Opondo 2003).

References

AHI. 1998. African Highlands Initiative: an Ecoregional Program in Eastern Africa. Proposal January 1998 to December 2003.

AHI. 1999. Documentation of the African Highlands Monitoring and Evaluation Workshop held at ICRAF in Nairobi, Kenya.

AHI. 2001. Proposal for Phase 3 of AHI (draft), July 2001 (unpublished).

Amede Tilahun, Dea Birhane, Belay Gebremedhin, Mergia Abera, Kirkby R & Stroud A. 2001. From farmer strategies to sustainable rural livelihoods: experiences from the African Highlands Ecoregional Programme (AHI). Paper presented to the AFSRE Conference, Nairobi, Kenya, August 2001.

Ashby JA, Quiros CA & Rivers YM. 1989. Farmer participation in technology development: work with crop varieties. In: Chambers R, Pacey A & Thrupp LA (eds), *Farmer first: farmer innovation and agricultural research* (London: Intermediate Technology Publications), pp 115-122.

Ashby J & Sperling L. 1994. *Institutionalizing participatory research, client-driven research and technology development in agriculture*. AgREN Paper 49. London: Overseas Development Institute (ODI).

Ashley C & Hussein K. 2000. Developing methodologies for livelihood impact assessment: experiences of the African Wildlife Foundation in East Africa. Working Paper 129. London: ODI.

Biggs S. 1989. *Resource-poor farmer participation in research: a synthesis of experiences from nine national agricultural research systems*. OFCOR Comparative Study Paper 3. The Hague: ISNAR.

Carney D. 1996. Scaling up participatory research. In: *New frontiers in participatory research and gender analysis for technology development: proceedings* (Cali: CIAT), pp 113-121.

Earl S, Carden F, Smutylo T & Sander C. 1999. Outcome mapping: planning, monitoring and evaluating development programs by focusing on changes in partners - a facilitation manual.

Hagmann J. 1999. *Learning together for change: facilitating innovation in natural resource management through learning process approaches in rural livelihoods in Zimbabwe*. Weikersheim: Margraf Verlag.

Holland D & Silva C. 2000. Learn to participate: agricultural research communities and farming communities face the same challenges. Unpublished discussion paper, CIAT seminar, Cali, Colombia.

IDRC. 1997. *Planning, monitoring and evaluation of program performance: a resource book*: Ottawa: IDRC.

Kibel BM. 1999. *What is "results mapping tool box"?* New York: Pacific Institute for Research and Evaluation.

Opondo C. 2003. Institutionalisation of participatory research: a process for fostering learning, innovation and change in national agricultural research organisations in East Africa (doctorate study in progress). Wageningen University / African Highlands Initiative.

Richards P. 1989. Agriculture as a performance. In: Chambers R, Pacey A & Thrupp LA (eds), *Farmer first: farmer innovation and agricultural research* (London: Intermediate Technology Publications), pp 39-43.

Sanginga PC, Tumwine J & Lilja N. 2002. Assessing the quality of participation in farmer research groups in the highlands of Kabale, Uganda. Working Document 19. Cali: CGIAR Systemwide Programme on Participatory Research and Gender Analysis (PRGA) www.prgaprogram.org

Sperling L & Ashby J. 1996. Methodological challenges for institutionalizing participatory research and development. In: *New frontiers in participatory research and gender analysis for technology development: proceedings* (Cali: CIAT), pp 101-108.

Stroud A. 2000. A summary of annual progress reports 1999/2000 presented at ASARECA CD Meeting, November 2000, Nairobi, Kenya.

Wang'ati F & Kebarra K. 1993. Integrated natural resource management research for the highlands of East and Central Africa: report on the consultative workshop held on 6-8 January 1993, Entebbe, Uganda. Nairobi: ICRAF.

Wang'ati F. 1994. The African Highlands Initiative: a conceptual framework. Nairobi: ICRAF.

Transforming the South African Agricultural Research Council to engage in PTD with black smallholder farmers

Tim Hart[1] and Joyene Isaacs[2]

Since the inception of the South African Agricultural Research Council (ARC) in 1992, one of the institutes, ARC Infruitec-Nietvoorbij, has tried to institutionalise Participatory Technology Development (PTD) within its activities with smallholder farmers. The Sustainable Rural Livelihoods Programme within the Institute has been reformulated to include farmers in the processes of technology development, planning, monitoring and evaluation. A similar process has been developing to a greater or lesser degree within the national structure of the ARC and, at times, these parallel processes influence one another. This case study looks at the chronology of activities that have been undertaken by one institute and the successes and constraints that it has experienced as part of the national ARC, which is transforming from an organisation that did not serve emerging black farmers to one that is attempting to provide services to these farmers by using PRA, PTD, participatory extension and similar approaches.

Photo by: Tim Hart.

Farmers and researchers carrying out a mapping exercise.

[1] Agricultural Sociologist, ARC Infruitec-Nietvoorbij, Private Bag X5026, Stellenbosch 7599, South Africa (tim@infruit.agric.za)

[2] Formerly Coordinator ARC Infruitec-Nietvoorbij SRL Programme; currently Director Farmer Settlement, Dept of Agriculture, Western Cape, Private Bag X1, Elsenburg 7607, South Africa (joyenei@elsenburg.com)

Introduction

Since its inception as a parastatal in 1992, the Agricultural Research Council Infruitec-Nietvoorbij (ARC Infruitec-Nietvoorbij) has attempted to move from a less participatory to a more participatory approach to developing technology with smallholder farmers in the emerging agricultural sector in South Africa[3]. The changes that have taken place during the last decade are significant and indicate an enormous paradigm shift in the definition of farmers and in the delivery of services to farmers. This shift, which is not yet complete, has not been without various obstacles and constraints.

What is meant by PTD

In order to place the activities of ARC Infruitec-Nietvoorbij and the national ARC structure into a context of Participatory Technology Development (PTD), the current international understanding of this term needs to be considered. This is important because there is no real understanding or awareness of PTD among researchers within this Institute and the national ARC structure. In effect, the activities discussed have developed in isolation and despite a lack of awareness. A brief literature review on PTD in various parts of the world describes it as a process that encompasses "… all forms of interaction that combine the knowledge and skills of farmers with those of outside facilitators in creating sustainable improvements in farming systems" (van Veldhuizen *et al* 1997:13).

On the one hand, van Veldhuizen *et al* (1997) stress that PTD is a collaborative research effort between farmers and outsiders (including researchers, extension officials and development workers) that is led by farmers (internally initiated), is based on what is important to them and is done in a participatory manner that ensures sustainability and the sharing of the results. However, they (1997:19) also point out that sometimes PTD is externally initiated and can have a somewhat top-down appearance. Rather than repudiating this approach outright, van Veldhuizen *et al* (1997) suggest that it can be used as an entry-level activity with the purpose of moving towards farmer-led research. External initiators must carefully facilitate the interaction between the outsiders and the farmers so that the process is participatory and sustainable. The farmers must at all times be aware of the risks involved and determine how the increase in risk will affect them.

In accordance with van Veldhuizen *et al* (1997) it seems that PTD practitioners currently understand it as a process in which researchers and farmers combine their skills and knowledge to develop technology that sustainably improves farming systems.

Origins of and changes within ARC and Infruitec-Nietvoorbij

Many of the events that occurred at both the national level and the local institute level influenced the direction in which these structures developed and tried to direct their

[3] The emerging agricultural sector in South Africa is currently comprised of black farmers and potential farmers who are farming or intend to farm relatively small areas of land, usually less than 5 ha per farming household. In this case study, the terms smallholder, small-scale, emerging and resource-poor are used interchangeably and refer to black farmers, the majority of which are farming largely for household consumption while selling or exchanging surplus where appropriate.

services towards emerging black farmers. Therefore, these two parallel processes are discussed together rather than separately and are summarised below.

Origins and structure of the ARC

Prior to 1992 agricultural research in South Africa was carried out by the Department of Agriculture. Researchers were engaged in research only, whilst other directorates (extension, land-use planning) undertook extension activities. In 1992 these research activities were brought under ARC, a parastatal with limited government financing. A number of research institutes that already existed became the institutes of the new ARC, which was given the mandate to carry out research (technology development) and, unlike before, some extension (technology transfer) activities.

Two separate research institutes were established in Stellenbosch: the Stellenbosch Institute for Fruit Technology (Infruitec) and the Nietvoorbij Institute for Viticulture and Oenology (Nietvoorbij). This distinction was based on their historically separate commodity-orientated research activities under the Department of Agriculture. In 1997 they were amalgamated in order to provide a one-stop service for farmers in the deciduous fruit industry. This new Institute is now known as ARC Infruitec-Nietvoorbij and consists of two campuses: Infruitec Centre for Fruit Technology and Nietvoorbij Centre for Viticulture and Oenology.

Clients of the ARC

Prior to 1992 both Institutes had directed their services towards the established white commercial farmers in the deciduous fruit sector of the Western and Northern Cape and other areas of South Africa. With the democratic election in 1994, the mandate of both Institutes was amended to reflect the changes in national agricultural policy, *i.e.* the provision of services and assistance to all farmers, with a special emphasis on the emerging black farmers, and the facilitation of their access to appropriate information and technology. The inclusion of black farmers was a new phenomenon for the ARC personnel at both Institutes. Having worked with educated and very often wealthy white commercial farmers who had access to a diverse range of resources, they were now required to work with farmers whose participation in mainstream agriculture is constrained by many factors including race/gender discrimination, lack of access to resources, illiteracy, etc.

To begin implementing the new policy, the researchers started by establishing links and interacting with a number of emerging black farmers in the Western and Northern Cape Provinces. This was done on an ad hoc basis through various non-governmental organisations (NGOs) that were already working with some of these communities (ARC Annual Reports 1994, 1995; Isaacs 1998b). The NGOs would identify the predominantly agricultural needs of the community and would then approach the relevant service provider to deliver the required services. Many of these activities that included the ARC researchers were related to transfer of technology such as in soil preparation, water management and some horticultural aspects. However, some of this technology had to be adapted to suit the local circumstances. In the case of soil preparation, for example, often the emerging farmers used animal traction instead of mechanised

ploughing equipment, so the basic principles had to be adapted. Similarly, the application and measurement of irrigation scheduling had to be adapted. The two Stellenbosch-based Institutes of the ARC thus became involved with the emerging black farmers in a process of technology adaptation, which later became recognised as PTD.

Local and national restructuring to support emerging black farmers

During 1994 and 1995 the management became aware that the two Institutes would have to be restructured in order to fulfil their mandate of serving the new clients effectively and efficiently. The structure of the Institutes prior to 1996 did not allow for multidisciplinary research with emerging farmers nor did it allow multi-commodity research[4]. A series of changes took place:

1996: Infruitec appointed an Institute Coordinator for farming systems research and development from outside the organisation to set up a support programme for emerging black farmers called the Fruit Information and Research Service (FIRS). Nietvoorbij appointed a similar coordinator from within the Institute. Based on predetermined criteria, the most suited individuals within the different technical divisions were identified for this programme.

1997: The two Institutes amalgamated to form ARC Infruitec-Nietvoorbij and the two separate programmes for emerging farmers became the Resource Limited Producers (RLP) Programme.

1998: The Institute Coordinator of Infruitec became the manager of the RLP Programme, which became a division within the Institute.

1999: RLP became the Resource Poor Agriculture (RPA) Programme in response to changes at Central Office, which gave permission to appoint a social scientist to help increase awareness of social aspects of agricultural development.

2000: An agricultural sociologist is appointed to the RPA Programme.

2001: The RPA Programme became known as the Sustainable Rural Livelihoods (SRL) Programme with five permanent staff.

During 1994 the ARC Central Office embarked on a similar process leading to the following structural changes:

1994: A corporate Farming Systems Research and Development (FSRD) Programme was initiated at provincial level to coordinate activities related to working with emerging black farmers. The purpose of this programme was described as: "to encourage participatory research, development, evaluation, demonstration and transfer of technologies applicable to integrated farming systems appropriate to small farmers" (quoted in Fowler 1998:119).

1996: The inability of provincial coordinators to mobilise personnel and the reasons for this (informal structure within institutes, increasing competition among institutes, etc) were brought to light.

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[4] Multidisciplinary research was and still seems to be largely understood within the South African agricultural context as involving researchers from the various natural science and agricultural disciplines. Only recently has there become a growing awareness of the specialist roles that agricultural economists and social scientists have in the research process. In any event they are seen more as playing supplementary rather than complementary roles.

1997: ARC's Multi-Institutional Project Initiative (M-IPI) replaced the FSRD Programme in an attempt to remedy the problems.

1998: ARC's M-IPI failed, key personnel retired or resigned and there was a subsequent lull in initiatives by ARC Central Office. Towards the end of the year, a discussion group was established to restructure the approach.

1999: The institutes of ARC nominated coordinators who attended this discussion group. A panel known as the ARC RPA Programme developed from within this group.

2000: The idea of a "virtual" Institute was conceived and established as the Sustainable Rural Livelihoods (SRL) Institute, mandated to coordinate the national SRL Programme of the ARC in all its institutes. This central structure is still transforming and should be completed by 2003.

Building staff skills to work with emerging black farmers

As soon as ARC Infruitec-Nietvoorbij was given the mandate to incorporate emerging black farmers into its client base, it became evident that the personnel needed new and supplementary skills. Therefore, the first group of ARC Infruitec-Nietvoorbij researchers was trained in Participatory Rural Appraisal (PRA) tools in 1995. More researchers and technicians were trained during 1996 and 1997. In 1997 a number of division managers were also trained in the use of these tools to ensure that they knew what was expected from their personnel. Drastic cuts in the ARC budget in subsequent years resulted in almost total cuts in the informal training of personnel[5]. By the end of 1999 more than half of the RPA coordinators and a few personnel within the various divisions had received some training in the use of PRA tools. The purpose of the training was to prepare the researchers to interact with the farmers and to function within the participatory appraisal teams. All this training was done by a local NGO that was working in the agricultural development sector.

Unfortunately, follow-up training was not provided and only a few of the coordinators actually used the PRA tools and techniques in their work with communities. This meant that, when it came to technology transfer, many used adaptations of the processes with which they were historically more familiar and experienced, such as lecturing. When it came to technology development, in some cases the team decided on the technology that was to be developed and transferred, despite the fact that it was done on emerging farmers' farms or in their communities, *i.e.* it was externally initiated. In a few cases, technology development was based on the needs of the farmers (see Case 2).

Another limiting factor in the application of the PRA tools was that, although many of the division managers had been trained in the theoretical and practical use of the tools, they did not promote it extensively. In some cases, managers and personnel believed that the procedure was unscientific and was neither valid nor reliable. These inflexible beliefs and the lack of extensive promotion of a participatory approach to research and development within the Institute resulted in the very limited adoption and application of these tools and of a participatory approach.

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[5] Informal training refers to short courses that are not undertaken for degree or diploma purposes. Certificates of attendance and competence are usually awarded.

Because of various constraints in capacity, experience and resources, the ARC Institutes of Infruitec and Nietvoorbij continued to rely heavily on the information provided by local NGOs and other service providers who were working in the rural and peri-urban farming communities. The ARC researchers were never part of these appraisals that were done to identify the needs, socio-economic circumstances, capacity, etc of the rural communities. The information was gathered at PRA training courses, during practical sessions on the use of tools, and was consequently incomplete.

Gradually, after the RLP Programme was consolidated in 1998, the RLP team began to make its own contacts with farmers and farmers' associations without intermediaries. It also meant that the team members no longer had to rely on second-hand data but could generate their own with community members. However, there only a few coordinators were actually confident in applying PRA tools. As a result, data (including socio-economic and cultural) were often not collected or at least not recorded and the necessary capacity building and empowering activities relating to the use of PRA tools did not take place.

Participatory research and other required skills of the group of RLP coordinators and their division colleagues were and still are limited, as most of the division coordinators are trained in specific scientific disciplines and, in many cases, their actions are constrained by the inflexible practices in their "home" divisions. The team is not assigned to the programme on a full-time basis, and a matrix system of management is used. On the one hand, the coordinators maintain a very strong relationship with their scientific discipline but, on the other hand, they are often expected to change gears during the course of the day, depending on the client group and also the, sometimes differing, requirements of their "two" divisions.

Because of the increasing number of emerging farmers that were being assisted by ARC Infruitec-Nietvoorbij after 1994, the Institute actively sought black researchers in order to overcome cultural barriers in terms of ethnic identity, language and customs. It was also believed that this would increase the active participation of emerging farmers in joint projects with the research teams. To some degree, this policy aided the movement towards farmer participation. However, many of these new researchers had been trained in the same inflexible approaches as their white counterparts, and in the same tertiary institutions. The more positive effect of this strategy will probably be realised only as the tertiary institutions themselves develop and the researchers gain more exposure to other methods and approaches, especially those of a participatory nature.

Some of the tertiary institutions have restructured or are considering restructuring their agricultural and natural resource management programmes so that they include familiarisation with "current development" practices such as the use of participatory appraisal tools or at least incorporation of social scientific practices. This is done in various ways[6]:

[6] This description is very subjective and is based on differing degrees of contact with three universities. Specific research on this topic might show a different trend. This account merely gives the reader an idea of what appears to be taking place in South Africa.

- Some departments have restructured themselves to include the latest trends in agricultural extension and social development into their curriculum.
- In some cases, new departments have been established in order to offer the training and orientation that is required.
- Some undergraduate degrees require that students take various social science or development modules to complement the natural science or geographical focus of their degrees.
- Some universities are offering new multidisciplinary degrees at postgraduate level to encourage students to become familiar with the importance of the social sciences.
- Some universities are offering certificate courses in participatory techniques.

Use of demonstration plot in research and extension with emerging farmers

Establishment and maintenance of demonstration plot

The demonstration plot was initially[7] the vehicle by which the SRL team at ARC Infruitec-Nietvoorbij tried to carry out participatory research, training and extension. The concept of a demonstration plot was first introduced in the Buisplaas community (see Case 1). The average demonstration plot was approximately one hectare in size. This was seen as an economically feasible unit for two reasons:

1. It can be managed by the average household of five members with no external labour.
2. It has the potential to generate an income from fruit (after five years and for a further ten years) of approximately SA Rand 20,000 per annum.

The specific size of the demonstration plot was further influenced by the following factors:

1. The needs of the farmers with regard to the number of trees or plants required, which was determined from discussions held with the farmers prior to designing the plot;
2. The availability of similar plant and tree species in the area;
3. The availability of land in the area for the purpose of a demonstration plot.

Sometimes, the farmers selected the type of crops and species they wanted to grow. In other instances, the ARC team made the selection after analysing soil and water samples, especially when a new crop was being tried out or when the crop was uncommon to the area. If the farmers wanted a crop that the ARC considered to be inappropriate because of the physical environment, it still provided this plant in small quantities so that the farmers could discover for themselves that the crop was unsuitable. The ARC team and the farmers planted the crops on the plot together. The farmers were responsible for maintaining the plot. The ARC provided the other necessary inputs such as the plants, fertilisers, pesticides, herbicides and training. This was done on the understanding that the farmers could afford and establish their own system if it proved appropriate; otherwise, there was no point in including these inputs in the demonstration plot. Usually,

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[7] It should be noted that, after documenting and analysing this case, the Institute moved from using demonstration plots to working with farmers on existing fields, and has moved towards a Farmer Field School approach.

the farmers appointed one person from within their group to monitor the growth and development of the crops in the plot and to notify the ARC team coordinator of any interesting observations, such as radical changes in the weather, the presence of diseases or insects, and other negative or positive changes in plant growth.

A training vehicle

From a training perspective, the plot was used to demonstrate what types of crops can grow in the area and to provide a practical setting in which technology can be transferred to farmers by means of practical training, complemented with theoretical training. Both types of training were not confined to production activities but also included basic nursery practices, so that the farmers could propagate their own plant material. Where nursery activities are requested, the ARC usually assisted financially in establishing the nursery structure, if a suitable structure did not already exist.

Practical training was done on a monthly or two-monthly basis and normally continued for five years. The training was planned together with the farmers and, on account of the seasonal nature of deciduous fruit and vine agriculture, took place at specific times of the year.

A research vehicle

From a research perspective, the demonstration plot was used to determine how well various crops grow in the area and the suitability of the microclimate and physical environment for this growth. It was also used to develop new technology with local farmers on the request of the farmers or as suggested by the ARC Infruitec-Nietvoorbij team. These on-farm comparative studies were often conducted in different communities using the same species in order to determine the suitability of a crop across a range of environmental settings. When research was being carried out, the ARC normally bore the cost of the analyses that were required such as soil, water, pests and disease identification. Based on the farmers' and the ARC team's joint observations of the plants on the demonstration plot, the ARC team gave immediate recommendations, where possible. If this was not possible, the information from the demonstration plot was used to inform further research. This information was also used to develop training programmes with the farmers. Information obtained in one area was used in other areas, if applicable. This process did not include direct farmer-to-farmer exchange because of the long distances that have to be travelled between areas.

The ARC team's experience with regard to community or farmer monitoring has been both good and bad. Sometimes, it is done regularly; at other times, it is done intermittently and often falls away completely, making the research activity extremely difficult. The success seems to depend on the individuals appointed to do this, especially their motivation and consistency with regard to observing and recording observations. It is also likely that the system for sending samples and providing subsequent feedback is not perfect.

Sometimes, the research methodology used on the demonstration plot approach was exactly that used on the research station. However, in many cases, the researchers adopted a more flexible approach suited to the circumstances instead of trying to achieve complete

accuracy. This resulted in criticism from scientists within the system as being "unscientific". In many cases, there was an explicit unwillingness to acknowledge the usefulness of this flexible approach. All this is despite the fact that most institutes in the ARC have used a similar approach while conducting on-farm research with white commercial farmers (Fowler 1998).

While some research was carried out on the demonstration plots since their inception in 1996, the primary activity on the plots was informal and practical training. Experiences with the demonstration plot in the Buisplaas community indicated that, although the primary purpose was to transfer existing technology in a participatory manner and practical setting, an element of participatory research emerged and was carried out at the request of the participating farmers.

Case 1: The Buisplaas community - the first use of the demonstration plot

The community of Buisplaas is a remote inland settlement in Western Cape Province. In 1986, the 56 families of Buisplaas formed the Buisplaas Residents' Association (BRA) to address several pressing issues such as land ownership, improved housing, provision of electricity and drinking water and agricultural development. In 1993 BRA started working with an NGO, the Land Development Unit (LDU), to facilitate an overall agricultural plan with the community and realised the need to link with other organisations.

In 1996 LDU approached ARC Infruitec-Nietvoorbij to assist the Buisplaas farmers with technical and crop management skills related to deciduous fruit production and

Photo by: Tim Hart.

Farmers and researchers discussing local solutions and practices while surveying for plant diseases.

processing. The BRA convened a meeting with all the Buisplaas community members and the ARC team. The concept of the demonstration plot and its objectives were presented to the community. The ARC team pointed out that, while it would mainly involve training, there would be an element of research because many of the selected crops were new to this particular area. The possibility existed that the microclimate and local environment might influence the cultivation of the crops, so there was a need to monitor the production process carefully.

Having agreed on the objectives, the BRA identified all residents who were interested. It also selected the liaison person to coordinate the demonstration plot activities with the ARC. A site for the demonstration plot was identified, fenced and planted with fruit trees by July 1996.

The environmental conditions, *i.e.* a high saline content in the soil and the water, the extremely dry conditions at the time and a scarcity of organic matter, required that the soil preparation process be adapted. Trenches rather than holes were dug and filled with compost to ensure that the trees would survive. However, this method proved to be too labour-intensive and the BRA requested the ARC team to use the other half of the plot for comparison purposes by digging holes, as is the usual practice of commercial farmers. Tree growth on the plot under the different planting methods was compared.

The ARC team monitored the tree trunk circumference by measuring and the nutrient balance by sampling soil and leaves on a regular basis. Through these activities, the different soil preparation and planting methods were analysed and the ARC team disseminated the results to other communities having a similar environment. Diseases and pests were monitored using different traps and the appointed local person, who was sometimes accompanied by other farmers, received on-the-spot advice from the ARC team. The information from the monitoring was also used during the regular, more formal training sessions that were often attended by other community residents.

Several training courses were given during 1996 and 1997 to the participating farmers and the broader farming group. These courses included soil sampling soil preparation, tree grafting, pest identification and control, pruning, fruit thinning and irrigation systems.

During the 1997 annual evaluation, a survey of the agricultural activities in Buisplaas revealed that, with the exception of three households, every household had planted 3-5 fruit trees in their homegardens and one farmer had actually established an orchard. Local residents said that this was a result of the information derived from the training programme. The BRA also indicated that a community garden would be established and 0.5 ha would be planted with fruit trees in order to raise money for community projects.

The farmers and the ARC team decided that from 2001 onwards the ARC would make only two visits a year to the community, unless the farmers required more advice from the team. The demonstration plot and the homegardens with fruit trees continue to develop and to be harvested. The orchard of the one farmer was the largest producer of deciduous fruit in the community.

Consolidating participation with farmers

Increased awareness of the dynamics of the emerging farmer sector

By 1997 the ARC team was becoming increasingly aware of the constraints facing the farmers with whom they had contact. At this time a number of documents related to the early experience and the national policy on emerging farmers were being published. These documents stressed the inappropriateness of much existing technology and the need to develop alternative options for emerging black farmers (Isaacs 1996). Many of these recommendations were based on the concept of the Farming Systems Approach and hinted at the existence of both on-farm and off-farm livelihood options and the variety of activities within these two options.

Given the constraints faced by emerging black farmers with regard to accessing both finances and land, it became increasingly important to consider the need for more than one farming system on a particular farm. This was largely a result of the fact that the ARC team increasingly encountered farmers who stressed that fruit was too expensive to establish and was therefore costly to produce. They pointed out that they would receive no income from the fruit for at least the first three years and that they could not accommodate this. They also pointed out that vegetables were usually cheaper to establish and could generally be harvested and sold within three months of planting. Transportation of inputs and products was a further problem that largely depended on finance.

These factors fostered an increasing awareness of the need for participatory research with the farmers. As mentioned earlier, this was initially attempted by training the coordinators, their division managers and other personnel in the divisions in the use of PRA tools. The purpose of the training was to enable the researchers to interact with the farmers and to be part of participatory appraisal teams, but the principle of participation and the underlying components of capacity building and empowerment were not stressed. As a result, the tools were seldom and/or ineffectively used and did not produce the results that had been expected.

Yet, there were some inroads made in consulting with farmers to find out what type of technology they wanted the ARC to investigate. The evaporative cooling facility in Montagu, described in Case 2, is an example of how researchers began to move towards doing research based on the request of the emerging farmers and also to move towards an element of involving the farmers in the research process. However, this was not identified as or termed "PTD", mainly because the term was unfamiliar to the researchers in the team and also probably because much of the work initially took place on-station and the initial participation of the farmers was considered minimal.

Case 2: The evaporative cooling storage unit at Montagu

In 1996 three emerging farmers, members of the Goudmyn Farming Trust in the Montagu deciduous fruit producing area, asked ARC Infruitec-Nietvoorbij to assist them with developing some means of storing produce for an extended period. For various reasons, these farmers did not have access to the larger cold storage facilities used by the local

commercial farmers, but realised the advantage of being able to store their fruit before transporting it to the market. As electricity was considered too costly, the farmers required a cooling facility that did not rely on electricity. Based on discussions with the farmers, the ARC Infruitec-Nietvoorbij RLP team decided to develop and evaluate an appropriate evaporative cooling unit.

The design and principles of the cooling unit were based on "evaporative cooling cupboards" used by rural inhabitants in the Northern Cape Province. After on-station trials, an agreement was reached with the Goudmyn farmers that one such facility would be built on a farm identified by them, and that they would collaborate with ARC Infruitec-Nietvoorbij in carrying out the on-farm trials relating to the use of this facility.

The cooling facility was built on the farm in August 2000 and the farmers were trained in its use as well as in the most appropriate post-harvest handling techniques for fruit and vegetables. The farmers were doing the monitoring and record keeping for two seasons until 2002. The ARC team visited the farmers monthly to make observations of the stored produce and to examine the farmers' records. The farmers were also involved in evaluating various materials for the structure in order to determine their suitability and cost effectiveness. The farmers and ARC team have been learning together about the technology from the results of the on-farm trials. These will be shared with other farmers.

ARC colleagues not directly involved in this project slowly began to show interest, probably because other examples of technology were now also being developed using non-traditional research methods. Extension officers from the Provincial Departments of Agriculture also started to show interest. In both cases, the interest has largely been in the technology development process and in ways of transferring the technology to other communities.

Need for a social scientist to support the team

While the researchers were becoming more exposed to the context in which their new clients farmed, a number of events occurred within the ARC, which reinforced the need for input by a social scientist. An independent review of the South African Research Councils in 1997 stated implicitly that the national RPA Programme was fragmented and lacked social dimensions. It indicated the lack of capacity amongst the researchers to determine and understand the nature of the problems and needs at the grassroots level because the social context often influences and obscures the problems and needs. A different approach was required that included the active presence of socio-economic researchers alongside the agricultural researchers.

Based on their experience in the 1994--99 period, the ARC Infruitec-Nietvoorbij management had realised the need to include a social scientist as a permanent member of their RLP Programme, for much the same reasons. To some extent, the idea was that a person with "soft" skills was required to assist those with "hard" skills. A small number of projects had been started with communities but later fizzled out because of a lack of continued farmer participation. It was hoped that a social scientist would assist in the preliminary identification of requirements for and constraints to agricultural

development, together with the farmers and the agricultural researchers (see Burgess & Isaacs 1999 for a discussion of some of the problems experienced).

In January 2000 an agricultural sociologist joined the ARC Infruitec-Nietvoorbij RPA team to assist the coordinators in their work with the communities. The Honeybush Demonstration Plot Project (Case 3) is the first project that the team (now including the social scientist) undertook to carry out participatory on-farm research on a new crop with emerging farmers.

Case 3: Attempts to incorporate PTD into the Honeybush Demonstration Plot Project

During 1997, the SRL Programme of ARC Infruitec-Nietvoorbij realised that honeybush (Cyclopia species) might have potential as a commercial crop for emerging farmers in the Western Cape. The honeybush plant costs considerably less per hectare to establish than deciduous fruit yet it seemed, based on independent trials undertaken by commercial farmers, to have the potential to provide an extremely good rate of return. Honeybush is currently harvested in its natural habitat, processed and sold locally and internationally as a herbal infusion. The international demand for the processed product outweighs the current local supply more than threefold. Consequently, the increased demand could lead to increased harvesting of this plant in its natural habitat, resulting in its extinction. These factors encouraged researchers in the SRL Programme to consider doing research related to this crop with interested emerging farmers in areas where it grows in its natural habitat.

Several workshops were held in 1998 to determine the interest of smallholders in cultivating the plant and participating in a research project. Meanwhile, ARC Infruitec-Nietvoorbij had begun a number of on-station research trials and a small group of

Photo by: Marlise Joubert.

Farmers sorting Honeybush seedlings.

commercial farmers were doing some trials. The purpose of the project with the emerging farmers was to conduct research on the cultivation of some market-desirable varieties of honeybush and to transfer this knowledge and that obtained from the parallel on-station research trials to these and other farmers.

In late 1998 and early 1999 the SRL Programme began discussing the possibility of planting honeybush with farmers in five communities (Genadendal, Rietkuil, Haarlem, Karwyderskraal and Friemersheim) in the Western Cape Province. These are all located in areas where some of the five main commercially suitable species of honeybush are known to grow naturally. By June 2000 farmers in Friemersheim and Rietkuil had agreed to participate in the proposed PTD project.

In July 2000 the social scientist was asked to put together a team, examine the process to date and make recommendations that would, where possible, ensure the improved and continued development of the project in the two communities and encourage the participation of the local farmers and community members interested in growing honeybush. This involved two processes - participatory community appraisal and participatory planning - with emphasis on the successful establishment of honeybush demonstration plots.

The two processes had the following purposes:

1. For both the participants and the research team to gain a general overview of the area and the current situation. The appraisal was therefore exploratory and helped identify issues that could be important and might require more in-depth study.
2. The key area under examination was agriculture and agricultural practices. The appraisals therefore focused mainly on actions required to solve specific problems related to honeybush cultivation, and not on the wider livelihood systems of the farmers involved in the project. Upon reflection this was probably a mistake, as more immediate issues were overlooked.
3. Using the lessons and data from previous involvement of ARC Infruitec-Nietvoorbij in the communities as baseline data for monitoring and evaluation purposes. This had not been done previously because no data was collected.
4. Involving the farmers in the design and planning so that they were aware of their roles and those of the researchers during implementation and so that the plan was developed to coincide with their availability, local conditions and circumstances.
5. Ensuring that the farmers and the research team worked together and use the various tools and techniques competently, allowing for a common understanding of the data collected and analysed.

In February 2001, it was decided to terminate the project in Rietkuil on account of a growing lack of interest by most of the participating farmers, attributed to:

1. The belief that the crop is not profitable because one of the farmers failed to secure a buyer for his intended harvest. This occurred because he waited too late in the season to harvest;
2. A conflict which arose within the group regarding responsibilities towards the demonstration plot and reimbursement for incurred costs, because the plot was established on land privately owned by one of the farmers;

3. An unprecedented weed problem and the financial burden of hiring labour for weed control.

The participatory appraisal that was undertaken, only after the plot was started, indicated that the farmers were "traditionally" smallholder grain and livestock farmers. It is believed that the farmers were not accustomed to the physical effort required to maintain the plot and that this was compounded by the fact that all the farmers were pensioners in their sixties or seventies.

The technology development process in Friemersheim continued along more participatory lines, including the following changes:

1. Participatory planning is done with the researchers and the participating farmers and has become an ongoing process that runs parallel to project implementation;
2. Researchers and farmers are involved in the monitoring and evaluation of the project as well as the actual research activities;
3. Participation in the project is confined to those farmers who are actively interested in developing the technology required for the successful cultivation of honeybush in their area, now that they have become aware of the exact purposes of the project;
4. By incorporating both the researchers and the farmers in the planning and implementation of the project, both groups became more familiar with the purposes, requirements and benefits of PTD and realised the significance and value of the contributions that each group brings to the process.

Many of the processes and changes described above are unfamiliar to both the researchers and the farmers. Both groups have had their historical roles and also their relationships with one another significantly altered by the adoption of a participatory approach. Only time and continual monitoring will indicate the success and benefits of this process to both groups. Neither the ARC team members and the farmers, nor anybody else directly or indirectly involved in this project has significant hands-on practical experience in this type of research in agriculture.

During 2001, a small group of team members carried out a weed management trial with the farmers who were cultivating honeybush in Friemersheim in order to develop and test various local and scientific methods to manage weeds. Weeds are a serious problem for virtually all crops grown in the community. The idea to do this research was directly linked to the continual discussions that took place between farmers and researchers during the PRA process and the participatory monitoring. This was the first time that PTD in this form has been considered as a serious option and was probably due to the fact that the trial included the use and development of both indigenous and scientific knowledge on the same experimental site. There is already some awareness that doing research with farmers might have strong merits. There is also an impression that more of the local farmers are approving of the new research approach.

Aversion to on-farm trials with new crops among some farmers

As part of the Honeybush Demonstration Plot Project, the ARC team contacted a third community, Karwyderskraal, and started a participatory appraisal with the interested community members and farmers. A number of problems arose, related to participation

of community members at workshops and meetings, and included subsequent long delays in putting plans into action. When this was discussed in January 2002, one of the farmers pointed out that it was unfair for the community to be part of a research project in the form of an on-farm trial that might or might not succeed in improving their situation. He indicated that it would be more important if the ARC team offered a project that was based on existing research results and where only a minimum of further research was required. This signals that some farmers are currently not interested in being part of PTD strategies or would rather be involved only where less research is required. This contrast to the interest shown by the other groups could be explained by the following:

1. This particular farmer and community leader wanted to start up a community-based development project that would immediately benefit all the local inhabitants. He was not interested in participating in research projects.
2. Farming is the farmer's and the community members' primary source of income and they cannot afford to make scarce resources available for research purposes.
3. The farmer's initial interest might be due to the fact that he was unclear as to what the process entailed and that, with time and further discussions, he realised that the goals and requirements were different to what he had expected This was due to communication problems and lack of appraisal data to guide the joint decision-making process.

Two other possible explanations for this lack of interest in PTD are based on the general situation in South Africa:

1. Many farmers do not want to take responsibility and want a recipe rather than a research activity.
2. It was and still is considered by many residents to be the government's responsibility to provide for the needs of the people and some farmers believe that the government should supply all the information and other inputs required for agricultural development.

PTD: The understanding of the ARC Infruitec-Nietvoorbij SRL Programme

The examples of the work being carried out suggest that ARC Infruitec-Nietvoorbij SRL Programme has a similar understanding of the concept of PTD as that of van Veldhuizen *et al* (1997), which was outlined at the beginning of this discussion. However, in this regard, three important points need to be stressed:

1. The understanding of PTD within the team is more subconscious than conscious and can be attributed to the history of the Institute and the current political environment within South Africa's development and agricultural sector.
2. Until December 2000 the research carried out with farmers was largely externally initiated as opposed to being initiated by the farmers themselves. The three examples indicate the different ways in which the SRL team has practised PTD, although it has seldom been considered as research.
3. The principle of participation is not as pronounced as it should be, although this seems to be increasing. While team members attempt to work together with communities in a participatory fashion, this is often overshadowed by their experience

of "hierarchical relationships of participation" within their institutes and divisions. Presence becomes confused with participation. In a few cases, some farmers also expect to be told what to do by specialists and do not actually expect to be deeply involved in PTD.

Although one of the key components of the FSRD Programme (initiated in 1994) was to encourage participatory research with black farmers, this has not been completely realised. However, a small group of researchers has been able to adopt this approach to some extent and gradually move to a more participatory process of research for several reasons:

1. At the national (Central Office) level and especially at the level of the Institute ARC Infruitec-Nietvoorbij, there was a conscious effort from 1994 onwards to restructure in order to deliver services to the newly identified clients. Despite the various setbacks and periods of inaction during restructuring on the national level, the Institute continued to strive towards developing ways to ensure appropriate service delivery.
2. A suitable structure was developed at Institute level and personnel (coordinators) were identified and selected based on predetermined criteria. This process was carried out in a participatory manner and those who wished to participate could do so, while those who wished to withdraw from the team could also do so without any adverse consequences.
3. Inexperience in working with the emerging farmers was acknowledged from the beginning and many attempts were made to overcome this and to provide team members with the necessary support and skills. This was done by means of working with other organisations that had the required experience, identifying and attending suitable training programmes and increased exposure of all personnel to smallholder farmers and their activities. Despite budget cuts in this type of training, many personnel have undertaken their own capacity building.
4. Reflection on the dynamics inherent in the emerging agricultural sector and in the Institute resulted in the awareness of constraints, and steps were taken to address these. The inclusion of an agricultural sociologist on the team is one result of this.
5. Desire to make a change and to keep abreast of international trends and models by networking within the ARC as well as nationally and internationally has driven the team to continue seeking ways to overcome shortcomings and to try out new approaches.

Unfortunately, the training that personnel received was not followed up by the training organisations; neither was the application of these skills and tools monitored. This is probably the strongest reason why participatory research is not as entrenched as it might possibly become. Similarly, the lack of a definition for participatory research within the context of the ARC or by the training organisations has made it a difficult concept to grasp and its realisation even more difficult.

The intended way forward with PTD

Introducing a new approach into any structure, especially one the size of the ARC (13 Institutes, one Central Office and about 400 researchers), is problematic. This is largely a result of the common human tendency to avoid change at any cost, in an attempt to remain in the perceived "comfort zone".

Experiences in working with farmers has led ARC Infruitec-Nietvoorbij SRL Programme to a number of important decisions and realisations with regard to its approach to working with emerging black farmers and attempting to institutionalise PTD. Members of the team and the SRL Programme are now implementing some of these decisions, while other points are recommendations for a way forward that will hopefully increase the institutionalisation of PTD and other participatory practices in the ARC and South Africa.

Steps that are currently being taken include the following:

1. In February 2000, the ARC Infruitec-Nietvoorbij SRL Programme took the decision that, in the future, no technology development or extension activities will take place until a participatory appraisal has been carried out with the farmers and interested community members in order to determine their needs and circumstances. This includes the participatory compilation of a plan of action, monitoring and evaluation of the project, if the ARC can help with this. Otherwise, the information will be referred to other more appropriate service providers. The SRL Programme adopted elements of this decision at a national level in May 2000.
2. Where possible, technology development will be based on farmers' requests. This will necessitate including other institutes that are skilled in other crops, livestock and agricultural sciences and fits in with the current approach being adopted at national level.
3. The team will continue to introduce interested farmers to technologies related to appropriate existing, alternative and new crops. It might be necessary to adapt these technologies during the transfer process and, consequently, some research might be required. This will be made clear to farmers from the outset, so that they are aware that the research is in their benefit and applicable to their local context.
4. The researchers will initially attempt to work more closely in line with the accepted international understanding and framework of PTD. Given the current aversion in some quarters to moving away from traditional research approaches, a framework that has found credibility elsewhere will be valuable to increase the support of local researchers. Once the researchers reach a level of familiarisation, they will then be able to adapt the framework so that it suits the various contexts in which they operate.
5. One of the authors is writing a thesis on the use of participatory research methodology and the importance of indigenous knowledge to fulfil the requirements of a Master of Philosophy degree. As it is inherently difficult for small groups of individuals to try to restructure a large organisation and national programme, academic recognition and support is being sought in the hope of increasing the chances of success. Peer-reviewed publications on work in South Africa with participatory approaches will show international acceptance of the approach and should encourage local acceptance.
6. The use of PTD was discussed at the recent strategic planning of the SRL Division in May 2001 and also at the SRL Programme meetings. During 2002 the programme was restructured at Central Office level and within the SRL Division at ARC Infruitec-Nietvoorbij. While the restructuring at Central Office continues, the Institute management with support from the Western Cape Department of Agriculture agreed in 2002 to include participatory practices in both research and technology transfer activities. It was also agreed that all new community-based projects would be identified using participatory approaches.

7. This case study was made available to the Central Office SRL Manager and the various Institute SRL coordinators in December 2001. However, on account of the transformation and restructuring activities during 2002, there were no opportunities to discuss the case study and the recommendations more widely within the Institute.

Recommendations and steps that still need to be taken:

1. Currently some researchers are averse to working in the field with farmers. The importance of basing their research on farmers' requirements needs to be brought across to them. However, the on-station components of such research can be undertaken in a fashion similar to their current practices. Their involvement in the field and subsequently with "less scientific" methods can be minimised, if they are willing to let others fulfil their field roles where possible. They will need to learn not to fear working alongside farmers in the field or allowing others to assist in some of their research activities.
2. There is a possibility, given the diversity of the nature of the emerging farmers and the community groups, that they might, for historical reasons, not consider PTD to be acceptable. In such instances, the team will follow an approach that is considered appropriate by the farmers and community members.
3. Intensive training is needed for the team members of the ARC's SRL Programme to implement this approach properly. Some important skills are present within the existing SRL research teams and should be built upon, while simultaneously developing new skills.
4. The ARC should adopt the PTD approach as the preferred method to develop technologies in rural communities. Despite evident difficulties, maximum support must be given to the research teams attempting to carry out research with farmers using this approach in light of the evident advantages.
5. The idea of real participation needs to be strengthened amongst all actors within the agricultural and other sectors so that the "hierarchical relationships of participation" are transformed into equal relationships of complete participation.
6. Awareness about this approach should be raised among farmers when contacts are first established. It is likely that they can suggest ways to make the approach more appropriate to their context.
7. Resources are limited and other stakeholders in the South African agricultural sector also need to accept the concept of a participatory approach if success is to be forthcoming in this context. Equally important is the awareness that emerging smallholder farmers require this type of research to a greater extent than their commercial counterparts. To realise this, both participating farmers and researchers will have to present their experiences of PTD to others in order to publicise them.
8. There is a need to outline clearly how best to measure the success of this type of research, because managers within the National Agricultural Research and Extension System will have to accept the concept and also manage their personnel according to new and, in many cases, unfamiliar indicators of success. This will involve the development of indicators that are more appropriate to PTD activities, rather than those used in the past that did not account for a participatory process and the socio-economic and socio-cultural influences.
9. There will need to be continual evaluation of the skills and resources that are required to ensure that the coordinators and their project teams are able to deliver effective

and efficient services to the farmers, given the continual state of flux of this sector and the on-going improvement in development strategies.

Two primary steps are needed to realise much of the above. Firstly, it must be ensured that the process, the development results and the technology results of the projects are recorded and evaluated. All this information must be presented and discussed with colleagues and others involved in the field. While this is being done, there is a need to ensure that over-exposure of one project in which only a few community members participate does not result in their being ostracised by the other farmers in the community and the possibility that the process is consequently rejected by others who could benefit from it. Secondly, colleagues and others involved in agricultural development should be invited and encouraged to take part in these projects. Initially, they might prefer to be guests but it is intended that they will play a greater role or start their own initiatives based on this approach. The likelihood of institutionalisation of participatory approaches will depend largely on trust and cooperation between individual researchers, extension officers and participating organisations. Leadership by example at all the various levels will be vital, as will the patience and perseverance of those involved in agricultural development in South Africa.

References

ARC. 1994. *The Annual Report of the Agricultural Research Council 1994*. Pretoria: Colorpress.

ARC. 1995. *The Annual Report of the Agricultural Research Council 1994/1995 & the contribution of the ARC to the RDP*. Pretoria: Business Print Centre.

Burgess RP & Isaacs JS. 1999. The factors affecting the success or failure of a specific development initiative. Paper presented at the AFSRE 15th International Symposium Proceedings, 29 November-4 December 1999, Pretoria, South Africa.

Republic of South Africa Department of Arts, Culture, Science and Technology (DACST). 1997. *The National Review of Science, Engineering and Technology Institutions: the review of the Agricultural Research Council*. Volume 1: Draft Main Report, November 1997.

Fowler R. 1998. Institutionalisation of Farming Systems Approach in South Africa. In: Anandajayasekeram P & Stillwell T (eds), Institutionalisation of Farming Systems Approach in Eastern and Southern Africa (Mbabane: Southern African Association for Farming Systems Research and Extension), pp 113-136.

Isaacs J. 1996. A profile of resource-poor farmers and research opportunities to address their needs. Paper submitted to the South African Embassy, France.

Isaacs J. 1998a. The role of the demonstration plots in training for small-scale farmers in South Africa. In: 6th SAAFSRE Symposium Proceedings, 31 Jan-6 Feb 1998, Lusaka, Zambia (Mbabane: Southern African Association for Farming Systems Research and Extension), n.p.

Isaacs J. 1998b. The rationale for restructuring a research institute to service resource-poor farmers in South Africa. In: 6th SAAFSRE Symposium Proceedings, 31 Jan-6 Feb 1998, Lusaka, Zambia (Mbabane: Southern African Association for Farming Systems Research and Extension), n.p.

Veldhuizen L van, Waters-Bayer A, Ramirez R, Johnson DA & Thompson J. 1997. *Farmers' research in practice: lessons from the field*. London: Intermediate Technology Publications.

Participatory technology development in Cameroon: the route and milestones in the process of its institutionalisation[1]

Paul Tchawa[2], Félix Nkapemin[3] and Jean-Marie Diop[4]

In the framework of the Indigenous Soil and Water Conservation (ISWC) action-research programme (see Box 1) that involves seven countries in Africa, an interesting innovation was discovered in Cameroon. Farmers had devised the "night paddock" (manuring of cropland by kraaling cattle on it overnight) to increase soil fertility for growing a local cash crop. The innovation spread rapidly within the community without any formal extension activities, and led to follow-on innovations by other farmers. In a participatory process, farmers, extension agents and researchers collaborated in validating and improving the new technology, leading to further experimentation by farmers. The ISWC programme used this positive example of local innovation and experimentation as an entry-point to introduce Participatory Technology Development (PTD) into the formal research and extension system.

Photo by: Chris Reij.

Informal visit of ISWC field agent to woman farmer growing Morella.

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[1] An earlier version of this paper has been published in the Journal of Agricultural Education and Extension (2002, 8, 4, pp 201-212)

[2] ISWC National Coordinator, c/o SNV, BP 1239, Yaoundé, Cameroon (ptchawa@yahoo.fr)

[3] National Coordinator, PNVRA, BP 11362, Yaoundé, Cameroon

[4] External advisor to ISWC-Cameroon, ETC Ecoculture, POB 64, NL-3830 AB Leusden, Netherlands (jm.diop@etcnl.nl)

Context

Institutional setting

The principles of PTD, which are related to identifying farmers' problems and seeking solutions to them, fit well into the current institutional context in Cameroon. The National Programme for Management of the Environment (PNGE) states that: "The extension of appropriate farming techniques requires first the identification of the existing farming techniques in order to integrate the farmers' know-how. During a second step, the adaptability of those techniques will be assessed, … and then the most appropriate techniques will be promoted."

PTD can play an important role in the systems of agricultural production, research and extension in Cameroon, because it starts with local knowledge and focuses on small-scale farmers. Referring to the food situation in Cameroon, Varlet (1995) wrote: "Analysis of the sources of available food shows an increase in imports (from 6 to 17%) and in production from large agro-industrial projects (from 7 to 15%), whereas the contribution of the traditional sector to food availability has decreased greatly (from 86 to 67%)." Such statistics point to the need for initiatives to boost food production by small-scale farmers. In response, international donors have tried to involve State organisations in their strategy which involves large-scale, high investment projects (e.g. 4238 employees in the Rural Development Project in Western Province, with a budget of almost FCFA 24 billion or about US$ 32 million), whereas international non-governmental organisations (NGOs) have focused on organising local communities to tackle their problems. In general, evaluation of the large-scale projects has revealed results that are disappointing in comparison to the investments made.

Looking back at the history of agricultural development efforts in Cameroon, two important observations can be made:

- Development approaches have evolved considerably, despite many failures over the years and a context wherein the State has made clear the lack of means to support rural development.
- Despite national expertise and external technical assistance, answers have not been found to the problems related to soil and water conservation. The cause is to be sought not in the level of qualification of the actors but rather in the approach and tools they have been using. Analysis reveals that:
  - past strategies did not always take farmers' knowledge into account;
  - there was little effective participation of farmers in diagnosing problems and seeking solutions;
  - the different actors trying to find solutions have often been working in isolation;
  - the size of the projects and scale of intervention generally did not favour real participation of farmers.

Today, new conducive elements for greater institutional openness have become apparent. For instance, the current government extension policy is to seek partners for collaboration in development. An indicator of this change to more favourable conditions for institutionalising a participatory approach to research and development is the shift in name from PNVA (National Programme for Agricultural Extension) to PNVRA (National

Programme for Agricultural Extension and Research) and from IRA (Institute of Agronomic Research) to IRAD (Institute of Agronomic Research and Development). This shows a growing willingness to link research and extension.

Setting of the initial PTD work in Cameroon

The farmer-innovation approach to PTD taken by the ISWC programme is based on the assumption that local innovators have already made their own assessment of local problems and opportunities, even without being involved in PRA (Participatory Rural Appraisal) or similar exercises. Their innovations show what can be achieved when local resources and local creativity are combined, and are based on and lead to further informal experimentation. The local innovations and experiments indicate the type of questions that farmers are trying to answer in order to improve their livelihoods. The ISWC programme encourages formal research and extension staff to recognise these local innovations and to enter into PTD based on the questions arising out of them.

The PTD work in Cameroon started in 1997 in the "grassfields" of the Western highlands, one of the main areas of agropastoral production in the country. Initial work was done in the village of Babanki, which lies in North-West Province, about 30 km from Bamenda, the provincial capital. The mean altitude of Babanki is about 1970 metres above sea level. The southwest monsoon from the Atlantic Ocean brings heavy rains from mid-March to mid-November (2000 mm/year). The soils are of volcanic origin and fairly

Box 1: Indigenous Soil and Water Conservation in Africa (ISWC II)

The first phase of ISWC focused on indigenous knowledge (IK) in land husbandry. The second phase (ISWC II) focuses on dynamics in IK: discovering and promoting farmer innovation. The programme operates in Burkina Faso, Cameroon, Ethiopia, Tanzania, Tunisia, Uganda and Zimbabwe. The main objectives are:

- to improve the effectiveness of ISWC practices and innovations through joint experimentation by farmers, researchers and extension agents
- to initiate research on ISWC, spread research results and create lobbying platforms to show policymakers that building on ISWC practices and innovations is an effective option for development.

Within ISWC, local innovators, who develop new ideas without direct influence from formal research and extension, are used as entry points for initiating a process of PTD. The major components of ISWC are:

- identification and analysis of farmer innovators and innovations
- networking between farmer innovators
- participatory research with men and women farmers to develop improved land-husbandry technologies and systems
- setting-up farmer-based monitoring and evaluation systems
- disseminating tested technologies through farmer-to-farmer visits.

