Monitoring the Outcomes of Participatory Research in Natural Resources Management

Experiences of the African Highlands Initiative

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Abstract

Sustainable use and management of natural resources is essentially about people relating to each other and their environment in a positive way. Therefore, outcome monitoring can be used to characterize and assess in detail changes in behaviour of researchers and farmers as they engage in community based participatory research activities. The innovation of outcome monitoring methodology is that it makes a shift from assessing only the technical outputs of research programs towards focusing on the changes in the behaviour, relationships and actions of the people and organizations noting "how" these came about (or not). These contribute and lead to desirable outcomes. The methodology used in the research reported here followed a "participatory learning action research" approach and involved teams of NARI scientists from eight benchmark sites in five countries of Eastern Africa. They systematically monitored the outcomes of participatory research, and its challenges, their experiences, lessons and behavioural changes that have taken place as they try to apply participatory research approaches. The methodology for monitoring outcomes is their use as a means to the desired changes as is part of the continuous activities of research activities

Preliminary results show that the desired changes in the approaches used by research teams to cope with NRM technology development has been realized. Researchers are focusing on documentation of adoption trends and economic profitability of technologies but are less engaged in documentation of the participatory research process, changes in behaviour, and interactions that result from using the process. Strongly rooted commodity approaches to research and technology development and dissemination, and skepticism about participatory research remain some of the challenges; if not by the researchers themselves, then by the institutional culture in which they are based. Additionally, skills and competencies in conducting participatory research and monitoring of the outcomes are developing. Increasingly, partnerships and other institutional working arrangements among collaborating R&D organizations are influencing the research teams who are starting to modify their approaches to include community based research.

Keywords: Outcome mapping; Monitoring and evaluation; Agricultural R&D; Participation

Introduction

The highlands of Eastern Africa are characterized by medium to high agricultural potential (producing about 50% of staple foods), but diminishing resource bases. 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 are already relatively very high (100-200 people per km2), have risen over the last fifty years within this ecoregion, resulting to critically small, often fragmented farms reaching 0.25 to 1.0 ha for an average family of six (AHI 1998). There is a diminishing natural research base due to declining ability to: maintain and improve soil fertility and erosion control; intensify livestock feed and nutrient management systems; decrease in social cohesion and positive arrangements to manage due to policies and increased competition for scarce resources, distance from markets, lack of inputs and credit, continued low local wage rates, and land inheritance practices. Indicators of decline are: lower yields, more pests and diseases of poor intensification, lowering income, fewer options for diversification, and lowering general ability to cope (AHI 2001).

Concerns that technologies emanating from agricultural research in the highland areas had not yielded results commensurate with investments to improve and sustain productivity and natural resource base led to the formation of AHI in 1995. Studies had shown that limited adoption and impact was due to 5 major factors: Socio-economic and biophysical circumstances are heterogeneous and the situation is dynamic. The farmer operates in a system with varying levels of resources and enterprise mixes and responds in a dynamic way to external circumstances – be it weather, markets, or other income generating opportunities: thus, no "one size fits all" or blanket recommendations (package approach) do not work, and a participatory approach is needed. Social concerns – such as local arrangements over resource management, gender and resource endowment differences were not taken into account and not addressed.

There are over-riding short-term concerns of small holders and inability or unwillingness to make long-term investments that are required for a number of soil improving technologies.External circumstances that act as disincentives to farmers and uptake - such as lack of market, credit and input supplies are the most commonly quoted problems from farmer surveys. Policy issues related to local by-law definition and enforcement, to communal management and to national level development support have not been addressed (Wang'ati and Kebaara, 1993; Stroud, 2000).

Background

PROGRAM CONTEXT

The African Highlands Initiative (AHI) was established as an ecoregional program focusing on the issues of natural resources management (NRM) in the highlands of East and Central Africa. AHI operates in eight selected benchmark locations (sites) in five counties (Kenya, Uganda, Tanzania, Ethiopia and Madagascar). The program is under the umbrella for the Association for Strengthening Agricultural Research in East and Central Africa (ASARECA), and is convened by the International