In each country, a government agency or NGO concerned with agricultural research or development acts as the lead agency. It establishes links with other local research, development and teaching institutions involved in improving land husbandry. In each country, researchers and extension agents are trained in PTD methods. They, in turn, support farmers in all aspects of experimentation: planning, monitoring and evaluation, sharing of experiences. Annual review meetings in Anglophone and Francophone Africa allow for exchange between national programmes.

fertile, especially in the higher areas where the humus is not removed. The rapid development of cattle keeping in the grassfields in the last 50 years can be explained in part by the fact that the tsetse fly does not thrive at these altitudes. The landscape is highland savanna with hilly terrain. Here, both cropping and livestock keeping are practised, but there have been frequent conflicts between crop farmers and herders. The population density is relatively high (more than 150 people/km2).

One farmer in Babanki village, when faced with a decline in soil fertility for cropping, started to develop a system of improving the fertility by inviting herders to keep their animals on the fields overnight. Many other farmers in the village took on the practice, given its success in improving soil fertility. This innovation, known as the "night paddock", was discovered by partners in the ISWC programme, who then entered into a process of PTD to help farmers find answers to questions they wanted to explore in connection with the innovation: namely, the most efficient way of paddocking livestock for manuring purposes in terms of both the number of animals and the length of time they should be kept in the paddocks. The crop planted on the manured plots is a Morella species locally called "hockberry" or "dianma-dianma". It is a leafy vegetable with a high demand on town and city markets.

Several socio-economic factors facilitated the introduction of a PTD approach in the Babanki area of North-West Province. These included:

- the strong tendency in the area for voluntary association and community development (often said to be a heritage from the British colonial times);
- the traditional institutional framework that promotes a spirit of agreement and mutual respect;
- a high coverage by rural development organisations such as MIDENO (Mission de Développement de la Province du Nord-Ouest), CIPCRE (Cercle International pour la Promotion et la Création), INADES (Institut Africain de Développement Economique et Social), HELVETAS (a Swiss agency) and SAILD (Service d'Appui aux Initiatives Locales de Développement).

Actors, their motivations and roles in the PTD process

The first step in the ISWC programme was to identify farmer innovators and their innovations. During this step, in 1998, the partner organisations that had discovered the local innovation of night-paddock manuring found it to be very relevant for wider application. Farmers were attracted to the ISWC programme because it recognised their priorities, knowledge and skills and because the programme's approach differed greatly from the external interventions they had experienced previously.

The motivation of the scientists was quite different. The country was in an economic crisis, and funds for research had been drastically reduced. Scientists who were approached by ISWC to take part in the programme regarded this as an opportunity to escape inactivity, to embark on new paths in research and thus publication, and to apply their knowledge and skills to addressing farmers' priorities in a concrete way.

The NGOs regarded the PTD approach as challenging and very relevant for their work. They were attracted to an approach rooted in farmer innovation. They also expected

that participation in the ISWC programme, particularly in training activities, would strengthen staff capacities and increase their renown and credibility in the field. This aspect of their motivation increased still further when they saw the interest of the mass media in covering the PTD activities.

Table 1 gives an overview of the partners involved in the PTD process, their motivations and their roles. In addition, other partners that have played a very important role in developing and promoting the process are the radio stations: the Uku rural radio and the Bamenda provincial radio have made regular broadcasts on farmer innovation and PTD activities.

Table 1: Motivations and roles of partners in the PTD process in Cameroon

Partners	Motivations	Roles
KEKUFAG (Kedjom Ketingoh Union Farmers Group) in Babanki	Appreciation of their knowledge; increase in yields	Mobilising farmers, monitoring and record keeping, spreading the approach
Kedjom Ketingoh Chiefdom	Village development	Institutional guarantee at local level
CIPCRE	Renown; strengthening the interventional capacity of its staff	Creating links between farmers and researchers, exchange visits
University of Dschang	New scope for research; possibility to publish	Proposing alternatives (add-on options) to farmers; analysis and documentation
IRAD Bambui	Escaping from inactivity; possibility to publish	Proposing alternatives (add-on options) to farmers; analysis and documentation
ISWC-Cameroon hosted by SNV (Netherlands Cooperation Services)	Introducing an approach that was working well elsewhere	Provision of facilitation, training and means

Strategies for institutionalising PTD in Cameroon

The institutionalisation of PTD in Cameroon was based from the start on a strategy of producing "success stories". It was only when concrete, visible results were available that ISWC approached the PNVRA, the government body responsible for extension throughout the country. Therefore, contact with PNVRA did not commence until the second year of the ISWC programme. The PTD process through the farmer innovation-approach was started with NGOs and farmer organisations. The institutional conditions permitted two simultaneous strategies for institutionalising PTD: informal and formal.

The informal strategy

Whether it is favourable or not for an agency that is not a government structure to promote a PTD approach in Cameroon can be debated. However, a "National Coordinator", coming from a university background, had been selected by the international programme coordination (a consortium of Dutch and British organisations) and was given the responsibility to launch the programme in collaboration with both NGO and government research and extension services. In a country like Cameroon, where hierarchical, top-down approaches are still quite strong, one can imagine the difficulties faced by one individual seeking to work with national research and extension structures. This explains why priority was given initially to an informal approach and why concrete results were sought in the field before approaching national policymakers.

The ISWC programme was hosted by SNV (Netherlands Cooperation Services). The image and good reputation of SNV in Cameroon were assets for the programme. The Memorandum of Understanding for collaboration with SNV gave the ISWC coordinator considerable flexibility and room for manoeuvre, as well as important moral support in planning and implementing the PTD activities. This was based on the conviction that success in building up the programme in Cameroon would depend primarily on the involvement of like-minded persons rather than institutional structures, at least initially.

This informal approach to promoting PTD attached great importance to producing concrete results in the field, in collaboration with interested individuals, and then involving policymakers in dialogue about the results, rather than trying to convince them only with words. To this end, the case of farmer-led experimentation with the night-paddock manuring system in Babanki village served as a entry point for institutionalising PTD in government research and extension structures. The ISWC programme had quickly realised that farmer-led experimentation with the night-paddock manuring system had several assets:

- The innovation had stimulated the development of follow-on innovations (see Tchawa 2000) and, in the process, had aroused the interest of a large number of farmers.
- The innovation was contributing to resolving a major problem in the region (conflicts between crop farmers and herders) and, for this reason, had aroused the interest of local and regional administrators and policymakers.
- The Africa 2000 programme supported by a major donor (United Nations Development Programme, UNDP) had recognised the relevance of this innovation and was keen to promote its application elsewhere in the country.
- Farmers who had been exposed to the innovation during exchange visits were quick to apply it in their own villages.
- Soil fertility experiments with this system had led to rapid results (within nine months).

The programme therefore felt that there would be considerable advantages in using the farmer-led experiments with the night-paddock system as an inspiring example of PTD. Nevertheless, strategies to reinforce the impact on the key organisations involved (SNV, IRAD and PNVRA) needed to be developed, and consisted of the following:

SNV. One participant invited to the 1998 PTD training in Bamenda was a technical assistant in agriculture working with an SNV-funded project in Ngie, North-West Cameroon (Diop 1998). She found the PTD training to be very relevant for issues related to natural resource management and decided to put the PTD approach on the agenda of the annual meeting of SNV. She made people higher up in the organisation aware of the approach and wrote an article entitled "Beyond appraisals: Participatory Technology Development" for the internal newsletter of SNV. She argued that: "The principles of PTD are highly relevant for the SNV policy, and training on PTD may well improve the functioning of staff involved in agricultural development …." (Pinners 1998).

IRAD. A similar approach was taken with IRAD. Initially, people at IRAD headquarters in Yaoundé showed little interest in the PTD approach. ISWC therefore approached an open-minded animal scientist working in the IRAD field research station in Bambui (near an area where many farmer innovators and innovations had been identified) and sought to interest him in the approach. A visit to a site of night-paddock manuring convinced him of the relevance of the innovation and of the farmer-innovation approach for developing locally appropriate technology. This researcher then played the role of contact person with the IRAD research station of Bambui. Two researchers from this station took part in several PTD training sessions and, attracted by interesting research questions in their own disciplines, redesigned their research around the night-paddock system.

PNVRA. The main objective of PNVRA is the diffusion of appropriate and efficient technologies to farmers. The ISWC experiences were used as examples to approach PNVRA in many informal ways:

- ISWC identified a contact person from PNVRA who was open-minded about participatory approaches in general, and PTD in particular. This person explained the importance of the PTD process to his extension colleagues.
- This contact person was invited to the ISWC Regional Workshop on Farmer Innovation in Francophone Africa, held in Bamenda in November 1999. He was able to listen to ISWC partners from other francophone countries (Burkina Faso and Tunisia) who gave convincing testimonies about the relevance of the PTD approach for their research and extension activities during this workshop.
- Advocacy about PTD was made throughout Cameroon by Dr Antoine Mvondo Zé, a well-known professor of agronomy at the University of Dschang (former professor of the present Minister of Agriculture); he arranged that the ISWC programme be presented to policymakers in the Ministry of Agriculture (MoA); thereafter, many MoA policymakers were invited regularly as official guests to key workshops of ISWC.

The formal strategy

The interaction with PNVRA gradually moved into a more formal phase, the milestones of which were:

- three formal meetings of the PNVRA National Coordinators and the ISWC coordinator in 1999 and 2000 (in addition to several informal meetings);
- two working meetings in March and May 2000 to identify points for integrating PTD into the PNVRA approach;

- a PTD training workshop organised by ISWC for PNVRA extension staff in August 2000;
- participation of the National Coordinator of PNVRA in the annual meeting of the African ISWC programme, held in Tunisia in October 2000.

PTD training for PNVRA extension staff. Before the PTD training workshop, the terms of references were formulated and the responsibilities of PNVRA and ISWC were shared (also in financial terms). The main training objectives were:
- to present the PTD methodology in theory and field practice;
- to share the extension experiences of PNVRA;
- to seek possibilities to integrate the PTD methodology into the PNVRA approach.

The workshop was prepared, funded and facilitated by both partners. During the field study, the workshop participants had the opportunity to discover and assess the strategies of developing and spreading the indigenous technologies identified through the ISWC programme.

Participation of PNVRA National Coordinator in ISWC Annual Meeting. The invitation of PNVRA to the ISWC Annual Meeting in Tunisia in October 2000 was highly strategic. It was the time for defining the scope of the next (third) phase of the programme and for specifying the expected roles of PNVRA within it. Two main decisions pertaining to institutionalisation of PTD were made at this meeting:
- The MoA will be the implementing agency in the next phase of the programme, and the functional responsibility will be given to PNVRA.
- The national proposal for the next phase will be coordinated jointly by PNVRA and ISWC-Cameroon.

The PNVRA National Coordinator's mission report to the MoA lauded the PTD approach and the collaboration between PNVRA and ISWC-Cameroon. The key steps towards institutionalising the PTD approach within the national extension service are shown in Figure 1.

Other activities aimed at institutionalising PTD. Other activities carried out with the aim of integrating PTD, above all into the government extension service in Cameroon, have included PRA and PTD training workshops and exchange visits; meetings with donors and international organisations; use of mass media (radio, television, newsletters, posters etc); organising the Francophone Regional Workshop in Cameroon; soliciting support from traditional leaders; and advising students preparing their theses on ISWC:
- *PRA and PTD training.* Staff and partners of ISWC participated in the PTD training sessions organised by the programme. The partners included both researchers (IRAD and the Universities of Yaoundé I, Dschang and Ngaoundéré) and development agents (CIPCRE, Optimum Rural, SNV). In addition, other participants from mainstream structures and NGOs were given the opportunity to attend. These people were chosen because they were open-minded about participatory approaches or because of the expected positive role that they or their institutions could play in promoting PTD methodology and institutionalising the PTD process. The PRA and PTD training

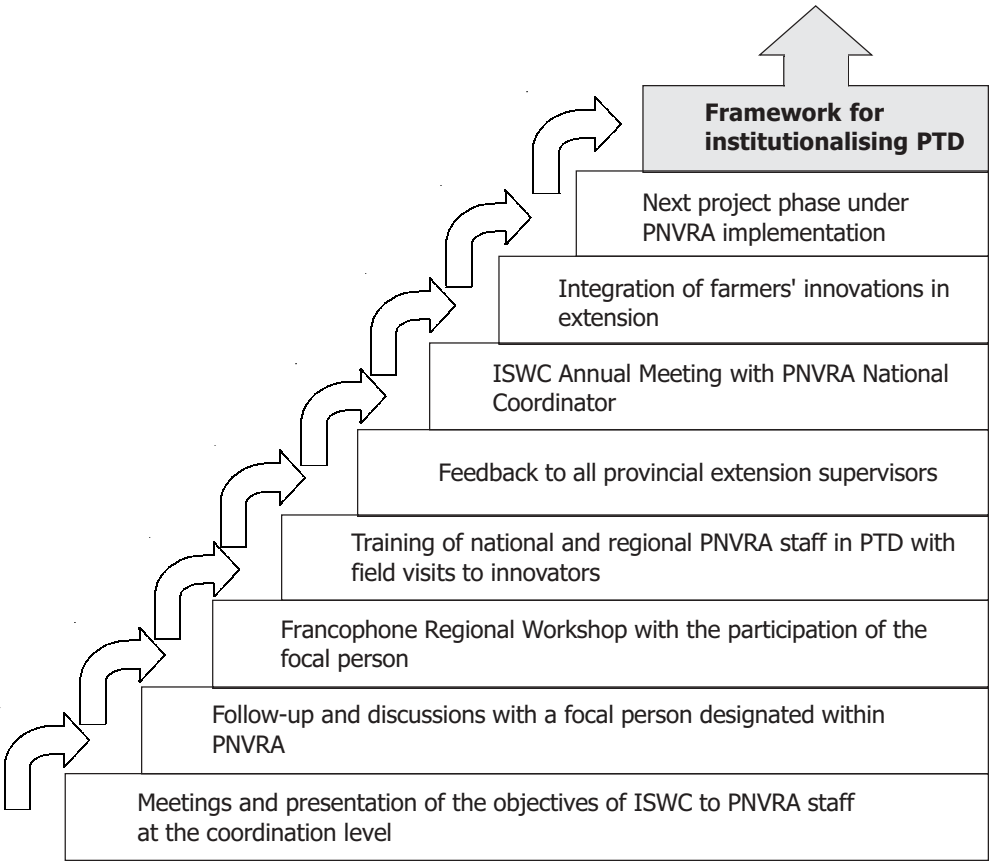

Figure 1: Key steps towards institutionalising the PTD approach within the national extension system in Cameroon.

always ended with a joint planning of PTD activities and was followed up by contacts with the trainees in their organisations.

- *Contacting international organisations.* For lobbying purposes, visits were made to international organisations and major NGOs, such as the UNDP, FAO (Food and Agriculture Organization of the United Nations), WWF (Worldwide Fund for Nature) and ICRAF (World Agroforestry Centre). The UNDP showed an encouraging openness towards the farmer-innovation approach to PTD. WWF is leading an initiative to create a PRA network. The ISWC coordinator was asked to head a task force to make a state-of-the-art study of participatory approaches in Cameroon, and is member of the thematic group dealing with the institutionalisation of participatory approaches.
- *Use of mass media.* Effective use has been made of mass media in promoting PTD. For more than a year, ISWC has facilitated a series of 30 radio broadcasts in both French and English (ten minutes each) on national radio. These include interviews with farmer innovators and coverage of ISWC workshops and exchange visits. In addition, ISWC produced a bilingual (French/English) newsletter *Peasant Innovator*:

Bulletin de liaison du Programme Conservation des Eaux et des Sols, which was widely distributed in the country. ISWC contributed financially to the national distribution of both the English and French issues of the international ILEIA Newsletter on "Grassroots Innovation / Innovation Paysanne", which included an article on the Cameroon experience. The rural radio stations were also used for promoting PTD in local languages.

- *Organising the Francophone Regional Workshop.* The main objective of the Regional Workshop on Farmer Innovation in Francophone Africa, held in Cameroon in November 1999 (Tchawa & Diop 2000), was to permit exchange of experiences between the three French-speaking countries involved in the ISWC programme (Burkina Faso, Tunisia, Cameroon). The fact that the Cameroon ISWC programme organised this regional workshop offered a good opportunity to show national policymakers the importance of farmer innovation for rural development. During the workshop, several farmers set up displays about their innovations and explained them to the participants, who included policymakers and people from the media. This market of local innovations gave a big boost to the farmer-innovation approach to PTD.
- *Soliciting support from traditional leaders.* Solid relations have been built with traditional leaders who, in return, give appreciable support to ISWC. For instance, the Chief of Babanki gave logistical support to organising the planning of experiments on the night-paddock manuring system and mobilising the whole village to organise a huge ceremony for participants in the Francophone Regional Workshop. These relations are significant, especially in view of the current policy of the Government of Cameroon to put responsibility for development activities into the hands of rural communities.
- *Giving support to students.* The support given by ISWC to Cameroonian university students preparing their theses with the programme has also been important for promoting PTD. Four students' theses were supervised jointly by their lecturers and the ISWC coordinator. This is the first step towards integrating the PTD approach into the curricula of educational institutions and services.

Monitoring and improving the approach. The farmer-led experiments in Babanki and the PTD approach itself were monitored by farmers, the ISWC field agent and NGO staff members. They were joined by research scientists during evaluation sessions. This process has played an important role in the institutionalisation of PTD. Firstly, the involvement of the scientists in assessing the experiments helped to convince them about the approach, and some of them are now including it in their research methodology. One scientist in Bambui is seeking to base his doctoral thesis on the participatory research on night-paddock manuring. Secondly, the monitoring and evaluation reports were made available to PNVRA staff and convinced some of them to include farmers' innovations in the extension programme. Thirdly, the farmers who keep records in their notebooks usually show these when staff from extension headquarters come to visit them; this makes extension managers aware of farmers' capacities to carry out and record experiments. Also the reports of the ISWC programme include analyses of and comments on the farmers' records and indicate the efficiency of some of the locally improved technologies.

The participatory assessment of the PTD process revealed some difficulties encountered in the approach, and improvements made as shown in Table 2. One such problem was the feeling of farmer experimenters that the community was marginalising them. Members of their Union (KEKUFAG) were complaining that only the innovators (experimenters) were benefiting from the PTD process: the innovators had received materials for the experiments and were keeping the knowledge to themselves. The experimenting farmers did not feel at ease and asked the ISWC coordinator to organise a meeting of experimenters and KEKUFAG representatives in order to clarify the situation. During this meeting, the misunderstanding was brought to light: the experimenting farmers and NGO staff had not invited members of the Union to take part in the different stages of implementing PTD in the field. It was decided that from then on, in regular village meetings, the experimenting farmers and ISWC partners would inform the Union about how the PTD work in Babanki was proceeding. The President of the Union then expressed the trust of the whole village in the experimenters, and the meeting ended with a feast.

Table 2: Difficulties encountered and improvements made in PTD experiments

Difficulty	Improvement	Comments
Farmers do not understand their role in the experiments	Going back a step in the iterative PTD process Using resource-flow maps	This was done with the support of the external adviser to the ISWC programme in Cameroon.
Farmer experimenters complain that they feel marginalised by their community	Information meetings in the village	Farmer experimenters were the first to notice that their involvement in PTD experiments was leading to their marginalisation.
Researchers complain that the PTD type of research does not favour their professional advancement	Meeting with researchers and display of journals, newsletters etc in which PTD findings can be published	
Lack of availability (due to overwork) of fieldworkers in partner NGOs	Recruitment of an ISWC field agent for monitoring the experiments and disseminating the information	Farmers particularly appreciated this initiative, as it led to better monitoring and circulation of information.
The "empowerment" of farmers in the PTD process leads to distrust on the part of certain NGOs	Organisation of meetings for clarification and discussions about the creation of farmer-innovator networks	Farmers explained that some NGOs insist on being the "obligatory path" between farmers and outsiders; they claim they know their needs and can express them without an intermediary.

Monitoring of field activities and the circulation of information about the experiments is continuing, even though the ISWC programme no longer has a field agent going regularly to the farmers to facilitate this process. Farmers have been trained to record the data themselves.

Impact of the strategies to institutionalise PTD

The impact of the strategies to institutionalise PTD within government agencies and NGOs in Cameroon can be seen at two levels: 1) in Babanki, where the experiments on night-paddock manuring are being carried out; and 2) at provincial and national level.

Impact of the PTD process in Babanki

The night-paddock manuring system has brought great benefits for both the crop farmers and the herders. The crop farmers have built up good relationships with the herders. The conflict between the two groups has been taken up as a subject for a doctoral research. Initial data reveal that, particularly in Tubah Subdivision, there has been a marked decrease in frequency of land disputes. Positive changes could be also seen during the exchange visit organised by ISWC, when the crop farmers and herders in Babanki joined forces to welcome visiting farmers and herders from Mbiame. The herders from Babanki explained to their colleagues from Mbiame that it is possible to live in peace with crop farmers. When Babanki farmers ask herders to provide cattle to manure the land, the latter are prepared to do so and the farmers pay the herders an acceptable fee for this service. Such statements and behaviour are evidence that farmer-herder relations in Babanki are good.

Photo by: Chris Reij.

Farmer experimenter harvesting a field of Morella.

The community of Babanki gives recognition to the farmer experimenters in their midst. Look-and-learn visits for farmers from outside the community are organised regularly at the sites of farmer-led experimentation. The farmer experimenters are the experts who explain the techniques to the visitors. Recently, two farmers involved in the night-paddock manuring experiments in Babanki were named as local farmer trainers by the SNV-funded project at Ngie, which wants to scale up the innovation. The farmers are paid for their services through a contract with CIPCRE.

Because the results of the PTD experiments are bringing answers to the problems raised by the farmers at the outset of the process, the farmers' confidence is increasing. The night-paddock innovation is spreading quickly, as was documented in a student's thesis in 2001. The main reason why the irrigation network in Babanki has been extended is because farmers in the newly connected area want to practise night-paddock manuring for dry-season production of *Morella*. The farmers involved feel that the programme has improved their capacity to experiment and, thus, to innovate. Also their self-help capacity appears to have been stimulated: the farmers are mobilising themselves to re-organise the marketing of *Morella* leaves now that production has been boosted by the night-paddock manuring system. With the support of wealthy people from Babanki living in the capital city, Yaoundé, the farmer innovators have set up an association for the "fair trade" of *Morella*. They claim that the middle-women were taking an unduly large margin for their services; the innovators want to handle the marketing themselves. ISWC supported this initiative and now Babanki farmers send 20 bags of Morella to Yaoundé twice a week in the growing season.

The Chief of Babanki has been very involved in the PTD process. He has given important moral support through his presence at the meetings, as well as logistical support in organising workshops and receiving visitors to the research village. This has helped to give strong social backing to the PTD activities.

Impact at provincial and national level

The creation of networks of farmer innovators is a sign that farmers are assuming ownership of the PTD process. Thus far, the following networks have been formed:

- GICPIH (*Groupe d'Initiative Commune des Paysans Innovateurs du Haut-Nkam*);
- NOWFINE (North-West Farmer Innovator Network);
- COPIB (*Coopérative des Paysans Innovateurs des Bamboutos*).

Farmers formulated their first ideas for innovator networks during workshops and field visits organised by ISWC. They had become aware that - in order to sustain the approach - they needed to organise themselves into structures for sharing ideas, defending their common interests and organising joint sale of their products. They asked ISWC to facilitate the process of building up the networks.

ISWC started in Haut-Nkam by asking some key farmers to seek other innovators in their area and to invite them to a first meeting. The farmers set up an Executive Committee and gave it the task of continuing discussions with the other farmers in order to propose

rules (statutes). ISWC organised and sponsored a two-day workshop, during which some cases of networks were presented. The farmers discussed these examples and decided on the form of organisation they wanted. After the workshop, further functioning of the network was supported by the farmers' own contributions. The first activity of the network was an exchange visit among the members in order to discuss their different innovations in the field. They then started to organise themselves to collect and to sell their products. Later, the members contacted the local administration in order to legalise their network. During monthly meetings, the network discusses technologies, marketing, input availability, new innovators, training needs, contacts with NGOs and possible joint initiatives.

The network in North-West Province was formed in a similar way. Then the farmers in Bamboutos Province followed the example of these two other networks. Thus, the innovator networks were created as a result of the growing self-confidence and spirit of self-help among the farmers involved in the PTD process. The process of network formation was carried by the initiative of the farmer innovators but was facilitated by ISWC in collaboration with official structures such as the *Délégation Provinciale et Départementale de l'Agriculture*. Direct contacts have been established between the three networks of farmer innovators, and representatives from each network will be invited to the workshop to formulate the next phase of the farmer-innovation programme.

The dynamism of the farmer-innovator networks is evident in their increasing initiatives to negotiate collaboration with research scientists, instead of waiting (as they used to do) for scientists to find solutions and bring them to the farmers. Members of the farmer-innovator networks also refer to the buffer role that they can play in countering the top-down approach that is still taken by many development NGOs. In general, the innovator networks want to choose the NGO with which they will collaborate, rather than being chosen as collaborators by an NGO; they explained that some NGOs use farmers simply to justify the NGO projects.

SNV has not yet integrated the PTD approach into its own strategy for rural development. However, as mentioned above, the SNV-funded project at Ngie in North-West Cameroon has asked farmer innovators collaborating with ISWC to facilitate training sessions for farmers in the Ngie area. This is a sign that SNV recognises the strength of the PTD approach in building farmers' capacities. At a later stage, after SNV has assessed the involvement of the farmer innovators in the Ngie project, there is a good chance that the decision-makers in SNV will propose the approach to other projects of rural development or natural resource management, such as the one in Mayao Oulo (Far North).

The national extension service PNVRA has recognised the relevance of including indigenous innovations among the technologies they offer to farmers. The PNVRA National Coordinator made the outcome of the training in Bamenda known to all regional directors of PNVRA and officially requested them to give more attention to local innovations and include them in the extension programme. This recognition given to farmer innovators, which started during the PTD training for PNVRA staff, represents a major change in PNVRA policy with respect to the type of technologies to extend.

The formal research system is no longer considered to be the sole source of information for extension. Farmer innovation is now considered to be another source of appropriate technologies.

After the PTD training for PNVRA staff, terms of reference were drawn up for collaboration between PNVRA and ISWC. The PNVRA National Coordinator assigned national-level working groups on extension content and research-extension linkages to include indigenous innovations among the technologies to be disseminated. The assignment entails the following steps:

1. Make an overview of useful indigenous solutions identified by the ISWC-Cameroon programme;
2. Select relevant indigenous solutions in the process of deepening the problem diagnosis planned for 2001 by PNVRA;
3. Identify the farmers who developed these indigenous solutions;
4. Map the spread of these indigenous solutions and trace the history of their development together with these farmers and local extension agents;
5. Assess the impact of these indigenous solutions on agricultural production;
6. Choose pilot topics from the indigenous solutions (one topic per Province) and explore these topics in the field in a PTD process.

For the first time in Cameroon, a group of farmer innovators was invited to the Research-Extension Linkages Workshop organised by PNVRA and the International Fund for Agricultural Development (IFAD), a donor of PNVRA. An important output of the workshop was the recognition of farmers as reliable sources of appropriate technologies for extension. This promises to have a positive influence on agricultural policy in Cameroon. The PNVRA National Coordinator recently declared that, in future, farmers' representatives would attend the PNVRA planning workshops at national level.

The mid-term review of PNVRA recommended that discussions with ISWC should be continued in order to build up an efficient programme for "Promoting Farmer Innovation in Africa". It has been recommended that the PNVRA National Coordinator keep in touch with ISWC concerning the training needs of PNVRA, because the greatest change in attitude appeared to have been achieved by training in participatory approaches to innovation development and dissemination.

The Governor of North-West Province has invited the ISWC coordinator to serve as a resource person in a meeting to plan development of the Province and to facilitate the session on "Participation and Partnership in Local Development". Three farmer innovators identified by ISWC have received awards from the Provincial Agropastoral Committee in West Cameroon; this is a committee under the MoA that acts at provincial level to give awards to the best farmers selected according to certain criteria. These are indications that decision-makers at provincial level have a positive perception of the approach to development being promoted by ISWC-Cameroon.

The major remaining challenge is to integrate the farmer-innovation approach to PTD into the curricula of the institutions of higher education. To this end, university staff heading the Departments of Agronomy, Rural Economy and Sociology will be invited

to the national workshop to be organised for drawing up the proposal for the next phase of the Cameroon programme within the larger regional programme "Promoting Farmer Innovation in Africa".

References

Diop J-M. 1998. Formation en Développement Participatif de Technologies et appui général au projet CES II - Cameroun, septembre-octobre 1998.

Pinners E. 2000. Beyond appraisals: Participatory Technology Development. Splash 2: 3-5.

Tchawa P. 2000. Chains of innovation by farmers in Cameroon. *ILEIA Newsletter* 16 (2): 14-15.

Tchawa P & Diop J-M. 2000. Rapport de l'Atelier Régional Francophone de Programme CES II, Bamenda, Cameroun, 29 novembre-2 décembre 1999.

Tchawa P, Kamga P, Ndi C, Vitsuh C, Toh S & Zé AM. 2001. Participatory Technology Development on soil fertility improvement in Cameroon. In: *Farmer innovation in Africa: a source of inspiration for agricultural development*. London: Earthscan Publications.

Varlet F. 1993. Dynamique de l'alimentation au Cameroun: présentation et interprétation des données quantitatives disponibles pour la période 1970-1992. Montpellier, France, Document de travail n°1, CIRAD-SAR.

Towards sustainable development in Mahaweli settlements through farmer participation

G D Perera[1] and Bert Sennema[2]

The Promoting Multifunctional Households Environment (PMHE) Project was operational in Mahaweli System C, Sri Lanka, from 1991 to 2000. During this period, the project was successful in developing a strategy for sustainable agricultural development in the Mahaweli settlements, based on the active participation of settler farm families in their own development. Participatory Technology Development (PTD) was a key component of this strategy, which was integrated into the extension approach of the Mahaweli Authority of Sri Lanka, the state agency responsible for all development activities in the settlement areas.

Photo by: MASL.

Farmers discussing their PTD experiences with the Minister of Mahaweli Development at a national workshop in 1999.

[1] Deputy Director of Agriculture, MASL, 500,T.B.Jayah Mawatha, Colombo-10, Sri Lanka (maslrbpm@sltnet.lk)

[2] Former advisor to the PMHE Project on behalf of ETC International, POB 64, NL-3830 AB Leusden, Netherlands (bert.sen@planet.nl)

Introduction

The Mahaweli Development Programme (MDP) is the most ambitious development initiative undertaken in Sri Lanka in the recent past. Five major dams constructed on the largest river, Mahaweli, supplied irrigation water to an area of 144,000 ha, deemed unproductive because of the lack of water. Nearly 125,000 families were settled during the early and mid 1980s - many of them poor, landless peasants who left their homelands and journeyed to the "promised land" with the dream of becoming proud owners of a plot of irrigated paddy land. Each settler family was entitled to 1 ha irrigated lowland for paddy cultivation and 0.2 ha rainfed highland for a homestead.

The Mahaweli Authority of Sri Lanka (MASL) was the government agency set up with the sole authority to manage this programme. It played a central role in the construction of irrigation and other infrastructure, in human settlement and in the development (also agricultural) of these vast settlement areas. When, in the late 1980s, it became evident that the "Mahaweli dream" among settlers had begun to blur and that indebtedness and poverty were on the increase, the PMHE Project was initiated to develop, promote and scale up a strategy for sustainable agricultural development. From 1991 to 2000, PMHE operated as a bilateral development cooperation project of Sri Lanka and the Netherlands, with advisory services from ETC International.

In the first 3-4 years, PMHE's attention was largely devoted to working intensively at grassroots level. After having developed the main components of the strategy based on settler participation, the focus shifted in 1995 to integrate this into the Mahaweli institutional set-up and adapt it accordingly. During the last three years of operation, PMHE pursued this goal, against many odds, and ended with the confidence that participatory development can be realised within a large, state-sector organisation such as the MASL. The experience described in this paper should be considered within this specific setting and timeframe and not as a blueprint for institutionalising PTD. However, the approach, experiences and lessons learnt can be useful for others trying to incorporate participatory approaches into similar organisations.

The context

In Sri Lanka, crown land has been issued in State-sponsored colonisation or settlement schemes since the beginning of the 20th century. Most of these settlement schemes are located in the relatively sparsely populated dry and intermediate zones of Sri Lanka, with rainfall between 500 and 1500 mm per annum (75% expectancy value). Not only landless farmers but also others interested in farming profited from these almost free issues of land.

The MDP aimed at:

- generating hydropower to address the growing energy requirements;
- increasing agricultural production;
- generating employment and livelihood opportunities for landless and impoverished farmers through new settlements in the downstream areas.

Administratively, the area under MDP is divided into (irrigation) Systems (B, C, G, H etc), Blocks and Units. A Unit is comparable to a village with an average of 150 resident farm families. Several Units form a Block, and several Blocks form a System. Around 11,000 employees managed this vast programme until the MASL underwent restructuring in the late 1990s and 60% of the staff was made redundant. Even so, MASL remains one of the biggest government agencies that, as a river-basin authority, will continue to be involved in managing these areas in partnership with farmers and other stakeholders.

The total extent of land cultivated under the Mahaweli project is about 92,000 ha. Nearly 90% of the land is under paddy cultivation in the wet season (*Maha*). In the dry season (*Yala*), about 50% is paddy and the rest is under other field crops. The annual rice production from the Mahaweli area is approximately 660,000 metric tons, which accounts for 25% of the national rice production.

The PMHE Project commenced at the time when MASL was shifting gears: from being mainly involved in establishing infrastructure for settlers to handing over management tasks to the farming community. It was also a time when donors were emphasising participation of beneficiaries and privatisation as a means of reducing State involvement. Coincidentally, enthusiasm and support were growing for integrated pest management, *i.e.* deliberately involving farmers in decision-making regarding pest control and reducing external inputs.

Bottlenecks to sustainable agricultural development

On arrival in the settlements, the families were assisted by the MASL in organising their farming activities - loans for buying agricultural inputs, initial supply of seed paddy, traction for the first ploughing of the land, seedlings for planting in the homegarden etc. Extensionists provided advice on cultivation of rice in an irrigated regime with high inputs. A standard homegarden development plan was handed out to the families. Thus, all the conditions for settlers to become successful farmers were considered to be in place.

Yet, the situation that PMHE encountered in entering Mahaweli System C in 1991 was far from one of success. Farmers were dissatisfied and debt-ridden. Homegardens lay bare and unproductive. Rice yields were decreasing after the initial years of cultivation and did not respond to increased fertiliser application. With increased costs of inputs and dropping yields, rice farming was not bringing an adequate income. Lacking the skills, knowledge and motivation to overcome agriculture-related problems, the farmers had not made the anticipated progress. Contrary to government expectations, the colossal investments had not paid off in terms of socio-economic development of settlers.

PMHE's action research in its initial year shed more light on this situation by pointing to certain drawbacks of the extension approach adopted by the MASL. Because of the diversity of settler backgrounds and land characteristics, the standard recommendations offered for agricultural development were often not feasible or were unsuitable. Farmer training was confined to classroom settings and theoretical in content. Processing of

farmer's problems through research stations was time-consuming; delay in transmitting the solutions meant that the usefulness and relevance were lost. Farmers being considered solely as recipients of the extension system ruled out any form of farmer participation in agricultural development. Poor social cohesion and weak organisational capacities among settlers due to their different backgrounds further prevented socio-economic development.

These negative aspects - lack of farmer participation, under-utilisation of resources, lack of appropriate skills and knowledge, dependency on MASL, poor social cohesion and organisation - were addressed by PMHE in developing a strategy for sustainable agricultural development. Principles of LEISA (Low-External-Input and Sustainable Agriculture) and PTD (Participatory Technology Development) were pivotal in this endeavour. Farmers needed to regain self-reliance, acquire new capacities, take over responsibilities and manage their own affairs, while the MASL staff had to become facilitators of this process - recognising and respecting the knowledge of farmers and supporting them as equal partners in development.

Key elements of the approach and methodology

Farm planning, farmer experimentation and farmer-to-farmer extension were regarded by PMHE as the key elements of the PTD approach in the context of the Mahaweli settlement areas. These worked hand-in-hand with Community Mobilisation (COMMOB) and Organisational Development (OD) to form the five main components of PMHE's approach to sustainable agricultural development.

Farm planning

Farm planning is essentially a tool for farm families to develop their farms while managing their resources in a sustainable manner, and to gain control and ownership of farm development.

The fundamentals of farm planning. Efficient resource use is the cornerstone of farm planning, which is based on ecological processes, LEISA principles and active participation of farm families. Recycling, biomass production, diversity, living soil, internal collaboration and efficient use of all resources are aspects of the natural environment that are imitated in farm planning. External inputs are considered only when all options within the farm have been fully utilised.

Farm planning is a tool to achieve systematic development of the whole farm - the irrigated plot and the homegarden - over several years, and provides a framework for action. This plan, however, is a flexible overview of how the farm family would like to develop the farm, and can be changed as and when required. In putting the plan down on paper, the family makes a commitment to farm development and also gains confidence in saying: "This we can achieve on our farm with our own resources."

Farm planning is also a participatory process in which the farm family takes the central decision-making role, guided by extensionists as facilitators.

Application of farm planning. A farm planning exercise begins with a situation analysis of the farm, considering both the irrigated plot and the homegarden. All resources and opportunities are identified. These findings are then depicted visually in the form of a map. Looking at the resources and opportunities, and bringing in its own vision, the farm family draws a map of the desired situation. A long-term (3-5 years) plan of action is then formulated, and consists of activities to reach this desired situation on the farm. Short-term or seasonal plans are extracted from this master plan as segments of development to be undertaken by the farm family in a given agricultural season. At the end of each season, the family assesses the progress made, makes alterations according to its needs, brings in new ideas and experiences, and re-plans for the next season.

Over the years, the methodology was refined to one that could be adopted by the MASL staff within their regular extension activities, consisting of the steps shown in Table 1.

Monitoring the implementation of farm plans and end-of-season evaluations with the farmers were incorporated into the regular extension activities of the Field Assistant.

Table 1: Steps in farm planning

Activity	Purpose	By whom and how
Awareness session	Orientation to farmer groups on farm planning and select group of farmers (35-50) interested in doing farm planning.	General meeting with all farmers by AO / FA or UM.
Session 1(½ day)	Identification of the sustainability of soils by comparing soil samples of a virgin forest and of a cultivated plot. Observation of sustainability in a forest setting.Visit to a resource farmer's land and observation of steps taken to achieve sustainability.	FA / UM / AO conduct this session at selected venue.
Session 2(½ day)	Analysis of present situation. Resource identification. Mapping of present situationof farm.	Block staff trained in FP. Group gathers at selected farm used as example for the exercise.
Session 3(½ day)	Group returns to a given location with maps of present situation and inventory of resources. Problems are clarified.	AO / FA
Session 4(½ day)	Exposure visit to farm developed through farm planning and exchange of ideas.	Visit organised by FA/UM
Session 5(1 day)	Mapping of future situation. Preparation of long-term plan. Preparation of short-term plan.	Block staff trained in FP guide farmers in small groups of 5 farmers each.

Acronyms: AO = Agricultural Officer; FA = Field Assistant (extensionist); UM = Unit Manager; FP = farm plan

The FA and UM work directly with farm families at the Unit level, whilst the AO supervises the work of FAs and UMs in all Units that form a given Block.

Farmer-led experimentation

Farmer-led experimentation is a process of iterative learning through interaction between farmers and outside facilitators. The experiments are geared not only to find solutions to current problems, but also to conserve and enhance natural resources for use by future generations.

The process. Most experiments started from problems articulated by farmers. A good understanding of the problems was gained through in-depth analysis, considering causes and effects. An inventory of the potential resources and opportunities, including human resources and good ideas, was then made. Possible options were listed; the most promising were selected for trying out. The experiments were designed accordingly, ensuring a level of complexity that could be managed by farmers. What was to be monitored, and how, was also decided in discussion with the farmers. At the end of the agricultural season, the experiments were evaluated, usually in group sessions, according to criteria set by the farmers themselves. Results were shared with other farmers. The results of one experiment often formed the basis for another, and farmers continued the process of experimentation. Farmers who went through this iterative process of action and reflection gained confidence to cope with their situations and were stimulated to try changes. Over the years, more than 2000 farmers have been directly involved in experimentation. More than 300 had close interaction with PMHE, while the others received support from MASL field staff or peer farmers.

Once farmers became involved and enthusiastic in experimentation, the more technical aspects were brought in. Farmers' skills were gradually built up so that they could undertake systematic experimentation, giving attention to aspects such as site selection and controls, replication, scale, border effects, number of variables, monitoring and evaluation.

A wide variety of issues in rice and other field crop production and homegarden development were tackled by a large group of farmers, including weed control, fertility management, soil conservation, variety selection, harvesting, processing and marketing. This diversity made the processing and systematisation of results relatively complicated. Because of the strong extension and action orientation of both PMHE and MASL and the almost non-existence of a formal research capacity in the region, the emphasis was on farmer-to-farmer and farmer-to-extensionist-to-farmer mechanisms to spread results.

Impact of farmer experimentation. The key impact of farmer experimentation was in instilling a problem-solving approach among farmers, which weaned them away from dependency and gave them confidence. Through experimentation, farmers were able to find solutions to their problems, instead of waiting for someone else to do it for them. Moreover, these solutions were well suited to the specific site conditions and therefore very appropriate. The ability to analyse problems, find suitable options, try them out and draw conclusions was a valuable capacity that the farmers applied not only in agriculture, but also in all aspects of their lives.

For example, some farmers took up experiments in zero or minimum tillage, never done in the area before, as a means of reducing costs of land preparation. By trying out

a combination of options - straight fertiliser application, organic manure, varietal selection etc - some farmers were able to increase their rice yields from 3000 kg/ha to 6500 kg/ha.

The positive findings from experiments were not confined to the experimenters alone; instead, these findings were shared and applied by a much larger group of farmers. For instance, a few farmers started to put the paddy straw back into the paddy fields as a means of recycling nutrients. Within a short time, many farmers took up the practice, as they saw its benefits.

Farmer-to-farmer extension

Farmer-to-farmer extension as an integral part of almost all activities undertaken with farmers took many forms:

- *Group discussions* for sharing what farmers know with others and for planning;
- *Inter-group events* where more than one small group of farmers came together and also invited outsiders, e.g. for group anniversaries, end-of-season evaluations;
- *Visits to resource farmers* with a certain specialised activity or experience to gain first-hand information;
- *Cross-visits* during which groups of farmers from one location (Unit) visited farmers in other Units to learn what they were doing, often covering the range of experiments being done at that location;
- *Farmer presentations*, often with a strong visual component in the form of photographs, diagrams, pictures etc, to convey farmer experiences to a larger audience;
- *Farmers as extensionists/facilitators*, depending on their motivation and interests. Praja Sevakas (community servers) were those men and women who had a vision and were interested in being facilitators of the community development process. Resource farmers, on the other hand, were those willing to share their knowledge and experiences in a particular activity, e.g. experimentation, livestock keeping, crop husbandry.

Farmers mentioned the following as major benefits of such activities:

- *Seeing another farmer doing is believing*: a farmer's experiment is more convincing and realistic than a trial plot in a research station;
- *Relevance of experiences*: what farmers see and learn from others often provides solutions to their own problems and new activities and ideas to try out;
- *Conducive learning environment*: a paddy field or a farm is a very non-threatening and informal atmosphere, particularly for women, and gives farmers the opportunity to participate freely;
- *Building bridges*: the possibility of creating linkages with other farmers is crucial in a settlement scheme, where contacts among farmers are initially weak;
- *Confidence building*: Hosting farmer groups or presenting findings to others helps build self-confidence of the experimenting farmers.

Community mobilisation and organisational development

In addition to the above three components of PTD, PMHE's approach to sustainable agricultural development included two more components. The fourth is community

mobilisation (COMMOB) and focuses on attitudes and skills to be built up to empower farmers. This is an approach inspired among others by Freirian thinking and has a considerable history in Sri Lanka. It encourages people to analyse their situation in the widest sense, creates awareness about what can be done by joining hands and encourages action planning. Central in this approach is the formation of relatively small farmer-neighbourhood groups, which either stay informal or become more formalised in the course of time. Considering the lack of social structure and coherence in the Mahaweli settlements, the hundreds of small groups that emerged were of crucial importance for the development and implementation of all other activities.

Closely linked to the above is a fifth component: organisational development (OD). This aims at strengthening community organisation emerging from the social mobilisation efforts. It addresses issues such as management and administration of groups, leadership and conflict resolution. In line with PMHE's overall approach, OD efforts are very much farmer-led and demand-driven. As a result, a variety of community organisations have emerged. Some small groups became formalised but remained on their own; others joined together to become federations of small groups. Some maintained a single purpose (e.g. saving and credit, marketing), while others developed a much wider agenda. In the later years of the project, the COMMOB/OD approach was also used successfully to strengthen the farmer organisations initiated by MASL for the purpose of community-led water management.

Integrating the approach into the MASL

The process of participatory development could not be sustained within the Mahaweli Systems, unless the MASL recognised and integrated it. The organisation was strictly hierarchical, with a blueprint approach to development and a paternalistic attitude towards the settlers. Taking on an approach to development based on farmer participation therefore required fundamental changes. These changes had to be brought about at three levels: 1) enabling staff to take on the role of development facilitators through a process of training and backstopping; 2) assisting middle-level staff to manage participation; and 3) lobbying at the higher-level to bring about favourable conditions for participatory development.

Building staff capacity

Content. Approximately 100 training workshops in participatory approaches were conducted during the period January 1995 to June 2000. This included full-fledged training workshops as well as periodical refresher sessions. The staff categories included in the training came from all layers of the MASL, from Unit to Head-Office level, and the subject matter varied accordingly. PMHE's contribution to training was extensive and included sponsorship, logistics, collaboration with various Mahaweli agencies in selection of trainees, training support in the form of trainers, co-trainers and field facilitators. Training was conducted in the following subject areas:

- Participatory rural appraisal (PRA) - focusing on building rapport with settlers and involving them in situation/problem analysis;

Photo by: PMHE.

Field assistants facilitating a farm family in developing a farm plan as part of their training.

- Farm planning for sustainable farm development (FP) - paying attention to optimal use of available resources in a systematic, planned manner;
- Participatory technology development (PTD) - concentrating on recognising and harnessing farmers' knowledge in a process of joint experimentation;
- Community mobilisation (COMMOB) - focusing on attitudes and skills to be built up in order to empower farmers;
- Organisational development (OD) - promoting strengthening of community organisations, as a follow-up to community mobilisation.

These topics were treated systematically through a sequence of training events covering a period of 1-2 years, with each event linking up with and looking back at the previous one.

Training in PRA, PTD and FP were conducted initially. PRA training was considered pivotal for all categories of MASL staff, as it focuses on developing the attitudes and skills required in facilitators. Continuing from PRA, PTD was important to develop the capacity of MASL field officers to interact with farmers in finding solutions to their specific problems through a process of joint experimentation. Training in FP imparted the skills and the knowledge required for an extensionist to guide farm families through a systematic process of planning their farms, using available resources optimally.

As field staff began to work in closer collaboration with farmers, the need for better facilitation and group-moderation skills for community strengthening emerged. Training workshops in community mobilisation (COMMOB) and organisational development (OD) were a response to this need and were conducted in 1998 and 1999. Participatory

monitoring and evaluation was an integral part of each topic and focused on finding simple systems of monitoring and evaluation with farmers. Gender was another aspect that encompassed all subject areas and helped officers to understand the different roles and responsibilities of men and women in development activities and, thereby, to ensure active participation of both parties.

Targeting training. In a large, multi-layered organisation like the MASL, selection of staff categories was crucial to achieve wide-scale application of participatory approaches. The first priority concerned people who worked directly with farmers, namely Field Assistants and Unit Managers. Application of participatory approaches by field-level officers required understanding by their immediate supervisors. Hence, the next category of staff that needed to be trained consisted of Agricultural Officers, Community Development Officers and Institutional Development Officers at Block level. Block Managers, who coordinated all development work, were also given orientation in participatory approaches. Human Resource Development Officers, who were attached mainly to the training centres and whose main responsibility was training, were included in all training programmes. Several programmes, some specially tailored, were targeted at the middle- and higher-level managers of the MASL.

Training content varied according to staff category. Field- and Block-level staff members were given intensive training, with a large component of fieldwork. Such workshops were of longer duration and more detailed. Shorter workshops or discussions, which generated awareness on participatory approaches, were used for managers. As opposed to field staff, that underwent 10-day rigorous PRA training, managers were exposed to a 5-day orientation programme. The same applied for PTD and FP.

Training approach. The training organised by PMHE differed significantly from what MASL staff were used to. Moving away from the conventional "top-down" courses focusing on transfer of information, the training in a workshop style was geared towards proactive learning. Focused learning sessions were interspersed with fieldwork that allowed trainees to practise what they learnt and then to reflect on how they acted. Such reflection helped trainees to go deeper into the subject and to gain new insights. All workshops, also those for higher-level staff, created space for trainees to interact directly with farm families. Assignments with farm families, visits to resource farmers and brainstorming sessions with farmers were all means of developing the relevant attitudes and skills, such as respecting farmers' knowledge, dealing with gender issues, stimulating creative interactions with farmers etc.

Training of trainers. Conscious of the fact that training in participatory methodologies cannot always be done by external trainers, PMHE began in 1995 to identify potential trainers from within MASL, who could be groomed for this task. A number of training-of-trainers workshops were organised in all the core subject areas. Such workshops generally consisted of 10-14 days of highly intensive work, combining theory and practice in an active learning environment. The project strongly believed that a PTD trainer can be effective and convincing only if she/he practises the main principles of participation during the training itself. These potential trainers were then given further on-the-job guidance as co-trainers with PMHE staff in relevant training workshops.

As most of these trainers belonged to the Human Resources Development Unit of MASL, this activity was a crucial one that tied up, in a sense, all PMHE's input into capacity building of staff. It was important to provide the Unit with the knowledge and skills required not only to continue training and backstopping, but also to adapt training to meet the changing requirements of the organisation and its staff.

Development of training curricula and manuals. The above-mentioned training activities were documented in detail to form the basis for the preparation of systematic training manuals for use by MASL trainers. A first outline of a curriculum for Community Mobilisation was discussed and adjusted to serve as an example. Curricula for the other subjects were prepared accordingly. Detailed session plans per curriculum were then worked out through a similar process. Each curriculum was tested and fine-tuned in ongoing training programmes. While all training manuals give step-by-step directions on how to organise training on the relevant topic, they also indicate where the users need to adapt the modules and innovate to suit group- or situation-specific requirements. Workshops for orienting the trainers on using the training manuals were also conducted.

Backstopping of field staff. Very early in the process of training, PMHE noticed some reluctance on the part of trained staff to apply the newly gained knowledge and skills. Although training workshops provided some "hands-on" exposure through short field exercises, it was obviously not sufficient to build up the confidence required to embark on application in the field. Even the more adventurous among the trainees dared only to take small steps in trying out what they had learnt. Backstopping was essential to reap the full benefits of training.

Backstopping evolved over the period and depended on the availability of PMHE staff, requests from MASL, type of training etc. The backstopping activities included:

- Sharing sessions for trained staff: these were usually one-day sessions during which staff members could openly exchange their experiences;
- Post-training refresher workshops: these were held per subject area and were more structured, dealing with problems of application faced by trainees in the field;
- Joint monitoring of post-training assignments: this was common in the case of FP and PTD. At given times during the agricultural seasons, follow-up visits were made to Field Assistants implementing their assignments, together with their superiors, the Agricultural Officers;
- On-the-job guidance to trained staff in routine MASL activities: PMHE staff joined MASL officers in their regular field programmes, mainly in the role of observer, helping out if and when necessary. On-the-job guidance in this manner proved to be very effective in building up MASL field staff to become excellent facilitators of participatory development.

Training impact assessment. An independent study carried out in the latter part of 1999 by the Department of Agricultural Extension of the University of Peradeniya, Sri Lanka, looked into how training in participatory extension methods/tools affected the

working styles of Field Extension Officers[3] (FEO) in three projects under the MASL and the Ministry of Agriculture. PMHE was one of three projects included in the study. It was found that FEOs had learned new methods/tools relevant to their day-to-day activities and were using them in extension activities with farmers. Both farmers and superior officers had experienced favourable changes in the behaviour of FEOs in interaction with their clients, *i.e.* the farmers said that FEOs were friendlier towards them and respected their views. More than 75% of the FEOs interviewed during the study were positive about the training received and agreed that they gained greater job satisfaction by using participatory methods and had increased their extension coverage with farmers (Wanigasundera & Sivayoganathan 1999).

Support to manage participation

Institutional development and organisational strengthening. Field officers who began to adopt a more participatory working style needed to be understood and supported by their superiors. In the MASL, the first and most crucial level of managers who deal with field officers is that of the block managers.

While all relevant staff at the Block level was exposed to PRA,PTD and FP though the above-mentioned training programmes, PMHE found that a more focused support to Block Managers was needed to motivate them towards a participatory approach and to enable them to manage their Block effectively on this basis. Support was given to block managers in strengthening their understanding and capacities in institutional development and organisational strengthening (ID/OS). The participatory principles of ID/OS training were to stimulate the block managers to take a more positive look at their situation and learn to respect the knowledge of farmers and staff as a valuable contribution to effective planning.

A series of one-week training workshops in ID/OS were conducted in 1998 for block managers. These included the topics of networking, inventory of key institutions in the area and the roles in development, and patterns of collaboration with the block office. Block staff was also challenged to do an internal SWOT (Strengths, Weaknesses, Opportunities, Threats) analysis to identify areas for improvement. Division of responsibilities among block staff, management style and mechanisms, and involvement of farmers and other stakeholders in development activities were areas identified.

Backstopping middle-level managers. Following the training, the block managers were given backstopping by PMHE staff in initiating ID/OS-based activities such as:

- facilitating the use of the "institutiogram" as a tool for analysing the activities of the block office in relation to all actors and for identifying areas for networking;
- analysing the tasks and skills of block staff to determine a more efficient use of human resources;
- identifying the priority areas of development for re-organising the block to function more effectively and efficiently;

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[3] Field Extension Officer was a common term used to refer to the staff category involved in field extension activities in each project. In the case of the MASL, these were Field Assistants (FAs).

- identifying the training needs of the block in relation to the tasks to be carried out;
- incorporating participatory action planning for the preparation of annual and seasonal workplans.

These interactions began, slowly but surely, to give block managers confidence in applying participatory approaches to management.

Support to on-the-job planning sessions. Finally, block managers were supported with the facilitation of block planning exercises, so as to integrate the priorities and plans of farmers. In some blocks, a team-building session was held prior to the planning exercise. In most cases, this was the first time that all block staff had come out of their compartments to prepare an action plan together. Genuine enthusiasm was observed as staff members set a common goal and found ways and means of achieving it through pooling of resources, irrespective of the department or sector. Regular sessions for monitoring the plans in a participatory manner were also scheduled.

Creating the conditions to sustain the integration

The full potential of all changes at field- and middle-level could be achieved only if the strategy for participatory development was fully integrated into the overall MASL approach and structure. Here again, PMHE worked on many fronts and with many key persons, mainly at the higher levels of the organisation.

Creation of awareness and acceptance at higher levels. *Seminars and workshops* were specially tailored to provide decision-makers with a clear picture of field developments and to raise issues that needed attention. These were also occasions when farmers were put in direct contact with higher officials of MASL to discuss important issues. *Successful case studies* were included in the progress reports to the project steering committee, which consisted mostly of top MASL officials. *Close personal contact* with sectional heads kept a continuous and open dialogue going about the process of participatory development and its implications. This helped to incorporate their views and led to strong support for the strategy. A few key MASL staff members were given opportunities to *study participatory approaches* abroad. Many openings for integrating elements into regular MASL programmes were thus found.

Close collaboration with staff of the agricultural division. A crucial point in the institutionalisation of PTD is the close collaboration and rapport that PMHE built up with the staff of the agricultural division of the MASL. Recognition of the approach by the director and his colleagues in the head office paved the way for smooth implementation by the staff at lower levels. Experiences of MASL staff in participatory approaches were documented in a video called "A new approach for the Mahaweli fields" in the Sinhala language (MASL 1999).

Formulation of MASL extension policy. The agricultural division in the head office was also responsible for formulating the MASL agricultural development policy. PMHE's lobbying was rewarded when the new policy document included an extension component with several key elements of the participatory approach: problem analysis with farmer

groups using PRA tools, participatory extension and farmer experimentation. It provided the legal framework for wider application of the strategy, also in other Systems of the MASL.

Networking and building alliances. PMHE looked continuously for allies beyond MASL and was actively involved in networking within Sri Lanka on participatory development. By being in these networks, PMHE could pave the way for MASL, its counterpart, to join and share the rich diversity of experiences. The PTD working group (see Box 1), one such network, made a significant impact on the scaling up of PTD experiences in Sri Lanka.

Support to the farmer bulletin "Aswenna". *Aswenna (Harvest)* is a monthly bulletin published by the MASL as a source of information to the farmers, who have very limited access to resource materials. In July 1995, PMHE was requested to take on sponsorship of the bulletin. Being involved in promoting an approach that put farmers in the centre stage of their development, PMHE felt that the bulletin was an ideal medium for taking this message to other farmers. Apart from providing financial support, PMHE's major contribution was in encouraging more farmers to contribute their experiences related to different aspects of the participatory approach, *i.e.* experimentation, self-help groups, farm planning etc.

Working through regular MASL programmes. For PTD to be integrated fully into the MASL, PMHE supported the inclusion of PTD components into regular MASL-wide agricultural programmes, such as the *Adarsha yaya* (model tract of cultivation) programme. This programme was implemented in all the Mahaweli Systems and took the farmers of a selected irrigated tract (*yaya*) as entry point for integrated agricultural

Photo by: PMHE.

A farmer volunteer (Praja Sevaka) sharing experimental findings with fellow farmers.

Box 1. Building alliances: the PTD Working Group in Sri Lanka

The PTD Working Group was an initiative of three donor-funded projects - namely, the North Western Province Dry Zone Participatory Development Project, the Smallholder Integrated Livestock Extension Project and PMHE - working in the field of sustainable agricultural development in different parts of the country. The objectives of the network were primarily: mutual learning through sharing of experiences in the application of participatory methods and tools in agricultural extension; sharing of resources and know-how (especially trainers); and conducting joint training-of-trainers programmes to improve the capacity and skills of local trainers. The network was set up in 1995 and was soon joined by two other organisations - CARE International and the Netherlands-assisted Integrated Rural Development Programme in Nuwara Eliya.

Although the members' involvement was voluntary, a narrow focus, concerted efforts, good cooperation and a high sense of commitment helped the working group to meet many of its goals and to have a positive influence on the government counterparts about the merits of participatory extension methodologies. Whilst being an active member, PMHE ensured that MASL, its counterpart, was introduced and gradually became a part of the working group. For the MASL staff, the working group was a great opportunity to meet, share and learn together with colleagues of other governmental agencies and NGOs.

Mutual learning through sharing of experiences
During the first year, the discussions were more fundamental in nature. After having experimented with PTD for 2-3 years, several topics of common interest were discussed at bi-monthly meetings. Problem identification, planning and policy on (free) input provision; approaches in group development and social mobilisation; farmer experimentation, design and monitoring; involvement of government officers in PTD and the role of transfer of technology in PTD were among them. The second year focused on more practical application of PTD and on problems faced in the field. A first round of cross-visits to each of the projects took place in this year, and proved very insightful.

Linking learning and lobbying
By the third year, the focus of the working group shifted to scaling up PTD approaches. Realisation of the need to bring PTD to the attention of a wider audience led to the joint organisation of a national PTD workshop in September 1997. Each member of the working group presented its own experiences in using the PTD approach, and highlighted one or more aspects of it. As intended, the workshop raised awareness on PTD among government agencies involved in agricultural development, familiarised the participants on how it could be adapted in various organisational settings and highlighted the institutional and managerial implications for effective application of PTD. Subsequently, a number of regional workshops were organised in 1998, each coordinated by one working group member, to allow greater participation of staff and government officials at regional level. In 1999, PMHE itself - with support from working group members - organised a two-day national seminar on farmer participation in the MASL development areas, which was attended by the Minister of Mahaweli Development and many high-level policymakers.

Training in PTD and training of trainers
As an original objective of the PTD working group, training of trainers in PTD was taken up seriously. PMHE, through its contact with ETC, was instrumental in introducing an external trainer to the working group and arranging several PTD training programmes for its members. A handpicked group from the member organisations and their government partners, who had the potential of being future PTD trainers, participated at the first Training-of-Trainers Course conducted in January 1997. A second in the series was conducted a year later in May 1998, with a refresher for the first batch of trainees. The investment in these two programmes resulted in the formation of a national pool of PTD trainers, who were able to meet most of the training requirements in PTD in Sri Lanka.

Pooling of resources
The third objective set by the working group was to pool resources among members. All resources related to participatory extension available within the working group were categorised and made available to all members. Apart from books and videos, trainers were another important resource shared within the working group. Not only did this allow for meeting training requirements, it also opened doors for cross-fertilisation of ideas and experiences. For the trainers, it was a great opportunity to widen their horizons and to build closer links with their colleagues in the pool.

development. Aspects of the participatory approach developed under PMHE that were included in this programme were:

- initiating the programme by doing a participatory situation analysis and options assessment with the farmers using PRA tools
- making a *yaya* plan together with farmers
- incorporating farmer experimentation to find solutions to location-specific problems
- bringing in farm planning to look at aspects of the farming system, especially from a viewpoint of resource management
- supporting integrated pest and weed management activities
- conducting participatory monitoring and evaluation sessions based on the yaya plan
- stimulating farmer-to-farmer extension as a means of sharing results.

In fact, this was one of the key points of interaction between PMHE and MASL staff after 1998, when PMHE withdrew from direct implementation. It was also well received by MASL field staff, who had to service farmers in a much larger area on account of the restructuring of the organisation and retrenchment of staff.

The impact of all these efforts to integrate the participatory approach developed with support of PMHE into MASL can be seen in the case of one *yaya* programme described below.

PTD in MASL after the project: a case study

Since the closure of PMHE in 2000, PTD is part and parcel of the agricultural extension programme of the Mahaweli Agricultural Extension Service. The Farmer Field School approach and the *Adarsha Yaya* approach are two examples where PTD is integrated and, as such, extensively practised in Mahaweli. Officers and farmers conduct field days to share the findings on successful experiments. Farmer seminars are held to present new field experiences to a wider group of farmers.

Model tract of cultivation

The Model Tract of Cultivation concept was introduced into Mahaweli areas to demonstrate the possibility of increasing rice yields. A tract of cultivation ranges between 50 and 100 ha, in which each farmer has a plot of 1 ha. The model tract in Mutuwella, in System B, started in the wet season of 2000 (see Table 1). At the very beginning, farmers gathered to discuss, with facilitation from the Field Assistant, their present situation and to identify the problems pertaining to the present yields of the rice crop. This analysis resulted in a problem tree. The roots of the problem were formulated as: lack of knowledge on the most suitable varieties for soil and climate, use of inferior quality of seed paddy, poor access to credit to purchase inputs such as fertilisers, and soil fertility depletion.

Table 1: Yaya programme extension approach

Step	Actors	How	Output
Adarsha yaya formation	FA and farmers	Meeting	Farmers interested in group activities to improve rice yields
Problem identification	FA, AO and farmers in group	Group discussion	Problem tree
Inventory of technology	AO	Visits to research institutes	Identification of need for location-specific trials
	FA, AO, and farmers in group	Group discussion	Observations on experiences with different rice varieties
Guidance in design	Research officer	Field practical	Design of simple experiment
Choice and adjustment of experiment	Farmer group	Group discussion	Experimental agenda
Monitoring of experiment	Experimenting farmers, Research officer, FA and AO	Records maintained by farmers and FA or Research Officer	Successful experiment in farmers' fields
Assessment of results	Farmers/farmer group	Observation/ discussion by farmers and group	Useful results for sharing
	Research officer	Statistical analysis of data	Results to complement farmers' findings
Sharing the results	Farmers, FA, AO, Research officer	Group meeting	Follow-up plans / spreading of findings

To eliminate these root problems, farmers decided to carry out many activities in their rice fields. Each farmer now has a well-maintained plot for seed production and a live fence around the rice field to produce green manure. They do not burn the paddy straw of the previous crop, but rather incorporate it into the soil. They obtain fertiliser through group-loan schemes. To test the most suitable varieties for their land, farmers were assisted by a research officer from the nearby regional research station. Guidance in experimental design and seeds of promising varieties were provided. The farmers tested eight rice varieties. Cultivation was done according to normal farming practice. The farmers, field assistant and research officer together observed and evaluated the performance of the varieties throughout the trial. The farmers evaluated the varieties

using their monitoring data, which was complemented by the data of the research officer. The findings were shared with a large group of farmers and MASL staff.

Platform for mutual learning

The Mahaweli-wide Technical working group Meeting now provides a platform to discuss farmers´ problems. Research officers of all regional research stations in the Mahaweli areas, representatives of the seed and planting material division of the Department of Agriculture and Mahaweli agricultural officers together with their director of agriculture take part in such a meeting once every season. This meeting provides an opportunity to share with each other the results of the previous season. The progress and findings of farmer experimentation are also shared in this forum.

Lessons and recommendations

The following main lessons of PMHE regarding a "strategy" for scaling up and institutionalising PTD emerge from this experience:

- ***The project as a process:*** PMHE lasted for nine years, but it did not start with a clearly set-out nine-year plan. Instead, it started with an action-research phase of just nine months. Based on the outcome of that phase, another phase was granted. This flexible approach made it possible to address problems - for example, the farmers' increasing dependency on external inputs resulting in indebtedness - and to seize opportunities, such as the rapid expansion of the training programme beyond System C, once the experiences in System C were well received by MASL. Like PTD itself, project implementation was based on an experiential learning process with cycles of planning, action, reflection and re-planning. Participatory monitoring and evaluation and a strong emphasis on process documentation helped to stay abreast of changes and continuously improve strategies.
- ***Use of opportunities:*** The biggest impact was sometimes achieved by using an opportunity when it arose, even though it was not in the workplan: a certain person in a certain position, a new MASL programme that could be open for PTD. One needs to have an eye open for the right entry points for scaling up at any moment, like a surfer in the ocean waiting for the right wave to jump on. The project design should be such that it allows for using such opportunities when they arise: flexible planning and possibilities to re-allocate resources relatively easily.
- ***Success stories:*** Documentation of successful initiatives (in the form of videos, case studies in progress reports, supporting a farmer magazine, compiling detailed training guides) and systematic dissemination of the documentation were useful in spreading the approach both within MASL and beyond (e.g. MASL 1999, PMHE n.d., PMHE 2000, Wettasinha 2001).
- ***Extensive, systematic capacity building:*** Systematic training, backstopping and refresher training for all levels of MASL staff, reinforced by working alongside the trained officers in the field, were instrumental in applying the strategy within MASL. As far as training programmes are concerned, the best sequence in training evolved as being: first PRA (focusing on attitude and skills) followed by content training (PTD, farm planning, community mobilisation and organisational development) and finally institutional development/organisational strengthening focused on

organisational implications of working in a participatory manner. ID/OS for middle-level managers was a first step towards managing participation and the follow-up activities in the field of organisational capacity building.

- ***Ownership of the change process:*** Key MASL staff members were actively involved in the scaling-up process in their own organisation. They adapted and synthesised the approach into the ongoing MASL policies of Farm Resource Management and Strengthening of farmer organisations, which was considered more important than "scoring points" (gaining recognition) as a discrete project at a limited scale.
- ***Building alliances:*** Networking went beyond MASL and included other initiatives at national level, as for example through the PTD working group. However, these activities included MASL staff and resulted in spreading of the approach. Partnerships and strategic alliances were established with other projects in the country, with representatives of related Ministries (e.g. Ministry of Agriculture) and, within MASL, with the heads of departments. The result of these efforts was the message that active farmer participation is essential for agricultural development.
- ***Carrying the message:*** All those who found favour in the participatory approach in general, and PTD in particular, e.g. enthusiastic farmers, MASL staff, village volunteers, were stimulated to tell their stories and to encourage others. The presentations by farmers and lower-level field staff to higher-level officials, for which PMHE created the opportunities wherever possible, may be the single most important factor in convincing the MASL about this approach.

References

MASL. 1999. *A new approach for the Mahaweli fields* [in Sinhala]. Video, 15 min. Colombo: MASL.

PMHE. n.d. *Strong together*. Video, 16 min. Colombo: PMHE / Media House, Open University of Sri Lanka.

PMHE. 2000. Promoting Multifunctional Household Environments: PMHE final report. Colombo: ETC Lanka / Leusden: ETC Netherlands.

Wanigasundera WADP & Sivayoganathan C. 1999. Study on the effectiveness of training in participatory extension methods/tools on the working styles of field extension officers. Department of Agricultural Extension, Faculty of Agriculture, University of Peradeniya.

Wettasinha C. 2001. Scaling up participatory development in agricultural settlements. *LEISA Magazine* 17 (3): 39-42.

Elements of a successful field day: information, experience exchange and fun.

PTD in the Kyrgyz Republic with special reference to the Rural Advisory and Development Service in Jalal Abad Oblast

Stefan Joss[1] and Kachkynbaev Nadyrbek[2]

Participatory Technology Development was introduced into Kyrgyzstan mainly by the Helvetas-funded Kyrgyz Swiss Agricultural Project (KSAP) Kochkor-Jumgal (1997-98) and the current KSAP in Jalal Abad (JA) and Naryn (NA). KSAP provides technical assistance and co-finances the Rural Advisory and Development Service (RADS) in three of six *oblasts* (districts). Four years of activities have shown that PTD is a concrete approach that contributes to developing new practices in production, processing and marketing, and generating income. However, there is a still a long way to go before the spirit of innovation and experimentation on improved production and marketing catches on fully in Kyrgyzstan.

Context

The Kyrgyz Republic is a small, mountainous, land-locked country of about 200,000 km2 in Central Asia. It is surrounded by China, Kazakhstan and Uzbekistan. After 70 years of Soviet rule, the country became independent in 1991 and, since then, has been in an economic and social transition towards a market economy and a more democratic political structure. In 1999, over 60% of the then population of 4.8 million lived below the official poverty line.

Agriculture is the most important contributor to the national Kyrgyz economy. According to official figures, 48% of the population work in agriculture and contribute 44% to the Gross Domestic Product (GDP), 10% working in industry contribute 22% of GDP and those working in services 33%. According to officials, the unemployment rate is less than 10%. This figure does not include workers temporarily laid off as a result of enterprises lying idle. Government employees often have to rely on additional sources of income, because salary payments are delayed by months. In the 1990s, despite substantial recovery in agricultural production and value added to near or above 1990 levels, rural incomes per capita fell substantially.

Jalal Abad (JA) *Oblast* (district) has two main agro-economic zones: a lower zone of intensive crop growing and an upper zone of extensive agriculture, based mainly on

[1] KSAP Advisor to RADS Jalal Abad, ul. 50 let Kirgisii 10, 715609 Jalal Abad, Kyrgyzstan (ksap-adm@helvetas.kg)

[2] Subject Matter Specialist, RADS Jalal Abad, Kyrgyzstan

animal husbandry. JA *Oblast* is divided into eight *rayons* (subdistricts), five in the lower and three in the upper zone. In the three biggest *rayons* of the lower zone, more than 60% of the agricultural GDP of JA *Oblast* is earned, whilst the upper zone contributes a mere 14%.

These figures also reflect the population density. The three agro-economically most important *rayons* are home to 59% of the rural people; only 8% live in the mountainous *rayons* of the upper zone. The average number of persons in each of the total of 67 village management units (Ail Ökmöt) in JA *Oblast* is high in comparison to other oblasts of Kyrgyzstan. The irrigated land owned per person varies between 0.06 and 0.5 ha. There are farms run by single families or small groups, and larger peasant farms (*dykan tsharpa*) with up to 1000 members.

The Rural Advisory and Development Service Foundation (RADSF)

The RADSF is meant to be a farmers' organisation with farmer councils (legislative bodies) at three administrative levels (*rayon, oblast* and national). The executive body consists of six regional centres (*Oblast* RADS) and a secretariat in the capital Bishkek. The role of the secretariat is to coordinate activities, to train advisory staff and to provide (financial) supervision.

The main aim of the RADS is to raise the standard of living in rural areas, which is linearly correlated with agricultural productivity. The RADS gives training to individual farmers, farmer groups or farmer associations.

In the *oblast* centre, a Regional Manager and five subject matter specialists (SMS) provide logistical and topical support to the *rayons* and are responsible for planning, monitoring and evaluation. In each of the eight *rayons*, 3-5 *rayon* advisors work. They are generalists with a basic knowledge in all spheres of agriculture and are in close contact with "temporary promoters", either "village promoters" (VPs) who are women working with groups, or village specialists (VSs) in charge of a specific task. A VS has either specific topical education (possibly an academic degree) or - even more importantly - profound experience in the subject matter.

The RADSF has four sources of finance: 1) a loan from IFAD (International Fund for Agricultural Development) and the World Bank, 2) the Kyrgyz Government, 3) a grant from the Swiss Government (implemented by Helvetas) contributing 51-60% to the budgets of the oblasts Naryn Issyk Kul and Jalal Abad, and 4) the beneficiaries. By the end of 2003, the beneficiaries are supposed to contribute 5% of the RADS budget. As of now, the Russian saying, "he who pays calls the tune" seems true as the RADSF is controlled primarily by donors and the Kyrgyz Government and only to a limited extent by farmers.

How PTD came to Kyrgyzstan

The first projects - advisory service and credit

Agricultural extension activities started in Kyrgyzstan in 1994 when the ATAS (Agricultural Training and Advisory Service) project set up a training centre in Bishkek. Later, TACIS-1 (Technical Assistance to the CIS Countries) advised farmers in Chuy, Issyk Kul, Talas and Jalal Abad through training and visits. The German Agency for Technical Cooperation (GTZ) started its advisory project in Osh *Oblast* in spring 1997.

On behalf of the Swiss Government, Helvetas started the Kyrgyz Swiss Agricultural Project (KSAP) in 1995 in the *rayons* of Kochkor-Jumgal in Naryn *Oblast*. In the same year, Caritas started the KSAP in Suzak, Bazar Korgon and Nooken *Rayons* of JA *Oblast*. At first, each project had its own or an associated credit component, and advisory topics were linked to credit in most cases. In 1998, the approach was revised in all projects, when Caritas ceased advisory activities and went for an independent credit line, Helvetas discontinued credit and focused on technical assistance, and GTZ institutionalised the link with the American-funded ACDI/VOCA. In 1997, with the support of Helvetas, participatory advisory approaches were started by KSAP in Kochkor-Jumgal.

"Advisory field laboratory" in two *rayons* of Naryn *Oblast* - a step towards PTD

In the field of seed-potato cultivation, fodder mixtures and meat and milk processing, Helvetas started collaboration with scientific institutes such as the Agrarian Academy (Division for Seed Potato), the Pasture Institute and the Polytechnic University. GTZ started to work together with the Osh State University. This collaboration with research institutes was a concrete step towards PTD. While planning was still in the hands of the researchers, implementation and ownership of the PTD experiments were in the hands of the farmers. In the case of seed potatoes, cheese and meat, the farmers were to a certain extent accountable to the service, as they received material support. Already in the second year, farmers organised themselves and decided on their own about the use of the seed. However, a fairly rigid legislation and unreliable input of original seed material prevented the technology from spreading to a larger number of farmers. None of the meat products developed during the experimental phase is produced commercially today.

Introducing PTD into the World Bank-supported RADS - starting to scale up

The World Bank and IFAD fund the Agricultural Services Support Programme (ASSP), which aims at providing services to farmers through the RADS. Adaptive research is foreseen in the planning document for the ASSP and its implementation within the framework of the RADS. The appraisal report describes adaptive research as "demonstration of proven small farm technology at *rayon* level" and refers to participatory research to develop a pipeline of new technology.

In Kyrgyzstan, the RADS is the major actor in transferring information and skills to farmers. In JA *Oblast,* as in the other five districts with RADS in Kyrgyzstan, it uses three main tools in providing advisory services to farmers: training, adaptive research

(PTD) and group formation. The first is applied in a rather linear Training-and-Visit approach, and group formation may not be considered as a "direct" advisory tool. Adaptive research offers the greatest room for manoeuvre in terms of methodology and technical approaches. It is the most practice-relevant form of farmer support foreseen in the planning papers.

PTD training and exposure for the various actors involved

PTD cannot be studied and then applied. The researchers and advisors involved have to learn while acting and reacting together with farmers. PTD in its entire complexity is only beginning to be built up in the RADS, and therefore needs continued follow-up.

Staff of RADS JA became acquainted with PTD for the first time when a SMS and a rayon advisor took part in a workshop in Issyk Kul *Oblast*. In the same month, these two staff members spread their knowledge to the advisors of RADS JA. Figure 1 shows the dissemination of knowledge through practical exercises. It distinguishes thereby between participation in PTD weeks (reception of information), illustrated with a white circle, and competencies (experiences, skills) gained through reproduction of PTD methodology as trainer or moderator, illustrated with a black circle. By the end of the year 2000, RADS JA has one master trainer, two trainers and 12 co-trainers in PTD.

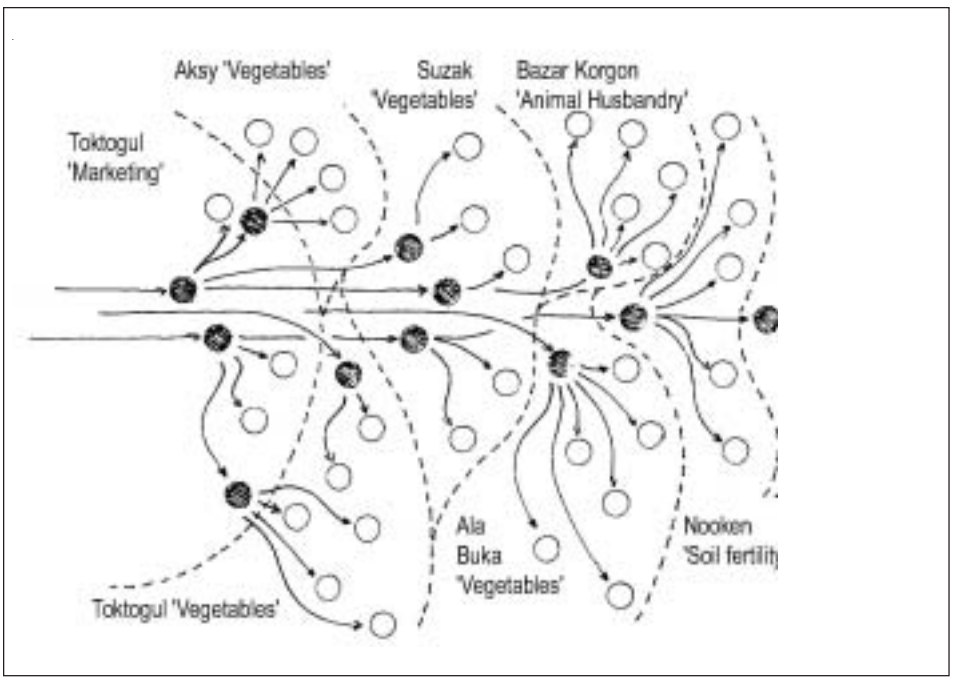

Figure 1: Dissemination of PTD among the staff of RADS Jalal Abad in major practical exercises. (●= performers, ❍ = participants)

My name is Ergesh Bekeshov. I'm a leader of a farmer association in Aksy Rayon of Jalal Abad *Oblast*. The association consists of five families, a total 38 persons, all relatives of ours.

We have 4.8 ha of irrigated land, located at an altitude of 1400 m. We decided to grow seed potatoes because they do well and we can sell them to the lower regions and to Kolkhozes in neighbouring Uzbekistan.

In the first year, Konstantin Pavlovich showed us three different ways of growing seed potatoes. The yield was good and so I prepared, together with Nurkul, a plan for the next three years. In the second year we had some difficulties with Phytophtora, but Nurkul showed us how to treat it and Konstantin explained what Phytophtora is. Now we plan to get the status of seed farm, but for that we need 50 ha of land.

My name is Nurkul Stamov. I graduated from the Polytechnic Institute of the former Kyrgyz Soviet Republic in food engineering. In 1989 the Aksy dairy plant became a victim of Perestroika and so I lost my job. Later I was given some land and gained experiences as a farmer. In 1999 I passed the exam and became a RADS advisor. In RADS each advisor is a generalist and so I had to familiarise myself with many new fields in agriculture.

From Bekeshov I learnt about the economic side of seed-potato growing and marketing. With my knowledge in business plan preparation, we drafted a plan for the next three years. From Konstantin I learnt how to grow potatoes, but also how to determine the yield in a scientific way. I'm the link between the two as the villagers often have no telephone.

My name is Konstantin Pavlovich Gorbov; I have a PhD in meristem seed potato production and am a lecturer at the Agrarian Academy of the Kyrgyz Republic. Moreover I'm the head of a seed potato laboratory, which has recently been privatised. As my salary as lecturer is only US$ 14 a month and paid irregularly, I concentrate more and more on commercial activities like the sale of seed potato or consultancies.

In 1997, the Advisory Service brought me, for the first time, together with farmers. This collaboration allowed me to contribute to basic on-farm seed development and to get valuable insights for my scientific work.

The advisory service helps me to continue my work as a researcher in the economically difficult transition period.

The farmers

It is difficult to characterise farmers involved in PTD in Jalal Abad. Some are so-called *Akimiat* farmers; this means farmers with a close relationship to local administration. The majority of clients are leaders of a farmer association or individual farmers with initiative. Only a minority are so-called poor farmers. Mainly the vegetable experiments, for which women were approached, reached this last group.

In RADS JA about 40% of experiments were set up and implemented together with women. Despite the fact that the follow-up of these trials through village promoters and female rayon advisors often lacked professional technical inputs, many of these trials were brought to a concrete result.

The research scientists

In RADS JA, the participation of scientists in PTD is a bottleneck. In most teams, there were no formal researchers. In all PTD weeks dedicated to vegetable growing and conservation, local resource persons therefore took the place of scientists. Scientists who graduated from Russian institutes often have a narrow specialisation and/or have not followed the trends of the last 20 years. When RADS JA wanted specialists in biological plant protection, there was simply no scientist available with such a specialisation.

The role of formal research was discussed on various occasions. In certain cases, the research scientists themselves wanted a closer involvement in the PTD experiments. However, their main motivation to collaborate with the extension service was not to test the innovation but rather to receive the cash payment - a fact that some of them admitted openly in informal discussions.

Staff of the advisory service

*Rayon **advisors*** are the link between farmers and formal researchers. Their participation in PTD weeks was aimed at:

- acquainting them with the methodology;
- initiating concrete advisory activities, to be followed up by the advisors;
- experiencing farming, farmers and their problems anew, while collecting the feedback and perception of outsiders (other advisors, specialists, facilitator);
- increasing their self-esteem and advisory/public relations effect.

The experience in RADS JA showed that rayon advisors were not able to conduct an entire PTD week on their own after being exposed to PTD methodology elsewhere.

In most PTD weeks, ***village promoters*** (VPs) were involved. VPs are part-time staff of RADS JA and in charge of group formation and coaching. The promoters have been able to bring the members of a group together, and later different groups together to exchange experiences. In most cases, the technical support given by VPs to farmers was poor. There are a number of cases in which PTD experiments gave good results without VPs.

Approach, planning and set-up

Selection of topics

Every October, RADS JA carries out local planning exercises in the villages covering three main aspects: 1) an assessment of the ongoing programme; 2) suggestions as to which topics should be added in the next year; and 3) suggestions as to which ones should be dropped.

It is then up to each specialist to decide which advisory tool is most suitable to deal with the problem. In 2000, only the agronomist and livestock specialist chose the PTD methodology as a tool. This rather liberal approach has the advantage of leading to need-based "research", but it involves a broad range of topics and challenges all staff with respect to facilitation and support.

A typical PTD initiation week

Each PTD week in RADS JA was dedicated to a specific topic and carried out as follows:

Day 1 Introductory workshop in a central village: mutual introductions, methodology of PTD, use of participatory rural appraisal (PRA) tools for the survey, common language regarding the topic, planning the visit to the village;

Box 1: About oil, bread and how an idea brings income to the Suerkulov family

It is late October in Bala Chichkan, a village in the mountainous Toktogul Rayon: We sit in the dining room of the Suerkulov family and eat tasty flat cakes (lepioshka). Gulmairam, the farmer's wife, explains to us how she came to have such nice bread.

"We were always wondering how one can make good bread, especially how bread can be stored for more than half a day and still be fresh, but the solution didn't come straight away.

Everything started in a PTD week of the local advisory service. We once heard about a new maize variety that can be used for oil extraction. When the advisory team was wondering about innovations with a chance to be marketed, we started discussing the maize idea with advisors and marketing specialists.

Later, the advisors helped us get the maize and we set up a trial comparing the new variety with our local maize. When it was growing, however, we became hesitant about our initial idea. It seemed that only the beak of the maize grain contains oil and our local extractors were not equipped for that. When the advisor brought us together with other families growing the same maize, we realised they had the same doubts.

Together we discussed alternative uses of the maize and came finally to milling it and adding it to the wheat flour when making bread. The advisor helped us prepare an analysis of the gluten content. In all cases, the new maize had more than the local one. We experimented with the mixture of flour and came to an optimal composition of 30% maize and 70% wheat flour.

Now our lepioshka have become famous and we can even sell them."

Days 2-4 Information meeting in the village, survey, visit to the farmers who showed interest, clustering ideas, going back to the farmers and refining the ideas, jointly working out the set-up for an experiment, presentation of screened ideas, welcoming farmers willing to try out the idea (technology) and developing an action plan together with them;

Day 5 Experience exchange among the different groups in the central village, handing over all action plans to the respective *rayon* advisor, discussing whether a (local) specialist is needed for the follow-up of the trial (moderator).

In many PTD weeks, the introductory meeting and the assessment were shortened. However, this posed a risk of including persons who are not familiar with the PTD methodology - often the local farmers in the preparatory phase or the specialists during implementation.

Topics of the PTD experiments and their technical feasibility

RADS JA carried out 13 PTD weeks dedicated to the following topics: production and marketing of agricultural products (1), cotton and soil fertility (1), Integrated Pest Management in cotton (1), fruit growing and conservation (1), production of prospective crops and animals (1), improvement of animal husbandry (1), and growing and processing vegetables (7).

PTD means trying out new things to see if they work: these can be either clever re-combinations of elements of familiar technologies or combinations of known elements with new elements that are brought into the area (e.g. cropping practices, new varieties, new ways of farm management or marketing a product). The degree of innovation varied in the different PTD experiments. The interest in material support was often bigger than the interest in the technology. Some topics of PTD experiments were of an integrated character, relying on multiple conditions or technical requirements.

Ownership of PTD experiments

If a *rayon* advisor says: "We want to show farmers the effect of …", then s/he is making a demonstration and not developing a technology in a participatory way. And when a farmer says, "Tell me what to grow and I'll do it for you", the advisor is definitely tempted to impose an idea. It is an art to pass the message that "continued improvement of a technology is an integral part of farming". The initiator (driving force) therefore has to be the farmer; otherwise the self-dynamics and sustainability of the venture are endangered. The fact that some farmers even today wait for innovations to come from outside is a leftover from the former Soviet system.

Besides the PTD experiments, RADS advisors were supposed to prepare demonstration "trials", at least one each. Here it was clear that the ownership was on the part of the RADS and mutual responsibilities were agreed upon in a contract. When ownership of PTD experiments leaned towards the RADS, observations and recordings often stopped and, because the advisor in some cases could not manage at the end of the season to supervise all the trials, essential data were lost. Such data would have been useful to the extension service for comparisons across regions and dissemination.

Implementation and follow-up of PTD experiments

Design of the experiment

Is it difficult to design a good PTD experiment?

No, it isn't. We saw a good approach when visiting the cauliflower trial by Marazikova. She simply planted a line of cauliflower between thousands of cabbages; same soil, same water, same climatic conditions and the same close influence from the crop around the trial.

Figure 2: A line of cauliflower in a cabbage field; simple but well-reasoned trial design

Yes, it can be difficult to design a good trial that allows for comparison and drawing of conclusions. Nursalkyn tried out the new tomato variety TMK. She planted it in a separate plot where she had previously applied compost. Despite this privilege given to the new variety, the old Volgograd in the control plot grew better. For comparison, such an approach is problematic.

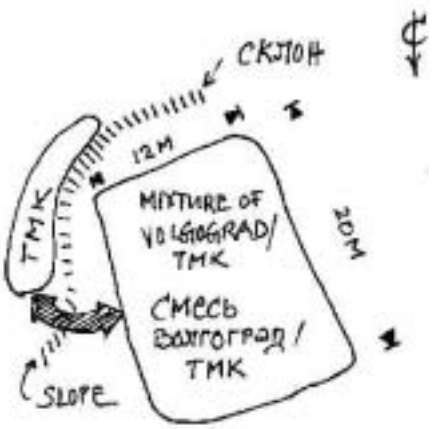

Figure 3: Sketch of Nursalkin's tomato plot

The main shortcoming in most of the PTD experiments was lack of or insufficient control. In Kyzyl Tuu farmers grew cabbage. It grew well and, at the end, farmers said: "We have nice results." "Nicer than what?" we asked. "Does cabbage pay more, nourish better or what?" Not having a control is a side effect of the subsidised seed, since the main aim for a farmer was to get seed (to be sponsored), rather than set up a trial that would satisfy his or her curiosity. Some farmers did not familiarise themselves thoroughly with the participatory approach.

One trial leads to another

At the southern edge of her garden, Toktokan planted Brussels sprouts. When we visited the plot, we observed a heavy attack of aphids. Insecticides can be bought only in Jalal Abad some 30 km away. We advised Toktokan to do so, as she was the only one in the entire *oblast* with Brussels sprouts. We suggested that she add another trial: spraying as

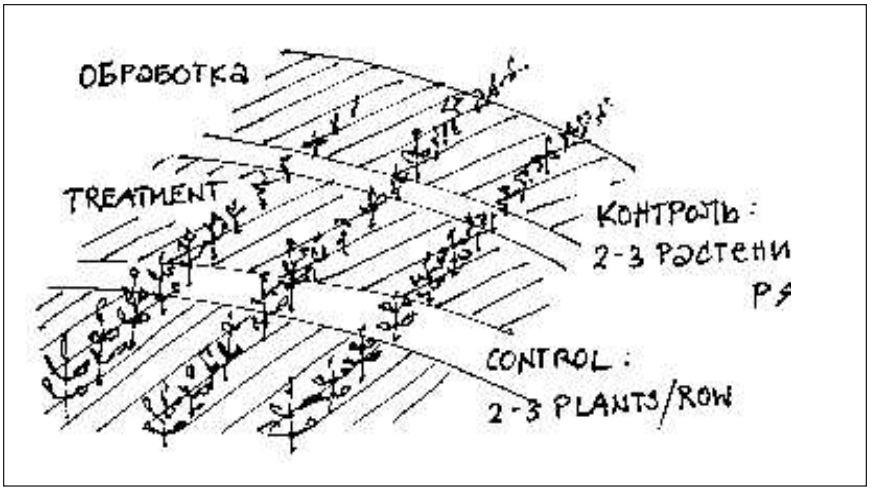

Figure 4: Two to three plants per row are left as control when applying the insecticide.

Box 2: Only such an indicator is sound that the farmer has found

Saidbek compared the yield of two sunflower varieties. When he discussed the results with us, he gave as much importance to the vegetation period - which was, in the case of the Ukrainian variety, 25 days shorter - as to the yield. Another indicator that he had initially foreseen - the height of the plants - he ignored completely.

indicated in Figure 4, while leaving control strips that would better show the effect of the insecticide. Toktokan did so and showed the trials to her peers the next time she hosted the women's group.

Setting criteria in advance

To set criteria in advance for assessing results of a PTD experiment is a challenging task. This calls for experience. RADS staff and scientists often did not pay enough attention to setting criteria together with farmers.

A sound criterion is economic efficiency. If one can express the result in Som (Kyrgyz national currency, 50 Som = US$ 1) of additional income, s/he has automatically taken all variables into account, ranging from local climate, soil, cropping technology, harvest, storage and sale. Expressing a result in Som allows for comparison of PTD experiments over distances. In RADS JA, a good trial result is only that which has an economic analysis. Where the hypothesis dealt with reducing human labour inputs (e.g. in small-scale mechanisation), the economics of household labour was also relevant.

Input of materials

In the pilot phase, the project subsidised those inputs that farmers could not afford or were unable to organise themselves. For instance, 80% of seed-potato costs were paid by the project. One Meristem seed potato costs US$ 0.50, or one fourth of a minimum

monthly wage in Kyrgyzstan. In the pilot phase, the few clients and therefore the close coaching, but also the direct contact between expatriate and farmer, helped build up mutual trust. In the scaling-up phase, this was more difficult. Fast results were wanted also in the other oblasts. Topics that showed good results in one place were adopted but not adapted thoroughly. Time constraints influenced negatively the building up of staff capacities or the "selection" of clients. In the scaling-up phase, the topics of the PTD weeks became less complex, for instance in RADS JA, but were supposed to reach more and poorer farmers. Practice showed that, also during scaling up, time is needed to build mutual trust between farmer and advisor.

The desire to increase one's knowledge and the mission of improving agriculture should be the main motivations for farmer experimentation. In most PTD exercises in 2000, RADS JA provided inputs for the farmers - in the case of vegetable growing, even completely free of charge. Thus many farmers who would have been able to pay for the inputs received subsidised materials. This enhances the "cup one's hand" mentality of the farmers, privileging some who then asked for more support the following year.

Payments slow down the implementation of PTD experiments

Provision of money led, besides the bad effect of the "cup one's hand" mentality, to slowing down the implementation of the trials. The PTD methodology is based on the needs of farmers. Kyrgyz farmers often live for the moment and today's problems are the essential ones. That is why the venture has to start on Day 1 of the PTD initiating week. In the case of RADS JA, if money was involved, the advisor had to prepare a budget, submit it to the manager who advised the accountant - agreed upon on with the SMS - to pay for it. However, if the accountant had ordered no money for trials, he had to wait until he was able to pay. It took up to four weeks before the advisor went back to the farmer to tell him or her that "concrete" work could start. In fact, the long wait was the "death warrant" for many a trial.

Technical support during the follow-up

Technical support during implementation is crucial for the final success. As mentioned earlier, the RADS had almost no scientists involved in PTD experiments. As a consequence, all technical support relied on RADS staff, and the generalists were often overtaxed. The structure of village promoter (not a specialist at all) coached by the rayon advisors (also not a specialist, but in contact with the SMS in the centre) and the SMS him/herself worked only in some cases. The workload in the different subjects was unequal. Nearly two out of three PTD experiments dealt with agronomy, which meant that the SMS in Agronomy carried the biggest workload.

The distribution among the *rayons* was also unequal because, during planning, the SMS set priorities according to farmers' needs. In certain *rayons*, around three families implemented the same type of PTD experiment whereas, in others, each family had its own.

The higher the number of different PTD experiments, the more the rayon advisors were challenged in the technical follow-up, either in mediating specialists or in doing it themselves. The lower the average number of experiments per family, the less the

possibility for experience exchange among them. High diversity in PTD experiments means, on the one hand, taking the farmers' concerns seriously; on the other hand, it makes the advisory service less efficient.

PTD in groups

Generating ideas when a group observes trials and exchanges ideas

Individual farmer families carried out most of the 77 different types of PTD experiments implemented in RADS JA in 1999-2000. The risk of failing was almost two times higher compared to the same experiments implemented by several families. The conclusion is simple: interaction between farmers is a key element of success. Interaction means exchange of experience during implementation and joint assessment of the trials.

In Bala Chychkan, Toktogul Rayon, five farmers conducted the same experiment in growing oil maize, when they realised their common interest. The rayon advisor brought them together. It was fascinating to see how many ideas they generated. The topics shifted from maize-cropping techniques to oil extraction, comparison with other oil crops and the use of by-products. They went as far as checking gluten characteristics of maize flour, wheat flour and a mixture of the two. The farmers have now set up a seed distribution scheme in order to involve more farmers.

Specialisation to earn more money

In Suzak Rayon, most experiments were done by groups, each group member having the same trial in her garden. In a second step, the farmers planned specialisation: some group members went for seedling production, some for growing vegetables, some for processing, some for marketing. The VP facilitated the discussion, paying special attention to responsibilities, economic impact and risks.

Assessing results of PTD experiments

Field days

Field days are the events during the implementation of a PTD experiment. In some cases, even two days were used for this purpose. In some others, field days fell into oblivion. During the hot period, advisors were on leave and, on their return, many crops

Figure 5: Three elements of a successful field day: information, experience exchange and fun (Oz Gurush, Toktogul).

had already been harvested. Besides the three elements of success - information, experience exchange and fun - economic analyses and/or, at an earlier stage, harvest prognoses have been integral parts of field days in RADS JA.

Determining yields

Besides the ongoing observations during the growing period, yield data are the most important to record. This involves measuring: counting and weighing. There were examples of successful recording, but there were also cases where harvesting took place without the advisor and, as most farmers need money in autumn, most of their harvest was already sold by the time the advisors came back to the village. In still other cases, the rayon advisors were present but forgot to record, or recorded and then "lost" the records. Extensionists do not yet consider the generation of data as the generation of capital with which the extension service can work.

Challenges of measuring and observing

In many cases, criteria were imposed and the scientists and advisors were too optimistic about all the criteria the farmers would observe. The interests of the scientists and advisors are quite different to that of farmers. Thus, the owner of one of the sunflower experiments in Cholpon Ata did not measure the plant height. She was more interested in gross yield and oil output, which she observed and recorded well.

In other instances, farmers did not know - or pretended not to know - their area of land (taxes are paid on the basis of land area). Thus, some farmers could say exactly how many kilograms of sunflower they harvested, but had "no idea" about the area on which it was grown. This posed a problem for analysis of the PTD experiments.

Some farmers could not say for sure what the yield was, but often remembered how many bags or wagon- loads they had harvested. As the bags are standardised, the yield could easily be converted to weight in kg. Local measurements are quite accurate; moreover, they are easily understood when explained to other farmers.

Recording and reporting

Of all the PTD experiments that brought a concrete result, the data of one out of two agronomy experiments were not recorded and analysed properly. Observations in the field confirmed this. In most of the farms visited in autumn 2000, there were no records or, if there were, they had stopped mid-way. Although many of the farmers still had the notebook, they had found it difficult and not always possible to keep records. Recording and analysing were better in post-harvest management/marketing (two out of three PTD experiments with analysis) and best in animal husbandry, all experiments having an (economic) analysis.

Box 3: Farmers with a blank notebook and the results in mind: a rather inconvenient database for an advisory service

When we asked Talaikhan, an experienced farmer in Utch Terek, about records, she answered:" I don't need a notebook; I have everything in my head." When we asked for details such as the exact day she applied the insecticide against aphids or when she harvested for the first time and how much cabbage she harvested, she replied without hesitation and confirmed that she knew "everything".

Later the rayon advisor said Talaikhan had good results, but no report. How can other advisors and farmers later capitalise on Talikhan's experience?

Not only recording and reporting on rayon level, also the processing of data at the centre needs improvement. Except for those experiments in which the involvement of money demanded proper reporting, SMS made compilations only to a certain degree and the analyses were often incomplete. Nevertheless, the results of some PTD experiments were published in brochures, which enjoy great popularity. In 1999 RADS JA entered most of the trial data into an Access database, but did not forward the data to the national RADS secretariat. Later, when the hard disk was re-formatted, the data were lost.

Outputs, results and impact

Outcomes of PTD weeks

In two years, RADS JA initiated 13 PTD weeks, of which one in 1999 and eight in 2000 brought concrete results.

Table 1: Number of PTD trials and topics according to rayon and oblast in RADS JA 1999-2000

	Toktogul	Bazar Korgon	Suzak	Ala Buka	Nooken	Aksy	Toguz Toro	Total
Total trials (farmers)	117	112	25	20	17	5	3	299
No. of different trials/rayon	35	14	6	7	17	1	3	77 [1)]
Average no. of replications (farmers) per trial	3.3	8.0	4.2	2.9	1.0	5.0	1.0	3.6

[1)] The sum of different trials per rayon (83) exceeds the total number per oblast (77), as six topics were repeated within *rayons*.

Seventy-seven different types of PTD experiments were set up, of which 65% in agronomy, 17% in animal husbandry, 14% in post-harvest management and marketing, and 4% in mechanisation. A total of 299 trials were conducted. The highest number of replications was achieved in the PTD week on "Pest and disease management with ISO broth" in Bazar Korgon Rayon (46 farmers). However, most trials were isolated ventures: 52 of the different trials were each implemented by only one farm family. These came mainly out of the PTD week on "Soil fertility" in Nooken and the one on "Improvement of animal husbandry" in Bazar Korgon.

Results of trials emerging from PTD weeks in RADS JA

In Table 2, the PTD experiments are classified by stages of success *i.e.* "ceased trials", "ongoing trials", and "trials with results". The 246 PTD experiments carried out in agronomy were most successful (79% came to a result), followed by post-harvest

Table 2: Number of trials emerging from PTD weeks according to sector, status of implementation and gender of farmer[1)]

	Planning		Implementation		Result		Total
	On-going	Ceased	On-going	Ceased	Without analysis	With analysis	
Agronomy	4 (21)	25 (5)	5 (0)	18 (0)	131(62)	63 (31)	246(99)
Animal husbandry	5 (4)	1 (0)	7 (2)	0 (0)	0 (0)	4 (1)	17(7)
Post-harvest management/ marketing	1 (0)	16 (6)	0 (0)	2 (0)	9 (7)	8 (6)	36(19)
Total trials by agricultural sector	10 (5)	42 (11)	12 (2)	20 (0)	140 (69)	75 (38)	299 (125)

[1)] Given figures are totals; figures in parentheses indicate number of trials owned by female farmers out of the total

management/marketing with 47% of 36 experiments. In animal husbandry, 70% of the total of 17 trials were still ongoing by the end of 2000. One of five trials failed (21%).

In terms of gender, women - with 125 experiments - had less than male farmers (174 experiments), but fewer of their ventures ceased during implementation. Women have brought more trials to a concrete result ("trials with results and analysis"). When it came to "ceased trials", female farmers had markedly fewer than male farmers. The risk that a PTD experiment owned by a male farmer fails is five times higher than in the case of a female farmer.

Possible reasons for failure of trials and suggestions for improvement

The project staff considered what might be the reasons why some trials failed and what could be done better next time:

- ***Little time during presentation of ideas to villagers on fourth day of PTD week.*** Some farmers listened to the topic and showed lively interest. The PTD team, consisting of extension staff, a contact farmer and a researcher, then often designed a trial in a standard way, as prepared earlier in the week with the initiator of the idea. There was usually no time to visit the interested farmer when the trial was set up. When the advisor later visited the farmer, the idea was already dead or it turned out that the design had not worked and the advisor was not skilled enough to adapt the idea to a new situation.
  Once experiments are designed, the team should aim to expose them to as many villagers as possible.

- ***Project was set up and fine-tuned without the farmer who first brought the idea.*** In quite a few cases, the PTD team failed to meet again with the creator of the idea. Either the farmer did not come to the appointed meeting or the group could not find him anymore.
  The team should take more time to work out better projects on the second and third days of the PTD week.

- ***Poor action plans.*** Many action plans were prepared poorly. Here again, this was due to time constraints at the end of the final presentation of ideas, but also to careless work by the members of the PTD team.
  More time should be spent on working out a good individual project (experiment) with the farmer, visiting his/her farm, going to the field and preparing the action plan on the spot.

- ***Poor follow-up by the advisor.*** After a PTD week, all advisory work is handed over to the local advisor. S/he is often not fully familiar with the topic and, facing a large number of new clients, is overburdened.
  The workload for each staff member should be assessed. If the burden becomes too great, local specialists should be involved to take care of the trial (moderators). The number of topics should be reduced, but not the number of clients per advisor.

Economic results of trials emerging from PTD weeks in Jalal Abad

Out of the 299 PTD experiments, 215 yielded a result and 22 are still underway; 76 PTD experiments have an economic analysis. As for the others, rough estimations were made in order to achieve the overview given in Table 3. The conclusion from the table is that trying out new things pays. On average, PTD experiments gave an additional income of US$ 16 per each of the 299 families - a monthly salary of a middle-ranked state employee.

Table 3: Number of PTD experiments with economic results according to subject matter

	Total [1)]	Agronomy	Animal husbandry	Economy/ gender[2)]	Marketing
Number of economically relevant trials	47	36	3	24	13
Total additional income in US$	4949	2298	1218	2505	1811
Average of additional income per economically relevant trials (US$)	105.3	63.8	406.0	104.4	139.3

[1)] The total is less than the sum of the four subject matters, as complex trials appear under two headings.

[2)] Within agriculture, the RADS JA differentiates 5 subject matter areas: agronomy, animal husbandry, mechanisation, economy/gender and marketing.

Impact of PTD activities 1997-2000

Evidence of capacity strengthening

The following bear witness to capacity strengthening:

- Exchange of experiences among cheese producers leading to improvements in cheese quality. Joint storage and sale of cheese by producers.

- Farmers involved in seed-potato production and vegetable growing have formed interest groups and keep in contact with each other. The potato growers in Aksy have established a seed-potato growers association and want to set up a seed farm in the rayon.
- RADS JA has competent staff members capable of carrying out PTD exercises on their own.

Evidence of the spread of new agricultural practices and innovation capacity

New agricultural practices spread more easily than innovation capacity. Not all stakeholders see the potential of jointly developed innovations yet. Results of variety, fertiliser and herbicide trials are more likely to spread than more complex issues such as setting up a milk shop or conducting an integrated PTD experiment aimed at improving soil fertility over several years. In the case of new varieties, the evidence of the new technology is given by the demand that exceeds the supply of seed (oil maize, Lima tomato variety, Dutch cabbage) and the increased demand for fertilisers and "brand herbicides".

Cheese production, for instance, has been a very successful PTD activity. In 1997 two farmers approached the advisory service for assistance in making cheese. Within four years, 41 farmers were involved - a remarkable number taking into consideration the difficulties a producer faces in post-Soviet Kyrgyzstan (lack of governmental support, lack of transparency in food legislation and tax regulations, informal markets with limited purchasing power among the local population).

Institutionalisation of PTD

Building and formalising partnerships

RADS secretariat staff has frequent contact with the Agrarian Academy but a contract has not yet been signed. RADS therefore refer directly to individual researchers and contract them if needed. In spring 2000, RADS JA signed a memorandum of understanding with the Andijon branch of the Uzbek Cotton Institute.

Managers and specialists from five oblasts were invited to the Issyk Kul PTD initiation week and the marketing specialist from Osh Oblast attended the PTD week in Toktogul, but activities started or continued in only three of the six RADS oblasts.

Box 4: Institutionalisation of PTD in RADS

What went well?

- In Jalal Abad Oblast, PTD capacity is built (trainers, network of resource persons, broad application)
- In Issyk Kul Oblast, PTD experiments drifted towards demonstration
- RADS of Naryn Oblast follows an integrated PTD approach (various trials set up along the vertical integration of a topic)
- National extension day with its innovation competition and experience exchange became very popular, not only for RADS staff
- PTD data bank under construction
- Various PTD experience exchanges held (Issyk Kul, Jalal Abad)
- PTD spread and documented through TV, newspapers, leaflets
- PTD methodology presented to an audience of researchers and politicians at the First International Cotton Conference

What went wrong?

- PTD is still is driven by and dependent on expatriates
- In the three Oblasts not supported by Helvetas, the PTD idea has not taken root.
- There is no common understanding at national level about PTD, adaptive research and demonstration trials.The main argument of the senior SMSs in the RADS secretariat is that PTD is not scientifically sound. The adaptation of trial methodology from dominant Soviet science towards simplified farmer and advisory trials is not understood and the discussion is prolonged as a scholarly dispute.

RADS JA has not yet worked with the local administration or NGOs. In fact, NGOs exist in Kyrgyzstan only in particular fields such as legal rights and women's self-help.

Conclusions related to PTD in RADS JA[3]

An overview of the activities in the different projects, including those in RADS JA, is given in Table 4.

Table 4: Swiss support to PTD in Kyrgyzstan

Advisory Service			Advisory Service RADS JA implements PTD week in Toktogul; training of regional staff; 24 different experiments with 90 farmers are started.	RADS JA carries out 12 PTD weeks with own staff; 53 different experiments with 209 farmers are started.
		ASSP planning paper foresees, beside farmer training and group formation, adaptive research as main tool of the advisory service.	In framework of new RADS project, KSAP initiates 2 PTD workshops in Issyk Kul; PTD training given to staff in 5 of the 6 RADS oblasts.	
	KSAP Kochkor-Jumgal practises "participatory knowledge and skill development" together with farmers and local resource persons (scientists) in seed-potato, fodder, cheese and meat production.		RADS Naryn succeeds this bilateral project and continues collaboration with farmers and researchers in seed-potato and cheese production.	
	1997	**1998**	**1999**	**2000**
Farmers	Farmers NA: 70 farmers take part in dairy training; 2 meat- and 5 cheese-makers operate on break-even level.	NA: 118 farmers take part in milk-processing training; 18 cheese producers earn total of US$ 260.		NA: 78 farmers take part in milk-processing training; 41 regular cheese producers sell products for US$ 1500.
		NA: 3 potato growers start with Meristem technology.	NA: 3 potato growers start with Meristem technology	19 farmers in NA and 17 in JA produce seed potato; value of seed material at end of year is US$ 4500.
				JA: More than US$ 4000 income for 300 families from 77 different experiments.

[3] Prepared during RADS staff meeting (advisors, SMS, Regional Manager) in autumn 2000

Conclusions in terms of tangible results - the advisors' view[4]

- By the end of 2000, employees of RADS JA are able to carry out PTD weeks on their own.
- There is some understanding about PTD methodology among all staff of RADS JA.
- Outcomes are better with a high replication of small PTD trials than with a few large ones.
- PTD weeks help find new clients and increase the number of contact farmers.
- Women have more staying power to bring a PTD trial to an end.
- Opportunities were not used systematically and, in some cases, misused in order to distribute inputs.
- Implementation of PTD trials needs improvement in terms of follow-up, field days and recording.
- Advisors lack professional knowledge to follow up the PTD experiments.

Conclusions in terms of making a living out of farming - the farmers' view

- Local techniques were spread.
- Yields remained the same, while expenses were reduced.
- Many new ideas were generated for 2001.
- Farmers in the villages await the next visit of the advisor eagerly.
- PTD experiments done in groups lead to interactions within and among the groups.
- Trial ownership was often not with the farmers. ("We couldn't understand the objective.")
- Scientist did not visit the fields.

Conclusions in terms of science and innovation management - the research scientists' view

- Discussions with farmers were enriched and enriching.
- The spirit of innovation and experimentation on improved production and marketing did not catch on fully in Kyrgyzstan.
- The link to researchers and research institutes needs further attention and improvement.
- Sometimes the research topics were not precise.

Conclusions - the common view

- The PTD methodology turned out to be a concrete approach that contributed to developing new production, processing and marketing practices and generating income.
- New varieties and technologies were found.
- Tangible results were achieved.
- The number of PTD experiments in subjects other than production is limited.

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[4] Statements collected in informal talks with farmers on the occasion of PTD monitoring exercises in late summer 2000

Epilogue

Two years have passed by since the PTD experiences in Kyrgyzstan were written up for the study-cum-workshop in the Philippines. What has happened in the meantime? Where are advisors and farmers today in their joint efforts to try things out that might work? Could PTD survive without specialist input, as was one of the questions for debate of the Philippines workshop?

Yes, it could. Let us sum up the achievements in the last three years.

2001:
Farmers in RADS JA carried out 139 new PTD trials in about half as many different trial set-ups. Most trials dealt with indigenous methods in animal health care. Increasingly, local specialists instead of researchers were contracted. Indigenous methods are alien to scientists educated in the Soviet system. First contacts were made with the Food and Agriculture Organisation for setting up Farmer Field Schools (FFSs) in Integrated Pest Management as a logical sequel to the numerous PTD trials carried out in cotton production in the previous years. The RADS reached a ceiling with national expertise and international inputs were needed. In a national PTD training and exposure event, 22 selected RADS staff from all over the Republic and the national Advisory Training Centre (ATC) shared the JA experience in a three-day PTD workshop. Each of the participants returned back to duty with an action plan.

2002:
For the first time in the history of RADS, PTD activities were carried out in all seven *Oblast*, in some regions, still combined with project-financed inputs. Despite the change of the international advisor to RADS JA, PTD activities continued (mainly in animal husbandry) and, by the end of the year, 178 trials were completed. Monitoring the innovation dynamics among the farmers might reveal an even higher figure, but the newly introduced mandate system (a payment system per unit of advisory outputs and results agreed beforehand) constrained advisors from including each and every emerging innovation in their work programme.

ATC assigned one of its staff members for PTD and made efforts towards compiling a standard, official terminology. Thereby the main criterion in distinguishing between PRA, PTD and demonstrations became the ownership of knowledge. In the case of PRA, the rural people have the knowledge; in the case of a demonstration, it is the advisor; and in the case of PTD, neither the farmer nor the advisor knows what the result will be. Jointly - with some external support - they are challenged to find out what works.

2003:
As further development of the "official version" of terms, ATC prepared a glossary, accessible on the ATC webpage www.atc-ras.kg. It makes a clear distinction between on-farm research and PTD. PTD is interactive and iterative development of technology with an important social component.

In two of the seven *Oblast*, international experts facilitated the definition of the *Oblast's* position with regard to PTD. In Issyk Kul, the four years of experience in PTD led to interesting impact-oriented insights. For instance, as a result of oil-crop trials, an oil extractor is now working in almost every village. In the case of rape (canola), although no suitable aflatoxin- free variety could be found, the weed-suppressing effect of the crop determined its adoption by farmers. In many other trials, marketing was the main bottleneck; for instance, a Dutch cabbage variety brought excellent yields, but consumers perceived it as being tasteless and having poor keeping qualities. Farmers therefore did not continue to grow it. A PTD trial on sainfoin (*Onobrychis viciifolia*, a forage legume) led to the setting up of a seed-farm in just four years.

Besides technical aspects, the PTD review in both *Oblast* revealed that knowledge management is a focal point. Both RADS have gained excellent experiences, but missed the opportunity to capitalise sufficiently on them. The originally planned database exists only in the head of the advisor. In many cases, his or her colleague does not know what worked best in the PTD trials. The role of advisors in the PTD process was much more that of a facilitator and individual consultant than an extensionist in the strict sense of the word.

In JA, PTD trials found their way into the Integrated Cotton Production FFS - an entry into a new dimension of PTD in Kyrgyzstan….we hope.

Photo by: Annie Bungeroth, ITDG.

Women being trained in using the donkey-drawn plough.

Participatory development of the donkey-drawn plough in Western Sudan

Mohammed Majzoub Fidiel[1]

This case study documents the process of developing animal-drawn ploughs in North Darfur, Western Sudan. It also reflects on how this process led to strengthening farmers' and blacksmiths' capacities to engage in Participatory Technology Development (PTD) and attracted the interest of formal institutions of agricultural extension and training in this approach to technology development. The process involved looking into previous experiences in the surrounding geographical areas and as far as the United Kingdom, and drawing on the valuable inputs of local blacksmiths (who made the ploughs), project engineers and the farmers themselves, the end users of the product. Lessons are drawn from the experience made in institutionalising both the technology and the process of developing it.

Introduction

The work on animal-drawn ploughs started in the Kebkabiya area in 1988/89 under the Oxfam-supported Kebkabiya Smallholders Project (KSP), and was later extended by the Intermediate Technology Development Group (ITDG) into two more areas, Jebel Si and Dar Elsalam, under the project Linking Indigenous Knowledge Support (LINKS). In 1998, a further extension of LINKS started under the name Darfur Livelihood Integrated Project (DARLIVE), and the Azagarfa and Kutum areas were added on.

Context

Geography and climate

The Greater Darfur Region, with a population of 3.5 million people, is divided into three states: North, West and South Darfur. North Darfur lies in the Sahel zone on the southern edge of the Sahara desert and has a population of about 1.4 million, with 70% or around 159,000 families living in poverty. Forty percent of these families are vulnerable to disasters such as drought, loss of animals etc; the other 60% are constantly threatened by food insecurity. The area is characterised by extreme remoteness, poor communications, minimal infrastructure and poor public services.

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[1] Country Director, ITDG Sudan, POB 4172, Khartoum, Sudan (majzoubm@sudanmail.net)

Kebkabiya is one of the four provinces in North Darfur. Provinces are divided into local councils and village councils. Each village council is formed of 2-7 villages. Kebkabiya Rural Council is situated in the southwest of the State and experiences nine arid months a year; annual rainfall is 350-400 mm and highly variable. The area has been hard hit by successive droughts since the early 1980s, resulting in long-term deterioration of the people's livelihood base, reflected in a severe decline in crop production, mass death of livestock, reduced range productivity and widespread ecological degradation.

Kebkabiya's dominant soil type is the hard-surface sandy loam locally called *nagaa* or *gardud*. Many families in the area own wadi land with seasonal water flow, which is more fertile but limited in area than the other land types. Jebel Si has a mountainous topography and *Gardud* or *wadi* land is very limited. In Dar Elsalam, soils are predominantly sandy (*goz*) and sandy loam (*gardud*) crossed by few seasonal streams where alluvial soil dominates.

The farming system and local economy

Access to land and size of holdings. Land for cultivation is the basic resource of the households. The farm unit is based on a nuclear family or families including married sons who, after three years of marriage, form their own household. Women head 25-40% of the 5000 households in the area. Tenure types include communal or tribal land, family- or clan-owned land, village-owned land and individually owned land. Access to land is easily gained through inheritance, sharecropping or borrowing from relatives or friends for 1-2 years. Land is not rented or sold in the area. Ninety percent of the women in the area own fields and have land titles. The main constraint to the amount of land cultivated is labour availability, and in terms of cultivated area, the most successful households are the larger polygamous ones. Each family owns several plots, each plot ranging from 2 to 4 *makhammas*. The average size of holding varies between 2 and 10 *makhammas*. (1 *makhamma* is 0.74 ha.)

Cropping patterns. Millet, and to a very limited extent, sesame and sorghum are grown on sandy and sandy loam soils. Millet is the main staple food, grown mainly for home consumption, and covers 80% of the area cultivated annually. Tomato, okra, chickpea, cowpea and groundnut are grown both for consumption and cash on *wadi* land. Some farmers have started to grow tomato, okra and groundnut on the *gardud* soil on terraces. The main tools used for cultivation are hand hoes.

Local economy. The economy is based on rainfed subsistence farming. The better-off farmers normally practise dry-season small-scale irrigation on alluvial soils of wadi land where the water table is high. Goats and sheep are raised as a means of saving and investment; donkeys are used mainly for transportation and only recently as draught animals. Off-farm activities include collection of grass fodder, building materials, firewood and wild fruits; charcoal making; petty trading and handicrafts. Opportunities for non-farm income are limited to seasonal or semi-permanent migration of men to mechanised-farming areas, urban centres in central Sudan and abroad to Libya. Remittances from migrant relatives are the primary source of non-farm income.

Main constraints to farming. Farmers in North Darfur face three main constraints: poor availability of seed, inadequate labour and lack of extension services.

- *Seeds*. Traditionally farmers used to preserve their seed requirement from the previous harvest. Seed depletion has taken place due to repeated crop failures. Pest attacks after planting is another constraint. When this happens, farmers need to plant more than once. Without emergency seed reserves, they have to borrow or buy seed at high prices to avoid losing the season. Moreover, re-sowing demands additional labour inputs.
- *Labour*. For poor farmers, family members are the main source of agricultural labour for land preparation, planting, weeding and harvesting. More affluent farmers with larger holdings depend on wage labour in peak periods. Hiring out labour is an important source of cash for most poor households. Farmers sometimes sacrifice part of family labour needed at critical times to secure off-farm cash earnings. A coping strategy practised by farmers to fill in the labour gap is polygamy. New wives, their sons and daughters are potential sources of family labour.
- *Extension services*. The entire state has a small extension core staff stationed in the capital El Fashir with no transport or other resources to extend their services to the farmers. Communication is extremely poor. Farmers are unable to obtain accurate information about a host of farming and marketing activities ranging from the use of seed dressing to the current crop prices at the nearest urban market. They depend on their own links in gathering news and information from visiting neighbouring villages or periodical markets.

The Kebkabiya Smallholders Project

After the major drought and famine in 1984/85, Oxfam started a seed distribution programme to help people, mainly small subsistence farmers, secure their food requirements in the 1985/86 season. Through continuous dialogue with farmers, the agency became aware of the many constraints in seedbed preparation, planting and weeding. Most of the poor farmers cultivated sloping land with hard-surface sandy loam soil that restricted water infiltration and led to runoff. Under such conditions, cultivation with the traditional hand hoe is difficult and time-consuming, particularly for women who perform 75% of the cultivation operations.

Although the average household sows 2-4 *makhammas* of millet, it manages to weed only 2 *makhammas*. The maximum period available for timely weeding is three weeks. The average production per *makhammas* is about 3 sacks. This means that the average household produces only 6 sacks of millet from 2 *makhammas*, half the average annual requirement per family (12 sacks).

The arduous tasks in farming coupled with other household tasks exert mental and physical pressures on women, adversely affecting their health. Time-consuming farming operations prevent other family members from working for better-off farmers after cultivating their own fields and from non-farm income-generation opportunities.

The Kebkabiya Smallholders Project (KSP) started in 1986 with the goals of increasing food security, increasing local control over available resources, and empowering the most disadvantaged social groups, especially women. The operation of a seed-bank

facility to secure sustainable supply of seed, pest control, extension and widespread introduction of animal traction were the designated interventions. Animal traction was regarded central for realising the three goals. The plough was a clear option, especially because some of the farmers had seen the benefits of the camel plough used by affluent farmers in adjacent areas.

The technology development process

The history of animal traction in the area

In the 1960s, nomadic camel traders brought a buffalo mouldboard plough from Egypt to Greater Darfur. In the 1970s, traditional Darfur blacksmiths modified the plough to suit the camel. The plough was used in rainfed plots but only by the few farmers who could afford to rent or buy it. In the mid 1980s, a steep rise in the value of camels led to an upsurge in camel theft. The use of camels became less popular, and the focus shifted to donkeys.

The role of development projects. The Jabal Marra Rural Development Project (JMRDP), which had been involved since 1971 in the Jabal Marra area, had adapted the design of the traditional mouldboard camel plough to suit the loamy clay soils of South Darfur, using the donkey for draught power. Also the Western Savannah Development Corporation (WSDC), which operated from 1974 to 1994 in Darfur, had done research in animal traction and developed the donkey-drawn seeder/weeder.

Oxfam's role. Oxfam's early work in Kebkabiya built on these experiences. Implements designed on the basis of those used by JMRDP and WSDC were tested in Kebkabiya in 1986 and 1987 and proved unsuccessful. Later a mouldboard donkey plough was brought over from Britain. Oxfam contacted a blacksmith in Nyala to train seven Zaghawa (a large, socially marginalised ethnic group occupying a vast area in North Darfur) blacksmiths from Kebkabiya area to make the plough. The aim was to transfer knowledge and skills in animal-traction technology to the village blacksmiths in order to empower them.

For experimenting with the mouldboard ploughs, Oxfam established four demonstration farms in four villages in the Kebkabiya area on land allocated by the village councils. However, very limited success was achieved with this plough. Oxfam and the pioneer farmers concluded that it was too heavy for the donkey and did not speed up cultivation significantly. Nevertheless, farmers saw it as a step forward. By mid 1988, it became clear that Oxfam had limited experience with animal-drawn implements. For this reason, ITDG was contracted to provide technical support in identifying, testing and developing a suitable donkey implement for ploughing.

ITDG's involvement. ITDG was involved in the activity from mid-1988 until 1990 and then again from 1992 to date. One staff member from Oxfam and another from the Regional Ministry of Agriculture (MoA) joined ITDG for this project. The specific tasks of ITDG were to:

- develop a donkey plough suitable for the poor farming communities;
- develop a training package to ensure that farmers gain the necessary skills and knowledge to make effective use of animal-drawn implements;
- follow a PTD approach in developing, disseminating, institutionalising and assessing the wider impact of the technology in the least possible time.

This third objective was to be achieved by getting the participation of farmers to ensure that the innovation met their needs and working with and training local blacksmiths so that they could produce the implements without external support. The blacksmiths were regarded as the only option to ensure local manufacturing and maintenance of the ploughs, an element that was key for the sustainability of the technology.

The process of participatory plough development

The approach

ITDG adopted the following approach in the process of designing and developing the animal-drawn implements:

- understand better the prevailing situation (through technical and socio-economic surveys) and work with the local stakeholders to strengthen their skills and organisations;
- regard technology development as a process and not a time-oriented task;
- offer the farmers several technology options.

From the beginning, the ITDG team was aware of the great restrictions in terms of implement design. Effectively, the need was to identify implements that were:

- affordable to the majority of farmers;
- suitable for cultivating the specific soil types under consideration;
- suitable for the operations that farmers found excessively hard;
- suited to the draught power available;
- capable of being manufactured using locally-available skills and materials.

Designing and developing the ard chisel plough

To reduce the need for large quantities of scarce steel, a wooden-frame implement was thought to be most suitable. In December 1988, ITDG hired a consultant engineer to develop and test some basic ideas for a simple wooden-framed implement based on a Middle Eastern ard (an ancient tool dating back to the earliest days of settled farming), and its Ethiopian version, the *maresha*. This work was done in England at the University of East Anglia's Rural Technology Unit. Two promising tine designs - one a scaled-down version of an Ethiopian *maresha*, the other a simple chisel plough with sweeps - were taken back to Sudan for blacksmiths in the Kebkabiya area to copy. A further brief evaluation of these in Kebkabiya demonstrated the suitability of the tine with sweeps, and no further work was carried out with the *maresha*.

The next stage involved working with blacksmiths in Kerikir village, near Kebkabiya. Some modification to the tine was necessary, as the blacksmiths found it difficult to

copy exactly the design of the English blacksmith. By now, the Zaghawa blacksmiths in Kerikir were far more interested in the work than they had been initially and developed their own solution to the fabrication problem. The blacksmiths came up with ideas of their own, and the job of project staff shifted from showing them designs to maintaining steady progress in the work. It was a clear step towards local institutionalisation of the PTD approach when the blacksmiths themselves began testing their modifications and products in the field near the village. By the end of March 1990, 20 ards had been manufactured for distribution to farmers for use in the 1990 cultivation season.

Designing and developing the mouldboard (the Kebkabiya plough)

The mouldboard plough is not a particularly suitable implement for a low rainfall area such as Kebkabiya. It inverts the soil so that soil moisture is lost to a greater degree than when some form of chisel plough is used. A further disadvantage of the mouldboard plough is that it has a higher draught requirement than, for example, a simple tined implement. In addition, the mouldboard requires a higher quantity of steel, which is always in short supply in the Darfur area.

Despite these disadvantages, development of a more suitable mouldboard version was continued due to other considerations. Firstly, the farmers and blacksmiths needed several alternatives to experiment with, so that they could choose the most appropriate technology option. In the early stages of introducing a new technology, experimenting with several alternatives can lead to good and quick results. Secondly, it was clear that the training of blacksmiths in manufacturing the ard would take some time. It was doubtful if large numbers of ards would be ready in time for the forthcoming wet season.

Experimentation in the 1987 wet season with the latest mouldboard version proved that the plough performed poorly. Farmers observed that the plough was too heavy for the donkey, it was not steady and stable on the ground (it jumped out of its path), the mainframe was weak and bent during operation, and ploughing was slow. Work continued to correct the above-mentioned defects to develop a mouldboard plough that suited the local conditions, met farmers' requirements and could be manufactured by village blacksmiths. By early 1989, the mouldboard plough had been improved.

The two Zaghawa blacksmiths based in Kerikir village near Kebkabiya town were responsive to the idea of working with the plough. The blacksmiths in Kebkabiya were more interested in making gates, windows and hand tools for the town dwellers. Although the Zaghawa blacksmiths were skilled artisans, the process of developing a suitable mouldboard design took some time. The design had to be modified several times to avoid welded joints but also to use the steel section that was available in Darfur at the time.

At this stage, it became clear that the Zaghawa blacksmiths in Kerikir, being few in number and busy making the ard, would not be able to manufacture a large quantity of ploughs before the wet season. The project then commissioned the Nyala blacksmith to mass-produce 100 ploughs. However, these ploughs resembled more the JMRDP plough than the plough developed locally by the project together with the blacksmiths and

farmers. This experience confirmed that future plough manufacture would be far more satisfactory if local blacksmiths could do it.

Developing a suitable harness

The leather harness used by the project in its demonstration plots was considered unsuitable as it had to be made to measure, and was too expensive, even if made locally. Therefore several simple harnesses were investigated. The project team considered that a breast-band harness would be the best bet, as this style suits equines (e.g. donkeys), which - unlike bovines (e.g. oxen) - can pull from the chest. A breast-band harness is easier to make than a collar, and it is fairly simple to ensure a good fit on the animal. Nylon webbing was used to make the harness as it was cheap, freely available and did not cause damage to the animal's skin by chaffing. A double layer, stitched along the edges and stuffed with cotton, rags or straw, crosses the donkey's chest. This is attached to single straps across the donkey's shoulder to keep the harness in place. The traces to the implement are tied to each end of the strip around the chest. This harness works well, is easy to adjust and is now being promoted among farmers using donkey ploughs.

Training of village extension agents

The project and its partner Oxfam realised the need for extension services and offered to build up a participatory extension system. The village development committees (VDCs) nominated some of their members, who were then trained as village extension agents (VEA) to deliver advice and services. The VDCs initially started as informal groups of active community members. The project then helped them to register as legal community-based organisations (CBOs).

Distribution of ploughs and training of farmers

By the end of March 1990, there were enough ploughs in stock (two mouldboard designs and the ard) to concentrate on distribution and farmers' training and testing.

Distribution of ploughs

Distribution was made through the Kebkabiya Smallholders Charitable Society (KSCS). The society started in 1986 as a semiformal project management committee to link the Oxfam project team and the beneficiaries at the grassroots. Centre committees were established at village-council level, primarily to help deliver inputs and services, to facilitate implementation of other project activities and to take over implementation in the future. It was registered as a charitable society in 1990.

Based on the results of the 1989-90 socio-economic survey and in keeping with its philosophy that dissuades outside assistance or subsidies, the project offered the mouldboard plough to farmers at a fixed price of Ls 450 ($US 22.50). It was expected that the first ploughs would be bought by those most able to bear the financial risk involved and that, if proven successful, other farmers would follow in subsequent seasons. The project also had a strategy for providing the less affluent households with ploughs at a later stage. A different approach was proposed for the ard. As this was an untried

technology, it would be offered to interested farmers on a sale or return basis. This would permit farmers to try them out without having to take the financial risk.

The project area was divided into 16 centres covering a total of 65 villages. Centre committees in the 13 centres with suitable soils for animal traction were asked to select farmers who would buy the 173 ploughs on sale. Twenty ards were distributed on a sale or return basis.

Giving equal access to women farmers was not as easy as anticipated as many female-headed households are among the least affluent in the community. In addition, many women expressed doubts in their ability to manage ploughs. There was however an instance where the women's committee pooled resources to purchase a plough that could be shared. Later it was revealed that the ploughs obtained by male family members were also used by women (sister or wife) to cultivate their plots.

Training of farmers

Distribution and training started in March 1990. Training was conducted with the cooperation of the project's extension officers and VEAs. In each village, training started with plough distribution and continued for two days, covering the following aspects:

- the three types of ploughs, their different parts and characteristics;
- how to train the donkey to pull the plough;
- making the harness and the most appropriate material to use;
- donkey feeding;
- how to attach the plough to the donkey and then to operate it.

Farmers' responses

The farmers were not satisfied at all with the ard plough. The responses and comments of both men and women were much the same: the ard was difficult to adjust, and the ridges formed were very small and washed out with the first showers. Accordingly, the ard chisel plough was rejected already in the first season of testing.

With regard to the mouldboard, the six farmers who were interviewed responded positively. The main benefits identified were improved infiltration of rainfall as the plough broke the soil's surface crust, and the large size of the ridges, which resisted washing out by runoff, thus preserving more water. Some farmers mentioned that the ploughing made subsequent weeding easier. Although the number of farmers interviewed was small, the positive responses were quite encouraging. Farmers' experiences are the most valuable and informative means of evaluating the performance of the various designs in the field, as they use the implements under realistic conditions that cannot be exactly replicated in the trials done by project staff.

Despite the positive responses, farmers mentioned the followed drawbacks of the mouldboard plough:

- heavy for the donkey;
- mouldboard and plough frame bend during operation;
- defects in manufacture and finishing of the ploughs (mass-produced by Nyala blacksmith).

Nevertheless, the farmers continued to use the plough because of the benefits realised in terms of productivity and increased area of cultivation.

Dissemination of the plough in the project area

By November 1991, farmers had more complaints about the drawbacks of the mouldboard plough in terms of its heavy weight, poor finish and the quality of steel. ITDG therefore became involved again as of January 1992. From this time onwards, the work was focused on disseminating the plough technology by:

- training more village blacksmiths;
- improving the quality of ploughs produced through training;
- ensuring more reliable supplies of steel;
- institutional capacity building.

In February 1992, training of local blacksmiths was started in Kassara village (30 km west of Kebkabiya) under the supervision of the ITDG engineer, first with the two blacksmiths who had already worked with the project. As a result of this additional training, 18 Kebkabiya ploughs were produced. ITDG supplied the raw materials. Through the training process, the blacksmiths' knowledge about plough manufacturing and operation improved. They were applying their own new ideas and considering farmers' observations to improve the plough. Car scrap springs and scrap steel sections were used for the first time.

All 18 ploughs were distributed on credit in the 1992 season through KSCS. Payment was in two instalments, 50% down payment and the balance to be paid at harvest. Project staff together with VDC members and VEAs used different methods to monitor farmers' responses, such as:

- feedback from farmers during training;
- visits by project staff to farmers in their villages immediately after cultivation;
- facilitating VDCs to organise meetings for the farmers and blacksmiths in the presence of project extension officers and agents;
- informal meetings of project staff with farmers and blacksmiths during market days.

Farmers gave very positive observations regarding overall performance of the ploughs compared to the 1990 batch manufactured in Nyala. Still, they made some negative observations about bending of the frog, which was made from light steel section, and the plough arm (handle), which was too short and required additional effort from the farmer to cultivate in a straight line.

In early 1993, the two trained blacksmiths from Kassara worked with another group of seven blacksmiths from Sigring village in overcoming the defects of the frog and handle. Heavier steel sheets were used to make the frog and the handle was lengthened. They made 70 ploughs. As before, ITDG supplied the raw materials and KSCS paid for labour and distributed the ploughs on credit. The fund accumulating from plough sales was managed by KSCS and used as seed money for a revolving fund. In this year, farmers' complaints related to finishing were very minor and blacksmiths immediately

made repairs. As of 1994, demand for ploughs started to increase. Table 1 shows the number of ploughs manufactured and distributed between 1990 and 2000 by KSCS through 13 village centres.

Table 1: Number of ploughs distributed by KSCS

Year	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	Total
No.	193	109	18	70	95	260	250	55	63	101	150	1364

Source: KSCS records

Training of blacksmiths continued, using trained blacksmiths as trainers. By 2001, there were 30 trained blacksmiths in Kassara alone. The village had become a source of trainers, facilitating technology dissemination in KSP project villages and in villages covered by the LINKS project.

The number of ploughs manufactured and distributed during the lifetime of KSP was greater than the number in Table 1, as blacksmiths started to manufacture and sell ploughs on their own. The drop in number of ploughs distributed by KSCS between 1997 and 2000 was mainly due to the fact that the blacksmiths' society and its members were selling directly to farmers without KSCS support. KSCS used to contract blacksmiths as an informal group to manufacture ploughs. It provided raw materials and paid for the labour against the delivery of ploughs. In this process, a blacksmith's return to labour (i.e. net profit) was Ls 5000 per plough. As of 1998, the blacksmiths started to manufacture and sell ploughs outside of the KSCS contract, realising a net profit of Ls 17,000 per plough.

Scaling up plough dissemination

Spreading beyond Kebkabiya

Dissemination of the animal-traction technology to other areas in and beyond Kebkabiya province was continued through the LINKS project after the end of KSP. It built on the work with KSCS and disseminated more widely the technology options and experience gained. The role of ITDG was to facilitate this process. In addition to animal traction, terrace cultivation and use of contour lines were introduced as adaptations of ploughing techniques from KSP, with the aim of minimising soil erosion and increasing the moisture retention capacity.

The LINKS project was designed and implemented in the period 1996-98, and covered three areas:

1. Dar Elsalam Rural Council (about 89,000 people) in the southern and southwestern part of El Fashir Province;
2. Jebel Si Rural Council (about 11,000 people), about 100 km west of El Fashir, a hilly and very isolated area;
3. Azagarfa Village Council (about 2450 people), 40 km west of El Fashir.

Scaling up plough manufacturing and distribution

ITDG organised training in making and using ploughs in all three project areas. The number of blacksmiths trained initially by skilled blacksmiths from Kassara was 10 from Jebel Si, 10 from Azagarfa and 8 from Dar Elsalam. There are now 25 trained blacksmiths in Jebel Si, 30 in Azagrfa and at least 8 in Dar Elsalam, all manufacturing ploughs. Table 2 shows the number of ploughs manufactured and distributed in these three areas. Ploughs were distributed through farmers' or blacksmiths' societies on various credit arrangements and conditions determined by the CBOs.

Table 2: Number of ploughs distributed between 1997 and 2000

Area	1997	1998	1999	2000	Total
Jebel Si	65	63	102	102	332
Azagarfa	-	42	65	14	121
Dar Elsalam	149	20	98	152	419
Total	214	125	265	268	872

Source: LINKS evaluation report

Scaling up through networking

Out of its office in Khartoum, ITDG Sudan coordinates and networks with many institutions in a range of technology areas including food production and animal traction. ITDG has organised workshops and exhibitions in Khartoum to demonstrate its fieldwork including the work on the plough. Many NGOs showed interest in replicating the success of the plough. Recently, FAO and UNICEF negotiated the possibility of training blacksmiths in, among other things, plough manufacturing in southern Kordufan and southern Sudan. ITDG advised them to regard the PTD approach as a major determinant of success in adapting any new technology, especially to ensure that the technology development process is sustained in the rural areas.

Institutional and capacity building of CBOs

When the project began, the staff first met the community leaders and organised group meetings with them. Once the leaders were sure that the outsiders would help them, they collaborated and nominated the members of their informal committees. Later, the formation and support of CBOs became the project approach. Through time, the number of CBOs has grown to six blacksmiths societies, three societies for manufacturing and selling intermediate means of transport and 63 village committees. Many of the CBOs are actively involved in developing their communities by identifying needs, establishing links, seeking and managing funds, developing technologies, mobilising members, and running and managing necessary campaigns.

Blacksmiths Charitable Societies. In 1999 the Kassara blacksmiths formed and registered a charitable society with the main aims to supply its members with steel and to assist them in marketing. The total membership is 64 blacksmiths, of which 30 are trained in plough manufacturing. By 2001, the society's assets were worth Ls 14,000,000 in cash, raw materials or finished products (99 ploughs in stock). In addition to seed money,

ITDG provided training in book-keeping and management. As a result of this training, the society now maintains satisfactory records for all its financial transactions and inventories.

The Azagarfa Blacksmiths Society was registered in 1998 with 43 members, 34 of whom are trained in plough manufacturing. ITDG support was similar to that of Kassara. The society had completed the following contracts in 1998 and 1999:

- 72 ploughs manufactured for the Azagarfa Farmers Society, which were sold on credit basis to farmers in the area; 78% repayment was achieved despite the drought experienced in 2000;
- 100 ploughs and 2000 hand tools (used to build terraces) produced for Dar Elsalam Farmers Society;
- 6 donkey ploughs and 6 camel ploughs produced on request for Oxfam to be sent to Eastern Sudan for dissemination there;
- 35 ploughs manufactured and sold to individual farmers.

In 2000, the 46 blacksmiths who were trained from within and around Jebel Si formed a charitable society, which is being supported by ITDG in terms of logistics, access to raw material and management training, including book-keeping and credit management.

Blacksmiths societies in the making. In 1999, 20 blacksmiths were trained in Kutum and provided with the necessary support. Kutum Agricultural Extension Society (KAES) monitors and gives field support to the Kutum blacksmiths who received technical support from ITDG. KAES and ITDG have obtained a plot of land from the local authorities in Kutum market and built a blacksmiths' shed. The group now consists of 47 blacksmiths, who are trying to register as a charitable society.

Thirteen of the 36 blacksmiths in the Dar Elsalam area were trained through ITDG. They are spread throughout numerous villages. The project is now working to train more blacksmiths in the area and to help them form an association.

Village Development Committees. ITDG has worked in 186 villages through their VDCs. In all the villages in which ITDG works in North Darfur, it supports VDCs by, for example, building premises including seed-/tool-banks, providing the necessary tools and seeds, and giving training in management and agricultural extension. All VDCs are now capable of planning and executing the development activities of their village.

Results and impacts

The introduction of the animal-traction technology into the area has had a multitude of beneficial impacts on the farmers, blacksmiths and the environment.

Impacts on farmers

To date, over 3000 implements have been distributed to farmers. More farmers are expected to apply animal traction as the technology becomes more widespread in farming. Use of the plough has resulted in improved tillage and seedbed preparation; increased

water infiltration and timeliness in land preparation, weeding and planting; reduced drudgery; and savings in labour and time. By using the plough, some farmers have cultivated and planted simultaneously. Others report that ploughing has made subsequent weeding easier. Furthermore, the introduction of rainwater harvesting combined with animal traction has helped to improve yields and to extend the growing of tomato, okra and pulses from wadi land to land with sandy loam soils.

Time and labour savings and timeliness in agricultural operations has allowed farmers to increase cropping area by 100% and to diversify crops to include, for example, groundnut, sesame and chickpea. Groundnut production, which has high labour requirements for planting and weeding, was first commenced with the use of the Kebkabiya plough. Farmers now sell the crop raw for immediate cash or extract oil from it using the service offered by owners of small presses in the area. Part of the oil is kept to meet household needs and the rest is sold, generating more cash as a result of the value added to the produce. This practice is now widespread in the area for both groundnut and sesame.

The increases in total production and crop diversity have led to increases in both food production and farmers' income. The household asset base for livelihood security has also improved in terms of savings, increased ownership of livestock and larger reserves of millet. These effects were reflected in reduced household vulnerability to droughts. In meetings held in February 2001, farmers in Shouba (Kebkabiya) and Bardi (Jebel Si) reported that, compared to the famous drought of 1984, seasonal migration in dry years dropped after the plough became widely used for cultivation and new crops were introduced. Farmers in Bardi said that most of the families stayed in the village because they had some millet reserves from the previous season. They added that diversification in crops gave them new sources of income such as dried tomato, dried okra, cooking oil and onion. Because they had additional income from selling crops and savings from producing other foods (oil, onion, cowpea, chickpea etc), they could buy millet and sorghum from the market for daily consumption and keep their own produce for bad years.

Impacts on blacksmiths

Zaghawa Blacksmiths in the area face social marginalisation and exclusion. They have their own village or a separate camp in a village; they suffer from lack of representation in local community institutions and are often subject to discrimination in allocation of resources such as land. By enhancing the recognition of blacksmiths' skills and increasing their value, the blacksmiths' market has become diversified, their social status has improved and their income has increased. Blacksmiths benefit from the animal-traction technology not only as producers of ploughs, but also as users of the implements - as they farm themselves.

Azagarfa blacksmiths estimated an average net return of Ls 300,000 per individual in the main season (June-August) in 1997, before they started making ploughs. Afterwards, the estimated average was Ls 416,000 per main season, an increase in seasonal income of 38%. Kassara blacksmiths who work on their own realise Ls 17,000 return to labour per plough.

The size of market for the plough will continue to grow, as there is high demand for it in Darfur, and will grow even further if demand is created in adjacent areas with similar climatic and soil conditions. The Azagarfa blacksmiths have developed a larger version of the mouldboard to be drawn by a camel and have already received some requests. This also reflects the creativity of the blacksmiths, a talent that was refreshed after they received recognition from the people around them.

Evidence of the social impact on the marginalised blacksmith community is starting to appear in Kassara villages. People have begun sending their children to school. In 1999, only one child from the community was in school; the number increased to six in the year 2000. Sixteen blacksmiths reported that they managed to purchase wadi lands, which is more fertile and expensive. Seventy percent of those who used to migrate during the off-season to earn some income are now settled as a result of a year-round secured income in the village.

Impacts on the environment

Access to the plough is not expected to increase the cultivated area dramatically, as this is dictated by the maximum area that a household can weed. Use of the plough in the sandy loam hard-surface soils increases water infiltration, reduces run-off and reduces soil erosion, compared with hand hoeing. Combining rainwater-harvesting techniques with ploughing has enhanced these advantages. Use of the plough encouraged farmers to shift from the fragile *goz* soil to the fertile *wadi* soil, giving the sandy soils time to recover.

Tractor use is not recommended for the local soils. It is also an expensive option. The donkey plough has limited the use of tractors for tillage, because the cost of hiring a tractor is ten times more expensive. Some farmers of Azagarfa who had been using a tractor for ploughing have not done so for two years since the introduction of the donkey plough.

Gender impacts

The introduction of the plough has had a positive impact on women. The project ensured that 40% of the ploughs went to women during the distribution. This has facilitated women's access to ploughs and supported women's autonomy within their families and communities. The use of the plough has reduced time in many farming operations in which women played major roles. For instance, time spent in land

Photo by: Annie Bungeroth, ITDG.

Woman using improved plough.

preparation has been reduced by 50-80%. Also less time is spent in weeding as, in many cases, the women use the plough itself for weeding. In cases of manual weeding, pulling grasses became easier as a result of the ridges made by the plough. As a result of time saved, women have been able to attend literacy classes.

As the plough reduced the need for family labour, there is a tendency to reduced polygamy. Recent findings show that men's savings are now used for acquiring houses in urban centres rather than for marrying additional wives. Local perceptions as to whether this change is good or bad differ.

Fifty percent of the members of VDCs are women as per their constitutions. The roles played by women as members of their village development societies has enhanced their social status and given them recognition within their communities and with the local authorities.

Institutionalising the technology and the PTD approach

ITDG uses the term "institutionalisation" to refer to both a technology and the approach to developing it.

Developing roles and skills to sustain the technology

Institutionalisation of a technology occurs when a demand for it is created among the users and its supply (in terms of the final product, raw materials, technical knowledge and other related services) is in equilibrium with demand.

In Kebkabiya, institutionalisation of the technology is heading towards maturity. Different institutions have participated in the process since the early stages of technology development. International NGOs (Oxfam and ITDG) provided technical expertise and financial resources, while CBOs (farmers' associations, KSCS and blacksmiths associations) provided their vocational skills, experience, experimentation and observation capacities, and feedback.

ITDG realised the importance of long-term training so that the development, production and marketing of the plough through normal marketing channels could be sustained. During the course of the project, three technicians and engineers were trained in technology development. Two of them are still involved and their knowledge has been retained in the area, as they are from the region. A total of 120 local blacksmiths were trained in plough manufacture. They work in pairs in 60 workshops in the area producing ploughs and other implements. Selected members of their associations were trained in procurement and transport of raw materials from as far as Khartoum, and other members in book-keeping and management of revolving funds. The market, without any external assistance, drives the process of dissemination and ensures sustainability of the technology.

In many villages, the project developed seed- and tool-banks. The villagers built the stores with project support. The stores were then stocked with some seeds and a variety of tools such as hoes, shovels, wheelbarrows and ploughs. Farmers can access seeds and tools by purchasing in cash, in kind or on credit, by renting and even by borrowing.

Introducing PTD within the curricula of centres of education

Involvement of universities and research institutions in the process of technology development came late, because the intervention started as a consultancy with an agreed output of a report on a technical and socio-economic survey.

In 1998 and 1999, respectively, the Faculty of Agriculture of Khartoum University and the Rural Extension Department of the Faculty of Agriculture of Sudan University developed a curriculum for "Appropriate Technology" including sections on "Animal Traction" as part of an "Agricultural Tools" course. Both approached ITDG for support in curriculum development and acquisition of necessary literature. The course is intensive and incorporates knowledge of all agricultural tools and equipment, their relevance to the physical and socio-economic environment, and methods of technology development, including the PTD approach. In 1999, the University of West Darfur approached ITDG for a cooperation programme involving, among other things, development of hardware technology, including the plough. El Fashir University came on board in 1996 after the evaluation of the project's first phase and organised a workshop to present the findings. It agreed to participate in development of hardware technology, but a restructuring of the university, which led to its split into El Fashir and Nyala Universities, brought these good intentions to an end. Later, El Fashir University signed a memorandum of understanding to work on developing technologies appropriate to the region. Financial constraints prevented full realisation of the above-mentioned agreements, but the chance still remains to pursue them.

In 1999, the Rural Development Department of Gezira University drew up a curriculum on NGOs' roles in rural development, including their methods and approaches such as participatory needs assessment, participatory monitoring and evaluation, and PTD. The main example is the Kebkabiya Society with its case of plough development.

Recently, the agricultural research station at Gezira, Central Sudan, was contacted by the project and was given an oxen mouldboard plough for testing and fabrication. The Gezira University will also be involved in this process.

Strengthening the community to sustain the process

The structures set up by the ITDG project, particularly at the level of farmers and blacksmiths, play a crucial role in sustaining the PTD process. The VDCs and their VEAs have convinced their communities to take part in the process. They have assisted in nominating farmers and allocating land for experimental and demonstration plots, and have liaised between the farmers, the project engineers and the blacksmiths throughout the process. Now they provide advice to farmers and serve as a link between the farmers and the extension head office in El Fashir. As such, a much-needed participatory extension service has been built up in the area.

Through their societies, the blacksmiths respond to the needs of the farmers communicated to them through VEAs. The capacity building provided by ITDG has helped them to become independent entrepreneurs, capable of managing the process of technology development. They also operate their own funds, keep records and monitor their business progress.

Lobbying and advocacy of the plough and the process

The government was involved since the very early stages in 1988/89, when ITDG and Oxfam approached the Darfur State MoA. The first national agricultural engineer, who still works for the project, is on secondment from the MoA. Since then, the MoA has continued to show interest in the technology and the PTD approach, including dissemination.

After the evaluation of the first animal-traction project in 1993/94, ITDG organised two workshops in El Fashir and Khartoum, where the evaluation findings were shared with other interested NGOs and institutions. The very positive results encouraged many institutions, mainly governmental, to think along the same PTD lines. The MoA very recently established a Department of Technology Development led by a professor in agricultural engineering from the research field. Last year, the State Government supported 200 poor farmers by acquiring ploughs through a Government Grant Fund. The draft strategy of the Federal MoA has incorporated an output of promoting ploughs in relevant geographical areas in the country.

Cost effectiveness of the work

In the 13 years that the project has been operational, approximately GBP 300,000 has been spent on the animal-traction work. The benefits derived include at least 3000 ploughs produced, sold and being used by farmers, many more farmers using the plough through rental agreements and nearly 120 blacksmiths in business. Also included are the economic, social and environmental aspects mentioned earlier. Assuming the 3000 ploughs as the only output, then the cost per plough is about GBP 100. If the 3000 ploughs would be regarded as the only output, the cost per plough is about GBP 100. If the above-mentioned achievements of the plough are quantified, then GBP 100 per plough is very cost-effective, without even considering its multiplier effect.

Lessons learnt

Among the important lessons learnt through the long years of involvement in developing and disseminating the plough through a PTD process are:

- The valuable support received by the Kebkabiya Smallholders Project through the training of staff and other stakeholders, and the offer of credit to the blacksmiths to produce the ploughs and to the farmers to acquire them. This support was important for the success in developing appropriate technology in a PTD process.
- A careful needs assessment is key for the success of any project, especially one involving technology development. The early surveys determined precisely what type of tool was required, what power is ubiquitously available, how much people can afford to pay for the tool, and what channels of production, marketing and dissemination can be used.
- The farmers' and blacksmiths' CBOs proved to be essential elements in pushing the PTD process forward. Without their combined efforts, the plough would never have been developed.
- CBOs formed through natural growth from informal bodies are more successful than those started formally. This requires relaxed timeframes that do not force the pace of forming and developing groups to fit an external project framework, and should be taken into consideration in project strategies.
- Technology development is a long process that starts with needs identification and ends with a sustainable process working effectively through normal market channels.
- Manufacturers in general and blacksmiths in particular can be empowered to show their own creativity in developing the technology further.
- Institutionalisation of PTD is an important ingredient in the exit strategy of an intervention project. The project would have had even greater impact in institutionalising the PTD approach had this concern been built into the project design from the beginning, e.g. by involving government services and universities much earlier. As it is, the greatest impact has been in strengthening capacities for PTD in local-level institutions.

References

Reeves EB & Frankenberger T. 1990. Farming Systems Research in North Kordofan, Report No. 2.

Majzoub Fidiel M. 2000. Creative solutions to poverty. Paper presented in the BDN workshop organised by WHO, Khartoum, February 2000.

Majzoub Fidiel M. 2000. The transfer and adaptation of technology: the case of the donkey drawn plough. Paper presented in a workshop organised by Sudan Ministry of Industry, Khartoum, October 2000.

Croxton S. 1990. Animal traction in Kebkabiya: a review of ITDG involvement with the Kebkabiya Smallholders Project 1988-1990.

Malik Abu Sin A M & Osman Hdra T. 1994. ITDG support to Kebkabiya Smallholders Project, Evaluation Report.

Wedgewood H, Abdalla A & Gumma E. 1998. Linking indigenous knowledge support: an evaluation report.

ITDG Staff. 1997. LINKS annual review report.

PTD in community-based forestland management to build up a farmer-led extension system in Vietnam

Hoang Huu Cai[1], Ruedi Felber[2] and Vo Hung[3]

The Social Forestry Support Programme initiated Participatory Technology Development (PTD) activities in Vietnam with the aims of building research capacity and improving undergraduate curricula related to social forestry (mainly extension) so that they reflect field practices and realities. In 1999, the Swiss Centre for Agricultural Extension organised two training events involving the three main actors in PTD: farmers, extensionists and researchers (from five forestry universities). The participants then conducted experiments at selected research and training sites in diverse agro-ecological locations all over Vietnam: in the mangrove area of the Mekong Delta, in natural forests in the central highlands, in the buffer zone of Bach Ma National Park and in a mountainous area in North Vietnam. Although PTD still has a long way to go, the initial results are very promising and indicate that efforts towards building a farmer-centred extension system in Vietnam will certainly continue.

Photo by: Ruedi Felber, Helvetas, Vietnam.

Farmer exchange on fruit tree PTD experiment in a village in Dak R'Lap District, Dak Lak Province.

[1] Senior Lecturer, Faculty of Forestry, University of Agriculture and Forestry, Thu Duc, Ho Chi Minh City, Vietnam (lnxh@hcm.vnn.vn)

[2] Technical Adviser in Institutional Development, Helvetas-SFSP, Vietnam (sfsp.rf@hn.vnn.vn)

[3] Lecturer, Faculty of Forestry and Agriculture, Tay Nguyen University, Vietnam (sfsp.tn@dng.vnn.vn)

Context

Extension in Vietnam

Agriculture is the dominant sector in the Vietnamese economy and the principal livelihood of 70% of the population. As such it plays a critical role in generating employment, income, domestic savings, foreign exchange and food security. To compete successfully in an open-market world economy, Vietnamese farmers require comparatively lower production costs, greater efficiency in resource use, and higher product quality and yields, while still conserving natural and environmental resources. Farmers cannot achieve this without additional support. Therefore, the types of support required and the effectiveness of development institutions in delivering this support are central concerns.

Although agricultural extension services are known and widespread in many countries, such support to promoting agricultural production is quite new to Vietnam. Agriculture used to be based on a system of central planning. Technical personnel were assumed to direct or to command production according to plans and targets, instead of supporting farmers in developing appropriate technologies and practices. The national agricultural and forestry extension system was officially established by Decree 13/CP in March 1993 (see Table 1) and has been rapidly developed to district level.

This brief history of the Vietnamese extension system explains some of the constraints in the extension approaches predominantly practised in the country. Emerging after the de-collectivisation period, extension activities were influenced by conventional approaches, dominated by a relatively small number of staff trained as technocrats. These activities were therefore production-focused, using training and demonstration plots. The plots, usually called "models", were developed with the aim of disseminating advanced cash crop and animal production methods with little attention to natural resource management (NRM) or socio-economic and cultural dimensions of production systems. Interviews (Hoang 2000) revealed that this approach contributed to developing agricultural production technologies only in areas where natural, socio-economic and production conditions are quite homogenous and that only better-off farm households have access to this public service. Many poor farmers, especially forest dwellers, are

Table 1: Organisation of extension in agriculture and forestry in Vietnam

At national level	Ministry of Agriculture and Rural Development (MARD):Department of Agriculture and Forestry Extension
At provincial level	Provincial Department of Agriculture and Rural Development (DARD): Agriculture (and Forestry) Extension Centre
At district level	District Office of Agriculture and Rural Development:Agriculture (and Forestry) Station
At commune level	Commune People's Committee, Farmers' Association etc:Extension Club, Extension Collaborators

unable to access extension services, because they are in very remote areas. Other farmers see technologies disseminated by the government extension services as admirable, but not applicable. They find the technologies quite complicated, needing expensive external inputs that are unaffordable, and not fitting-in with their resource-limited situations.

Farmers are experimenting ...

Of course, poor farmers in remote areas with marginal conditions do not wait for suitable technologies to come to them. They carry out trials and experiments themselves. A man in the South Eastern Province of Tay Ninh caught 15 fresh water shrimps in a pond near his farm and conducted an experiment to see if he could raise this shrimp species in his own fishpond. A woman in Dak Lak returned to her original province in the North to bring some seedlings to test on her new land. Although these farmers did not conduct rigorous and scientifically designed experiments, these examples show that they are committed to the idea of "finding new things that work". Many of the technologies and practices generated during this process are appropriate to their specific situations.

Growth of interest in PTD

The development of an effective extension approach is one of the main concerns of the Social Forestry Support Programme (SFSP, Box 1) and its working partners. Implemented by Helvetas[4], one of the first organisations in Vietnam to introduce PTD, SFSP co-sponsored a seminar in 1997 during which the Department of Agriculture and Forestry Extension reviewed the national agricultural and forestry extension system (Department of Agriculture and Forestry Extension 1997). It was agreed that, in order to achieve more sustainable agriculture:

Box 1: SFSP in Vietnam: a brief overview

In 1994, SFSP started working with the National Forestry University, located in Xuan Mai just outside Hanoi. In its second phase from 1997 to 2002, SFSP expanded to include four more Universities of Agriculture and Forestry, one national research institute and one extension organisation in Hoa Binh Province. With this set of partners, SFSP covered all aspects of tertiary-level social forestry education throughout Vietnam. The programme focused on developing an approach to the education of forestry professionals that would enable them to be responsive to and deal with the dynamic range of needs arising in the field of social forestry in Vietnam.

The development objective is to achieve, through social forestry, more effective management of forestland and renewable natural resources in order to raise the living standards of rural people. SFSP has been contributing to this objective by developing social-forestry approaches and training activities to make an effective transition from state-directed protection and exploitation of forests to local-level and people-centred forestland management. A major challenge has been to link field-based experience generated through research and extension activities to the creation and building of appropriate curricula, and the development of continuous feedback loops from the field to the classroom and vice versa.

[4] Helvetas, a Swiss NGO, contributes to improving the living conditions of economically and socially disadvantaged people. It works towards eliminating the causes of such disadvantages and promotes international solidarity.

- not only the efficiency but also the stability and the equity of production systems should be taken into consideration;
- human development is a critical factor in agriculture and forestry extension;
- curricula that contribute to a shift from purely production-oriented extension to incorporation of natural and environmental resource management issues need to be designed and implemented;
- the extension system will have to play a crucial role in linking development and conservation in communities of forest dwellers.

Werner's (1997) critical review of the "model" and "transfer-of-technology" approach of extension in Vietnam confirmed these conclusions. In 1997/98 Helvetas initiated action research in the Northern Province of Cao Bang. It confirmed the extension staff's lack of knowledge about and experience in participatory research approaches and highlighted the need to strengthen this aspect (Helvetas Vietnam 1999).

The PTD Process

Why SFSP launched PTD

At the end of 1999, SFSP launched PTD, focusing on social forestry issues through a set of training workshops, coupled with technical and financial support to its seven working partners from the North to the South of the country. SFSP regarded this as a way to deal with two challenges:

1. To make the extension system responsive to the needs of poor forest-dweller communities where the situation is complex, conditions are diverse and production systems are risk-prone;
2. To nurture farmers' initiative and their spirit of self-help, to enhance their capacity to find appropriate technologies for themselves.

Besides generating appropriate technologies with the participation of farmers, the process of introducing PTD was also to develop an alternative research and extension approach that would provide input for participatory curriculum development with the seven working partners. PTD was also perceived as a way of improving the linkages between the researchers and extensionists, who operated independently because of the existing institutional set-up.

The PTD actors

The selection of actors was a main concern in the initial phase of the PTD process. As a development approach based on farmers' indigenous knowledge, experience, potential, problems and needs, PTD is designed to ensure the active participation of local farmers. In PTD, innovation takes place by combining farmers' knowledge and local experience with researchers' scientific analytical skills. Farmers usually innovate within very complex conditions and options, which only they fully understand. On the other hand, researchers are accustomed to handling only a limited number of variables. By conducting joint experimentation, new ideas developed together have a better chance of being adapted to local conditions and being adopted by other villagers in the area. The

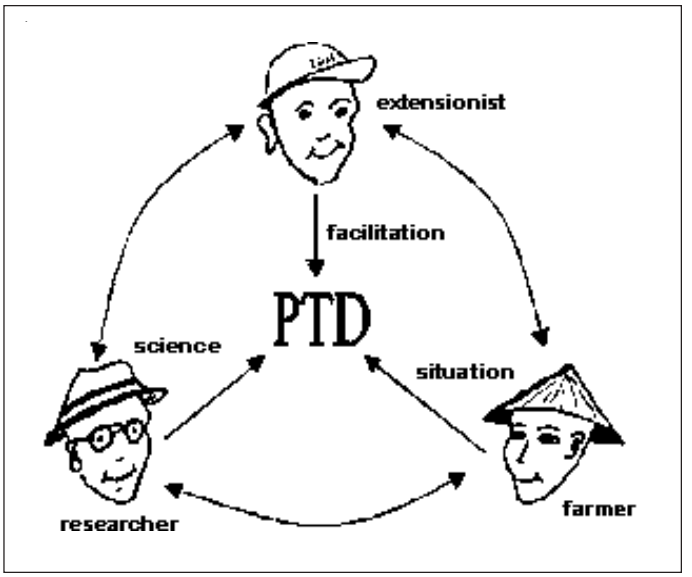

Figure 1: the three PTD actors

interaction between villagers and researchers often needs facilitation, which is best done by extensionists possessing good communication skills. This third actor is responsible for a number of rural communities and is therefore interested in developing innovations that are potentially relevant to the majority of farmers (Scheuermeier & Katz 2000).

A critical question in the initial phase was: "Which farmers get involved in PTD?" Although all farmers were interested in the PTD process, not all became involved in the actual experiments, often for reasons of resource limitations. Moreover, some farmers are more curious than others to know about new things and are keener to contribute to village development. Several "key farmers" were selected in each village to conduct the experiments, to inform all farmers in the village about the on-going activities, to arrange for cross visits, to guide outsiders through the village, to provide historical information about the village and to interpret local ethnic languages. These farmers should make sure that the activities are not biased towards dominant groups in the community. Therefore, they need to be willing, motivated and have the personal qualities required to become involved in the PTD process. Ideally, the community should select such key farmers based on these criteria. Local leaders (both formal and informal) who have a good relationship with the community are usually nominated as key farmers during village meetings. They are usually better-off farmers and their social positions can affect the effectiveness of technology generation and dissemination. Other selection criteria are ethnic origin, wealth rank and gender. In communities of ethnic minorities, key farmers need to be able use Vietnamese to communicate with outsiders. Informal training was given to enhance their capacity to implement PTD. They improved their skills in experimentation and communication. This is an important outcome of PTD, along with the technology itself.

Other household representatives, women and men, participate at village plenary meetings to discuss and review group work plans and results, to decide which ideas and experiments are to be conducted. As a result, an impressive number of farmers, independent of their financial situation or ethnic origin, put their names on the list for participating in experiments.

Researchers' skills of scientific analysis help to ensure that the process is implemented in a manner that useful information can be collected. The extensionists' facilitation skills are used to build a bridge for the dialogue between researchers and farmers and to spread PTD results to a larger group of users. We regard PTD as action research and identify researchers and extensionists according to their roles in the process rather than their titles. For instance, in the case of experiments in the Northern Province of Hoa Binh implemented by the provincial extension centre, extensionists play the role of the action researchers. In many cases, university staff members are action researchers. However, researchers do not have a monopoly on action research simply by reason of their title.

The study sites

SFSP's seven working partners have been involved in the PTD implementation process within their relevant, mandated areas: mountainous communes in North Vietnam, the buffer zone of Bach Ma National Park in Central Vietnam, the natural forests of the Central Highlands and the mangrove area of the Southern Mekong Delta. The activities have thus provided an excellent opportunity for learning a development approach in diversified natural and socio-economic settings in Vietnam. However, this case study describes PTD only in three sites in the southern provinces of Vietnam where the authors have assisted local partners directly in monitoring the process.

The three working partners involved in PTD in the South are the Faculty of Forestry of Hue University of Agriculture and Forestry (HUAF), the Faculty of Agriculture and Forestry of Tay Nguyen University (TNU) and the Faculty of Forestry of the University of Agriculture and Forestry (UAF) in Thu Duc, Ho Chi Minh City. Each of these partners works closely with relevant local development agencies and with farmers in a selected site within its mandated area.

The HUAF group in Hue works with a commune in Nam Dong District. This is a poor upland commune in the buffer zone of Bach Ma National Park where local farmers are Kinh immigrants and Kotu ethnic minorities who are highly dependent on the forest for their livelihoods.

The TNU group selected a commune of the M'nong ethnic group in Dak R'Lap District of Dak Lak Province. Natural forest resources are still important in this area, which is becoming increasingly deforested on account of coffee plantations, the principal source of income in the region. In collaboration with the provincial DARD, TNU's Faculty of Agriculture and Forestry has tested a scheme for forestland allocation in this commune and has assisted the local community and development agencies to plan use of the allocated land. The development of technologies for sustainable land use was seen as a continuation of this effort.

The UAF group's choice was a mangrove forest-dweller commune in Ngoc Hien District, Ca Mau Province. Mangroves, which were badly degraded during the war, had been rehabilitated with state investment. However, the development of shrimp farming in recent years has created a new threat to the restoration process. Farmers need assistance in developing this shrimp-mangrove area to fulfil requirements of both ecological restoration and viable aquaculture production. In 2001, an additional site was chosen in Da Nhar (Lam Dong Province) to compare the applicability of the PTD approach in upland and wetland settings.

The common issues in these sites are the high demographic pressure on forest resources because of immigration, the evidence of a process of transition towards commercial production systems that are still unstable, the ambiguous resource-tenure situation that affects motivation for sustainable production and resource management, and the poor accessibility to formal extension services. However, the state enterprises in these areas have provided some form of assistance to farmers. Previous assessments, made through farmers' group discussions and interviews of key informants, revealed that the performance of the very limited extension service in all three provinces did not meet the demand of the local farmers.

At each study site, there is a forestry enterprise (or forestry-fishery, in the case of the Ca Mau site). In Vietnam, these forest "owners" were allocated large areas of forestland to manage. They are the strongest stakeholders in decision-making with respect to local development plans. These institutions are in a process of transition from state-run enterprises to public agencies providing services for farmers. In a recent proposal to re-structure the forestry sector, many such enterprises were regarded as "public enterprises" that will be more explicitly involved in rural community development programmes. In fact, many of them already implement programmes, such as the national Five Million Hectare Reforestation Program Partnership and the national programme for the development of poor rural communes. Policy is being revised to encourage forestry enterprises to become "two-sided development service agencies", one side providing technical inputs to farmers and the other side supporting farmers to market their produce. This means that forestry enterprises take on the role of extension and their involvement in PTD is therefore "justifiable".

Preparations for launching PTD

Training in PTD

Although many of SFSP's working partner institutions thought that PTD was an approach to make extension more responsive to farmers' needs, the real meaning of this approach and its applicability in the Vietnamese context had been ambiguous. The first activities were therefore a clarification of basic concepts. Some initial questions needed answering: What is PTD? How can it be initiated in reality? What are the roles of farmers, researchers and extensionists involved in the process?

With the assistance of the Swiss Centre for Agricultural Extension (LBL), SFSP introduced PTD by organising two ten-day training workshops. The first workshop was

held in the Northern Province of Thai Nguyen at the end of 1999. Some months later, a similar workshop was conducted in the Western Highland Province of Dak Lak. The three main actors in the PTD triangle, *i.e.* farmers, extension agents and researchers (from five forestry faculties) were involved in both workshops. These training events marked the first time that the different partners working in technology generation, utilisation and dissemination had come together to discuss a new approach to research and extension linkages, based on field experience.

Both workshops were implemented with the same three-step structure:

- an introduction to the basics of PTD;
- a field exercise to apply participatory methods and tools to initiate PTD in a village;
- a final workshop for PTD follow-up planning.

The three phases of the PTD process (preparation, initiating PTD in the village, continuation of activities) were explained and the workshop participants discussed them animatedly. The exhaustive documents of these two workshops (Scheuermeier & Katz 1999, 2000) lay out the objectives, procedures applied and experience gained from each module in a very practical way. These documents have been used as examples of how the process of PTD can be documented.

Although the two training events required a high input of resources, this can be justified as necessary to create a basis for initiating PTD in social forestry in Vietnam. The important outputs of these events were a group of trained researchers, equipped with the knowledge and skills to take responsibility for the PTD process in their study sites, and some initial knowledge and experience to contribute to developing a curriculum for extension.

Initiating PTD in more villages

The PTD workshops were replicated in selected research and training sites of the forestry faculties in Hoa Binh, Nam Dong and Ca Mau. In these follow-up events, researchers who took part in the previous training events assumed the role of facilitators. The same basic three-step structure was followed, but using only the key modules from the previous workshop. Even though extension staff received less training during these follow-up events, PTD could be successfully launched with a reasonable amount of resources. Concrete and challenging experiments could be designed and planned after about four days of intensive work with villagers. Facilitators documented the efforts to initiate PTD in Nam Dong, Ca Mau and Dak Lak by describing the steps implemented, especially in exploring ideas and designing experiments with farmers (Hoang *et al* 2000, Le & Felber 2000, Scheuermeier & Katz 2000).

Table 2 summarises the key steps for initiating PTD in a village. This is a well-organised sequence of highly demanding work, including hill walking in natural forests in the uplands, crossing rivers and tidal flats in the Mekong Delta, lively interaction during group work in villages, late-night village meetings with multi-voting exercises and, at the end, tough negotiations with serious-looking local authorities.

Table 2: Key steps for initiating PTD in a village

Phase 1: Preparation	Provide information about PTD	In a short training event, provide general information about PTD approach and discuss key experiences gained so far. Explore willingness of villagers to participate.
	Make organisational arrangements	Fix period for initiating PTD activity with villagers. Identify key farmers.
	Prepare introductory meeting and work in the village	Explain and discuss in detail the sequence of work in the village.
	Conduct introductory meeting in the vilage	Explain purpose and key steps of activity . Discuss topic(s) of PTD activity and set the thematic boundary. Agree on details of next village meetings.
Phase 2: Work in the village	Walk around to gather ideas	Explore village's issues and opportunities regarding PTD topic(s). Explore ideas in the field that might become interesting things to try out.
	Screen and select ideas in the village meeting	Review collected ideas and establish final idea sheet. Clarify commitment of involved stakeholders. Select promising ideas for experiments by voting.
	Move from idea to experiment sheets	Develop selected ideas into experiment sheets by clarifying justification and criteria. Design experiment(s).
	Select experiments to be taken up first	Let farmers select the experiments that look most challenging and interesting to them, as the first to be implemented.
	Elaborate activity plans	Plan each experiment by assigning detailed tasks to farmer participants, extensionists and researchers.
Phase 3: Continuation of PTD activities	Debrief local authorities and rural development organisations at district level	Provide information about PTD in the village, its results and required decisions and support for following up the initiated activities.
	Build up experiment committees, prepare experiments and set up documentation system	Confirm list of farmer participants, search for additional information regarding the experiments, train farmers and extensionists in keeping track of the experimentation process.

Field implementation

Launching experiments

After initiating PTD, the "outsiders" - extensionists and researchers - gained a fairly good understanding of villagers' issues and opportunities regarding forestland management. A couple of experiment sheets and related activity plans were jointly defined, and the commitment of local authorities and rural development organisations in respecting agreements and supporting the PTD process was gained.

Before the experiments were started in the field, the villagers formed interest groups for each experiment. It was encouraging to observe how the farmers created ownership and how much detail they put into preparing the experiments: they collected additional information, confirmed the list of participants, identified the experimental plots in the field, discussed measurements and listed required materials. Subsequently, the first experiments were launched in the Southern provinces (see Table 3).

About ten farmers are involved in each type of experiment and are following an agreed system of very serious experimental protocols in terms of respecting deadlines, methodological design and supervision in the field. The farmers are certainly eager to obtain good results, but it also appears that they want to prove to outsiders that they can carry out efficient experimentation.

Table 3: First experiments launched in the Southern provinces

PTD sites	Ongoing experiments
Dak Lak	Management of 3 rattan species in allocated natural forestsPlanting grafted durian and seed-grown durian in coffee gardensPlanting princess jackfruit in degraded hilly land remote from water sources
Nam Dong	Planting bamboo along streams in natural forestPlanting cinnamon in regenerated forest after shifting cultivation
Ca Mau	Thinning methods to improve the productivity of mangrove and the living conditions of shrimpsRaising red shells in shrimp ponds in mangrove area

NB: Additional experiments are presented on the website www.socialforestry.org.vn

Learning from joint experimentation to facilitate scaling-up

Farmers play a very active role in the PTD process, but it is important to ensure that all three PTD actors implement the whole process together. If "good" experiments are done in some villages, the PTD approach has a better chance of being extended to other villages in the same district and gradually accepted in the extension system on a broader scale. In order to increase the acceptance of such new participatory approaches in the Vietnamese technique-orientated extension system, the three actors need to analyse each step of the process. Much interaction and learning takes place, and lessons learnt need to be shared among the actors at different levels: locally within the villages, regionally and nationally.

If PTD is to be integrated into the extension system, then it is crucial that decision-makers at all levels receive accurate and regular information about promising experiences and related learning:

- Local district authorities have to receive accurate information and reflect on new ways to support community development. Without their agreement, such new farmer-oriented approaches become stalled;
- At district level, those responsible for extension need to be regularly informed about what is happening in the forest and in the villages, and why it is happening;
- Provincial extension authorities and people in charge of rural development also require information about the ongoing efforts.

By making concepts of participatory forest management more clear, PTD helps to promote social forestry in Vietnam. This is why SFSP has supported exchange and joint learning events at national level. At the end of 2000, people came from all the areas where PTD was initiated and, for the first time, shared what had been achieved. This sharing of experience led to discussion of important issues. Such events gradually create a common platform for exchange.

Apart from these exchange workshops, other tools are also necessary to strengthen PTD efforts. The Internet could play a strategic role for regular and quick exchanges between PTD practitioners both within Vietnam and abroad. Furthermore, exchange visits among actors from different areas of Vietnam present challenging possibilities to assist each other in improving PTD approaches (Scheuermeier 2001). To organise and enhance doing, learning and exchanging PTD, it is important to monitor, evaluate and document the PTD efforts.

Monitoring and evaluation

Some initial criteria for practising "good" PTD were jointly developed during a PTD review workshop (Scheuermeier 2001). The intention was to launch a quality control system for PTD and to use the developed criteria as tools in scaling-up and in monitoring and evaluation (M&E). The Vietnamese PTD practitioners agreed on four types of criteria, which are directly linked to current challenges and major concerns regarding PTD:

- ***Farmer-led experiments or demonstrations***
  Demonstrations are perceived by local extension workers as the most important tools for spreading well-tested technologies in rural areas. PTD experiments are different in that researchers do not come with a set of "blueprint" technologies to demonstrate. They encourage villagers to conduct their experiments properly and to share what they have learned with their neighbours. In PTD, farmers can conduct the experiments they prefer in a systematic way; these "experiments" are new to them (*i.e.* cannot be seen in neighbouring communes) and can be explained by the farmers. We want to show that, with minimum support from formal researchers and extensionists, farmers can carry out experiments wisely and creatively, and can develop learning platforms at the grassroots level. Results so far are encouraging. Local extension workers involved in the process have gradually changed their attitudes towards recognising farmers' roles in the development process and the need to change the extension approach.

- ***Support and incentives***
  A common belief among development workers is that, without financial and material support, farmers will not conduct experiments. However, if providing material support is the only way to launch experiments, it is not PTD but rather "participation" induced by material incentives. Such experiments do not necessarily concern farmers' aims and, in the long run, can destroy the spirit of self-help and self-reliance. These are strong reasons why material support should be restricted. Farmers visiting from other villages will not be convinced by successful innovations if they are based on financial and material support. Exceptions may be justified in the case of initial bottlenecks, but should be convincing to neighbouring farmers.

- ***Scope and extension***
  There is a dilemma in PTD: on the one hand, a PTD programme should focus on experimentation, so that new things can be found that really work. On the other hand, the new things must be extended if the PTD experimentation is to be of any wider use. "Good" PTD therefore needs an extension effort that is operationally distinct from the PTD experiments as such but is, of course, closely linked to the experimentation process. In our case, this issue has been addressed by two strategies: 1) in the screening phase, jointly deciding on the experiment(s) and the potential beneficiaries of its results; and 2) assisting the participating key farmers in initiating farmer-led extension. These farmers have become more confident in facilitating interest-group discussions, explaining the experiments to other farmers and visitors. A balance must be found in involving the right number, which has to be low enough to manage the experiments well, but high enough to convince visiting farmers. Along with criteria and indicators for monitoring of the experiment itself, related criteria on the extension process were included in the M&E system.

Documenting

Results and processes have to be documented to ensure that learning takes place, results are not lost, promising innovations are evaluated, the effects of extension are followed and the PTD approach is adapted and improved. All the involved parties need to have access to information that is as complete as possible. Each person therefore has to take responsibility for ensuring that information is consistent and reliable. This is a challenge in the Vietnamese context, where reports are often written for bureaucratic administrative purposes, reflecting general descriptions and superficial opinions rather than accurate and profound analyses of emerging issues.

In SFSP, documentation occurs at various levels:

- In the village, farmers have a full set of idea and experiment sheets with corresponding activity plans. These basic documents are jointly developed during the activities to initiate PTD. Villagers also keep diaries in which they record all implemented activities and regularly write down discussions of issues with visiting farmers from neighbouring villages or with technicians from extension organisations;
- The extension organisations at commune, district and province levels are supposed to have at least documents summarising ongoing experiments (experiment sheets, activity plans) and periodic progress reports. So far the information flow from district extensionists to the provincial service has not been smooth.

Photo by: Ruedi Felber, Helvetas, Vietnam.

Writing idea sheets in a village in Nam Dong District, Thua Thien Hue Province.

- PTD researchers from the universities analyse results obtained in the field, critically study the way PTD is launched and continue to make concrete suggestions for adjusting concepts to the Vietnamese context. At present, there are several diverse documents available, but the level and scope of documentation is quite broad and varied among the faculty research teams.

Adaptation of PTD to the Vietnamese context is still in an exploratory phase. However, the following adjustments need to be considered:

- When initiating PTD, a stakeholder analysis needs to be done before selecting local partners in order to avoid domination by certain groups. PTD is better implemented after an exploratory PRA to gain a better understanding of the community's problems. Researchers need more time to think about the potentials of technological options in addressing these problems before going on to translate idea sheets into workable experiment sheets.
- In the context of some poor upland communities, the combination of technology generation and local capacity building can help to address resource management issues and to revive the community's spirit of self-reliance. The facilitation skills of local partners need to be improved before PTD activities are initiated. Over-emphasis on "newness" can lead to the risk of generating good technologies for better-off groups without paying adequate attention to disadvantaged groups.
- Taking the above-mentioned issues into consideration, a clarification of the role of PTD documentation and reflection on how to make it work easier and better is required. PTD documentation should be based on the information requirements of the involved parties.

Results, impacts and lessons learnt

The evaluation of PTD deals not only with its direct results, but also with the process. In the beginning, many researchers focused on the former without giving enough consideration to the latter. Process-based evaluation helps to explain why new things work or why they fail. In the ongoing PTD exercises in SFSP, it is still too early to discuss the technologies, but the first results of the initiative are promising.

Promising experiments

All experiments have been well implemented and followed up by farmers. This indicates that the objectives of the experiments respond to their interests and priorities. The chosen topics, which are related to forest and forestland management and agroforestry, correspond to their search for ways to diversify current farming practices. At the top of the "hit parade" are experiments to identify new species of fruit trees that have short-term potential to increase farmers' income. The high-value fruit-like dragon (*Hylocereus undatus*) offers excellent opportunities. In natural forests, improved management of rattan (*Calamus viminalis*, *C. tetradactylus*, *C. poilanei*) and bamboo (*Bambusa procera*) offer promise for increasing the production of non-timber forest products. It is also likely that, when farmers thus receive direct benefits from natural forests, they will be more interested in protecting them. However, a precondition for developing such new forest technologies is appropriate long-term land allocation. This issue was clearly stated by farmers when PTD was initiated in the first villages.

Photo by: Ruedi Felber, Helvetas, Vietnam.

Experiment "Bamboo for shoots" (10 months after planting) in a village in Dak R'Lap District, Dak Lak Province.

Even when the experiments were less than one year old, they attracted the interest and visits of farmers from other villages. Many of them had heard about the experiments at the local markets. Farmer-to-farmer visits were initiated by the district extension service of Dak R'Lap already in December 2000. Some 40 farmers from three communes visited the three experiments and immediately sought to initiate such activities in their own home villages. They were very impressed by the planting of new fruit trees, which could diversify their coffee plantations.

PTD process monitoring and evaluation

Process evaluation is being emphasised in the initial phase for newcomers to PTD, as good process documentation and a system of continuous monitoring create a strong basis of data for scaling up PTD in the future. For instance, the output of the

PTD initiating step is experiment sheets, which can be used for monitoring activities in subsequent steps. However, it still remains to be explored and documented how well these sheets have been elaborated, who selected the experiments and why these were selected.

After some initial experiences, the formal researchers became convinced of the necessity to have a good system of process documentation. Initially, some researchers thought that documents serve a bureaucratic management purpose. Later they realised that process documents are tools to validate results, just like statistical analysis is in conventional research. An important improvement is that participating farmers have used these documents to reflect on the experiments. More work is needed in making the forms user-friendlier. And once this is done, the documents could serve as a medium of interaction between researchers, extensionists and local farmers.

Participation

Initiating farmers' participation and establishing trust were the main concerns of the research teams in the beginning of the process. In view of farmers' bad experience with interventions in the past; their reluctance to participate in any introduced activities affecting their normal life is understandable, especially in cases where land tenure is still a problem. However, the reactions of local stakeholders differed. Some had expectations over and above what PTD could bring to the commune; others expressed a lack of confidence in the success of the approach. The research teams were sensitive to these sentiments. In establishing trust, the teams explained the PTD objectives clearly and ensured the participation of both farmers and the other strong stakeholders in their area (district and commune authorities, extension services, forest protection services and forest enterprises).

SFSP monitors farmers' participation in PTD according to their willingness to share perceptions and ideas when generating idea and experiment sheets, the time they spend on intra-community information sharing and the quality of the process documents (completed forms, experiment diaries). The initiation of PTD is the first time in Vietnam that remote forest-dweller communities, local extensionists and researchers have come together to discuss local problems and possible action. In focus-group discussions, the farmers expressed their willingness to take part and were happy with the experiments. "This is the first time our inspirations and ideas have been heard," a woman in the mangrove area of Ca Mau said in a focus-group discussion for monitoring experiments. Judging by their high level of motivation, it is clear that the quality of farmers' participation has increased throughout the process.

Provision of material incentives is an important issue, especially in poor communities. A good PTD approach should not depend on strong external support. The self-help nature of the PTD process was therefore clarified already in the initiation phase. The limited material support to experiments has been given in special circumstances: to compensate for risks of the experimenting farmer or to obtain material not available locally. A revolving fund for PTD has been set up for long-term development research in which technology generation is coupled with local capacity building.

Another indicator of success is farmers' confidence. Participating farmers are becoming more and more confident in explaining experiments to other farmers and to visitors. SFSP observed this confidence not only in PTD activities, but also in self-help activities for community development. In view of this impact, it would be a good idea to consider ways of training key farmers to enhance their spirit of experimentation and to encourage them to become good voluntary farmer-led extension workers at the community level.

An institutional impact of the PTD process is the increased mutual understanding between farmers and local extension agencies. Firstly, problems of farmers and other local stakeholders were shared in focus-group discussions. Secondly, development of mutual understanding has led to attitudinal change among some of the participating extensionists, besides increasing farmers' confidence.

Scaling up PTD

The administrative leaders at provincial, district and commune level are increasingly recognising the roles and potential of communities in NRM. However, scaling up PTD is not an easy process and the degree of recognition is still low in comparison to the prevailing culture of obedience to higher authorities and a strict adherence to policy directives from above. "Extension has been planned according to the state programme. Unless that is changed, we cannot do otherwise," said a leader in DARD. This leads to weaknesses, but also opportunities: NRM policies in Vietnam have been rapidly changing towards more decentralised governance, and extension approaches will change accordingly. As in other areas of development, social forestry in Vietnam needs supportive policies for PTD to be adopted as an extension approach in complex situations.

Capacity strengthening

PTD is not only an approach to develop practices; it also deals with capacity building. In our case, PTD has contributed to the capacity building of the three partners in the triangle in at least three aspects:

- creation of field-based learning by forming platforms involving different actors who conduct joint experiments;
- development of a network of key farmers who are keen on community development activities and establishment of local interest groups that work together on the experiments;
- continuous reporting to local authorities and the involvement of local development agencies in monitoring not only the experiments, but also the group dynamics, thereby encouraging reflection on the process and its applicability in establishing an effective extension system.

Civil society in rural Vietnam is taking a more important role in community development. For instance, the Women's Union in a commune in Ca Mau is giving its members access to the formal credit system, and a Farmers' Association in the uplands is involved in business activities to provide farm inputs. By working closely with these institutions, the research teams are having more opportunities to learn from the communities and to enhance capacities in local organisations.

Changing attitudes

SFSP clearly observed indicators of attitudinal change among research team members and some participating extensionists. In the beginning, some of the research team members were exposed to PRA training and field exercises. However, this exposure was too short and the idea still existed that PRA and PTD were distinct, instead of wisely combining PRA tools to facilitate participation, identify problems and select experiments. Future PTD training should help participants reflect on ways to incorporate different PRA tools into different phases of the PTD process. Linked to this, formal researchers need additional skills in conducting PTD as an action-research process. More time should be allocated to encouraging researchers to interact with experimenting farmers and to share their analytical skills so as to strengthen capacities for farmer-led research and to sustain the PTD process.

In addition, researchers need to learn to take an "un-learnt" attitude so that they are more sensitive to the real needs of farmers, instead of jumping to conclusions based on their own perspectives. For instance, when a thinning experiment in mangroves was discussed, the forester's perspective was that this would optimise timber production, whereas the reason participating farmers wanted to try it out was "to make the shrimp pond easier to manage". This "management" included the ease of keeping watch over their shrimps to prevent theft.

Also many of the extensionists and local authorities misunderstood the nature of PTD at the beginning of the process. Some of them expected PTD to lead to an investment or intervention, e.g. a development project from the donor side. Others were uncertain about participating, worried that it could disturb their management system. Seeing that this could lead to a distorted view of the roles of formal researchers, the site teams have used various, more or less informal ways of clarifying their roles. However, through learning by doing, extensionists are gradually changing their attitudes to PTD and have also realised the need to change their attitudes to the local community.

Implications for a social forestry extension curriculum

A university-level "Agriculture and Forestry Extension" curriculum was elaborated in the Participatory Curriculum Development (PCD)[5] process implemented by SFSP and its seven working partners, along with curricula of other subjects related to social forestry. A first draft of the workbook - the result of a long collaborative effort - was distributed for revision and feedback. The workbook was designed with the ambitious aim of providing future extension workers with a comprehensive set of knowledge and skills. However, reflection on the field-based learning experience during the PTD process and its implications can help improve the structure and content of the curriculum. Instead of over-emphasising the "teaching" role of extension, PTD should be considered the main component of the subject. Firstly, as discussed above, the extension system should be more responsive than directive, to cope with the complex, diversified and risk-prone situations of forest-dweller communities. Secondly, in using PTD as the main approach, future extension workers will be trained to develop their attitudes to become learners

[5] See www.socialforestry.org.vn to obtain more information about the PCD approach.

rather than "teachers". There is clearly a need to rethink the "target groups" with which the future social forestry extension workers will work. The aggregation of agriculture and forestry into one extension course, as indicated by the course title, may simplify the approaches. It may be necessary to de-emphasise some conventional extension approaches in order to provide more space for PTD.

SFSP initiated PTD to create field-based learning experiences as a contribution to the process of PCD. The initial results have already provided tangible outputs for this purpose. PTD monitoring documents have provided good inputs for identifying additional skills needed to enhance PTD results and impacts. Firstly, PTD can be perceived as an action-research process, and some skills relating to this need to be improved. Secondly, the role of the action-researchers in PTD is not only to conduct research, but also to facilitate farmers' own research; to be able to do so, extensionists and researchers need continued enhancement of their facilitation skills. They need training on how to provide effective technical inputs related to the PTD experiments, how to analyse experiment sheets with farmers and how to facilitate discussions with farmers to improve experimental design. Training should also address the skills required to construct rational layouts of experiments to fit farmers' situations, to identify which criteria farmers want to observe, to select rationally the criteria to reflect farmers' needs and, at the same time, to maintain rigorous experimentation. Skills are also required to develop a system for farmers to monitor and evaluate the results and processes of PTD themselves, to monitor group dynamics and participation, and to strengthen key-farmers' and interest groups' roles and capacities. Last but not least, skills are needed in lobbying for policies that support PTD.

The participants of the PCD workshop in December 2000 agreed to design and implement an integrated social forestry practicum for three subjects. In the case of PTD, students should have the opportunity to work hands-on in some important phases of the process. The study sites selected for PTD are excellent learning grounds for field-based teaching and practical training. However, logistics such as gaining accessibility to the sites need to be given sufficient attention. Moreover care should be taken in fitting these training schedules into ongoing PTD activities.

In September 2002, a PTD draft manual in Vietnamese was circulated in universities, research institutions and several provincial extension centres for feedback. The final version took account of the comments received and was published in 2003 (Bao Huy *et al* 2003). It reflects three years of field-based learning about PTD in the context of Vietnam. The manual was originally designed for use by researchers at universities in the SFSP network. However, feedback from extension workers revealed that they found the stages and steps of PTD and the examples of good PTD practice to be well described and illustrated, and that the manual will also be useful to them.

Challenges

Even though a dynamic process has been started through PTD, there are still weaknesses to overcome and challenges to face. Achieving "good" PTD is important not only for

the current experiments, but also because it is the only way to convince other stakeholders in the extension system about the effectiveness of the approach. Some of the weaknesses and challenges are as follows:

PTD experiments

- Some PTD experiments were started too quickly after community members and researchers prioritised the problems. By over-emphasising the "newness" of the activities, some experiments were designed to address superficial symptoms and not the root cause of the problems in the local system of resource management. PTD practitioners need to improve their facilitation skills so that the idea sheets can be explored jointly in more depth.
- Quality control was launched by jointly defining initial criteria for practising "good" PTD. The criteria need to be more strictly observed in the field during M&E of current and future PTD experiments.
- Extension of the jointly developed innovations needs to be closely followed so that the effectiveness of PTD can be measured. To facilitate dissemination, local extensionists and authorities have organised farmer-to-farmer visits in neighbouring villages. It is important that extensionists keep records of the farmers who adopt or adapt technologies generated through PTD.

Scaling up

- The most challenging issue is the effective and active involvement of local extension staff. There is an immediate and general need for training and coaching in order to improve their organisational, management, facilitation and communication skills.
- As PTD involves tripartite coordination, a mechanism for collaboration among researchers, extensionists and local farmers needs to be clarified. In the current situation, one of the options is a kind of "PTD network" in which each faculty of forestry participating in SFSP acts as a node to coordinate with extension agencies in its mandated area. Experience from PTD at each site should be used to develop short courses for in-service reorientation of forestry extension staff.
- The process of sharing PTD experiences, initiated after the December 2000 workshop, needs to be enhanced.

Concrete PTD processes have been initiated in Vietnamese villages. However, PTD has still to be adapted to the Vietnamese context, carefully taking into account the institutional setting of rural development organisations and their staff. Key concepts and most tools for PTD have been "imported" and they may have to be reviewed and adapted to local conditions. This is a process still underway.

From SFSP to ETSP - moving on with PTD

These challenges will be taken up by the new four-year project "Extension and Training for Forestry and Agriculture in the Uplands" (ETSP) commenced in January 2003 under a bilateral cooperation agreement between the Swiss Agency for Development and Cooperation and the Vietnam Ministry for Agriculture and Rural Development. Building on the experiences of SFSP, ETSP reflects a new direction and a broader scope: working

directly with stakeholders at provincial, district, communal and village level, to scale up PTD in an effort to link poverty reduction with sustainable NRM in three upland provinces, namely Hoa Binh, Thua Thien Hua and Dak Lak. The project seeks to involve local stakeholders through participatory planning at village level, and to enhance local capacities in developing demand-driven extension systems.

References

Bao Huy, Hoang Huu Cai & Vo Hung (eds) with technical assistance of Christina Giesch and Ruedi Felber. 2003. PTD manual (in Vietnamese). Hanoi: Agricultural Publishing House.

Department of Agriculture and Forestry Extension. 1997. The National Seminar on Agriculture and Forestry Extension, 18-20 November 1997. Hanoi: Sida-MRDP / SDC-Helvetas.

Helvetas Vietnam. 1999. Terms of reference for Ueli Scheuermeier, Consultant, LBL Switzerland, Consultancy on Participatory Technology Development (PTD), Cao Bang Co-operation Programme, Nguyen Binh District (31 May to 26 June 1999).

Hoang Huu Cai. 1999. Report of a training needs assessment for the development of natural resource management curricula (unpublished).

Hoang Thi Sen, Hoang Huy Tuan & Felber R. 2000. Initiating PTD in Phu Mau village, Huong Phu Commune, Nam Dong District, Thua Thien Hue Province (03-06 April 2000). Hue: Hue University of Agriculture and Forestry, Forestry Faculty / SFSP.

Le Ba Toan & Felber R. 2000. Initiating PTD in Rach Goc B village, Tan An Commune, Ngoc Hien District, Ca Mau Province (24-28 April 2000). Ho Chi Minh City: University of Agriculture and Forestry, Forestry Faculty, Thu Duc / SFSP.

Scheuermeier U & Katz E. 1999. Initiating PTD in a village: documentation of a training workshop for SFSP working partner institutions, Thai Nguyen and Vau (Van Lang Commune). SFSP / SDC / MARD / Helvetas Vietnam.

Scheuermeier U & Katz E. 2000. Initiating PTD in a village: documentation of a training workshop for SFSP working partner institutions, Dak Lak. SFSP-SDC-MARD-Helvetas Vietnam.

Scheuermeier U. 2001. PTD review workshop 11-15 December 2000 in SFSP Hanoi. SFSP-SDC-MARD-Helvetas Vietnam.

Werner M. 1997. Government extension service: a need for rethinking the purpose and redesigning the task? Some ideas based on organisational development principles. In: Department of Agriculture and Forestry Extension (ed.), *The National Seminar on Agriculture and Forestry Extension*, 18-20 November 1997. Hanoi: Sida-MRDP / SDC-Helvetas.

Supporting agricultural innovation in northeast Brazil: the approach of Projeto Paraíba

Eric Sabourin[1], Pablo Sidersky[2] and Luciano Marçal da Silveira[3]

Projeto Paraíba is a local development programme being carried out in partnership by a Brazilian NGO-AS-PTA[4]-and several farmer organisations from three municipalities of the Agreste area in Paraíba State, Northeast Brazil. This case study is about innovation management by smallholders in the context of this initiative. The paper traces how innovation management has evolved and grown to be a main focus of the programme. It analyses the methods, results and limits of a pioneering local initiative, conceived as a means to support a farmer-led innovation process.

Photo by: AS-PTA.

Experimenting farmers in Curimataù using participatory mapping as a tool for discussion.

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1 CIRAD Tera, UFPB-CH-DAS, BP 5035, F-34032 Montpellier Cedex 1, France (sabourin@cirad.fr)

2 AS-PTA, Rua Goncalves Maia 114, Ap. 21, Boa Vista, 50.070.060 Recife, PE, Brazil (pablo@aspta.org.br)

3 AS-PTA, CP 33, Esperança-PB, CEP 58130-000, Brazil (luciano@aspta.org.br)

4 AS-PTA (Assessoria e Servicos a Projetos em Agricultura Alternativa) is a Brazilian non-governmental organisation (NGO). Active since the mid-1980s, it works on issues that include agroecology, family agriculture and sustainable development. Its activities focus around field research on and extension of appropriate technology for small-scale producers, networking and advocacy.

Introduction

It is now widely recognised that building up sustainable agriculture depends, among other things, on the creation of a whole new range of technical references[5] (Sébillotte 1994, Mazoyer & Roudart 1997). However, like so many other smallholder systems the world over, rainfed farming in semi-arid Northeast Brazil suffers today from the lack of very necessary support and, also, a lack of useful information on innovations in different technical sectors.

And yet, in spite of the many difficulties they face and the few resources they have, farmers in the Agreste area of Paraíba State have never stopped inventing, trying and disseminating innovations. This fact, among others, led AS-PTA and a group of farmer leaders to focus on providing support for, and building upon, these processes. The purpose of this initiative was to reinforce farmers' capacities, in an effort to increase the autonomy of farmers and their organisations vis-à-vis the different social actors on the local development scene (*i.e.* extension services, markets etc), in a context of ever-decreasing resources and growing privatisation. The assumption was that this greater independence would help them negotiate support on new and, hopefully, better terms. This initiative - *Projeto Paraíba* - started operating in two municipalities in this area: Solânea and Remígio. It later spread to a third, Lagoa Seca, and now works in more than ten.

This paper analyses the methods, results and limits of this pioneering local initiative during the period 1993-2000. It draws upon a two-year study that included monitoring several groups of farmers involved in experimentation in Remígio and Solânea (Sabourin 1998) and upon AS-PTA's own experience and records (AS-PTA 1994, 1995, 1996, 1997, 1998, 1999, 2000).

Context

Family farming in the Agreste area of Paraíba State

Northeast Brazil is a very large tropical region, covering eight of the country's 26 States. The environment is extremely varied, ranging from the humid coastal plains to the semi-arid interior. *Agreste* is the name given to the transition region in between. According to Andrade (1980), the main feature of this region is the intense diversity at very short distances. In Paraíba State, the coastal plain ends and the *Agreste* starts, with a small hilly range that runs parallel to the coastline. These hills form a barrier for the more humid winds from the Atlantic, causing a sharp drop in rainfall from east to west. The situation in Solânea, Remígio and Lagoa Seca Municipalities illustrates this well: while average annual rainfall amounts to approximately 1100 mm in the east, it drops to around 400 mm only 30 km further west (AS-PTA 1997a).

[5] Technical data on a particular innovation, developed and/or implemented in a specific situation, which can be referred to by others.

The various family farming systems found in the three municipalities are based on mixed cropping and livestock production. Since the end of the 19th century, smallholder family farming in the region has been, at least partially, market-oriented, following a succession of cash-crop cycles (tobacco, cotton, sisal, coffee, potato, aniseed etc)[6]. Fields of annual crops, pasture and, to a lesser extent, orchards dominate the landscape (AS-PTA 1997b). Virtually all smallholder families raise a few animals, mainly cattle. The proportion of small ruminants is higher in areas with less rainfall. Family farms are numerically important, but most of them are small *minifúndios*. According to census figures, 77% of farms in the area are smaller than 5 ha (FIBGE 1986).

Several factors limit the development and consolidation of sustainable family farms. The prevailing inheritance system has stimulated farm fragmentation. The recent abrupt disappearance of cotton (because of an insect pest) and the difficulties encountered in production of the few remaining cash crops have reduced incomes and savings. The gap between rural communities, local political representatives (most belonging to a patronising elite) and rural development institutions (research, extension, credit) makes autonomous farmer organisation more difficult (Sidersky & Marçal da Silveira 2000). Also, the highly diverse context of farming systems and ecological conditions, associated with the lack of locally adapted technical information, makes agricultural innovation a difficult task.

The general institutional approach

These were the challenges taken up by *Projeto Paraíba*, a rural development project implemented by AS-PTA in association with the local *Sindicatos de Trabalhadores Rurais* - STRs (or Unions) and community organisations of Remígio, Solânea and, more recently, Lagoa Seca Municipalities. Using a participatory approach, *Projeto Paraíba* works on the basis of partnerships. Decisions on what is to be done are made jointly by farmers and technical staff. An interesting dialogue among these stakeholders has emerged over time with the help of Participatory Rural Appraisal (PRA) exercises that favour a shared understanding of local farming systems and problems to be tackled. Capacity building has also been enhanced by these partnerships. Another important feature of AS-PTA's approach is the use of an agroecological perspective[7] as a tool to understand and discuss local farming systems.

The initial, broad PRA exercise carried out in late 1993 identified several problems. The general trend was an increasingly intensive use of natural resources without a corresponding evolution of respective technical systems. For example, although growing land pressure had led to continuous cultivation on the same plots, techniques to renew soil fertility had not evolved accordingly. Little or no manure or chemical fertiliser was being used. Without the perspective of acquiring more land, sustaining production and

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[6] The start of these cycles has always been prompted by favourable prices. The end of a cycle can be due to a price collapse, the appearance of pests or diseases, or a combination of both.

[7] According to Altieri (1989) agroecology is the study of agriculture from an ecological perspective. It is a theoretical framework intended to help understand agricultural processes from a comprehensive perspective.

income depends necessarily on bigger and more diverse harvests from the same fields. The major challenges were: 1) how to intensify agriculture, and this 2) without further degrading the natural resources.

A situation such as this called for innovative action, but where were the new ideas? Although, in theory, local farmers could expect a contribution from research and development (R&D) institutions, very few new ideas were available from the different R&D regional centres and most of those that did exist were inadequate. There was obviously a need for local processes of technology development and dissemination (Sidersky & Marçal da Silveira 2000).

Farmer experimentation and its role

The evolution of *Projeto Paraíba's* approach to agricultural innovation

Projeto Paraíba's first full agricultural year was 1994. Activities were organised around the dissemination of innovations; experimentation to develop new agricultural technologies/ideas suitable for local smallholders; and capacity building of local organisations (mainly the STRs). During this first year, most of the effort was dedicated to disseminating contour planting, pigeon-pea cultivation and banana-weevil control. Experimentation started with a couple of rather conventional on-farm trials to compare maize varieties and less structured farmer tests of new fodder crops on a very small scale.

Very soon more importance was given to experimentation and technology development, as the existing "choice" of innovations "ready for diffusion" was not considered satisfactory. Experimentation evolved towards a more systematic follow-up of the trials implemented by about 15 "reference farmers", who were chosen among those who

Photo by: AS-PTA.

A seedbank group selecting bean seeds for storage.

volunteered for hosting experiments on their farms during the general evaluation and planning meetings held in late 1994 and early 1995[8]. A few new ideas were introduced for testing: green-manure crops in banana stands and alley cropping with gliricidia (*Gliricidia sepium*) and leucaena (*Leucaena leucocephala*).

In 1995, the modest STR seedbank initiatives that had started the year before (when one ton of bean seed was "loaned" to about 100 families) were expanded dramatically with the help of a national seed-distribution initiative. The STRs and AS-PTA agreed to work on a decentralised basis, which led to the creation of 16 community seedbanks. This initiative, that can be considered more as a social and organisational innovation, reached more than 500 families. *Projeto Paraíba* put in much effort into the support of community seedbanks, focusing on capacity building at both community and municipal level.

Yet, in spite of these changes, *Projeto Paraíba* still saw experimentation and diffusion of innovations as separate processes. The idea was that technologies for dissemination had to be "ready" - that is to say, proven to be "good" in the context. The experimentation done by some farmers and AS-PTA (on the Sao Miguel farm[9]) was supposed to produce this "proof".

The lessons learnt in 1994 and 1995 showed that the development of relevant new technological options was crucial and much more difficult than initially thought. It also became clear that some of the practical problems faced by farmers called not for new technology, but for new or different organisational arrangements. For instance, difficulties faced by the poorer farmers in finding seed at planting time led to the creation of the community seedbanks mentioned above. These lessons had a strong influence on how Projeto Paraíba evolved in 1996 and 1997.

One important feature of this second period was a marked increase in experimentation, aiming at developing innovations. Many new themes/ideas were tried. Experimentation methodology evolved from "reference farmers" to "interest groups". The "reference farmer" approach permitted an ongoing discussion between AS-PTA staff, STR leaders and each of the experimenting farmers, but there was little or no contact amongst the latter. Staff and STR saw a need for more discussion by experimenting farmers with their peers, making it a more collective process. Partners in *Projeto Paraíba* also realised that experimentation and dissemination were proceeding separately, making the latter a process that relied heavily on AS-PTA staff and STR members. In 1996 a group including a staff member and three STR leaders (who are also farmers) travelled to Central America[10]. During their visit to the Nicaraguan *Movimiento Campesino a Campesino*

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[8] These farmers were called "reference farmers" because regular monitoring was done by STR members and/or technical staff with the hope of collecting information on the progress of the different experiments that would help in establishing references for later dissemination.

[9] AS-PTA's 7-ha farm (the Centro Agroecológico São Miguel, or CASM for short) started functioning in 1995 as a place to test new ideas and as a venue for different activities (courses, seedling production etc).

[10] This trip was financed by Projeto Paraíba and a small grant from another donor.

(MCaC), they were able to see that experimentation and dissemination not only could, but also should go together. They were also able to appreciate the confidence and creativity of the farmer promotores[11] and their capacity to communicate with fellow farmers (AS-PTA 1996). The need for changes, as had already been discussed before the visit, was confirmed by the lessons drawn from it.

The first change was to bring experimenting farmers in contact with each other. Focus was put on experimentation and technology development with a thematic approach, through nine "interest groups" on a regional scale covering two municipalities[12]. Each of these groups worked on a theme, such as banana, potato, animal husbandry, soil fertility, agroforestry etc (Sabourin *et al* 2000, Sidersky & Marçal da Silveira 2000).

A thorough review was made of earlier dissemination activities. For example, it became clear that more intensive pigeon-pea cultivation needed more experimentation to become an interesting alternative for farming families. Monitoring of the activities to disseminate contour planting showed that, although erosion and soil fertility did in fact present a problem, these activities had not taken sufficient account of local (community) conditions. This meant that *Projeto Paraíba* was recommending a technical alternative that did not suit many specific situations and was, at the same time, failing to see - and therefore to value - what was already being done by farmers in a particular location. Banana-weevil control suffered less from this "blinker effect", but it was seen that the mitigation or even complete control of the weevil problem would not make a very big difference in banana yields. Overall, the efforts to promote the initial innovations (contour planting, weevil control and pigeon-pea cultivation) were reduced significantly.

On the other hand, a new kind of activity began. This combined small amounts of credit, training of farmers by a more experienced farmer and a certain amount of experimentation. The effort to spread yam cultivation is a good example of this approach. As planting material is expensive, a yam seedbank was created. At the same time, a local farmer with long experience in yam cultivation was available to train farmers who had little or no experience with the crop. Visits to nearby yam-growing farmers and discussions with an official technical advisor also supplied new knowledge inputs for interested farmers. The experimental part of this activity consisted in observing the potential of yam as a cash crop in different environments. A new kind of innovation development and dissemination effort emerged in this phase, where the line between developing and spreading a technology became rather "blurred" and, in some cases, the gap between experimentation and dissemination began to close. However, this cannot be considered a general rule, as the water-tank example (that started later, in 1998) came to prove. In this case, the initiative consisted of small-scale credit through revolving funds and the training of local farmer-masons in how to build the tank, with no need for experimentation.

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[11] Promotores is the name that MCaC uses for farmers who are involved in trying out new techniques and in extension activities.

[12] At the time, Projeto Paraíba had not started working in Lagoa Seca.

In 1998-2000, the *Projeto Paraíba* methodology continued to evolve. The general trend could be described as a greater focus on local processes ("local" refers to an area covering a community or group of neighbouring communities having similar agricultural systems - regarded as an agroecological unit). The previous period had brought experimenting farmers together in "interest groups". Although this approach was indeed an improvement when compared to the previous years, it soon became apparent that it needed to change further: the focus on a single theme across different localities did not favour discussions around the issue of integration of tested innovations into the local systems. At the same time, not really including community dynamics in the discussions on experimentation and technology development made a more autonomous organisational development process and the use of pre-existent community communication channels more difficult. As a consequence, activities with experimenting farmers were redefined on a local micro-zone basis, in order to bring innovation processes closer to the reality of the various agroecological units and their different farming systems and social dynamics.

Several of the former thematic groups evolved naturally into local micro-zone groups. For instance, most of the members of the former "potato group" were from one community, so it naturally became the Meia Pataca group. Farmers who belonged to the "alternatives for animal fodder group" divided up into two local groups: the Curimataú group and the Gravatá group. This move brought experimentation closer to other initiatives already occurring on a community basis, such as the seedbanks and the community groups linked to the Solânea Parish.

Looking at the wider picture of innovation development and diffusion, even if - at the time of the latest shift (late 1998 and in 1999) - AS-PTA referred to "local groups of experimenting farmers" as the main *Projeto Paraíba* focus for innovation development, in fact it would seem more appropriate to refer to "local innovation processes" (in which farmer experimentation plays a very important role), rather than to the more structured idea of farmer-experimenter groups. If we were to define the "participatory innovation development" process that is taking shape, we would use the idea of a "collective construction of knowledge", underpinning the gradual conversion of the present systems towards more sustainable ones. What are the main characteristics of this process? It takes its roots in past and present realities. Access to external information and local innovation feeds a growing process of experimentation; when necessary, new inputs are also discussed and provided as a donation or grant or in the form of revolving funds. This not only allows fine-tuning of innovations to the conditions of each farm, but also produces information that helps evaluate the potential of these innovations for other farms in the community and the wider micro-zone[13]. Making this process more "visible" to other farmers is considered as an incentive and an invitation to try things out, according to their needs and/or fancies. This process defines the support activities that are discussed further on in this paper.

It is interesting to note that the main trait of the evolution of PTD within *Projeto Paraíba* is the increasing importance of farmers' inputs (including knowledge, ideas, labour etc)

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[13] In some cases, this information can be useful to a wider audience (the municipality or even the region).

and involvement in the process of innovation development. At the same time, farmer organisations have also become increasingly involved in supporting the fieldwork and in using accumulated experience to negotiate more and better-quality support from the different social actors on the local development scene.

But before going further to discuss the support activities, we briefly describe below the process as it developed in one of the agroecological units in Solânea.

The innovation process in Curimataú

The Curimataú agroecological unit is located in the westernmost part of Solânea Municipality. It is drier and less densely populated than the eastern units (Agreste and Brejo)[14]. Quite a number of farmers from the Curimataú area have been involved in *Projeto Paraíba* activities ever since the first PRA exercise in 1993. In 1995, a couple of them volunteered to test gliricidia alleys and pigeon pea. They were part of the group of "reference farmers" mentioned earlier on. When the "interest groups" started up, some 8-10 farmers from this unit took part in activities related to animal husbandry and fodder alternatives.

Visits to other farmers and also to the work of an EMBRAPA (Brazilian Federal Agricultural Research Institute) researcher in Sergipe State led to a larger number of innovations being tested. The 1998 drought and the PRA exercise on the use of local plants brought to the fore a series of local innovations that, until then, had received little attention. In 2000, just over 40 families[15] were involved in testing one or more innovations, mainly related to new fodder possibilities for cattle.

But experimentation is not the only activity in this area. In 1995, three community seedbanks for beans started up and have continued ever since. Another one started a couple of years later. The local parish groups are active in several communities and, since 1999, are working with homegardens, medicinal plants and, as from 2000, infant nutrition. Water-tank construction also commenced with the training of local masons in 1998 and 1999. Since then, several revolving funds have permitted the construction of about 50 tanks.

Some seedbank "members" and parish groups are actively involved in experimentation. In certain cases, the experiments are discussed in seedbank meetings (e.g. the testing of new bean varieties or groundnuts as a new crop). Other experiments (e.g. medicinal homegardens) are being encouraged by the parish groups. Table 1 lists the main types of innovation being tested.

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[14] Beside the three units mentioned in the text, *Projeto Paraíba* is active in four of these agroecological units in Remígio and another six in Lagoa Seca.

[15] Often both husband and wife are involved in experimentation, and this is actively encouraged by *Projeto Paraíba*. Children who help with work on the farm participate, although this happens less often. There are cases, of course, where only the man or only the woman is directly involved in group activities involving experimentation.

Table 1: Communities and experiments in Curimataú in the year 2000

Community or sítio	No. of experimenting families	Div	Var	TrF	Opt	Afc	Sto	Pkn	Ect	Nu	Lfe	Wlt	HgM	NPp
1. Salgado do Souza	8	3	-	1	4	4	4	4	1	1	3	3	-	1
2. Palma	5	2	1	-	2	1	3	1	-	-	1	-	2	1
3. Bomsucesso	13	3	3	-	4	6	5	6	5	1	4	-	5	3
4. Goiana	7	1	1	-	3	3	3	3	-	1	2	3	-	3
5. Fragoso	2	-	-	-	1	2	1	2	-	-	1	-	-	-
6. Pedra Grande	6	1	-	1	2	4	1	4	-	-	4	-	2	-
7. Capivara	1	1	-	-	-	-	-	-	-	-	-	-	-	-
Total	42	11	5	2	16	18	17	20	6	3	15	6	9	8

Main Curimataú experiments[16] in 2000:

Div - Crop diversification: experimentation with groundnut and sesame
Var - New bean varieties
TrF - Tree planting in cropping fields
Opt - Opuntia cactus intercropped with fodder trees (mainly gliricidia and leucaena)
Afc - Annual fodder crops (sorghum and/or pigeon pea and/or non-intercropped maize)
Sto - Animal fodder storage (silage and/or hay)
Pkn - Sowing fodder pumpkin (Citrulus lanatus cv citroides) in crop fields and/or in Opuntia plots
Ect - Erosion control techniques in crop fields (gully control, stone contour lines, hedgerows in vetiver grass)
Nu - Tree nurseries
Lfe - Live fences with local and exotic species
Wlt - Woodlots mainly with the local species sabiá (Mimosa caesalpiniifolia Benth.)
HgM - Homegardens with medicinal plants
NPp - Zero-grazing natural pasture observation plots

Other innovations that were tried in this unit in 2000 were: bee-keeping, testing of gramão grass, and subsurface dams for water retention.

As mentioned above, all these efforts in the field were actively supported by AS-PTA staff and by STR members. Table 2 presents the main support activities carried out in Curimataú during 2000. Experimenting farmers did not necessarily participate in all events listed in this table, although the more active ones were often present.

[16] Actually these "experiments" are really types or subjects. For example, under the heading of "Intercropped Opuntia cactus", several different designs are found, combining different species etc.

Table 2: Main support activities implemented in Curimataú in the year 2000

Month	Activities	No. of local participants*
Dec. 99	Evaluation 1999 meeting and planning session for 2000 with experimenting farmers	40
Jan. 00	Community meetings to discuss seedbank activities for the year 2000, in 4 communities	~ 60
Feb. 00	Course on how to build a subsurface dam	30
	Start of tree and bush seedling distribution	-
Mar. 00	Distribution of new varieties of beans for testing.	5
	Distribution of groundnut seed and trial installation	11
	Visit of farmers from another municipality to Mr Luiz Souza's farm	18
	Field day on fodder production and water management	15
Apr. 00	Individual visits by AS-PTA staff and STR members to groundnut and Opuntia experiments	-
	Meeting of community association representatives to discuss revolving funds for water-tank construction	8
	Visit to Ceará State to see subsurface dams operating	8
	(Support for) Establishing hedgerows for erosion control	4
	(Support for) Establishing homegardens and producing medicinal plant seedlings	12
	Events for distributing medicinal plant seedlings in Pedra Grande and Bomsucesso	35
May. 00	Visit to Itabaiana area to see groundnut growing by smallholders	~ 8
	Visit of EMBRAPA researcher to discuss natural pasture or rangeland management	20
	Seedbank community meetings to evaluate seed distribution and to plan next steps	~ 60
Jun. 00	Seminar on farmer experimentation and innovation in Goiana	~ 20
Jul. 00	Large-scale field day on groundnut growing in Corrimboque community	~ 200
	Courses on drinking-water management in 4 Curimataú communities	~ 50
	End of tree-seedling distribution	
	Solânea Parish groups mid-term evaluation meeting	~ 10
Aug. 00	Visits by AS-PTA staff and STR members to monitor revolving funds	-
Nov. 00	Visits by AS-PTA staff and STR members to monitor revolving funds	-
Dec. 00	Local exchange visits and evaluation discussions on intercropped Opuntia	16
	Solânea Parish groups end-of-term evaluation meeting	~ 10
	Solânea Municipal Meeting of family farmers drawing participants from all communities	not known

* Many activities listed here involved farmers from other regions. In this column, we have tried to estimate the number of participants from the Curimataú area.

Institutional support for local innovation processes

Institutional support for local innovation processes is a joint venture between AS-PTA technical staff and the STRs. In some cases, other institutions present in the region (other NGOs, R&D centres, universities etc) participate. Usually, AS-PTA organises the training of experimenting farmers and local organisations.

Support activities fulfil four major roles:

1. Helping to organise experiments (including logistics)
2. "Feeding" experimentation processes in terms of methods, information and material inputs (genetic material, equipment etc)
3. Helping to collect and analyse data and to evaluate results
4. Helping to disseminate results and lessons.

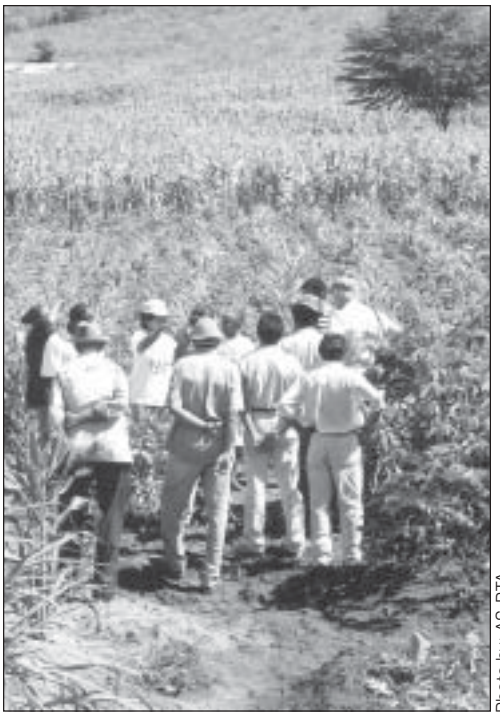

Photo by: AS-PTA.

Exchange visit on small farm in Curimataù Region.

With the increasing number of farmers involved, some of the tasks (e.g. supply of seeds and cuttings) are being carried out by community associations, seedbanks and STRs. In many cases, experimenting farmers who were supplied with the first round of planting material are now supplying their neighbours with own seeds, cuttings etc. More recently, as experiments have grown more complex and involve more resources, the need for credit has arisen. Small revolving funds have been set up to meet these demands. The management of these funds always involves the experimenting farmers, the local association and/or the STR. In some cases, AS-PTA is also present. Payback arrangements are discussed when a particular fund is set up, and adjusted according to results. Risks are dealt with mainly by flexibility in paying back: for example, if a harvest is lost, yam seed can be paid back the following season. Although not the official policy, in practice the risk of total failure is covered in part by the family involved (invested labour and inputs in some cases) and the other part by the AS-PTA budget.

Different PRA exercises (on native vegetation, soil fertility and water resources) have also proven interesting for experimentation support and programming (see Box 1).

Several instruments and methods were tested to collect data and document trial results, although no standard format has been adopted because of the diversity of situations and experiments. In reality, it is impossible for technical staff to monitor all experiments, to register and measure numerous parameters, and to collect and analyse data, as would be the case in on-station or conventional on-farm trials. Moreover, this type of

Box 1: PRA exercises and farmer experimentation

A shared understanding of different aspects of local reality, built collectively by farmers, STR leaders and AS-PTA staff, has been instrumental in taking innovation processes forward within Projeto Paraíba. Usually this has been done with PRA exercises that start with a meeting amongst staff and leaders to discuss the theme and plan the fieldwork. This can take place in one or more communities, and always entails interviews with families and the use of one or more "participatory" data-gathering tools (e.g. maps, transects). The same team that met in the beginning is in charge of data collation and systematisation. The result is then discussed within the communities involved. According to the scope and the urgency, and as these initiatives are implemented alongside other activities, the time taken to complete an exercise is extremely variable.

Experimentation has benefited from PRA exercises on the management of biomass and fertility, on local bean varieties, on the potential of local plants etc. The identification of interesting local innovations that concern the specific subject of the exercises is one of the most important practical contributions. The shared understanding developed has always produced a better dialogue between the different actors involved (AS-PTA, STRs, farm families, sometimes other institutions).

documentation or data processing does not always interest farmers, considering that they evaluate crop performance and results of experiments with their own parameters. However, experience suggests that two levels of monitoring could co-exist:

- Farmers' own monitoring for the majority of the experiments and tests. We have observed that farmers use their own parameters such as "compared income": the economic monitoring of yam cultivation usually includes the comparison of the income obtained from this crop with that from a similar plot of common beans. The labour involved is also an important issue. Qualitative observations on crop development, runoff and erosion etc are common. Productivity (production per unit area) - the usual focus of formal research - is also a parameter often observed by farmers. So far, however, we have not come across written monitoring of experiments by farmers. In the case of farmers' monitoring, institutional support takes the form of joint preparation of intermediary meetings, visits or exchanges, and support to field days organised by the groups.
- Technical staff monitors, records and processes quantitative data of certain experiments from which detailed results are sought. Interest in this kind of monitoring can emerge from a collective planning effort by farmers, technical staff and, in some cases, research institutes. For example, quantitative data on biomass flows and management are being collected from farms involved in experimentation by a research team from the university in the neighbouring State of Pernambuco.

In fact, the farmers' ability to present their experiments in terms that can be easily comprehended, together with the monitoring parameters used by farmers, has created a good deal of impact amongst their peers. In the Paraíba case, we have witnessed extremely interesting field days and visits, organised by experimenting farmers and the local STRs. One such day was on groundnuts as a new crop for food and cash. Participants included neighbouring families, some farmers from more distant communities, and staff from the local extension service and a nearby EMBRAPA research centre.

Capacity building and dissemination of experimental results take place mainly through evaluation meetings, exchange visits (thematic and regional) or training events. The exchange visits may also involve farmer organisations from other regions or States.

Support is given in documenting the results of farmers' initiatives and producing leaflets, posters or short videos. This material is used primarily in the above-mentioned meetings and visits. Some of the *Projeto Paraíba* partners present or participate in radio programmes. AS-PTA has provided support to improve the quality of these initiatives. The documentation work mentioned here provides interesting material for broadcasting.

Alongside the planned experiments mentioned above, several similar initiatives emerge from individual farmers every year. This was the case, for example, with the native cacti included in the intercropped *palma* cactus (*Opuntia sp*) experiment or in live fences. Usually, spontaneous innovations seldom spread without encouragement from outside. This brought up the question of how to document spontaneous innovations. A first level of quick and practical documentation has been used for the ideas that deserve to be made known locally, as in the case of a potato-harvesting instrument developed by a Remígio farmer. In this case, it was important to record the main traits and source of the innovation, so that interested farmers and institutions know where to go for additional information. A second level of documentation can be more systematic, if the innovation justifies larger-scale dissemination. For example, planting of forage pumpkin (*Citrulus lanatus cv citroides*), identified during the PRA exercise on local plant use, was disseminated through the publication and distribution of a small leaflet, with photographs of the farmers presenting their experience.

New knowledge reinforces farmers' research capacities (including appraisal, experimentation and monitoring skills). It also helps to build up organisational autonomy. This approach can be considered one of the most interesting forms of institutional support to the processes of developing local farming innovations. But this is not an easy task. While making an effort to place technical questions and doubts within the cultural universe of the communities, how does one stimulate the starting up of innovation processes that associate scientific and academic knowledge with the empirical skills and knowledge developed by the farmers (Petersen *et al* 1999).

The case presented here suggests that capacity building for experimenting farmers should consider at least two levels. At a more practical level, training events prepare farmers to be able to present and discuss their experiments and results. It also helps them to understand and discuss the protocols and results of experiments done by formal research centres and to take initiatives such as documenting their trials or using relevant tools (*i.e.* an agenda or photograph panels). Teaching certain practical skills, such as building a specific type of water tank, are also included.

But capacity building in *Projeto Paraíba* also considers a more conceptual level. This aspect stimulates farmers' individual learning by introducing scientific information and concepts on subjects such as biology and ecology, which can be useful to better understand the experiments. For example, when working on experiments with silage

and the problems that can appear in silage production, concepts such as anaerobic fermentation and toxins were discussed with farmers.

On the whole, capacity building helps to mobilise groups in a way that guarantees collective learning processes, for example, by preparing farmers to dialogue or negotiate with public authorities, researchers and extension agents.

Learning from *Projeto Paraíba*: some results and lessons on managing innovation

Initial results

At the end of the year 2000, local experimentation involved about 150 experimenting farmers in the three municipalities covered by *Projeto Paraíba*, working on a number of different technical proposals. Basic genetic material for 40 rural communities (maize, beans, groundnut, yam) was being preserved or revived in some 30 seedbanks.

In addition to these figures, it is interesting to note that the innovation "scene" seems to have changed quite substantially. Support provided to experimenting farmers has helped this process, and it seems that the example is "contagious". For instance, the appraisal exercise on bean varieties helped introduce the idea of recovering and disseminating traditional varieties in community seedbanks. At the same time, new bean varieties were tested. Farmer organisations and AS-PTA followed the same support strategy for groundnut and yam. The revolving fund system used by the community seedbanks was adapted for a municipal "manure bank", organised by the Lagoa Seca Sindicato.

Innovative pedagogical and institutional results also deserve mention. In the example of field days, experimenting farmers shared the presentations and demonstrations with researchers and extension workers, using language understood by all farmers attending the event. This process also helped establish new inter-institutional coordination and decentralised initiatives, involving themes related to public policy for agricultural development. For example, farmer organisations and other institutions brought together by the Articulação Seimi-Árido network[17] have signed an agreement with the State Secretary for Agriculture, according to which they will be responsible for the distribution and management of bean and maize seed through their seedbanks.

The role of farmers

The experience described here has helped reinforce some initial assumptions regarding farmer innovation. Firstly, the idea that smallholders have a capacity to innovate and develop their farming practices was clearly confirmed. To make their production systems more efficient, they have introduced various innovations in the recent past, either from local sources (forage pumpkin, live hedges, mixed cropping etc) or external ones (animal traction, new types of water cisterns, gliricidia planting etc).

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[17] A network that brings together farmer organisations, some Catholic Church groups, NGOs and some researchers from practically all Paraíba State.

Secondly, farmers do not adopt ready-made practices or technologies - they experiment. They try to adapt the technical proposals to the specific conditions of their farms. In fact, innovations introduced by farmers have effects on the farming system at various levels. This was seen very clearly with the majority of biomass management practices, in which biomass is, at the same time, a forage supply and a source of soil fertility.

Thirdly, along with experimentation, farmers contribute to the dissemination of innovations through their own information channels, for example, religious meetings (prayer, saint's celebration), cultural festivals or commercial events (e.g. weekly fair).

Fourthly, farmers develop their learning capacities. They incorporate scientific knowledge on biology or ecology into their innovation processes, if this knowledge is made available to them. For example, farmers used information about insect ecology and behaviour to control banana weevil and information about air humidity to improve how they dried beans and maize seed.

The role of farmer organisations in innovation management

Farmer organisations are very diverse and not necessarily directly involved in innovation management or even agricultural production. Here, we consider only the roles associated with the innovation process.

When referring to innovations, a distinction should be made between structures that were created specifically to deal with issues related to agricultural production: product associations (*i.e.* a potato-growers association), seedbanks etc, and the more general formal organisations: community associations, STRs and cooperatives. On the other hand, traditional peasant structures[18] do not distinguish technical or productive roles from social and cultural roles. New ideas emerge in their discussions during work, or during or after a religious meeting. Therefore, these peasant structures still play an important role in innovation, even if it is not very prominent.

Innovations are common topics of conversation in the many structures and organisations of farming communities, be they traditional and informal (*mutirão* or mutual-help groups, groups of neighbours, family relationship networks) or more formalised (associations, cooperatives, unions). Even if reciprocity relationships are less frequent than in the past, the greater part of the education of young farmers still happens through kin or neighbourhood structures (Abramovay 1999). Technical dialogue networks function not only at community level, but also on a micro-regional scale, and are usually organised around specific themes: potato growing, goat breeding, animal feeding etc. Even so, flows continue to be marked by family relationships and alliances (among godparents, for example). The whole set of these relationships constitutes a form of local social capital (Putnam 1993).

[18] In the region considered here, these structures are informal in the sense that they do not have a legal status.

In the study area, cooperatives or the larger associations (such as the potato-growers regional association that covers several municipalities) so far have not contributed directly to the development of farming innovations.

Is it more interesting to build capacities in existing organisations to deal with innovation or is it better to stimulate the emergence of specific structures (interest groups, farmer research committees etc)? In the case presented here, the initial option has been to work with existing structures (STRs and community associations), mainly in support roles.

But does the actual experimentation call for institutionalisation? At present, AS-PTA staff members are discussing the idea of an increased "structuring" of the PTD process. On one hand, they perceive that some structuring - for example, regular annual meetings of experimenting farmers in a given region - could be quite useful. On the other hand, however, too much structuring would certainly be counterproductive. AS-PTA staff members feel that, in the earlier years, they were too eager to propose activities and "ways of doing things". Where does the balance lie? Would it be better to wait and see what develops, while farmers continue experimenting and participating in different capacity-building initiatives? Experience shows that local conditions are crucial to answer these questions.

Even if several questions in this field still remain unanswered, the main feature of *Projeto Paraíba* from an institutional point of view is the intense involvement of the STRs and community associations in processes linked to agricultural innovation, as described earlier in this paper. When one compares the situation of the Projeto Paraíba partners in 1993 with the situation today, the institutional picture has changed substantially. Solânea and Remígio Sindicatos became AS-PTA's first partners because they were interested in looking beyond the issue of old-age pensions, which takes up most of STR leaders' time all over the country. Today these unions still work on pension issues, but they have also learnt that it is not only possible, but also in their own interest, to work on subjects such as water harvesting, animal husbandry, seedbanks etc. Although this sort of "reconversion" is perhaps not entirely consolidated, progress is certainly visible. We consider that the evolution of community associations goes in the same direction. The results obtained, as well as the energy that is being invested by these farmer organisations, show that they can have a decisive role in these processes, even if traditionally they have had little involvement in this kind of issue. The interest shown by farmers and their families in the whole PTD process suggests that the "reconversion" of these organisations could be invigorating.

These farmer organisations have been brought into closer contact with extension, agricultural research, local government and, in some cases, State and Federal agencies. This contact has shown that there is a need for substantial changes in the way the governmental organisations act and in the policies they implement. Debate and negotiation on this issue have already started in the region, but - the goal being a more active support of public policies for sustainable family farming - all *Projeto Paraíba* associates know that there is still a long way to go.

Methodological lessons

With reference to organisational mechanisms and methodological instruments, and to institutional support for innovation processes among family farmers, our study took up and confirmed some important elements in response to initial assumptions.

In the local context where land is private property and land use is also governed by this logic, the development of innovations by farmers is essentially a practical and individual phenomenon[19] that takes place on a plot or field, in a herd of livestock or on a farm. The decision to experiment, the implementation and the analysis of results refer mainly to individual farmer action. However, this mechanism is fed by information, practice and references produced and/or transmitted by the local community (neighbours, priests, seasonal workers, merchants etc). One example of collective action of a sort that fed individual farmers' experiments is the effort to recover traditional bean varieties. R&D institutions also feed this process to a certain extent. Thus, these innovations are the result - at least in part - of collective action (community and organisations) and of public action (R&D centres). However, the information circulates mainly through socio-technical networks among individuals, and less through institutional or official programmes (rural or technical schools, field days, public institution training etc). Therefore, it could be said that the (individual) processes of innovation development grow and gain in efficiency, if stimulated or fed by more and better institutional or methodological support, and by collective organisational learning dynamics (Engel 1997).

Institutional support for farmers involved in innovation management (interest groups, experimenting farmers, associations) can play the role of an interface, making the necessary linkages between individual and public action. We believe that the approach and methodology of *Projeto Paraíba* is a step forward when compared to top-down (conventional rural extension, Training & Visit methods) or rather rigid or strict systems that demand intensive follow-up, such as networks of closely monitored "reference"[20] or demonstration farms. However, it must be noted that the *Projeto Paraíba* approach can be quite demanding in terms of methodology and human resources (capacity building and monitoring).

The approach offers some insights for the renewal of both rural extension methods and public policy concerning agricultural innovation. It has been tried, essentially, on local innovation processes, using participatory mechanisms that contribute to a clearer perception and consideration of local conditions. This is why it could be useful in the context of increasing decentralisation and the appearance of new stakeholders on the rural development scene.

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[19] There are no commons (forest land or pastures) in the region concerned, nor has watershed management developed to a point where collective action of several farmers has become necessary.

[20] "Reference farms" are farms that are monitored in order to obtain technical and/or economic data that are discussed with other farmers.

In the region concerned, innovative initiatives of collaboration between research centres and farmer organisations have taken place. The EMBRAPA Cotton Centre asked experimenting farmers to test new groundnut varieties for the semi-arid zone. In addition to the joint monitoring and evaluation of these experiments, that had been carefully negotiated between the experimenting farmers, the STRs and EMBRAPA, the partners chose to hold joint field days. Throughout these field days, the researchers, extension workers and experimenting farmers shared the presentations and demonstrations, creating in-depth dialogue with visiting farmers. However, this case cannot be considered the rule, when referring to the relationship between smallholders and researchers in the region. If we mention this example here, it is because it indicates the type of interaction that we feel would be of greater use to farmers than the conventional approach that still prevails.

Capacity building and information delivery are perhaps the most efficient forms of institutional support. It is important to value farmers' experience and knowledge, to favour direct contact between farmers themselves and to use appropriate language. Field days and visits organised by the experimenting farmers, or by technical staff and farmers together, are very interesting tools for this purpose.

Conclusions

The case described here provides evidence of farmers' capacities to manage local innovation. It also gives an idea of what the present and potential role of smallholder organisations in innovation management and dissemination can be.

These initial results are promising, but there are still many questions and gaps that need to be addressed in order to guarantee the sustainability of this kind of process in a context of scarce and diminishing resources. One important challenge lies in the institutional and professional environment of public services. Another crucial issue is how to reach smallholders who have few contacts with experimenter groups and farmer organisations. This will probably mean more systematic work on the question of socio-technical networks and local knowledge systems (Röling 1993, Engel 1997).

Projeto Paraíba has yielded methodological and institutional lessons that can contribute to a new way of providing support for the development of agriculture and farmers. The idea is to push the notion of participatory methods a bit further or, as Hocdé (1997) proposes, to think in terms of the participation of support institutions and technical staff in the projects, logic and knowledge of farmers, instead of the other way around. Joint action on the basis of negotiated partnerships is at the core of what is being proposed. But experimentation need not be the only or the first step. In the Paraíba case, the different participatory appraisals helped build a shared view of local reality. This, in turn, proved to be a solid base on which discussions on innovations and experimentation took root. These appraisals also helped the actors think about other aspects, such as institutional and capacity building, information dissemination etc.

As shown by this case, such an approach demands certain prerequisites, such as time, patience and an open attitude. Even if initial processes are slow, once set in motion they gain momentum rapidly and can thereby save time and energy in the long run, when compared to more classical approaches.

As Albaladéjo (1999) suggests, what is at stake is the "renewal of public action". Between the levels of individual (the farmer) and public action (public policies, credit, infrastructure, education etc), the new institutional environment today includes a level of collective action - meaning the organisational level of stakeholders in local development, including family farmers. This level is crucial, not only to guarantee negotiations between individuals and public authorities but also to form networks and alliances capable both of stimulating individual action and of exerting pressure and provoking a better response from public services.

References

Abramovay R. 1999. Cinco proposições sobre a construção do capital social. II Fórum CONTAG de Cooperação Técnica 'A formação do capital social para o desenvolvimento local sustentável', São Luiz, Maranhão: CONTAG

Albaladéjo C. 1999. Réflexions sur la notion de 'systèmes locaux de connaissances' à partir de projets de recherche / formation en Amérique Latine. *Elaboration de références tecnico-économiques*. Montpellier: CIRAD Tera: 12 p

Altieri M. 1989. Agroecologia: as bases científicas da agricultura alternativa. Rio de Janeiro: PTA / FASE

Andrade M C d. 1980. *A terra e o homem no Nordeste*. São Paulo: Hucitec

AS-PTA. 1994. *Projeto Paraíba - Relatório Anual 1993*. Solânea: AS-PTA

AS-PTA. 1995. *Projeto Paraíba - Relatório Anual 1994*. Solânea: AS-PTA

AS-PTA. 1996. Intercâmbio técnico na América Central: relatório de viagem. Solânea: AS-PTA

AS-PTA. 1996. Projeto Paraíba - Relatório Anual 1995. Solânea: AS-PTA

AS-PTA. 1997. Projeto Paraíba - Relatório Anual 1996. Esperança: AS-PTA

AS-PTA. 1997a. Agricultores familiares do Agreste Paraibano: o DRPA de Solânea e Remígio. Solânea: AS-PTA

AS-PTA. 1997b. Sistemas agrícolas sustentáveis para a agricultura familiar nos municípios de Solânea e Remígio - Paraíba. Solânea: AS-PTA

AS-PTA. 1998. Projeto Paraíba - Relatório Anual 1997. Esperança: AS-PTA

AS-PTA. 1999. Projeto Paraíba - Relatório Anual 1998. Esperança: AS-PTA

AS-PTA. 2000. Projeto Paraíba - Relatório Anual 1999. Esperança: AS-PTA

Engel PGH. 1997. The social organisation of innovation: a focus on stakeholder interaction. Amsterdam: KIT / CTA

FIBGE. 1986. Censo Agropecuário 1985. Rio de Janeiro: Fundaçao IBGE

Hocdé H. 1997. No quiero plata, quiero conocimientos. No equivocarse de planteamiento! San José: IICA-PRIAG

Mazoyer M & Roudart L. 1997. Histoire des agricultures du monde. Paris: Le Seuil

Petersen P, Tardin JM *et al*. 1999. Desenvolvimento participativo de sistemas de plantio direto sem herbicidas voltados para a agricultura familiar: a experiência da região Centro-Sul do Paraná. Rio de Janeiro: AS-PTA

Putnam RD. 1993. Making democracy work: civic traditions in modern Italy. Princeton: Princeton University Press

Röling N. 1993. Agricultural knowledge and information systems: models for knowledge management. In: Blackburn DJ (ed), Extension handbook: process and practice for change professionals. Guelph: University of Guelph, pp 57-67

Sabourin E. 1998. Organização dos produtores familiares para a produção e difusão da inovação no Agreste da Paraíba. Campina Grande: UFPb-CH, CNPq, CIRAD

Sabourin E, Sidersky P & Marçal da Silveira L. 2000. Smallholder experimentation groups: a challenge for innovation management in the Agreste region of Paraíba (Brazil). Paper presented to the AFSRE Conference, Santiago

Sébillotte M. 1994. Recherches-Système et action. Symposium International sur les Recherches Système en Agriculture et Développement Rural, Montpellier, CIRAD-SAR

Sidersky P & Marçal da Silveira L. 2000. Experimentar com os agricultores: a experiência da AS-PTA na Paraíba. In: Guimarães Filho C & Andreotti C (eds), Experimentação com agricultores. Brasília: EMBRAPA-CCT 5: 33-58

The meeting of two worlds: constructing processes of PTD in the Huetar Region of northern Costa Rica

Henri Hocdé[1] and David Meneses[2]

In the Huetar North Region of Costa Rica, two separate initiatives were underway with similar purposes. On the one hand, a group of farmers was promoting a movement for farmer experimentation and exchange between farmers about their experiments; on the other hand, a group of extension workers and researchers from the national Ministry of Agriculture were promoting an approach called "farmer experimenters" as a new model for technological innovation. Eventually, they met each other and sought ways to join hands. This coming together offered a possibility to broaden ("scale up") the processes of "PTD" (although the term, as such, was never used). Here, scaling up does not refer primarily to wide-scale incorporation of participatory research and extension into the various formal institutions that support agriculture (research, extension, universities, local governments). Rather, the focus is on strengthening the organisation of producers who want to be responsible for managing the processes of technological innovation: to conduct these processes themselves and to invite the supporting institutions to join them.

Photo by: Henri Hocdé.

Elections at *Comite Regional de Agricultores Experimentadores de la Zona Norte (*CRAEZN).

[1] Programme Agriculture Familiale, Montpellier, France (hocde@cirad.fr)

[2] Coordinator, Depto Investigacion, Ministerio Agricultura y Ganaderia, Costa Rica (dmeneses@mag.go.cr)

Creation of CRAE-ZN

In April 2000, farmer leaders called together people from about 40 farmer organisations (FOs) in northern Costa Rica - women and men, young and old, quiet and talkative. Some of them came from organisations of palm-tree growers, others were cultivating coffee, pineapples or tubers; also butterfly producers and people raising wild animals were there. It was a very heterogeneous group. Also at the meeting were people who take quite an active part in the process of agricultural development, but on this day they had a clear mandate: to assist, to accompany, to facilitate, but not to lead. These were the technical experts and extension workers of the Ministry of Agriculture and Livestock (MAG) and some researchers. A lawyer was also present, but the task was not conflict resolution.

The group had come together to create a new organisation with a legal status. They called it CRAE-ZN: *"Comite Regional de Agricultores Experimentadores de la Zona Norte"* (Regional Committee of Farmer Experimenters in the North Zone), and wanted to achieve the following:

- to contribute to strengthening the existing processes of farmer experimentation in the administrative region of Huetar North;
- to establish a system of ongoing support to this rural experimentation, linked to the existing agricultural services, in order to respond to the demands of the FOs;
- to design mechanisms to guarantee the long-term financial sustainability of the system.

Between August 1999 and February 2000, the group of FO leaders who had called this meeting had been working hard - supported by advisers in MAG and a local NGO, CENAP (National Centre for Pastoral Action) - to write an 80-page project proposal in which the orientation, goals, organisational set-up and internal structure of CRAE-ZN are explained (Hocdé & Meneses 2000). This intensive and complicated task had arisen out of determined collaboration among several actors: the farmers and their organisations, MAG, CENAP and the French-funded Centre for International Cooperation in Agricultural Research for Development (CIRAD). Together, sometimes encouraged by the extension agents, sometimes with the impulse of the farmers, they had pushed forward. It was not merely a technical task. It was driven by the desire to earn mutual respect and trust and supported by an attitude of huge faith in the final result, an attitude that helped to overcome the numerous difficulties along the way.

This movement of farmers and their organisations aimed at implementing "farmer experimentation" processes at regional level could be called "scaling up" in development terminology. This paper starts with a brief introduction to the agro-ecological and human context, emphasising the historical evolution of the two "worlds" involved. The preparation, implementation and results of their coming together are then described. This leads to a discussion of the lessons learnt. Finally, certain important aspects in the efforts made by many actors in the country to institutionalise PTD, and the constraints to this process are stated.

Preparation for the union

Main actors in the process

The Huetar North region of Costa Rica is home to more than 250,000 people. Within the past 15 years, household livelihood systems have diversified from growing only a few crops to a wide range of activities, including tourism. There are more than 300 farmer organisations in this region. Most of them wish to market the produce of their members, mainly in non-traditional crops such as palm, roots and tubers, vegetables, citrus and coffee. Medicinal plants, grains, fruits and butterflies are also produced. Many FOs would like to improve production techniques and management of financial and natural resources as well as labour. Others wish to move into organic farming.

The main actors who initiated and are involved in the PTD process in Huetar North are:

Farmer organisations

- The *Programa Campesino a Campesino* (PCaC) or Farmer-to-Farmer Programme, represented in Costa Rica by the *Mesa Regional Campesina* (MRC, Regional Farmers Board) and made up of the following FOs in Huetar North: *Coopellano Azul*, APRODEGUA (Producers' Association of Guatuso), UPPROCCHI (Small-Scale Farmers Union of the Canton Los Chiles), APROSAMA (Association of Farmers, Foresters and Similar Producers in San Marcos de Cutris) and ARAO (Regional Association of Organic Farmers);
- UPANACIONAL, an organisation of small- and medium-scale farmers constituted at national level which promotes a "Rural University";
- other regional organisations of producers who are not members of the above-mentioned organisations, e.g. AGROPALM (Palm Tree Agro-Industrial Association), FUFUMRAMA (Association of Butterfly Producers), GEMA (Ecological Women's Group of El Abanico) and ASOMU (Women's Association) Santa Elena;

Public institutions

The Ministry of Agriculture and Livestock (MAG), through a handful of extension agents and specialists in the Regional State Office Huetar North and the National Extension Office, with the support of PRIAG (Regional Program for Reinforcing Agronomic Research on Basic Grains in Central America);[3]

Non-governmental organisations

CENAP (National Centre of Pastoral Action) has played a strong role in training farmers and extension agents in organic farming.

Evolution towards an union

The Farmer-to-Farmer movement in Costa Rica originated in the 1980s from various exchange visits between farmers from Costa Rica and neighbouring Nicaragua. A

[3] Development cooperation programme financed by the European Union (1991-99).

cornerstone of the movement is the "promoter farmer". The farmers had little trust in the public extension service, questioned the dominant technological model for agriculture and linked up with national and international NGOs that promoted farming without chemical inputs.

Meanwhile, from 1992 onwards, MAG - with the support of PRIAG - was building up a methodological approach to innovation development in the Brunca Region in southern Costa Rica called *"Agricultores Experimentadores"* (Farmer Experimenters, FEs). It is characterised by the participation of farmers in research and dissemination of findings, and recognises the key role of farmers in managing the process.

From 1994 onwards, the MAG Regional State Office Huetar North (DRHN) - also with PRIAG support - adopted this approach, starting in one canton (Upala). Farmers involved in innovating, being local sources of information, able to communicate well with others and willing to carry out experiments were identified. Hereby, the topics of informal research being done by farmers and the links to problems of agricultural production (e.g. high production costs, excessive use of pesticides, soil degradation, environmental damage, low profitability) were discovered. Together with the MAG extension agents from the region, these farmers worked out a plan for joint experimentation and training activities.

In 1994-95 the local team (FEs and the MAG extension agents) organised some meetings to share the results of the experiments, inviting farmers from other localities. These exchange visits became a way to find new FEs and, thus, to enlarge the team. Apart from these meetings at local level, the MAG-PRIAG project arranged some trips for the farmers and extension agents to the south of the country, to Panama and to Brazil (to see green manuring, cover cropping and direct sowing). In 1996, DRHN decided to expand the Upala experience to other cantons and organised several workshops on this topic for its extension staff. The various activities (joint experimentation, methodological and technical training, exchange visits, documentation), despite many inadequacies, succeeded in creating synergy among farmers, extension agents and technical staff from different MAG departments and the universities.

In 1999 the MAG extension staff decided to hold a Congress of Farmer Experimenters in Huetar North Region (Hocdé & Meneses 1999). Of greatest importance was the recognition given in this congress to the FEs. Table 1 shows the paths that were taken by the FOs and the public sector institutions up to the meeting of these two different "worlds". Table 2 shows the directions and contributions of these two "worlds" (farmer organisations in the left-hand column, the public sector in the right-hand column) towards PTD within CRAE-ZN (central column).

Capacity building for PTD

Over the years of building up to a process of PTD, many activities such as workshops, courses and exchange visits were carried out with the aim of strengthening the farmers' capacities. These activities involved FEs, potential users of the results of their experiments, leaders of farmers' groups and sometimes youth and children. The types of training given are shown in Table 3.

Table 1: Evolution in the "worlds" of farmer organisations and the public sector (1980-2000)

Period (years)	Criteria	Perspective of farmer organisations (FOs)	Perspective of governmental institutions
1980-90	Production model	Diversification, food security, environmental damage	"Return to the land", market-based high-external-input agriculture
	Agenda / relations	Antagonistic or paternalistic relationship with Government	International loans and implementation of Structural Adjustment Programme
	Research and extension	Focused on market demand	Vertical mode
1990-95	Production model	Monoculture for export causing environmental degradation	Search for alternatives to conventional agriculture
	Agenda / relations	FOs make more proposals	Government encourages FOs to enter into dialogue
		FOs and Government in process of coming closer to each other	Change in attitude of extension agents; organisational development approach
	Research and extension	Farmers become involved in designing training, extension and experimentation programmes	According to farmers' problems and needs
		Development of production practices to reduce environmental damage	Transition to horizontal mode
1995-99	Production model	FOs promote alternative production activities to agricultural export model	Search for alternatives to conventional agriculture
	Agenda / relations	FOs arrange negotiation frameworks and agreement with Government institutions	Modification of policy and institutional guidelines
			Dialogue within the institutions
	Research and extension	FOs develop own programmes, research methods and technical innovations (promoter farmers)	Knowledge and experience of the farmers are re-discovered and valued
		FOs make own diagnosis and develop stronger capacities of analysis, discussion and planning	Development of farmer experimentation programmes
			PTD

Table 2: Directions and contributions of PCaC and MAG towards PTD in CRAE-ZN

Criteria	FOs in PcaC	CRAE-ZN	MAG
Target groups	Farmers	FOs and individual farmers	Small-scale farmers
Lines of action	Decreasing the vulnerability of smallholder economies in the face of globalisation. Food security. Farmers' knowledge as a source of wealth. Experimentation by farmers.	Decreasing the vulnerability of smallholder economies in the face of globalisation. Strengthening FOs' possibilities. Research according to FOs' needs.	Research and extension for PTD. Local development.
What do they experiment on?	Site-appropriate or organic farming. Fair trade.	According to limitations and potentials of FOs: - low-external-input and organic farming -connecting research to market and agro-industry.	Conservation agriculture. Agriculture in transition.
How do they experiment?	Network of promoter farmers. Support team of MNC.	Local and regional planning of experimentation by CTEs within FOs. Promoting interaction between FOs and scientists/extensionists	Working plan for FOs. Regional Committees of FEs working with public-sector institutions.
Doubts/worries	Strengthening versus destructive or destabilising process?		How to switch from positive but isolated meetings of FEs to regional plans for farmer experimentation as part of Annual Operational Plans for extension?

Acronyms: CNP: National Council of Production; CTE: Technical Committee for Experimentation; FE: Farmer Experimenters; IDA: Institute of Agricultural Development; MNC: National Farmers Board (*Mesa Nacional Campesina*).

Table 3: Evolution in the training of farmers and extension agents

Actor	1994-1998	1999-2000
Farmer experimenters	Introduction to experimentation	Functions and training of CTEs
	Analysis and elaboration of proposals for experiments on the basis of work carried out by FEs Communication techniques Conflict management Making plant extracts	Setting up webpage
Extension agents	Farming system management	Functions and training of CTEs
	Techniques of adaptive research Communication techniques Conflict management	Setting up webpage

Implementation of PTD in the field

Farmers' involvement

The process of farmer experimentation means, by definition, that farmers are involved in the different activities. They are the ones who teach other farmers about their experience and results (farmer-to-farmer extension), while the extension workers facilitate this process. Table 4 gives an overview of how farmers were involved in the different components of PTD.

Table 4: PTD activities and farmers' involvement

Activity	How do they participate?	Which farmers?
Designing the proposals for experimentation	Proposing what to investigate and why, based on problems identified in the production process; determining together with extension agents and specialists what to observe and measure, and when and how to collect the information	Research-minded farmers (FEs), farmers facing the same problems and lead FE of the group
Working out and negotiating the proposals	Describing background, targets and expected results, and methods and tools to carry out and evaluate the work, making budget	FE groups and lead FEs
Implementing the research	Providing the inputs, land, labour, knowledge and experience.	FE groups
Disseminating the results and experience	Presenting the results, receiving feed-back from the other actors	FE groups and lead FEs

Activities and methods

Among the activities undertaken over the years leading up to this union, the most important are the workshops for analysis and planning, and the farmer exchange visits and meetings.

The workshops for planning, presenting, discussing, analysing and evaluating the results of the farmer experimentation are usually held at a site close to the FEs' communities. The FEs, extension agents and research scientists take part. Each group introduces its work and proposals, and the participants as a group decide which activities to approve or exclude.

To bring optimal results, the farmer exchange meetings need to be well structured in three phases: before, during and after each event. The lead FEs of each group organise the exchanges with farmers in the forefront explaining their experiments and results. Extension agents and specialists play only a supporting role (Hocdé & Byron 2000).

Collective experimentation as a learning platform

Several stages can be distinguished in the process leading up to collective experimentation as shown in Figure 1.

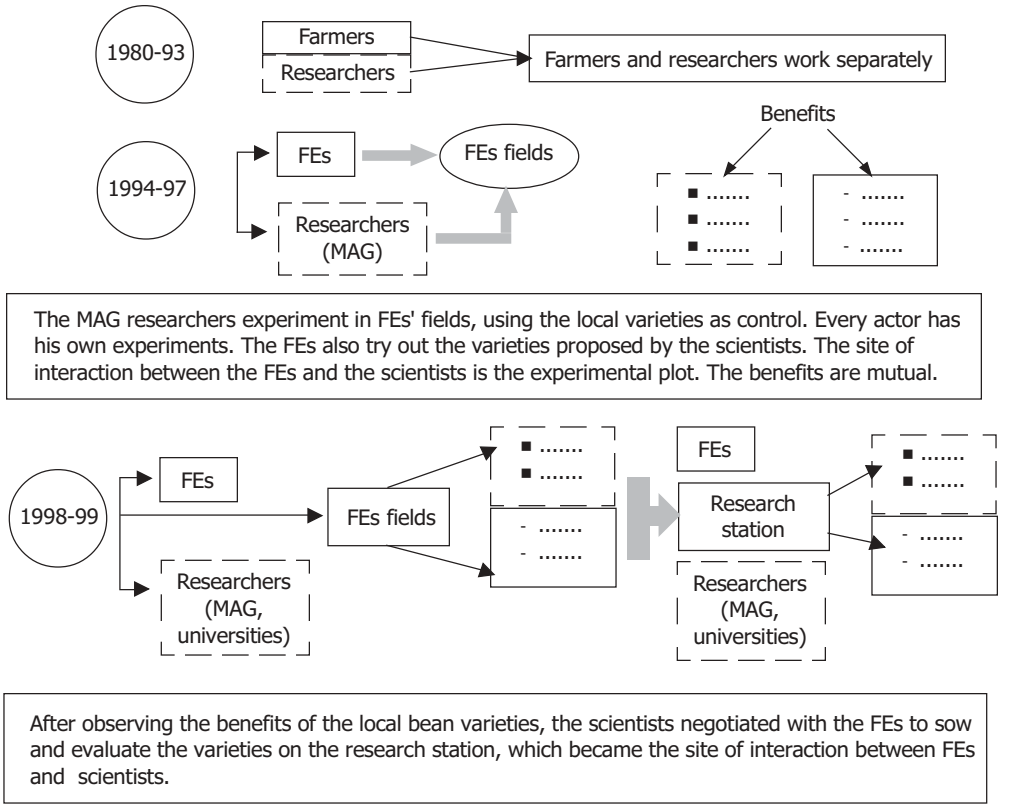

Figure 1: Evolution of FE-scientist interaction in bean research in 1991-98 in Brunca Region

The roles of the different actors in the PTD process are shown in Table 5.

Table 5: Roles of the different actors in the implementation process

Actor	Activity	Role
FEs and promoter farmers	Designing and implementing proposals; disseminating results	Negotiator, implementer and channel for dissemination of technologies
Lead FEs	Preparing proposal and negotiating financial and logistical support	Negotiator
Extension agents and specialists	Proposing, implementing and negotiating proposals; disseminating results	Negotiator, implementer, facilitator and channel for disseminating technologies

Monitoring and evaluation

Generally, the experiments are designed for comparison between treatment and control plots. The farmers keep track of technical and economic results such as plant protection, soil improvement and yield estimates in workbooks. Researchers and extension agents visit the experiments carried out by the FEs and give relevant feedback "on the spot". Although these experiments are quite weak in terms of generating data that can be analysed scientifically, they generate a great deal of enthusiasm. The extension workers and scientists are responsible for documenting the technologies developed in this process. They do this in the form of reports. In exceptional cases, the FEs make reports on the visits themselves.

Results and impacts

Strengthening capacities at farmer level

Throughout this process, the FEs gradually change and assume new responsibilities. They not only experiment with crops and livestock; they are also involved in processing of products, marketing of products and services etc. Table 6 gives an overview of some of these capacities.

Lately, FEs have ventured into completely new areas such as community forest management, raising of frogs and butterflies, biological pest control and preparation/ use of organic fertilisers. Box 1 gives an example.

The results of farmers' experiments and new practices are spreading slowly, despite economic restrictions. FEs, for instance, find it hard to spare money to visit each other in the region. The process of building the CRAE-ZN project is, in itself, evidence of how local capacities have been strengthened.

Table 6: Capacities strengthened at farmer level

Topic	Strengthened capacities
Research	Identification of the problems Preparation of proposals Data collection and analysis, and presentation of the results Drawing up proposals on new themes such as value addition, biodiversity conservation, organic farming and soil management, seed improvement and production etc. Selling products and services Promoting sales through national and international workshops Making contacts with national and foreign tourists Setting up and managing tourist accommodations
Arts and crafts	Painting and handicrafts Negotiating sale of products Participating in national and international fairs Linkages with external organisations Making contacts with private companies and public institutions (MAG, universities, Institute of Technology, CNP) on research topics Negotiating financial and logistical support from public institutions, private firms, NGOs and FOs; drawing up collaboration agreements between FOs and public institutions. Negotiating with national and international firms for sale of products, as well as envisioning new locally processed products.

Box 1: Farmer innovation in adding value to production

In February 1999 a female member of ARAO (Regional Association of Organic Farmers), one of the organisations in CRAE-ZN, attended the international fair on organic products Biofach in Nuremberg, Germany. This allowed ARAO to understand the huge potential that its products have. The ginger from Costa Rica proved to be better than the ginger from other countries. Some months later, buyers from Italy contacted ARAO with an order for 4000 kg/month of baby ginger and asked that the ginger be processed and made into sweets in Costa Rica, thus adding value in the country of origin. The product had to be organic (i.e. using organically-produced sugar or molasses). That put the creativity and inventiveness of the producers in ARAO to the test. The new experts in making the sweets decided to extract juice from sugar cane and obtain the molasses. Through further experimentation, they produced also ginger syrup and a dehydrated jelly, for which the CNP then carried out market research.

Sustainability of the process of local innovation and PTD

Despite the fact that innovation requires investment, the FEs and their organisations have made great efforts to keep up the innovation process in their farms and communities. Some of them carry out experiments using their own resources; others write proposals with the support of scientists and negotiate the necessary financial support; some FOs make agreements with research centres in universities, the MAG Regional State Office of Research and Extension, and private industry. Setting up CRAE-ZN in August 1999 was a similar exercise in which FEs wrote a project proposal and submitted it to different

donors in an attempt to obtain required funding. Despite the constraints faced, they stress the urgency of involving young farmers and schools in the process of local innovation and PTD.

Overall "cost-benefit" comparison

Thus far, no overall calculations or even estimates have been made of the real costs and benefits of this approach. The FEs contribute their land, equipment and infrastructure, as well as their knowledge and experience to the PTD process; in addition, they invest time, as do the scientists and extension agents who are working with them. A calculation based purely on monetary inputs and outputs would probably show a lack of balance, with the former being more than the latter. On the other hand, in specific cases such as described in Box 2, the benefits generated by farmers' experiments have been calculated. This does not give a monetary value, however, to the intangible benefits such as the pride and increased self-confidence of having produced one's own innovation.

Box 2: "This is my own innovation" - Limpo grass in the Atlantic Region of Costa Rica

Livestock-keepers in the region benefited little from the research station's work. However, through the tenacity of one experimenting cattle grazier reinforced by the vision and creativity of an extension worker, Limpo grass - that had been present in the research station for nearly a decade and finally discarded - was introduced onto some 300 ha. Limpo grass can support twice as many livestock as (the traditional pasture grass) Ratana and as a result farmers have been able to double their meat production and make a profit of about US$ 200/ha. Annual profits equivalent to US$ 60,000 are already being made throughout the region as a result of the knowledge of Limpo shared at the first FEs' workshop.

Source: Hocdé & Chacon (2000)

Learning from field experience

No activities were carried out on a regular basis with the specific purpose of learning together from the experience. However, extension agents use the different workshops as opportunities to raise issues of farmers' research. From the farmers' side, the process of developing the CRAE-ZN project has been one of the most productive ways, together with the congresses and exchange visits, to learn from experience.

CRAE-ZN has planned activities in the coming months designed to sharpen a "strategic vision" of its future, the type of agriculture that the farmers want to work towards, and how to organise themselves in the face of globalisation. These will doubtless offer good opportunities to deepen the learning from the experience gained thus far. There is general agreement about the benefits of regular self-evaluation, but its implementation depends on the willingness of the leaders, and the skills of both farmers and professional staff to force all involved to stop for a moment, step back and examine what they have been doing.

Documentation

Documentation of the process is one of the weakest aspects on the part of both the FEs and the extension agents who support them. Numerous drafts of papers and reports have been written, but few have been finalised. These are some of the initiatives and what has been produced thus far:

- In 1995 the extension agents and FEs of Upala made a video about the initial experience of the FEs, entitled "Invent, invent, invent!" (PRIAG 1995);

- In 1996 the MAG National Extension Office organised a workshop to reflect on the FE process in two small areas of the country, involving also some MAG extension agents from other regions;
- In 1998 a Belgian NGO (VECO), the farmer organisations UPPROCCHI and Coopellano Azul and the Women's Organisation of San Miguel de Guatuso documented the results of three years (1995-97) of farmer experimentation in the project "Rural Development in the Guatuso Plains" (PCaC 1998);
- In 1998 about 20 extension workers from Huetar North and Brunca Regions supported FEs in documenting their own experiences; about 40 FEs volunteered but only a few cases were published (Bermúdez 1999, Mena 1999, Solis 1999);
- In 1999 the National Extension Office proposed that all extension workers in the country organise FE Congresses in their different regions. Five of the eight regions accepted the challenge. The staff in charge of these events spent two days analysing and documenting the experiences (Camacho & Rivera 1999);
- Some researchers at the National University (Department of Agricultural Sciences) tried to compare the different experiences in farmer experimentation in the countries of Central America;
- In 2000 the development of the CRAE-ZN project gave farmers and professional staff an opportunity to analyse their experiences as a basis for building their new project (Hocdé & Meneses 2000).

In these efforts at documentation, some lack of balance can be observed: much more emphasis is given to documenting the changes among the farmers and their organisations, overshadowing the changes that have taken place in the world of the extension agents.

Adjustments made as a result of learning

The most important change that has come about as a result of the experience has been the efforts of the FOs in Huetar North Region to come together and set up CRAE-ZN. It is a transition from farmers and extension agents facing the day-to-day problems to a group of people who wish to build a long-term project based on a strategic vision. Here, farmer experimentation becomes the foundation for building their livelihoods and society. It must be admitted, however, that CRAE-ZN is moving only very slowly, on account of a lack of funding, which also prevents sufficient reflection on the process.

Institutionalising the approach

Lobbying to gain project support at policy level

Once the CRAE-ZN project proposal had been written, it was presented to the authorities in MAG. Lobbying is, in fact, an investment because it means that the FOs must set aside some resources for this purpose. Lobbying about farmer experimentation - or any form of agricultural research, for that matter - is unusual for these organisations, which are used to negotiating with politicians about matters of immediate urgency, such as rural credits, product prices etc. According to the official statistics, the country's investment in technological innovation is decreasing. It was in view of this situation and in an effort to reverse this trend that the farmers and their organisations decided to set up CRAE-ZN.

Long-term training plans

Many farmers expressed the opinion that the training, in the past, was usually oriented to very specific activities that had little impact. The funds were exhausted before they could design long-term training plans to enhance the PTD process and the research capacities of the FEs. The planners of CRAE-ZN therefore designed a training guideline, adapting the curriculum to each actor. Table 7 shows the proposed contents of the training.

Table 7: Content of training for the different actors involved in the PTD process

Actor	Content
Farmer experimenters	1. Why do natural phenomena occur? 2. Causes and effects of production problems 3. Creativity as an alternative way of solving problems 4. Farmer experimentation managed by FOs: long-term view 5. CTE (Technical Committee for Experimentation) in an FO: what is it? how does it work? 6. Annual Operational Plan: organisation, preparation, design, negotiation, implementation 7. Designing experiments 8. Exchange visits by FEs and CTEs 9. Extension agents as active intermediaries between FEs and professional staff 10. Information exchange 11. Technological progress: biotechnology, biological control, biodiversity etc 12. Local innovation and other non-farming actors 13. Local innovation, women and youth 14. Local innovation and a territorial view of the region 15. Local innovation, health and environment 16. The art of negotiation and lobbying 17. Vision of agriculture 18. Human relations and conflict management
Young farmers	1. What is agriculture? 2. What do you expect from agriculture and what do you contribute to it? 3. Why do natural phenomena occur? 4. Creativity as an alternative way of solving problems
Managers of CRAE-ZN	1. How FOs manage farmer experimentation 2. Research contracts between FOs and research centres 3. Dealing with the farmer experimentation process in an entire territory 4. Constructing a "strategic view". 5. Handling and disseminating information 6. The art of negotiation and lobbying 7. Research administration and management 8. Human relations and conflict management
Extension agents and specialists	1. Creativity as an alternative way of solving problems 2. How FOs manage farmer experimentation. 3. Methods to support processes of experimentation and research in the field 4. Vision of agriculture 5. Technological progress: biotechnology, biological control, biodiversity etc.

Integrating PTD into the curriculum of education and training centres

Apart from some isolated cases, too little has been done thus far to improve the curriculum in agricultural education and training. The Department of Agricultural Sciences in the National University uses the FEs as resource persons in student training. In 1992, MAG concluded an agreement with the National Open University (UNED) to train its professional staff in extension approaches and methods, including "Principles of on-farm research and extension". Some agricultural colleges in Huetar North encourage the students to experiment with potential solutions that could help their parents on their own farms.

The EARTH (School of Regional Agriculture in the Humid Tropics) is one of the institutes that contributes more intensively to the process. It sends students to visit the FEs and also gives short, specialised courses to FEs, offering technical options to address some of their concerns. Unfortunately, lack of time has prevented the setting up of contracts between the FEs and this academic institution.

Some of the rural schools include environmental studies in their curriculum, and bring in examples of farmer experimentation. Similarly, the project "*Tres Amigos*" ("Three Friends", implemented by APROSAMA) has developed some activities together with pupils in the rural schools. The NETA (*Niños Ecologistas de Tres Amigos* or Ecologist Children of Three Friends) are children of FEs and practise environmental protection on small plots of land in their villages.

Organisational change to support institutionalisation of PTD

At regional level, some initiatives have been undertaken to support the institutions that want to be involved in promoting farmer experimentation. In 1999, CENAP concluded an agreement for cooperation with the Costa Rica Institute of Technology (ITCR). In most cases, individual persons rather than entire institutions have been involved; these individuals try to make links between each other and within their institutions to support and enrich the process. This is also the case in the University of Costa Rica and the National Autonomous University, as well as in some cooperation projects (e.g. GIIAS: *Grupo Interinstitucional para la Agricultura Sostenible*, Inter-institutional Group for Sustainable Agriculture).

At national level, extension specialists are convinced of the value of supporting farmer experimentation. In 1997, staff from different disciplines (e.g. agronomy, sociology, anthropology, animal husbandry) working in different government institutions (MAG, University of Costa Rica, National Autonomous University, National Open University, Ministry of Environment and Energy etc) set up the *Asociación Nacional de Extensionistas Agropecuarios y Forestales* (ANEAF, National Association of Extension Workers in Agriculture and Forestry). This association encourages discussion and analysis between the FEs and their organisations, on the one hand, and extension agents and specialists in agriculture and forestry, on the other, to agree on their respective roles in processes of technological innovation for rural development.

Key people

The key people who have promoted the PTD process were the pioneer FEs. Every new FE who joined in - especially the women - also played an important role in consolidating the path that had been set out by the pioneers. Some extension workers and scientists accompanied the FEs in this risky process. The different heads of departments in MAG allowed the extension agents enough room to express their creativity and to put efforts into constructing the process. The MAG technical coordinator in Huetar North played and still plays an essential role in motivating his colleagues to expand the local experiences throughout the region, to seek the necessary support, to promote farmer experimentation combined with formal research, and to keep looking for solutions to the problems that continue to arise.

The process would have been much slower if MAG had not been able to rely on a European facilitator from PRIAG. He contributed methodological elements, encouraged the FEs and extension agents, proposed new activities, found resources, and involved the farmers and professional staff in combining formal research with farmer experimentation in a strategic vision.

Over time, a working relationship that is based on trust and cooperation among FEs, leaders of FOs, extensionists and scientists was built up, in which the most important aspect is collaboration. Each of them contributes the best and works with commitment and mutual respect, and the merit goes to all.

Photo by: Henri Hocdé.

A farmer experimenter shows three varieties of coriander (*Coriandrum spp.*), a native plant being grown for export.

Public sector support

The progress that has been made thus far in integrating a PTD approach into institutions of Huetar North has been due in large part to a handful of extension agents and scientists who believed in the necessity to change their way of acting. The farmers regard these people as "our friends".

However, the progress has also been due to the institutional situation over the past ten years. Costa Rica is a country that still counts on public extension services to support small- and medium-scale farming. During an entire decade, the MAG extension services have continued - irrespective of the changes in the political administration - to support the process of making extension more participatory. This was achieved through different projects, both national and bilateral or international (e.g. MAG-PRIAG , MAG-GTZ, MAG-FAO) in different parts of the country and with different actors, modalities and approaches. At the same time, the public-sector extension staff reflected internally about the role and the future of an extension service firmly based on active farmer participation, and drew up an official document containing policy guidelines that are clear in their rules and procedures (MAG 1998).

It is a general policy of MAG to support existing FOs and to create others. This is a task primarily of extension, which required a change in the extension approach. It meant working with groups of producers instead of with individuals, and strengthening the capacities of these groups to the extent that the extension could change from "working for the FO" to "working with the FO". Some national financial organisations are also promoting, in their way, the processes of technological innovation by small-scale producers, e.g. by supporting transition and diversification. As a result, the extension staff is well disposed to participatory approaches. Extension managers stress the leading role of farmers and their organisations in technology development and the importance of strengthening capacities for local innovation.

Farmers' interest in the process

Conventional technology generation and transfer did not meet the needs of small- and medium-scale farmers (low-cost technologies, organic farming with low level of external inputs, satisfying consumers' preferences, adding value to production). Farmers and their organisations had no choice but to find solutions for themselves. They had to become proactive and build linkages with those who were committed to the same purpose - institutions, scientists, extensionists etc. Every time that FEs speak of their reasons for experimenting, they say, "We generate a change… we experiment because change is necessary, our families need to eat, and the future generations must live".

Decisive factors

The two worlds did not come together as a result of decrees; words can be very well intentioned, but they cannot build anything. In the specific case of Huetar North, an alliance among extension agents, scientists and FEs was built on mutual trust established between them over a period of several years. Such trust building meant that the actors, who did not share the same interests and concerns at first, managed to find common ground. Important in this context was the application of simple but basic principles such as giving responsibilities to the FEs and their organisations, sharing tasks, agreeing

on clear rules, functioning democratically, thinking in a long-term process instead of short-term tasks etc. Once these principles had been applied, using appropriate methodologies and gaining positive results helped facilitate and accelerate the process.

Difficulties in the institutionalisation process

The difficulties encountered in the institutionalisation process are of four main types:

- ***Personal or cultural:*** a) weaknesses in the education of extension agents and other professionals in the public-sector institutions, b) very little aptitude for change, c) difficulty to establish a stronger link between the two worlds as many academics do not want to recognise the research capacities of farmers;
- ***Learning/training:*** a) lack of training of the FEs, extension agents and scientists in on-farm experimentation, b) insufficient diffusion of the FEs' work;
- ***Methodological:*** a) lack of tools to collect and systematise the information from farmers' experiments, b) poor quality of some experiments done by FEs;
- ***Financial:*** the lack of financial resources is, without doubt, the main limitation to pursuing the dreams of the FEs and FOs.

Conclusion

Institutionalisation of PTD in this case is not achieved by strengthening the research/extension institutions with the mandate of supporting the farmers. On the contrary, the sustainability of the process comes through the consolidation of FOs able to manage the process of technology development. A group of agricultural professionals from the public sector accepted this challenge, made allies with the farmers and tried to make their idea work. This has resulted in the creation of CRAE-ZN and a movement which purposes to enhance the skills of both the farmers and the agricultural professionals in re-inventing a multifunctional agriculture.

References

Bermúdez A. 1999. "We are not afraid of change": Concepción de Pilas, Brunca Region. PRIAG Technical Document.

Camacho M & Rivera F. 1999. Systematisation of the experience of the subprogram Farmer Experimenter of MAG/PRIAG in Brunca Region, Costa Rica. National University Change and Rural Development Professorship, Heredia, Costa Rica.

Castillo O, Elizondo FI & Hocdé H. 2000. "It was the first time!" Workshop to evaluate regional congresses of experimenting farmers. Alto de Ochomogo: MAG National Extension Office.

Hocdé H & Hernandez JC. 2000. *Una historia de Sacapobres! Elementos para un proceso de fitomejoramiento participativo en frijol en Costa-Rica*. In: CIAT (ed.), *Fitomejoramiento participativo en America Latina y el Caribe*. Cali: CGIAR Participatory Research and Gender Analysis (PRGA) Program (CD-ROM).

Hocdé H & Byron M. 2000. Farmer exchanges: beyond the frontiers... Let us become futurists! San Salvador: Comunicación y Mercadeo.

Hocdé H & Chacón M. 2000. "This is my own innovation": the history of Limpo grass. ILEIA Newsletter 16 (2): 31-32.

Hocdé H & Meneses D. 1999. *Proceedings of the First Congress of Farmer Experimenters in Huetar North Region*. San Carlos: MAG.

Hocdé H & Meneses D. 2000. Producers' organisations and management of innovation processes: CRAE-ZN, Huetar Norte Region: Project Document for Collaboration of Producers' Organisations. San Carlos: CNP / CIRAD / CENAP.

Hocdé H, Bermúdez A, Hernández JC & Chacón R. 1999. Farmer experimentation, research and producers' association: the Concepción de Pilas Producers' Association case, Brunca Region, Costa Rica. *Proceedings of the Workshop on Strengthening Producer Organisations*, 28-30 June 1999, World Bank, Washington DC.

MAG. 1998. Policies, guidelines and strategies for the service of the national extension system. Alto de Ochomogo: MAG National Extension Office.

Mena M. 1999. The birth of a farmer, Veracruz, Región Brunca. PRIAG Technical Document.

Meneses D & Aguirre JP. 1999. Experiences on processes of extension and participatory research: case of Huetar North, Costa Rica. Workshop on Mutual Learning about Participatory Methods, October 1999, The Hague, Ministry of Foreign Affairs of The Netherlands / Agriterra / Ecocooperation.

PCaC. 1998. Farmer experimentation in the North Region of Costa Rica, Women's Association San Miguel de Guatuso, UPROCCHI, Coopellano Azul/VECO. San Rafael de Guatuso, Alajuela, Costa Rica.

PRIAG. 1995. "Invent! Invent! Invent!" A history of farmer experimenters in Upala. Video. 40 min. [in Spanish].

Samper M. 2001. *Experimentation and knowledge exchange among farmers: case study and comparative analysis*. Doctoral thesis, Faculty of History, UNA (in press).

Solis E. 1999. And... experimenting farmers reveal their experiment: the experience of William Berrocal Retana, Upala, Costa Rica. PRIAG Technical Document.

PTD for sustainable dryland agriculture in South India: balancing our way to scale

Y.D. Naidu[1] and Edith van Walsum[2]

AME (Agriculture Man Ecology) is an independent support organisation, which has been a prime mover of sustainable and ecologically sound agriculture in South India since the mid 1980s. Its programmes have been implemented in the States of Karnataka, Tamil Nadu and Andra Pradesh. AME has developed an approach to concerted stakeholder action, with Participatory Technology Development (PTD) as "entry strategy". The initial focus was on field-level guidance to farmers and NGO field staff. It then started working "upwards" by feeding the lessons learnt in PTD processes into the formal information systems of research institutions and the Ministry of Agriculture. AME also works "sidewards" by facilitating the formation of stakeholder platforms of farmers, NGOs, researchers and Departments of Agriculture; and "forwards and backwards" by involving banking institutions, input suppliers, and processing and storage experts in these platforms.

Photo by: S.Jayaraj, Consultant/AME Foundation.

Barefoot scientists - farmers and an NGO fieldworker study groundnut growth characteristics and forecast the yield on a one-square-metre sample in their experimental plot.

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[1] Y.D. Naidu, Area Team Coordinator, Madanapalli Agriculture Man Ecology (AME), Chittoor, Andhra Pradesh, India (amebang@giasbg01.vsnl.net.in)

[2] Edith van Walsum, Senior Advisor, ETC Foundation, POB 64, NL-3830 AB Leusden, Netherlands (e.van.walsum@etcnl.nl)

The context

AME's operational area

AME's area of operation - the Deccan Plateau - is a chronically drought-prone region in the rain-shadow of the Western Ghats in Andhra Pradesh, Karnataka, Maharashtra and Tamil Nadu States, India. Annual rainfall ranges from 500 to 900 mm. Rainfed farming is practised in 81% of this region, which was largely bypassed by the Green Revolution. The area has a population of about 200 million people, and the livelihoods of more than half of them are (still) partly or totally dependent on dryland farming.

During the past 50 years, there has been a steady decrease in soil fertility in this region, water tables have fallen rapidly and draught power has almost disappeared. There are increasing energy shortages, increasing stretches of fallow land and increased mechanisation, which has reduced opportunities for agricultural wage labour. The number of marginalised female-managed farm households is increasing as a consequence of (predominantly) male migration. Traditional institutions, and the indigenous knowledge contained in them, are eroding quickly. Most recently, farmers are faced with crashing prices of agricultural products, partly due to the opening up of markets as a result of globalisation policies.

Going to scale in the Indian context

When talking about scaling up in the Indian context, the scale itself should be understood: the sheer size of the Indian subcontinent and its population, the pressing environmental issues, the complex institutional scenario with a bureaucratic Federal Government and a comprehensive agricultural research set-up with over 200 agricultural research institutions and some 60 agricultural universities. The NGO sector consists of an estimated 60,000 registered NGOs that together form a complex, colourful and diverse whole. There are more than half a billion small-scale and marginal farmers and about a quarter of them are on the Deccan Plateau. They live under very diverse conditions, speak many different languages, raise different crops and animals, and yet they are all subjected to the same government policies, extension messages and marketing regimes. Obviously, their needs are diverse and call for open-minded and flexible support systems that, unfortunately, do not exist at present.

However, there are encouraging developments that need to be acknowledged - within the Government, in research institutions and in civil society. Participatory and people-centred approaches have been well established in India over the past 10-15 years. PRA has been institutionalised as a participatory planning tool. People's organisations (mostly initiated by NGOs), notably women's self-help groups (SHGs), have mushroomed. SHGs and other village-level institutions have started organising themselves into large federations.

Within this context, the challenge for AME and its partners has been to get PTD rooted and institutionalised. The institutional environment and the available human resource potential, especially in the form of village-level institutions, are conducive. On the other hand, the overall ecological and economic context is all but rosy. Within this larger geopolitical scenario, the niche spaces for the rural poor are ever decreasing.

AME: an independent support and linkage organisation

AME started in 1986 as a training programme and gradually broadened its approach, becoming a full-fledged resource organisation that plays an increasingly important role in initiating and advancing PTD and in forging collaboration between stakeholders in sustainable agriculture.

AME has the long-term objective of promoting sustainable land use through concerted stakeholder action. AME's practical aims are to assist NGOs in strengthening their capacities to implement sustainable agriculture programmes and to facilitate collaborative action between NGOs, research institutions and the Government of India's (GoI) Departments of Agriculture (DoAs). AME's approach leans on a mix of participatory methodologies such as PTD, Participatory Rural Appraisal (PRA), Farmer Field Schools (FFSs) in Integrated Pest Management (IPM) and Rapid Assessment of Agricultural Knowledge Systems (RAAKS).

AME neither implements PTD processes on its own, nor is it in the position to instruct others to do PTD. We are in between. AME does not form part of any other larger institution but occupies its own unique niche. We work "downwards" by giving guidance and field-level facilitation to farmers and NGO field staff. We work "upwards" by feeding the lessons learnt in PTD processes into the formal information systems of research institutions and the Ministry of Agriculture. We work "sidewards" by facilitating exchange between farmers, NGOs, researchers and DoAs in the three regions where we operate. We work "forwards" and "backwards" by involving banking institutions, input suppliers, and processing and storage experts in strategic deliberations within PTD processes.

Since 1996, AME has been given the explicit mandate by its donor, the Netherlands Government, to be a catalysing agency, with the aim *to enhance the linkages between the biomass actors on the Deccan Plateau of South India*. Since becoming a bilateral project in 1997, AME is formally implemented under the Ministry of Agriculture, which endorsed its mandate. In practice, it has been operating very differently to most bilateral projects, in the sense that it has acquired many characteristics of an independent NGO.

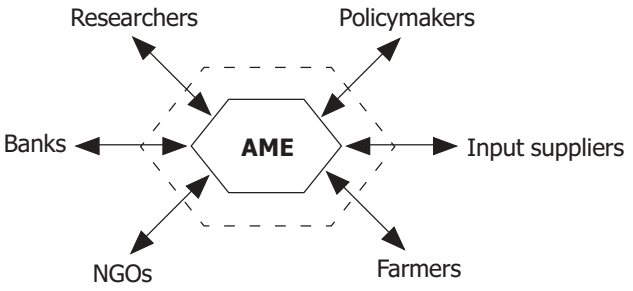

Figure 1: AME as a linkage agent.

Main actors and their motivation for PTD

PTD as an approach has taken shape within an institutional landscape with many actors, each with its own role, interests and potential. Counted here are NGOs, research institutions and DoAs, banks and input suppliers, and most importantly, the village-level institutions.

NGOs

The number of registered NGOs in the Deccan Plateau region is approximately 10,000. So far, the focus of most NGOs has been on people's mobilisation and organisation for participatory watershed management and on the formation of SHGs (most of them women's groups), which are primarily concerned with savings and credit management. A few of them have started using the existing social infrastructure in the communities, water-users associations and women's SHGs, as a basis for agriculture-related initiatives. However, they lacked agricultural expertise and were looking for professional support, which could be given by AME. Most were familiar with PRA as a tool, but that alone was not a sufficient methodological basis to develop a participatory approach to developing dryland agriculture.

Research institutions

Policymakers and the prevailing system of research and development of agricultural technologies have, so far, paid far less attention to dryland agriculture than to irrigated agriculture in high-potential areas. Moreover, approaches followed often do not address the problems in an adequate manner. As such, there is a great need for appropriate technologies for generally fragile, high-risk, low-potential, rain-fed areas. Research Institutes - International Regional and National - are gradually opening up to participatory approaches to technology development in dryland agriculture.

Here, the role of *passionate researchers* cannot be underestimated. These are enlightened individuals who have taken up PTD in their spare time with AME, NGOs and farmer groups, and made radical shifts in their thinking about agriculture. For them, PTD has become a passion, and in some cases, this has been recognised by their institutions.

Government departments

During recent years, two of the GoI Ministries - Agriculture and Rural Development - have started giving more importance to dryland areas. Whereas the focus in earlier years was on technical land-restoration interventions, the approach has become more comprehensive and people-oriented. The magnitude of environmental degradation is becoming clear, and it is also realised that dryland regions do have an inherent productive potential. Most remarkable is the increased attention by the GoI to watershed management. Recent policy guidelines spell out an active role for NGOs and other potential actors with PRA as the recommended tool for initiating participatory watershed management programmes.

Within this context, enormous opportunities are emerging for organisations like AME to promote sustainable dryland farming through a participatory approach. Suitable technologies which redress the degraded ecosystem and which are economically feasible

for small-scale and marginal dryland farmers need to be developed. Forward and backward linkages, such as supply systems for eco-friendly inputs, credit facilities to obtain them, market niches and adequate forms of social organisation to enable farmers to use the technologies effectively are also required.

Banks

Over the past ten years, the rural banking system has opened up to collective initiatives of small-scale and marginal farmers, mainly through their positive experience with women's SHGs, which have proven to be very creditworthy. Individual bank managers, who noticed that the package of sustainable agricultural practices developed through PTD processes by farmer groups was economically viable, started adjusting their lending policies.

Picking up on this, AME has been using the following various strategies of sensitising the rural banks: getting them into the District Working Committees, inviting them to field days where farmers share the results of PTD processes; and seizing the opportunity to provide training to bank managers on sustainable agriculture when invited.

Input suppliers

Commercial suppliers of eco-friendly inputs such as bio-fertilisers see a natural ally in AME. From its side, AME encourages farmers to try out inputs produced by different suppliers and assess for themselves what works best. In some cases, NGOs have started taking up production of biological inputs themselves, together with enterprising farmers, with the aim of making them more accessible to farmers and seeing whether it could bring in income.

Village-level institutions

A "new" form of community organisation has taken shape during the past 15 years, mainly through the initiatives of NGOs. Village-level SHGs were formed, first consisting primarily of men, but gradually the majority of SHGs became all female. In addition to SHGs, other forms of village-level institutions were established, such as watershed management committees and other groups of natural resource users. These institutions, in contrast to the SHGs, still tend to be male-dominated. A development of the past five years is the formation of SHG Federations: the SHGs organise themselves into larger structures consisting of often several thousand women or men farmers. These groups are important entry points for PTD in the community and sometimes have become effective mechanisms for scaling up.

Connected farmers

Many small-scale and marginal dryland farmers struggle in a context of degrading resources, decreased risk taking capacity, declining yields and neglect on the part of institutions supposed to cater to their needs. Their dependency on moneylenders is high, not just for money, but also for agricultural advice and inputs. The interest to change this difficult situation depends on several factors: resource base, labour situation and the mind-set. It is this interest, and a deeper motivation for farming behind it, that forms the basis for PTD experimentation processes. It is perhaps one farmer out of ten or twenty who has this deeper motivation and can serve as a source of inspiration to

many others. We have seen that a deep respect for and connectedness with nature is essential for being motivated PTD farmers, the reason for calling them "*connected farmers*".

PTD: a central pillar in AME's approach

Evolving an approach

In 1994 AME started a collaborative pilot project in two villages in partnership with one NGO. We evolved an approach, learned from it and adjusted it. Based on two years of learning, we started comprehensive area programmes in three districts in 1996. In each of these areas, PTD was taken up as an approach from the beginning. We chose to work through fairly simple entry-point activities and crops, with a limited number of farmers and organisations. We opted to work with organisations having different ideologies, thereby aiming to break barriers and encourage cross-institutional learning. The intention was to work primarily on technologies that were - weather permitting - almost sure to give the farmers an increase in their net profits and, if possible, their yields. In this way, they would gain confidence to try more. Once positive results were booked with these farmers, we built further on these results. From a fairly early stage, we began linking up the PTD processes to research institutions and the DoA. After about three years, we saw that NGOs and farmers had gained sufficient confidence to take PTD processes further. They started doing PTD work in other villages, and NGO networks took the activities to other districts. Technologies began to spread autonomously.

AME's approach goes "beyond PTD", but PTD is a critical pillar, the catalytic activity in a change process that brings actors together. The process consists of problem assessment and institutional scanning, training, implementation, monitoring and documentation. It then moves on to policy dialogue and wider sharing of experiences through workshops and publications. The learning that takes place in this process feeds into a new cycle of PTD experimentation

Problem identification and institutional scanning

Initial assessment of problems in agriculture and their connection with other livelihood issues is done through a combination of PRA and RAAKS methods. PRA lends itself well to problem assessment at the village level. An initial scanning of key actors in relation to these problems is done with the help of RAAKS, which aims at mapping agricultural knowledge systems and their interconnections, the key institutional actors and their perceptions of problems in agriculture. Important in the mapping process is to find out what binds and what separates the actors, and then try to identify what could be a strategy to overcome these blocks in communication and collaboration. The insights gained through RAAKS exercises thus give an initial direction for a strategy for collaborative action.

Training

AME distinguishes first and second phases in the comprehensive training process of NGOs - each covering a period of about three years. This sounds like a time-consuming

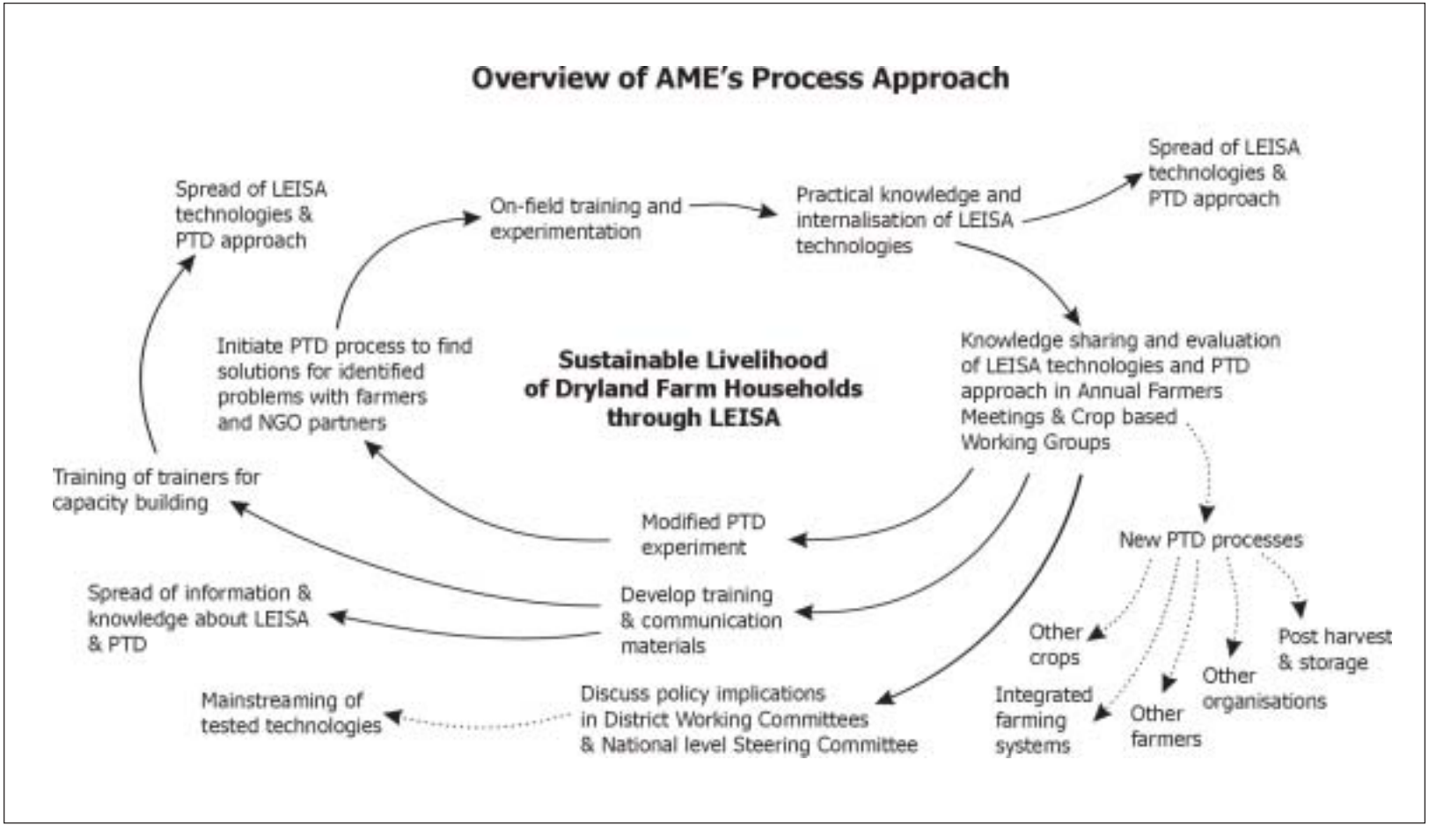

Figure 2: AME's process approach.

process - it is! But it should be borne in mind that this is a long-term capacity building process whereby NGOs are trained to handle PTD processes independently.

The support given to each organisation is specific, depending on background and experience - a different starting point and mix of social and technical development and a varying degree of complexity. AME prefers to work with NGOs that are active members of larger networks, because this enhances the potential for scaling up. We aim at building up network teams that can handle the training needs of member organisations in the long term. This will ensure sustained capacity building and a lateral spread of efforts within the district.

Training is participative and experiential: the experience of the participants is the starting point for both practical and theoretical learning. The training addresses social, technical, methodological and process aspects. These are all interconnected (Walsum *et al* 1999).

First phase of training for NGOs and farmers

Initially, the emphasis is on conducting training in the field around the PTD processes that have been initiated. From the second year onwards, we start training-of-trainers (ToT) programmes for NGO field staff and for farmers with proven training capacity.

Training consists of:

- a season-long PTD training process, starting in Year 1 and continuing in Years 2 and 3;
- strategic workshops for chief functionaries of the NGOs, from Year 1;
- a season-long ToT process for NGO trainers and farmer trainers who, after three years, take over the management and implementation of the PTD process; from Year 2.

Box 1: Modules of a season-long training for NGO field staff and farmers

- PTD concepts and approach
- Identifying problems and possible solutions
- Gender mainstreaming in the PTD process
- Stepwise field-based training with focus on the technical aspects of the problems identified and the technologies being tested
- Monitoring the PTD process
- Evaluating the results of the experiments and the process of experimentation

Second phase: scaling up, with emphasis on strategic linkages, ToT and monitoring

After three years, the trained NGO and a core group of farmer trainers are expected to be able to carry on by themselves. AME's role changes to:

- monitoring field-level training and PTD activities implemented by the NGOs and farmer trainers;
- creating a conducive environment for farmer groups and NGOs to take LEISA technologies and PTD processes further.

AME shifts its attention to strengthening stakeholder fora (e.g. District Working Committees and Crop-based Working Groups) and strengthening the forward-backward linkages, e.g. helping NGOs set up bio-control laboratories, doing a joint study on marketing models, establishing seed banks with SHGs, facilitating the establishment of village shops for eco-friendly inputs run by women's SHGs etc.

Joint implementation of PTD processes

In 1996 we started our comprehensive area programmes with a process of mutual rapport building. As part of the problem identification and institutional scanning process, we identified NGOs and NGO networks in each area that were interested in collaboration and had potential to take up PTD processes. We then jointly selected *entry-point activities*: our initial focus was on specific problems experienced by farmers in one or a few annual crops which were central in the farmers' livelihoods system. The choice was made after careful study of the prevailing farming systems and meetings with farmers and other stakeholders. Thus, different strategies and entry points emerged for our three concentration areas.

Box 2: Entry points for PTD in Andhra Pradesh, Tamil Nadu and Karnataka

In Andhra Pradesh and in neighbouring districts of Karnataka and Tamil Nadu the focus was on groundnut, the main sustenance factor for a large population of farmers. A working group of institutional actors involved in groundnut production was established already from the second year of PTD experimentation. This group has evolved into a strong platform for joint action (Prasad et al 1999). The partners have begun to address issues such as village-level seed production and storage and the aflatoxin problem. There is also a move towards intercropping in groundnut.

In Tamil Nadu the thrust was integrated management of pests and diseases in paddy and cotton. The FFS approach was adopted because, especially for paddy, the technologies that form part of the IPM "package" have proven to be effective and hence there did not seem to be a pressing need for further experimentation. In FFS, the focus is more on training through experiential learning and less on experimentation than in PTD. Another reason for adopting FFS as a strategy in Tiruchi was the fact that the DoA was already following this approach; it gave scope for collaboration and helped to gain official recognition for our work.

Our team in Raichur took an approach that was a "mix" of the approaches taken in the other two areas. Raichur District faces a peculiar situation: half of the district has a typical dryland scenario, but the other half is in the command area of the Tungabhadra River Irrigation Project with a high dependency on chemical inputs and domination of the system of agricultural production by a nexus of commercial and political interests.

In all areas, we encouraged farmers to share their knowledge about indigenous technologies. In the process, it became clear that they did not have their own answers for many of the problems they face. Thus, the focus of the PTD processes was primarily on testing and adapting eco-friendly technologies that had been developed elsewhere. This was especially so for groundnut, which grows under most marginal and degraded conditions. For paddy and cotton, farmers suggested several indigenous technologies for further testing.

We introduced a system of revolving funds. These were given via the NGO to the farmers' SHG; it was the SHG's responsibility to manage the funds, having being adequately trained. The purpose was to enable farmers to procure the macro inputs required for the experiment (seeds, organic fertilisers) in time. A more strategic long-term objective was to enable farmers to prove to the regular banks that the LEISA package tested by them is economically viable and thus worth considering for a regular loan.

Joint experimentation as a platform for learning

Experimentation is a collective process. AME works with groups, never with individual farmers. We work with partner NGOs that are closely involved in field-level implementation of the PTD process, the social organisation around it and process monitoring. At appropriate moments, we bring in researchers, or they step in out of their own interest. Wherever possible, we involve DoA field staff in the experimentation process.

Farmer groups

At the village level, the entry point for PTD experiments is an existing group that has been established with support of the partner NGO. This is most often a SHG, sometimes a Watershed Development Association. Although primarily intended as collectives for credit and savings management, the SHGs gradually moved into other community activities. When the idea of joint experimentation was introduced to these groups, many were interested. In the past five years, SHGs have proven to be not only suitable institutional "entry points" but also platforms for village-level sharing and springboards for scaling up.

Sharing between farmers, NGOs and AME

Sharing between the "primary" stakeholders takes place in several ways: during the weekly field visits of the NGO, during training conducted by AME, at the monthly review meetings between AME and the NGO, and at a meeting with farmers and NGOs

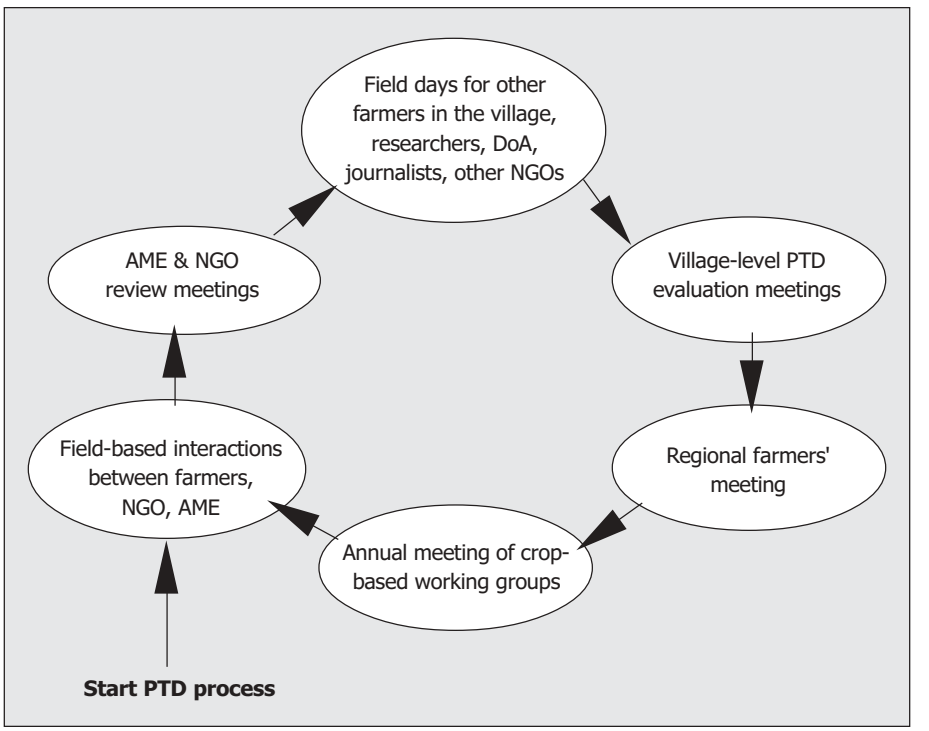

Figure 3: Learning shared - from farmer interactions to institutional working groups and back to farmers.

to evaluate PTD results. Thereafter a regional meeting of representatives of all PTD farmer groups across the three states takes place. This regional meeting feeds again into the annual meeting of the Crop-based Working Groups.

Involvement of researchers and DoA staff in field-level experiments

We invite researchers and government extension staff to join at important stages in a PTD process. In the preparatory stage, we ask researchers to share their knowledge about suitable technologies. Once the experiments have started, we invite them to visit at regular intervals and to give inputs into the season-long training. Again, at the end of the season, we invite them to join in the evaluation of experiments. Sometimes, we organise specific field days: researchers, DoA staff, farmer groups from neighbouring villages and the local press are invited to visit the farmers' fields and have discussion with the experimenting farmers.

Shifting roles in implementation

Initially, AME was the prime mover in PTD processes in all the areas of operation. Gradually, the NGOs assumed greater responsibilities, taking over some of AME's roles, and later facilitating PTD processes on their own. By and large, this transfer of responsibilities has been successful, but there have been a few hurdles:

- A fairly high turnover of staff in many NGOs, which meant that in some cases, most experienced staff had left and we had to start from scratch.
- The tendency to "fall back" into a prescriptive mode, rather than keeping up the spirit of experimentation, which requires considerable experience and sensitivity to participatory processes.

This led us to a reflection on the role of NGOs in PTD processes. NGOs are not always strong enough to anchor the PTD process, and have reservations as to who should take it further. Several NGOs felt that the process was time-consuming. And being dependent on donor funding, they were more interested in activities that gave "impressive" results. Once a number of technologies had been tested, they saw little reason for continuing in the experimental mode.

This made us realise that, for many NGOs, the outcome of the PTD process - a farmer-proven technology - is ultimately more important than the process itself. Whilst understanding this dilemma of NGOs, we were made aware of the need to work directly with farmer trainers who would ultimately carry the process. There was also a need to make donors more aware of PTD/LEISA within the context of sustainable rural livelihoods.

Shifting responsibilities at farmer level: the need for gender mainstreaming

Agriculture in dryland areas is increasingly a women-managed affair. Women's SHGs are now completely institutionalised and have become officially accepted as very important mechanisms for people-centred development. We see a trend of women taking over PTD processes: in 1996 about 30% of farmers involved in PTD processes were women; in 2000 65% were women. But is that the same as gender mainstreaming? No. There are plenty of problems when one looks at the institutional and field-level realities of gender mainstreaming.

Photo by: S. Jayaraj, Consultant / AME Foundation.

Kadiri Women's Federation prepares to discuss with officials and bank managers about their production plans and requirements.

First of all, even though women play an increasingly important role in the field, this fact is yet to be reflected in a more gender-aware approach in the major agricultural institutions, which remain strongly male-dominated. Secondly, the success of the women's SHGs has resulted in complacency on the part of the men in the village: women's status has increased but also their responsibilities and worries. Thirdly, many organisations *work with women*, but they are *not gender-aware* and hence they contribute, knowingly or unknowingly, to increased physical and mental burdens for women.

There is no easy way out. The first step is to bring about greater institutional gender awareness in the organisations. In the context of PTD, this means that there is a need to critically analyse the actual and potential roles and responsibilities of women and men, vis-à-vis the activities and crops that form part of the PTD process. AME promotes a household approach, whereby a conscious effort is made to involve both women and men in the PTD process, along functional lines. We have learnt that, whenever women and men are jointly involved in a PTD process, the quality of learning is greatly enhanced and so is the overall outcome of the PTD process.

Monitoring and evaluation of experiments

Monitoring takes place at four levels: individual farmer, SHG, NGO and AME. Farmers' monitoring and evaluation focus on crop performance, labour requirements and cost-benefit analysis. At the time of training, farmers receive notebooks from the NGO and are trained to record every relevant observation regarding crop growth and conditions, especially rainfall. Farmers discuss these observations in their groups every week or fortnight. A copy of the SHG meeting minutes is sent to the NGO. The NGO in turn submits monthly and quarterly reports to AME.

Box 3: Stumbling blocks to gender mainstreaming

In our effort to mainstream gender in the context of PTD, we have come across a number of stumbling blocks in the form of biased perceptions about women and men:

1. **"Women do not have a say in agricultural decision making.**"
   In spite of changing realities in agriculture, many people - NGO workers, researchers and others - find it difficult to acknowledge the reality and to plan the PTD process accordingly.

2. **"Participatory approaches are 'naturally' gender sensitive."**
   PTD, like any other participatory approach, provides no guarantee that women are also participants in the process being initiated. Women's participation will not happen automatically, it needs to be facilitated.

3. **"Trickle across: from men to women, from women to men"**
   Many extension programmes were based on the classical incorrect assumption that if information reached men, it would automatically trickle across to women. During the past decade or so, we see instances of the reverse. Organisations have started to interact directly with women, but here the same problem of non-trickling or partial trickling across of information can be seen. There is an additional problem, too: men are still the final decision-makers. This has led to frustrating experiences of women.

4. **"Gender specialists take care of the gender aspect."**
   It is often taken for granted that, within development organisations, women will take care of the "gender aspect" (whatever it is). The only way to overcome this obstacle is real teamwork and intensive gender sensitisation within organisations.

A more elaborate analysis of gender issues in PTD can be found in Walsum & Kolli (2001).

NGOs address crop performance, the extent of farmers' involvement as experimenters and the interactions between farmers, including gender dynamics. This monitoring is done on a weekly basis. AME monitoring integrates the other two levels and is done on a fortnightly to monthly basis. It addresses the technical, socio-economic, gender and process aspects of PTD.

At the end of the farming season, farmers' meetings are held, where farmers share their learning. First they discuss among themselves in their own village and then they share their experiences with other farmers. At a later stage, district-level meetings are held where representatives of several farmer groups share their findings. In the case of groundnut, we also organised cross-regional meetings where farmers from three states met to review and share their learning.

In these meetings, farmers present the results of their experiments. The results are jointly analysed by farmers, NGO staff and AME facilitators. Farmers are asked to state their indicators for success of a certain experiment. The evaluative process and outcome of these meetings becomes an input into the meetings of the crop-based working groups (groundnut and cotton).

Documentation

Documentation has been done more or less systematically in all areas. The results of several years of experimentation now serve as a basis for the production of a PTD training manual and crop production manuals on various crops. We are in the process of preparing these documents, which will become important tools in our scaling up efforts.

Documentation is a difficult and tedious part of PTD. The effort required to set up and to maintain a good documentation system should not be underestimated. Most people involved in PTD are not writers but fieldworkers. Therefore: the simpler the system, the better.

Results and impact of PTD processes

Results and impact of PTD processes are multi-dimensional. They vary between farmers, between crops, between villages and areas, and from year to year. Impact occurs not only at the farmer level, but also in the organisations that are involved in these collaborative efforts, and beyond. Impact means spread of technologies and approaches, within one farm - from one crop to another, from entry point to system level, then from farmer to farmer, from village to village. The impact also spreads within and between organisations, and so on.

Here we give a broad picture of visible results and impact of PTD processes in our three concentration areas. We highlight common elements rather than location-specific details and variations. In doing so, we keep in mind our own limited timeframe - in most areas where we work, PTD was initiated in 1997.

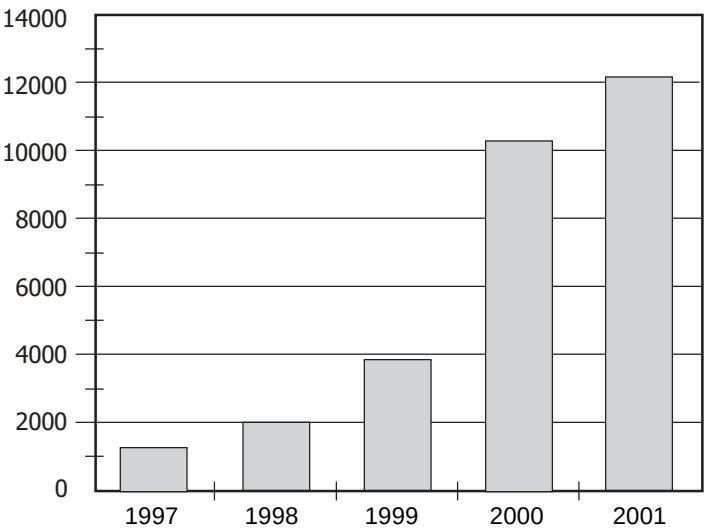

Figure 4: Diagram of number of farmers involved in PTD processes 1997-2001

Number of farmers involved in PTD processes

In 1997 we started doing experiments with 270 farmers in two districts, in collaboration with 12 NGOs. As of now, in 2001, we are involved in PTD processes with 1900 farmers in 25 districts, with an estimated outreach to another 10,300 "extension farmers". These farmers do not take part in PTD experiments but are exposed to the technologies tested through PTD and are encouraged to try them. Only a small part of these farmers (about 300) are in direct contact with AME; the rest are guided by NGO staff trained by AME.

After a rather modest growth in the first three years, the number of farmers involved in PTD processes rose sharply in 2000. This is largely attributed to the fact that, by 2000, the NGO and farmer trainers started taking up PTD processes independently.

Number of NGO staff and farmers trained in LEISA technologies and PTD

Table 1 shows how many NGO staff and farmers went through season-long training and ToT processes between 1996 and 2001. Shorter courses organised by AME are not included. The table also shows the shift in training focus, which was initially on season-long training directly supporting PTD processes in the field. From 1999 onwards, there was greater emphasis on ToT for NGO staff and farmers. This led to a significant increase in the number of farmers trained, both those directly involved in PTD and "extension farmers"; most of them were trained by NGO staff, not by AME. After 1999, AME continued intensive direct interaction with about 300 farmers through PTD and season-long training, with a focus on second-generation PTD experiments: Integrated Farming Systems, Seed Village concept, storage and marketing experiments. Furthermore, AME continues to guide the NGOs and farmer trainers and monitors their training activities.

Impact of PTD processes

Table 2 gives an overview of the immediate impact of PTD on the participating farmers and on their farms. It shows the dimensions of impact and the indicators that were used to assess impact. Sometimes, indicators "emerged" out of the PTD process.

Table 1: Number of NGO staff and farmers trained in PTD and LEISA technologies

Year	NGO staff newly trained		Farmers trained (cumulative)		
	Season-long training / PTD	ToT	Season-long	"Extension training / PTD	ToT farmers"
1996	10	----	30	----	----
1997	64	----	135	135	----
1998	63	18	350	410	10
1999	70	36	763	1205	22
2000	61	48	1600	6900	28
2001	80	35	1900	10300	35
Total	**348**	**137**	**1900**	**10300**	**95**

Table 2: Impact of PTD processes on participating farmers and on their farms

Impact on	Indicators
Knowledge about LEISA	Farmers are aware of LEISA practices: - importance of farmyard manure (FYM) application - rationale for reducing fertilisers/ pesticides - alternatives and how they work
Application of knowledge	FYM application up > increased organic matter content in soil; farmers stop selling FYM Fertiliser use downPesticides use down > less business for pesticide dealers Farmers stop selling neem seeds and use it in botanical pesticides Extensive use of cow urine; has become a commodity which is also sold Increased use of green manurePlanting trees on bunds etc
Farm performance	Increased yields: paddy 20-40% on average, cotton 10-20%, groundnut 20-30% Increased quality of produce Decreased risk; yield stability Increased on-farm biodiversity: inter-/ mixed cropping, trees, green manure Reduced pest and disease incidence Higher net profits because lower cultivation costs: paddy 30-40%, cotton 20-30%, groundnut 10-20% Better soil health and moisture retention capacity Higher crop productivity in following years due to residual effect of manure
Social organisation and jointlearning	PTD as an activity has been integrated in SHG agenda Collective decision-making on input purchase, pest and disease management, marketing Improved access to knowledge centres: farmers visit as group Farmers visit each other's farms more frequently, and learn from each other
Gender balance	Some technologies are labour intensive especially for women, e.g. bio-fertiliser and mussoorie phosphate application. Some technologies are big labour savers, e.g. in cotton IPM women are spared the work of fetching water for pesticide application (= 800 km walking with water per acre per cropping season). Knowledge empowerment of women through PTD is important aspect of a larger empowerment process. Women's mobility increased; they visit agricultural-knowledge and training centres and regional farmer meetings. Women mention less reproductive problems, which they attribute to reduced contact with pesticides.
Health and nutrition	Reduction in pesticide use > less health problems, lower health bills, food tastes better and can be kept overnight (rice), better storage capacity
Innovation capacity	Application of concepts learned through PTD on other crops Independent experimentation with technologies e.g. bio-pesticides, staggered intercropping in cotton
Overall awareness > empowerment	Confidence in own capacity to improve agriculture has increased Farmer groups resist pressures of pesticides dealers, money lenders Ability to see larger connections in agro-ecosystems, regaining connectedness with natural processes

Spread of technologies and processes

The extent of technology spread differs according to the crop - groundnut, cotton and paddy. This is related to the overall profitability of the crop and the risk involved in growing it.

- Groundnut is grown mostly by resource-poor farmers, who have a strong tendency to avert risks. Hence, it is quite understandable that the spread of LEISA technologies for groundnut, even if proven successful by PTD farmers, is comparatively slow. We observed a spread of about 1:3, *i.e.* from one farmer to three farmers, but also noticed that the ratio is growing year by year;
- In the case of cotton, there is a strong perceived need for change. Farmers are completely fed up with applying ever-increasing doses of pesticides with diminishing effects, and are highly motivated to try out alternatives. Autonomous spread is up to 1:7 inside PTD villages and 1:3 outside.
- In the case of paddy, the expected results from alternative technologies are very good. Most paddy farmers are in the small-scale farmer category. Hence, the rate of autonomous spread in paddy can be as high as 1:10.

Socio-economic conditions play an important role. People with slightly larger farms are better able to take risks and therefore more open to trying out alternatives. A practice is easily adopted when old farmers were already doing it and with good results. Once someone takes it up again with success, it tends to spread fast. Social cohesiveness of the group and/or the village also contributes positively to the extent of spread.

Furthermore, the *user friendliness of a technology* is important: Is it easy to adopt? Are the inputs available? Technologies that provide positive visible results are obviously adopted easily. The credibility of the given technologies increased if advocated by other institutions.

Mechanisms of spread have been:

- From farmer to farmer: by working together with relatives or neighbours, farmers see the technologies being applied, learn from it and start to apply in their own field; informal discussions in the evenings; sharing insights in the market place (information can spread as far as 60 km); small-scale farmers cum labourers learn to use technologies on their bosses' fields and try them out gradually on their own farms
- Exposure trips to other farmers/groups organised by the NGO
- From SHG to SHG, often through the SHG Federation (see next section)
- From SHG to Federation
- Via the NGO field staff to other operational areas of the NGO
- From NGO field staff to other NGO staff
- From NGO to NGO
- From AME to other NGOs.

From joint experimentation to stakeholder concerted action

After taking specific crops as entry points into PTD, the next step was to form crop-based working groups. We started involving institutional stakeholders - researchers, policymakers, suppliers of eco-friendly inputs and banks. The objective of forming these groups was to create a mechanism for joint learning and information exchange with a focus on "bottom-up" flows of information, and also to strengthen important forward-backward linkages.

Simultaneously, a different type of platform development took place. A national-level Steering Committee and three District Working Committees were formed, with representatives from the Ministry of Agriculture and State Departments of Agriculture, research institutions, partner NGOs, banks and farmers. These committees were part of the institutional agreement between the GoI and the Netherlands Government regarding implementation of AME as a bilateral project. However, they were also taken up as functional mechanisms for promoting concerted stakeholder action rather than "just" being formal structures.

Groundnut working group

In 1997, AME made its first attempt to bring a larger group of stakeholders together on a common learning and action platform. The focus was on groundnut. Researchers who had been involved in PTD processes were invited to a meeting, along with suppliers of eco-friendly inputs, the NGOs involved in PTD processes, representatives of the DoA and bank officials. Since then the meetings are convened annually and stakeholders discuss and review the outcome of the past year's PTD processes in groundnut and other relevant developments in the larger "groundnut scenario". Action to be initiated by different stakeholders is then discussed.

Four years later, this working group has built up significant credibility and momentum. It has formed the basis for several joint research initiatives between researchers and NGOs, *i.e.* the 1998 collaborative project with ICRISAT and the Australian Council for Research to control white grub damage on groundnuts). The GoI has acknowledged the importance of this "model of collaborative action" and wants to use it as an example for

Box 4: Peer-group pressure

The fourth groundnut meeting was held in February 2001. AME and NGO partners presented the results of seed trials with ten new varieties released by ICRISAT and a few regional research stations. One presenter explained that, in their experiment, farmers harvested the crop after 116 days, instead of 90 days as recommended by scientists. He explained that this delay was because the women who were to harvest the groundnut were busy transplanting paddy at that point in time. A scientist from one of the institutions that had made seed available reacted very critically, saying that the experiment was totally unscientific because the farmers had not followed the official recommendation. The fieldworker replied that this was a real-life constraint; whether scientific or not, it was an important lesson from the PTD process. Other scientists supported the fieldworker's view; they argued that the person who "stuck" to his scientific principles had not yet understood what PTD was all about and needed some more exposure.

other crops and also wants to pursue the official validation of farmer-tested technologies with the help of this working group. Intensive learning is happening and up-front feedback is being given during these meetings.

The cotton working group

A similar initiative was the cotton working group formed in 2000. This time, the prime mover was not AME but another support NGO that found the "model" of crop-based working groups useful. The Andhra Pradesh Cotton Network was formed around a group of seven NGOs from seven districts in the State. AME provides technical and strategic support to this network, which also receives financial support from the Andhra Pradesh DoA. The network tries to address the problems faced by cotton farmers. Many of them are heavily indebted as a result of over-dependence on pesticides, poor yields and inappropriate advice. Though the State Government officially advocates an IPM approach in cotton, the actual field-level implementation is very limited due to lack of trained extension workers. Therefore, the State Government has warmly welcomed the cotton network initiative. The cotton working group supports this network, feeding it with information about promising cotton IPM technologies for testing, and drawing lessons at the end of the cropping season.

Institutionalisation of the working groups

Both groups are intended to become autonomous semi-formalised learning and joint action platforms. In both cases, cost sharing arrangements have been sought, with the major actors contributing to the expenses. Both groups operate under the guidance of a management committee with representatives from several organisations. In both groups, AME has been playing a facilitating role, but structures have been evolved in such a way that there is shared ownership and decision-making.

Institutionalising PTD - walking on four legs

In this paper, we have addressed different levels and aspects of institutionalising PTD processes and outcomes. AME's approach has been to work towards a favourable institutional climate that gives space for experimentation and development of LEISA technologies, for scaling up these technologies and for the evolution of suitable forward-backward linkage mechanisms to help sustain the approaches and technologies. Our work started at the village level, moved on to intermediate levels - district, state and region - and is "ending" at the national level. In this final section, we try to synthesise the different dimensions of institutionalisation, the "four legs" we have been walking on, and the challenges ahead.

Institutionalising our comprehensive area approach within concentration areas

Usually, a concentration area covers one district and activities radiate from there into several surrounding districts. It is at this level that the PTD processes take place, from where the primary spread of technologies happens and the spirit of innovation is carried forward. Some important mechanisms in institutionalising area programmes are:

- strengthening district working committees (DWCs) by developing them into true stakeholder platforms at district level
- ongoing comprehensive capacity-building processes which AME conducts with NGO networks and farmers
- capitalising on the enormous potential of village-level and above-village-level people's institutions (Federations).

Strengthening and diversifying crop-based working groups

Two strong working groups have been established that have become effective mechanisms for problem-focused stakeholder action. They need to be further strengthened in order to become fully autonomous, sustainable learning and action platforms. Such platforms should also be built up to cover other aspects such as dryland coarse grains/ pulses and biomass development. Links between these working groups and other fora, such as DWCs and Steering Committee, have to be developed.

Strengthening links with national policy

AME's institutional status of a bilateral project has provided a structural opportunity to enter into dialogue, through its Steering Committee, with policymakers at the national level. These policymakers are interested in the innovative approaches developed by AME and its partner institutions and want to take them further. It is therefore extremely

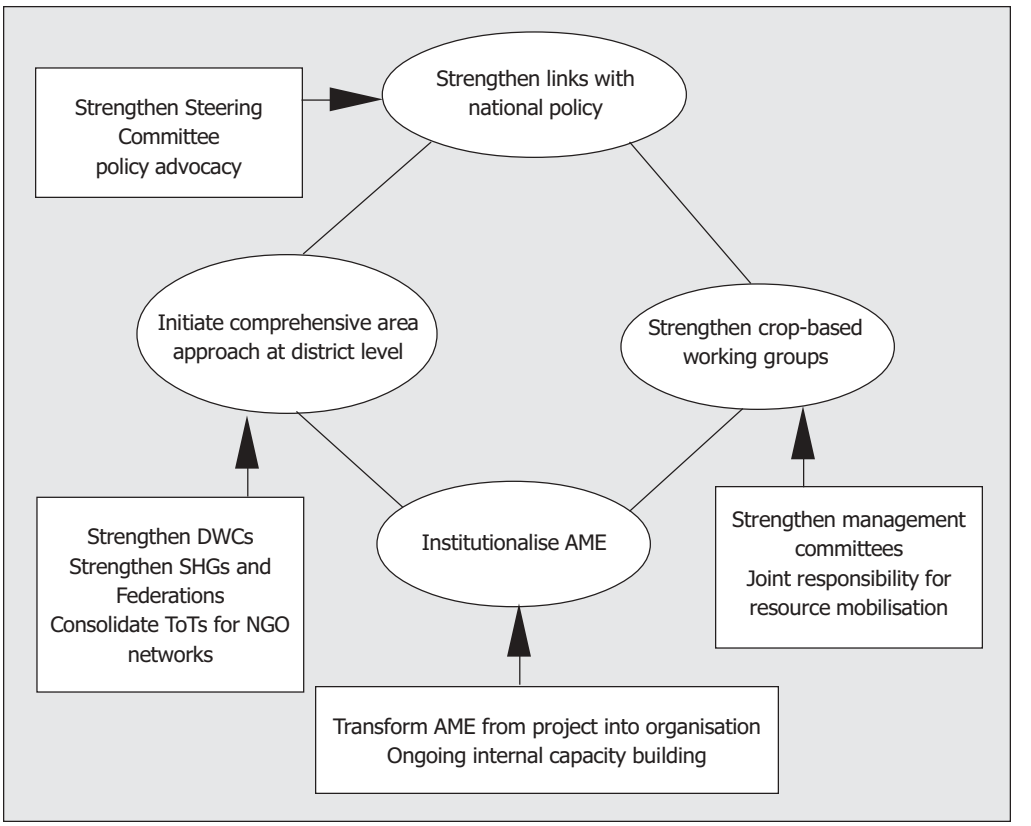

Figure 5: AME's approach to institutionalisation - walking on four legs

important to capitalise on the opportunities given by the Steering Committee towards institutionalising the approaches. Other tools such as state-level workshops should also be used. It should be mentioned that the Steering Committee has expressed its commitment to assist AME in its own institutionalisation process and in mobilising resources for the coming years.

Institutionalising AME

If AME wants to consolidate its approach and continue to anchor collaborative processes, it has to institutionalise its own organisation. In the long run, operating in a project mode is restrictive and makes it difficult to contribute effectively to larger processes of institutionalisation. Such processes, by definition, require a medium- to long-term time perspective. And the agent facilitating such processes should commit itself to such a timeframe. This is the main reason why AME has decided to transform itself from a foreign-funded project, with limited accountability to Indian society, into a full-fledged Indian organisation, duly accountable to its trustees and stakeholders.

This organisational change requires some important adjustments. The AME team as well as its partner institutions have to change their mind-set, especially with respect to sustainable mobilisation of funds. In a project mode, one remains assured (for the duration of the project) of funds that often come from a single donor. As an independent organisation, AME will enter into arrangements with a variety of donors, foreign as well as Indian - which in a way is part of the larger process of concerted action. AME will increasingly generate its own resources, which is a strategy towards increasing effectiveness, efficiency and accountability. These changes form part of an overall policy shift, from "free service provider" to strategic partnership builder.

Sustainable development processes (of which PTD forms part) need healthy and accountable support organisations that can evolve long-term perspectives on the processes in which they are involved. And this is what we are trying to work on.

The challenges ahead

From entry points to integrated farming systems: the challenge is now to move with the farmers and institutional partners towards more complex changes in their farming system. The aim is to gradually restore the ecological balance in the farm as a whole, moving towards more sustainable land-use systems.

Capitalising on the potential of people's institutions: the enormous potential of people's institutions in moving the PTD processes has been demonstrated. In future, we will further capitalise on this by giving strategic support and training to the key people in these institutions.

Strengthening stakeholders' platforms: District-Level Working Committees with a cross-section of important stakeholders should become platforms for stakeholder concerted action at the district level. Similarly, the Crop-based Working Groups should become effective instruments for policy advocacy and lobbying.

Balancing the scaling-up process: How far should we go in scaling up? Going into the mode of stakeholder concerted action, lobbying and policy advocacy, there is a risk that we loose touch with field-level realities - and being connected with them has been our strength. We need to evolve models of institutionalisation that can be replicated and taken further to scale by others.

Can PTD become part of an alternative route to globalisation? The dryland farmers in South India are facing crashing farm gate prices for almost every crop. Are there new niches for dryland farmers? We are confronting these challenges by looking, together with the farmers, for alternative cropping and marketing systems.

References

Prasad KVS, Suresh C & Lanting M. 1999. A platform for groundnut production. *ILEIA Newsletter* 15 (1/2): 72-76.

Walsum E van, Jangal J & Lanting H. 1999. Training for NGOs: the approach of the AME project. In: Farrington J *et al* (eds), *Participatory watershed development: challenges for the twenty-first century* (New Delhi: Oxford University Press), pp 247-260.

Walsum E van & Kolli RD. 2001. Mainstreaming gender in Participatory Technology Development: dynamics between farmer groups, NGOs and a support organisation in developing sustainable dryland agriculture in South India. In: Murthy RK (ed.), *Experiences in gender transformative capacity building* (New Delhi: Sage), pp 252-272.

Institutionalisation of Farmer Participatory Research in Southern Ethiopia: a joint learning experience

Ejigu Jonfa[a], Barry Pound[b], Endreas Geta[c], Ousman Surur[d] and Furgassa Bedada[e]

This case study follows the process of institutionalising Farmer Participatory Research (FPR) into research, extension and training organisations in southern Ethiopia. The process commenced in 1991 with the "Farmers Research Project", in which FARM-Africa worked with non-governmental and governmental organisations in carrying out participatory research with farmers in North Omo Zone. In 1998, the impact of the project was assessed through a peer review process. Geographical scaling up of the application of FPR to cover the entire Southern Region and the institutionalisation of FPR into the main research and development (R&D) organisations was recommended. A three-year follow-on project was formulated building on the experience and contacts made since 1991. The project is one of the few examples of a comprehensive effort to incorporate participatory research and extension simultaneously into the main R&D institutions of a large region. This paper highlights the challenges faced and some of the lessons learned while promoting and institutionalising FPR.

Photo by: Ejigu Jonfa.

A PRA trainee discusses with key informants.

[a] Project coordinator, FARM-Africa Farmers' Research Project, POB 495, Awassa, Ethiopia (farm.frp@telecom.net.et)

[b] Farming Systems Agronomist, Natural Resources Institute, UK, and Project Technical Advisor

[c] Farmers Training and Database Team Leader, Bureau of Agriculture, SNNPRS, Ethiopia

[d] Centre Manager, Areka Agricultural Research Centre, Ethiopia

[e] Agronomist, FARM-Africa, Awassa, Ethiopia

Introduction

Between 1991 and 1998, FARM-Africa, a non-governmental organisation (NGO) based in the UK, conducted the Farmers' Research Project in pilot areas in southern Ethiopia and gained considerable experience in applying Farmer Participatory Research (FPR) methods in partnership with government organisations (GOs) and NGOs. The experiences and lessons of implementing FPR in these pilot areas led to a three-year follow-on project, "Institutionalisation of FPR in the Southern Nations, Nationalities and Peoples Regional State (SNNPRS)" [1], which commenced in April 1999. The project is being implemented in selected *woredas*[2] of SNNPRS (referred to hereafter as "Southern Region") in collaboration with research, extension and academic institutions in the State.

Context

Geographical context

Ethiopia is one of the least developed countries in the world. Its economy is heavily based on agriculture, which accounts for more than half of the Gross Domestic Product, 80% of total employment and 90% of exports (CIA 1999). Over 80% of Ethiopia's 57 million people live in rural areas and are engaged in subsistence farming or pastoralism. Pressure on the land is very high: the average landholding per household in the mid/high altitude areas in the region is only 0.2-0.6 ha (Percy 1997).

The Southern Region covers about 10% of the total area of Ethiopia and has a population of 11 million (20% of the total). The region is highly diverse, complex and risk-prone, and most of it is affected by recurrent drought resulting in food insecurity. Ninety percent of the population of the Southern Region is engaged in agricultural activities. Subsistence mixed farming prevails and landholdings are fragmented. The soils in most parts of the region have been heavily exploited. Degradation of the natural resources is becoming more severe.

Agricultural extension

In the 1990s Ethiopia underwent a process of regionalisation within the framework of decentralisation. There are now 14 regions in the country, mostly based on ethnic divisions. With regionalisation came new roles for the Ministry of Agriculture. At the central level, the Ministry's activities are focused on national policy issues, and on coordinating and facilitating activities at the regional level. The Regions now have much more autonomy than before, as have the zones within the regions (Percy 1997).

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[1] The project is financed by the European Union (EU). The authors of this case study appreciate the support of the Commission to implement this project. The opinions expressed here do not in any way reflect the views of the European Union.

[2] A "*woreda*" is an administrative unit equivalent to a district.

Agricultural extension began in Ethiopia in the 1950s, and various approaches have been used over the decades. An integrated development approach in the 1960s and 1970s was followed by the adoption of the Training and Visit (T&V) system, which became the main extension approach used by the Bureau of Agriculture (BoA), although it was later recognised to be insensitive to the varied requirements of small-scale farmers. The present government extension system is based on the package approach and is called the "Participatory Demonstration and Training Extension System" (PADETES). It combines technology transfer and human resource development, and promotes the participation of farmers in the research process (Percy 1997). However, there are several weaknesses in this approach, such as the promotion of inappropriate technology, insufficient on-farm and adaptive research, continuation of inappropriate promotion criteria for research and extension staff (*i.e.* based on scientific publications), poor research and extension linkages, and the lack of "real" participation of farmers (Misgana 1998). This has meant that, because of a range of biases (class, gender, literacy and location), most small-scale farmers have derived limited benefits from this programme. In addition, the capacity of research and extension is very low to respond to the problems and needs of the farming communities.

Historical development of FPR in Ethiopia

Participatory research is not new in the Ethiopian research system. First attempts to make closer contact with farmers date back to the 1980s. Some of the limitations of previous research approaches, such as the pure commodity approach, led to the adoption of farming systems research (FSR) by the National Agricultural Research Authority (now the Ethiopian Agricultural Research Organisation, EARO). The lessons from the FSR approach, and the increasing concern for active participation of farmers in research, led to experimentation with more farmer participation and the development of a research-with-farmers approach. However, such initiatives were taken only in small projects in a few of the research centres.

Although there was growing awareness of the need for farmer participation in technology development in Ethiopia, some researchers did not even consider this to be proper science at all. To them, farmer participation meant the end of good research; they considered it rather as a better way of technology transfer, which they did not regard as the task of research. It was under such conditions that the Farmers' Research Project was launched in North Omo Zone with the overall goal "*to increase, in a sustainable manner, the incomes of resource-poor families in the project area, and ultimately, through example, in Ethiopia as a whole*". It aimed to achieve this by promoting the use of FPR as a mechanism for generating and disseminating improved and appropriate agricultural technologies.

At the National FPR Workshop conducted by the Project in 1992, a working definition of FPR was stated as "*a type of research approach in agricultural research that involves farmers at all levels including decision making*" (Sandford & Reece 1992). Based on this, the Farmers' Research Project worked towards "collegiate research" (Biggs 1989), *i.e.* recognising the farmers as innovators and experimenters, and treating them as active and equal partners with researchers and extensionists (rather than mere passive end-users of technologies).

In recent years, however, there has been a considerable "push" by donors, and from national researchers, towards participatory agricultural research. As a result, there is now a wide array of "participatory" projects in Ethiopia, as well as a wealth of literature discussing the issues of farmer participation in agricultural research activities. However, many of these initiatives are based on projects that operate for short periods and have not brought about institutionalisation of the FPR approach. Moreover, the experience of researchers is generally limited to surveys using questionnaires or consultation and, at a later stage, verification trials. Almost all research activities, except some verification trials, have been carried out in the research centres. The majority of the research and extension professionals have limited knowledge of FPR, and resources have not been allocated to support FPR work. Taking this situation into account, the Farmers' Research Project made its contribution to promoting FPR: it provided FPR training and carried out practical implementation with GO and NGO partners at the field level, and disseminated information on the results and impacts of FPR.

Box 1: Aims of the Farmers' Research Project

The Farmers' Research Project strove to achieve the following outputs:

1. to create better linkages and understanding between farmers, researchers and extension staff;
2. to develop a better understanding of ways in which FPR can be conducted in Ethiopia;
3. to enhance the capacity of GOs and NGOs to enable farmers to undertake FPR;
4. to stimulate and encourage the incorporation by GOs and NGOs of FPR into their own organisational activities.

To achieve these outputs, the Project developed a comprehensive framework of activities through which it promoted a participatory approach to undertaking agricultural research with farmers. The key elements of this framework were:

- participatory diagnostic studies complemented by additional, specific research studies;
- training programmes, both formal and informal, for institutional staff as well as local farmers;
- participatory on-farm trials, i.e. research trials that take place in a farmer's field and are managed and evaluated by the farmer him/herself.

These activities were supported by a programme of internal monitoring that served to assess and re-direct project activities.

The initial project: Farmers' Research Project

Research studies

Between 1991 and 1998 the Farmers' Research Project published 38 reports on different research studies[3]. These studies were primarily aimed at creating a better understanding, by researchers and extension staff, of the local farming systems and their constraints and opportunities. Many of the reports relate to diagnostic studies, *i.e.* ones that describe the farming systems being practised by different rural communities and analyse their constraints and opportunities. These diagnostic studies were undertaken using Rapid or Participatory Rural Appraisal (RRA/PRA) techniques and involved 10-12 days spent in the field studying the farming systems in question.

[3] For details of these publications, contact FARM-Africa at the address given on the first page of this paper.

The project also conducted 22 other studies defined as "topical" or "special" studies. Topical studies are in-depth studies of the production, consumption and marketing of particular commodities or inputs, and are published in technical pamphlets. Examples of such pamphlets include sweet potato production, small-scale poultry keeping and indigenous methods of mole-rat control. Special studies are in-depth follow-up studies on particular problems that had been identified in diagnostic or topical studies, such as the reproductive problems of local cattle.

The beneficiaries of these studies and their reports can be divided into three broad groups. Firstly, the Project staff members who were involved in the studies gained professional knowledge and expertise from their direct participation. Secondly, through the wide distribution of the reports, many others - most notably research and extension staff - gained a better understanding of the area's agricultural systems and constraints. The publications also stimulated a shift in attitudes about participatory approaches and how to conduct research with farmers; as a result, Project collaborators reformulated their plans and designed new proposals. Several of the collaborating organisations undertook further diagnostic studies as a direct result of having been involved in these initial studies. The third group of beneficiaries are the local farmers because, through these studies, the support services (*i.e.* research and extension) have become better informed about the farmers' needs and constraints, and more aware of appropriate methods of working with farmers.

Training activities

The Farmers' Research Project organised a wide range of training activities. These activities had a variety of objectives, depending on the nature of the event and the people involved. For example, the training events for GO and NGO staff were primarily aimed at enhancing their personal and institutional capacity to conduct FPR, whereas training events for farmers were partly aimed at creating better knowledge about the

Photo by: Ejigu Jonfa.

A farmer sharing his knowledge on enset (*Enset ventricosum*) management practices with students from Awassa College of Agriculture, Debub University, during a travelling seminar.

ways in which FPR can be conducted in Ethiopia, and partly at fostering better linkages and understanding between farmers, researchers and extension staff.

Between 1991 and 1999, the Project organised a total of 80 training events, involving about 2,300 people and included:

- formal training courses for research, agricultural extension and development staff of GOs and NGOs (21);
- workshops for research, agricultural extension and development staff of GOs and NGOs (16);
- visits by senior/middle-ranking officials of GOs and NGOs to see field activities (3);
- travelling seminars by students of agricultural colleges to see field activities (6);
- formal training courses for farmers (2);
- workshops for farmers (9);
- travelling seminars by farmers to other farming areas, research stations etc (20);
- national conferences (3).

The Project's formal training was based on the provision of two standard courses in PRA and participatory on-farm trials (POFTs). Both courses centred on the complementary use of classroom-based theory and analysis, and field-based practice and experimentation, with course participants being able to put the theories they learned in the classroom into practice in the field.

The most important observation from these training activities has been the transformation of the trainees' attitudes to agricultural research and extension. Some GO/NGO trainees have trained others in their respective organisations, thereby extending the knowledge and skills they obtained from their training with the Project. There are already some examples of the practical application of FPR by some of the collaborating organisations, representing an important behavioural shift in their approach.

With regard to training events for farmers, travelling seminars were considered most useful. Farmers mentioned examples such as starting up a community-based programme to control the tsetse fly and construction of moisture-conserving terraces after having observed similar successful programmes in other regions. Although very popular, travelling seminars are very expensive, because they normally last 4-5 days, with farmers being transported in project vehicles and spending nights away from home. This therefore severely limits the potential replicability of this activity.

Farmers have also reported other benefits of training, such as the adoption of new technologies or management techniques, and getting a better understanding of local problems. Many farmers reported that they had shared information with other farmers, and a few had taken on a training role themselves, in order to defend new technologies and demonstrate them to other farmers. However, farmers also commented that some training activities raised interest and/or suspicion among neighbouring farmers, highlighting the importance of communicating to local farmers through community structures.

Participatory On-Farm Trials (POFTs)

These are experiments conducted on a farmer's field and managed and evaluated by the farmer him/herself. POFTs are an essential part of any research process and fulfil the following objectives:

- to test technologies and practices under the resource constraints and management levels experienced by farmers, and to provide important feedback about farm-level constraints and problems;
- to monitor how farmers adapt technologies/practices to achieve a better "fit";
- to complement existing farmer experimentation and enhance farmers' experimental capabilities.

Between 1991 and 1999, the Farmers' Research Project was involved in 39 POFTs involving over 400 farmers, through partner organisations. The degree of involvement varied from high intensity, putting a substantial amount of Project staff's time in the field, to low intensity "very hands-off" support, with the Project simply advising the partner organisation on trial design and/or analysis of results. The POFT process, in most cases, followed a diagnostic study using PRA tools and methods. After analysis of the situation and problems with the farming communities, those problems that could be addressed through on-farm research were put in the list for joint follow-up action.

Box 2: The participatory on-farm trial (POFT) process

A planning meeting with selected farmers in groups (farmers are selected by community members in a meeting or, in some cases, partner organisations that are working closely with the community facilitate farmer selection) includes:

- More detailed and focused discussion on the problem to be addressed by the POFT
- Identification or suggestion of possible / alternative research areas (e.g. variety test, practices such as composting, pest-control measures)
- Clarification of the need to consult others' experiences (including research findings)
- Fixing dates for second planning meeting, at which
  - feedback from consultation is discussed,
  - decisions are made on what to try,
  - farmers' objectives in the POFT are clarified in light of the problem under question,
  - farmers' criteria for treatment selection are clarified,
  - treatments (what farmers suggest and what professional experts suggest) are identified,
  - agreement is reached on what data / observations are to be made,
  - activity calendar and sharing of responsibilities are set out.
- Execution of POFT, including
  - monitoring / observation, data recording
  - cross visits and field days
- Evaluation meeting
  - setting out criteria (accumulated through time)
  - preference ranking
  - recommendations / suggestions
- Sharing with others
  - community meetings, field days
  - workshops (for professionals, farmers)

The "adaptation POFTs" were extremely popular with farmers because of access to a range of planting material to experiment with. In contrast, the agricultural extension service would, at best, only give them access to one species/variety pre-selected by the professional experts. These adaptation trials, together with the PRA and POFT training that normally preceded them, built an entirely new kind of relationship between farmers and extension staff.

Regarding technology development, a smaller but significant proportion of the farmers reported technology adaptation and conducting their own research in order to develop technology, mainly in the area of pest control. With respect to the development of farmer research capacity as a result of the POFTs, nearly all farmers stated that they had a wider choice than before of technologies they could use to address a specific problem. Most of them were able to lay out and manage conventional on-farm experimental plots and evaluate technologies using participatory ranking. A few were also actively conducting their own new experiments.

Lessons learned from the Farmers' Research Project

This initial project provided a great deal of learning. The people directly involved in South Omo recognised:

- the need to work closely with local GOs and NGOs if a project approach is to become institutionalised within local structures;
- the importance of adopting a multi-faceted approach to FPR, including training, studies and POFTs;
- the importance of continuous and regular monitoring and evaluation of the process of FPR and of the technology; this includes looking at the progress, challenges and lessons and designing the next steps;
- the importance of combining theoretical training with practical hands-on sessions;
- the need to involve senior-level staff in training events, in order to influence the management of local organisations and their policy towards FPR;
- the possibility of effective use of POFTs to stimulate the adoption and adaptation of technologies by farmers and to strengthen farmers' experimental capabilities; it is important to monitor how these technologies spread to other farmers in order to see the adoption rate and paths of dissemination as well as what adaptations are made;
- the importance of linking with the wider community of farmers to encourage dissemination of information.

Despite some successes, the continuity and sustainability of such efforts were constrained by a number of factors. The practical application of the knowledge acquired during staff training was largely limited to the individuals trained rather than being spread within the institutions. Most of the trainees were middle-level professionals, whereas the senior officials, who lack awareness of participatory research, failed to provide support to facilitate the spread of the knowledge and skills. With regard to the outcomes of the POFTs, the Project's experience indicated the need to improve the uptake

environment[4] in order to facilitate the wider use of technologies developed through FPR. This demands a detailed analysis of the key actors and their roles both in formal and informal research and extension systems.

The follow-on project: "Institutionalisation of FPR in the SNNPRS"

In 1998 a peer review of the Farmers' Research Project was conducted by the major research and extension and higher-education institutions relevant to the Southern Region. This review and a subsequent collaborative workshop strongly recommended the development of a project with the purpose of institutionalising FPR in the major agricultural R&D institutions of the Region. As a result, a three-year follow-on project was conceived. The purpose of the project is to institutionalise FPR approaches and tools within the organisations involved in generating and disseminating agricultural technology in the Southern Region. This is meant to contribute to improving the process of technology generation and transfer so that it suits the economic, social and cultural setting of small-scale farmers. The project was jointly planned by the Bureau of Agriculture (BoA), Awassa and Areka Research Centres[5], Awassa Agricultural College[6] and the Bureau of Planning and Economic Development in the Southern Region. These organisations implement the project in collaboration with FARM-Africa in nine woredas (one woreda from each zone of the Southern Region) and five "Special Woredas".

What is institutionalisation of FPR?

Institutionalisation is a process through which new ideas and practices are introduced, accepted and used by individuals and organisations so that these new ideas and practices become part of "the norm" (Sutherland 2000). Institutionalisation of a new approach involves change and development within the organisations. It is more than a policy or intention, more than a strategy or plan, and more than an activity or method.

The follow-on project defines "institutionalisation" of FPR as the incorporation of FPR tools and procedures into the regular activities of the organisations mandated to work with farmers. It refers to the routine application of practices that actively engage farmers in a decision-making role in identifying and prioritising production constraints, defining and testing potential solutions, and selecting and adopting / adapting technologies that enhance agricultural production and productivity. According to project documents, FPR is considered to be "institutionalised" if the following are achieved by the end of the three-year project period:

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[4] Uptake environment refers to a set of conditions that need to be in place before an uptake of the technology can be assured. The composition of that "set" depends on the technology and on the community for which it is meant. Included are the technical conditions, marketing opportunities, a supportive policy and institutional environment, and access to technical advice.

[5] Awassa and Areka Research Centres are part of the Ethiopian Agricultural Research Organisation (EARO).

[6] Awassa Agricultural College is part of Debub University.

- clear awareness of, and appreciation for, the concept and philosophy of FPR at all levels;
- acquisition and development of knowledge and skills to plan and implement FPR;
- creation of institutional structures that facilitate the incorporation of FPR approaches;
- availability of adequate resources in terms of skilled staff, funds and logistical support for implementing FPR;
- creation of effective linkages among relevant organisations and the farming community to enhance coordination and experience sharing;
- availability of adequate incentives to encourage adoption of tools and procedures of FPR and to develop respect for farmers' knowledge and skills among staff of relevant organisations.

The following outputs are being pursued in order to realise the objectives of the project:
- ensuring the support of Council (*i.e.* elected government) members, policymakers and decision-makers at various levels to facilitate the institutionalisation of FPR;
- creating awareness of FPR among those who influence the environment for project implementation;
- providing training in PRA, POFTs, training of trainers (ToT) and participatory monitoring and evaluation;
- establishing more organised information and database systems;
- establishing a functioning organisation and management system for FPR activities;
- ensuring the participation of farmers in all processes, and the linkage of technology generation to extension and input supply;
- establishing systems of participatory monitoring and evaluation (PM&E).

Experiences and progress made towards institutionalisation

So far, at policy level, there is general agreement within the collaborating institutions in the Southern Region that an FPR approach to agricultural R&D should be institutionalised. Also at federal level, the strategies of both research and extension support the principle of participation. By the time of the mid-term review in July 2000, the stakeholders shared considerable optimism about the possibility of achieving its aim. Review findings (Waters-Bayer *et al* 2000) and subsequent activities of the Project are highlighted here under a number of key headings.

Creating awareness. Currently, there is a very good awareness of the FPR institutionalisation process at various levels in the project area. There is also good acceptance and positive appreciation of the FPR approach by farmers, Development Agents (field extension agents) and woreda-level staff of the BoA. However, there is a need for continued effort in raising awareness and changing attitudes, particularly among senior officials, including Council members at zonal and regional level. An inter-institutional peer group assessment carried out during the mid-term review also indicated that the level of awareness differed between institutions (higher in BoA and lower in the Council and planning offices at zonal and regional level).

The Project has used various means to raise the awareness and encourage the involvement of partner organisations in FPR and its institutionalisation. In one of the most effective

campaigns ever to publicise FPR methodologies in Ethiopia, the Project has made good use of the national broadcasting service to reach a huge audience in the country. This FPR programme is broadcast every Monday on the agriculture programme ("*Awde geter*") of Radio Ethiopia. In addition, the Project is creating awareness by:

- drawing up project agreements (memoranda of understanding) with all partner organisations;
- membership of all partner organisations in a high-level Project Steering Committee;
- inviting the institutions to send participants to courses / workshops on concepts and principles of FPR, and on PRA, POFT, PM&E and ToT;
- engaging staff of the institutions in joint activities such as diagnostic surveys, field-monitoring visits and impact studies;
- collaboration in holding annual FPR Fora in which experiences are exchanged and issues debated;
- collaboration in formulating a set of flexible guidelines for the implementation of FPR;
- arranging participation of staff of partner organisations in conferences related to FPR;
- publicising FPR in articles in national newspapers.

Institutional linkages. The Project includes all the key government institutions directly or indirectly involved in technology generation and transfer. These institutions were involved right from the project preparation stage and have a considerable sense of project ownership. There is close cooperation in planning, implementing, monitoring and evaluating the FPR-related activities.

At the time of the mid-term review, the verbal commitment of the key players to institutionalisation of FPR was judged to be good, but the changes needed in institutional procedures had still not taken place. Staff members within partner organisations were beginning to recognise more clearly that changes are required with respect to disbursement of funds, job descriptions and research review procedures. There were still problems related to funding the FPR activities in the field, especially travel and per diems, and for facilitating (e.g. through transportation) and funding additional activities not foreseen in the original project proposal, such as travelling seminars for farmers.

FARM-Africa was deliberately kept as a separate entity in the institutionalisation process (*i.e.* not part of a government institution) and was meant to help all the partner institutions acquire the knowledge and skills to carry out FPR and to set up the necessary structures and linkages to institutionalise it. The formation of both a Steering Committee composed of the heads of the institutions and a Technical Team composed of technical staff from these institutions brought these partners closer together. FARM-Africa's coordinating role will be only until the partner institutions take over the coordination within the lifetime of the project (*i.e.* not after a "handover" at the end of the project). Increasingly, these institutions are taking the lead in activities such as training and facilitating joint diagnostic surveys by researchers, extensionists and farmers. The great amount of interaction between the institutions that was needed to implement FPR and realise this shift in roles has improved the linkages between them.

Box 3: Methods used in training to achieve progress in institutionalising FPR

- Effective joint planning and implementation of training and workshops with partner institutions
- Interactive and hands-on training and workshop events
- Bringing in experiences of others (e.g. International Institute of Rural Reconstruction) to help improve the quality of training
- Quick assessment of the training events before, during and after the training
- Technical back-up of project staff
- Practical work to reinforce the class sessions
- Development and distribution of a set of training materials (hard and electronic copy) for partner organisations

The creation of an annual FPR Forum also helped to create a joint stakeholder understanding of FPR and to improve the institutional linkages. The purpose of the Forum is to bring together organisations and individuals involved in FPR-related activities in order to share experiences, lessons and challenges. It includes farmers, who describe and discuss their experiences with FPR. These practical cases help to review the quality of the FPR process from different perspectives and in different settings. Suggestions and recommendations drawn from the Forum are disseminated through Forum reports. Information about organisations and individuals working on FPR is brought together and made more widely available. Thus, the Forum provides an opportunity for networking and for growing into an additional institution that could support further development of FPR in the Southern Region.

Farmer research groups (FRGs) have been set up wherever POFTs are being conducted in the Project area. The FRGs are formed by the community members during the diagnostic survey and continue to take part throughout the POFT process. During the course of the POFTs, staff of the partner institutions monitors the activities of the FRGs. At a review meeting in February 2001, farmer members and non-members of the groups reflected on the composition, roles, responsibilities and performance of the groups in their communities. They suggested that the roles of the FRGs should be:

- to coordinate the POFT activities and farmer-to-farmer exchange visits;
- to coordinate the overall activities of POFTs;
- to disseminate results and findings of POFTs;
- to monitor and evaluate POFT activities;
- to liaise between farmers, researchers and technical experts;
- to participate in conducting POFTs.

An important function of the FRGs has been to link between the farmers conducting trials, other farmers, formal researchers and the local government (known as "Peasant Association").

Provision of practical and field-based training. In the training activities, much attention is given to practice in the field. In most cases, participants (both professionals and farmers) are taken to the real situation at farm level; in addition, farmers are sometimes brought to the training venues to share their experiences.

Recently, two important training events took place that laid the foundation for a wider institutionalisation than had been originally envisaged by the Project. The first was the inclusion of FPR methodology (the principles of participation, PRA, problem diagnosis,

Photo by: Ejigu Jonfa.

A farmwoman shows how she uses a device being tested and adapted in collaboration with technical researchers to ease the arduous work of scraping enset (*Enset ventricosum*) leaves, a staple crop in the area.

POFT, ToT and PM&E) into a nine-month training curriculum of field-level Development Agents (DAs). There are some 4000 DAs in the Southern Region. In this particular training, 107 DAs were trained. The second was the inclusion of FPR methods into the Research Methods component of the BSc in Agriculture at the university covering the Southern Region (Debub University). Most future BoA staff will be drawn from the University.

Participatory problem diagnosis and POFTs. The knowledge acquired during the training events is, in most cases, applied immediately in the participatory diagnosis of problems and identification of alternative solutions. Field practical sessions are used to initiate POFTs that address priority problems identified by farmers. In this way, research and extension staff learn from farmers and start to appreciate their knowledge, preferences and decision-making criteria. They see the potential of participatory problem diagnosis and POFTs to improve the process of setting the research and extension agenda. However, there is still a tendency for them to look only at those problems that are amenable to study using plot-based on-farm trials and to suggest as treatments only those technologies that are "on-the-shelf" in research stations. Greater emphasis needs to be placed on enabling the farmers themselves to suggest ways of addressing their priority problems, e.g. interesting local innovations as alternative treatments, and encouraging the partners in POFTS to try these out.

Internal and external evaluation of the experience in conducting POFTs revealed that, if these were facilitated properly, they improved farmers' abilities to test alternatives, evaluate them and analyse the findings. During the process of experimentation, more issues have emerged that have helped to fine-tune research and extension plans. Some

examples of POFTs are in mole-rat control in Dita, Bonke and Konso Woredas; maize variety adaptation trials in Offa and Bonke Woredas; addressing the problem of trypanosomiasis in Konso; cotton variety and pest control trials in Humbo and Kindo Koysha Woredas; evaluation of labour-saving and fuel-saving devices by women at numerous sites; and composting in Chencha (FARM-Africa 1999a & 1999b).

Dissemination of findings. Findings from the activities in applying and institutionalising FPR are disseminated to staff of the partner organisations and others through workshops, visits and publications, including diagnostic survey reports, technical pamphlets, proceedings and monitoring reports. In addition to the afore-mentioned radio broadcasts, a FPR Newsletter was started. This is one of the few sources of up-to-date information on FPR available to the DAs in the field. Facilitation of farmer-to-farmer dissemination through cross visits and farmers' workshops is a key experience of the Project in disseminating findings of the POFTs.

However, there is still a problem in terms of farmers' access to the inputs needed to adopt the promising technologies identified through POFTs. This problem has various dimensions: a) lack of a clearly understood mechanism through which farmers can access inputs via the BoA; b) lack of capacity of the government organisations to meet farmers' input demands; c) inability of the farmer-to-farmer dissemination mechanism (although increasingly supported by outside agencies) to meet the demands (in some cases, for technical reasons, e.g. the supply of hybrid maize seed; in some cases, for social and economic reasons).

Lessons and challenges

Lessons learnt

The mid-term review identified the following lessons that have been learnt thus far from the current institutionalisation project and that could be applied to future projects of this kind (Waters-Bayer *et al* 2000):

a) Benefit of previous project

The Project benefited enormously from the previous Farmers' Research Project in a number of ways:

- the experience gained in conducting FPR
- the credibility this experience gave the team
- the experience gained in training and evaluation
- the development of a network of FPR "champions" in various organisations;

b) Need for project start-up period

During project planning, it had been assumed that the project would be "up and running" from the first day of fund disbursement. The reality is that a substantial period is required to initiate project implementation, such as for procuring required items, developing working procedures and allocating human resources. Future projects should consider such realities and incorporate preparation time into the project design.

c) Need to allow for unforeseen developments

It is not easy to anticipate problems and additional activities in process projects of this sort, which pioneer new approaches. Sufficient contingency allocations need to be considered in budgeting, and allowance needs to be made for their use, where justified, in project procedures.

d) Slow change in attitude

Working norms, attitudes and self-confidence levels take a long time to change. It should be expected that changes will be slow at least at the beginning and gain momentum with time and experience. Such realities should be considered in project design.

e) External reviews

The value of a participatory, external mid-term review, which gives all participants an opportunity for reflection and for recognising ways to improve the project, should not be underestimated. Such a review should come as early as practicable so as to indicate problem areas that need to be resolved before much time and resources have been expended.

f) Establishment of support structures

This project recognised the need for establishing coordinating bodies at various levels (policy, technical and local implementation) to assist in dealing with policy, technical and operational issues that can militate against successful project implementation. Establishing the Steering Committee, Technical Team and Farmer Research Groups was a sound decision that has proven its worth within a short period of time, and has sustainable potential beyond the project period.

g) Financial sustainability

Institutionalisation projects should pay special attention to the financial sustainability of activities at project end. One way to assist this process is to negotiate cost-sharing with stakeholders in such a way that, over the project period, the project's (external) share of costs decreases and the local stakeholders' share increases, thus ensuring that essential costs are included in local budgets before the end of the project.

h) Changing roles

There was a tendency among other project stakeholders to depend on FARM-Africa staff to initiate activities. This was discussed during participatory workshops and ways were suggested for subsuming FARM-Africa's functions into those of partner institutions. Recognition of the need for change in roles over the different stages of an institutionalisation project is an important lesson for other projects of this nature.

i) The timeframe

Fundamental institutionalisation of participatory approaches is a slow process!

Challenges within the formal institutions

Thus far, the Project has gained practical experiences that show the potential of FPR in addressing the constraints that farmers face in agriculture. However, current efforts for institutionalising FPR, which are fragmented and short-term, should be supported to sustain impact. Some of the challenges in this process are as follows:

- FPR is a process that requires time, effort, appropriate communication methods, a change in attitude and behaviour as well as some visible improvements for the farmers, which can only be assessed in longer-term interactions that have impact at farmer level. However, with the existing procedures in government institutions for priority setting, research planning and implementation as well as the staff reward systems, the initiative to undertake FPR is limited to projects and individuals rather than widely spread within the institutions. A three-year project period is too short to bring about these changes. Moreover, integration among several of such small projects helps to push the institutionalisation process from different directions.
- Participatory research requires the joint effort of all actors who are involved in technology generation and extension. Although various institutions are working together to implement this particular project, there is still a high tendency to work in isolation, because of the physical and functional separation of the institutions. Closer collaboration is affected by personal attitudes, institutional mandates etc and are subject to the good will of individuals. There is a need to put better mechanisms in place to improve the linkages and a need for a larger number of FPR-skilled professionals, especially among those who influence the institutional environment.
- Given the current situation with regard to farmer organisation, representation of farmers at higher levels - woreda and above - is almost non-existent. This has implications for bringing in their views and influence on decisions, as well as for their roles in the research reviews. If scientists carry out research reviews and make decisions at these higher levels in the absence of farmers, can we really talk of genuine farmer participation in research?
- As project implementation involves the interaction of the stakeholders, it demands not only technical integration but also some financial and administrative changes. In this regard, the challenges relate to:
  - lack of effective communication mechanisms to share and exchange views on the progress of project implementation and related activities in the institutionalisation process;
  - different financial procedures in the various institutions involved and delays in accounting;
  - less emphasis being given to looking into the impacts and the process of institutionalisation in the respective institutions (ineffective monitoring and evaluation);
  - reluctance to take over leadership in project implementation. The shifting of roles and responsibilities from FARM-Africa to the stakeholder institutions, as envisaged in the project document, is making slow progress.
- More targeted action is required at all stages of the FPR and extension process (from the diagnostic studies onwards) in order to understand and act on the needs and criteria of women and the poor.
- A wider definition of "research" than is currently held by most technical staff is required. This will mean looking beyond technical "fixes" from "on-the-shelf" technologies as the only solutions for farmers' problems.

Decentralising research and extension

The involvement of farmers in research planning, implementation and evaluation has been seen to date as a means for improving the relevance of research outputs to farmers' circumstances and improving uptake through linkage to the PADETES (technology demonstration) system. Less emphasis has been placed on empowering farmers to assume some of the functions of the formal research and extension institutions.

At present, FPR is driven by agencies external to the community. Little attention is given to intra- and inter-community communication pathways as major conduits for the spread of research experiences or for the training of community members in the principles of experimentation. This was understandable while there was still little in-country experience of working in partnership with farmers. However, that situation is changing, and it may be time to consider complementary R&D models that recognise the following:

- The research centres have limited human capacity and facilities (e.g. transport);
- The BoA and other institutions suffer from high staff turnover, with serious implications for the sustainability of a process dependent on the accumulation of skills and expertise;
- Formal institutions have procedures that make it difficult to implement activities that are responsive to local or immediate needs;
- There is often a break between farmers' identification of preferred varieties in POFTs and the availability of planting materials and other inputs;
- Farming communities are comparatively stable;
- Experience from other countries (e.g. East and West India Rainfed Farming Projects; *Promoción e Investigación de Productos Andinos* [PROINPA] in Bolivia; *Campesino-a-Campesino* in Central America) suggests that, where appropriate facilitation, training and support are given, farmers and local institutions are capable of planning and conducting research, organising and implementing the local dissemination of technical knowledge, and multiplying or acquiring the necessary inputs.

The Project operates in only a few woredas. It is timely to consider whether the present, resource-intensive way of conducting FPR is replicable throughout the Southern Region, or if it is feasible to decentralise and give farmers a greater role in R&D activities, and to modify the roles of researchers and DAs so that they support this process. If such a radical stance is not taken, then the uptake (institutionalisation) of the FPR "package of practices" promoted by the Project may turn out to be somewhat analogous to the uptake of the technical packages of practices offered by the BoA to farmers. Just as farmers pick and chose those components of a package that suit their interests and resources, and build on their present practices, so the BoA and others may adopt those aspects of FPR that are within their capacity and resources and that do not require radical changes in procedures.

References

Biggs S. 1989. *Resource-poor farmer participation in research: a synthesis of experiences in nine national agricultural research systems*. OFCOR Comparative Study 3. The Hague: ISNAR.

CIA. 1999. The world factbook 1999 - Ethiopia. http://www.odci.gov/cia/publications/factbook/et.html

FARM-Africa Farmers' Research Project. 1999a. *Incorporation of Farmer Participatory Research in the Southern Region of Ethiopia*: Proceedings of a workshop held in Awassa, 18th-19th March 1998. FARM-Africa & Institute for Sustainable Development, Addis Ababa, Ethiopia.

FARM-Africa Farmers' Research Project. 1999b. *Review of Experiences with Participatory On-Farm Trials in the Southern Region of Ethiopia*: Proceedings of a workshop held in Soddo, 17th-22nd May 1998. FARM-Africa & Institute for Sustainable Development, Addis Ababa, Ethiopia.

Misgana LO. 1998. Critical review of the extension package popularisation programme of Ethiopia with reference to Oromia Regional State. Dissertation, MSc in Agricultural Extension, University of Reading.

Percy R. 1997. Gender and participation in agricultural development planning: lessons from Ethiopia. Working document. Rome: FAO Women in Development Service.

Sandford S & Reece A (eds). 1992. *Proceedings of the workshop on farmers' participatory research held in Addis Ababa*, February 17-19,1992. Addis Ababa: FARM-Africa.

Sandford S. 1999. Final report of the Farmers' Research Project in the North Omo Zone and Derashe and Konso Special Woredas of the Southern Nations, Nationalities and Peoples Regional State of Ethiopia. Internal report of FARM-Africa. Addis Ababa: FARM-Africa.

Sutherland A. 2000. Challenges in Institutionalising Farmer Participatory Research (in the context of a more participatory agricultural research and extension system). Paper prepared for the Second Farmer Participatory Research Forum, 29 June - 1 July 2000, Awassa, Southern Region, Ethiopia.

Waters-Bayer A, Seme Debela & Pound B. 2000. Mid-term review of the project "Institutionalisation of Farmer Participatory Research in the Southern Nations, Nationalities and Peoples Regional State", Ethiopia, 10-21 July 2000. Leusden: ETC Ecoculture.

Looking ahead

Ann Waters-Bayer, Chesha Wettasinha and Laurens van Veldhuizen

Learning by doing and sharing

These examples of attempts to integrate PTD into agricultural research, extension and education reveal that the challenges are huge but that committed groups throughout the world are facing them squarely and are persevering. For most of the participants who documented their experiences for the "Advancing PTD" study-cum-workshop, it was the first time that they had consciously thought through how they were going abut things. Indeed, only a few of the experiences began with a deliberate strategy to institutionalise PTD, but the logical sequence of action with a view to impact and sustainability had led the organisations into the midst of this process. The analysis of what they were doing, how and why helped them clarify how their strategies and activities could be made more effective in the future.

The documentation of their experiences proved to be - in itself - a form of monitoring and self-evaluation that supported the learning process. By exchanging their experiences with others, they learned even more about how to deal with the challenges and to recognise and grasp the opportunities for institutional integration of PTD. A workshop such as the one held in the Philippines can allow only a limited number of people to benefit from each other's experiences and assessment. In order to spread the lessons more widely and to stimulate a broader process of institutional integration, it is important to disseminate the experiences in as many forms and fora as possible.

Photo by: IIRR

Documentation and presentation of participant's experiences during the workshop.

There is still plenty of room for more learning. Many interesting and doubtless promising experiences - also experiences of failure, from which much can also be learnt - were not included because we were not aware of them. Moreover, few of the people and organisations who were involved in the PTD study-cum-workshop have formal training in managing change. The advancement of PTD would be even quicker if more systematic analysis of experiences would be made with organisational change experts from spheres other than agriculture.

Evolving partnerships

The partnerships in PTD evolve in the course of joint action. Success helps to bond the different partners together and propels the programme. Over time, the roles of the different actors and the relationships within the partnership change. In each new phase of a partnership, new objectives will need to be set and met. If a particular partnership has a beginning, does it have an end? Addressing this question helps to ensure that the changed or new structures that arise out of efforts to practise and mainstream PTD can continue the process.

In many of the cases, it is evident that NGOs have been playing a key role in facilitating stakeholder interaction, negotiation of roles, and joint monitoring and analysis of experiences. They have been guiding the participating organisations through change in their roles and relationships as the partnerships evolve. The NGOs themselves are recognising that also their own roles change over time, often from being catalysts and even driving forces in the beginning to becoming networkers and/or providers of expertise upon request by the other actors - or moving on to approach new challenges.

Changing university teaching

If PTD is to be truly and lastingly embedded in agricultural research and development (R&D), then change in the institutions of agricultural education and training is of utmost importance. In this book, there is only one example of deliberate efforts to change university curriculum and teaching methods - in Vietnam. In many of the other cases, there have been linkages with universities: involving lecturers and researchers from universities in supporting PTD processes and/or involving students in travelling seminars to visit experimenting farmers. Reference is also made to the efforts to incorporate PTD into institutions of higher education in Ethiopia and Tanzania (Kibwana et al 2000). However, there is a need for much more concerted action to change university teaching so that it embraces the spirit and methods of PTD.

Seeking more partners

The NGOs that are trying to advance PTD have seen the value of seeking partnerships beyond their traditional links with farmers and community-based organisations (CBOs). They are building partnerships with each other and with like-minded individuals and

groups within governmental and international organisations so that participatory approaches aimed at enhancing the capacity of farmers and CBOs can become the norm. Successful PTD requires not only making the farmers better prepared to interact with scientists and extensionists but also vice versa. This is indeed the greater challenge: to build the capacities of formally educated researchers and development workers to communicate with farmers and to value their contributions to research and extension, while creating an enabling institutional and policy environment for the scientists and extensionists to work in this mode.

It is for this reason that several NGOs and other organisations are combining forces to set up an international programme of promoting local innovation in agricultural and natural resource management: PROLINNOVA (PROmoting Local INNOVAtion)[1]. Local NGOs are facilitating a process of building multi-stakeholder platforms at national level to decide - on the basis of their own history, culture and experience - how to approach the scaling up and mainstreaming of PTD in their respective countries and how to support each other internationally. This initiative is linking up also with similar efforts - coming from the side of formal research - to mainstream participatory approaches to R&D in agriculture and natural resource management, most notably the systemwide programme Participatory Research and Gender Analysis (PRGA)[2]of the Consultative Group on International Agricultural Research (CGIAR). We look forward to even stronger partnerships among national, regional and international organisations and civil society organisations - both farmer organisations and NGOs - as well as private-sector groups in R&D in ways that empower farmers in the South to determine their own future.

Learning accountability

The cases in this book suggest that PTD can be integrated into institutions of agricultural research, development and education, and that this is a learning process. It starts with changes at personal levels, first within individuals, then in larger groups within the organisation. A sufficiently long timeframe and adequate flexibility in the process are crucial if it is to lead to success. In whatever form and way it is done, institutional integration of PTD ultimately implies that the staff and the institutions themselves have to learn to be accountable not primarily to their institutions or to the donors, but rather to the farmers and to wider civil society.

Reference

Kibwana OT, Mitiku Haile, van Veldhuizen LR & Waters-Bayer A. 2000. Clapping with two hands: bringing together local and outside knowledge for innovation in land husbandry in Tanzania and Ethiopia - a comparative case study. *Journal of Agricultural Education & Extension* 8 (3): 133-142.

[1] For more information, see the website www.prolinnova.net

[2] For more information, see the website www.prgaprogram.org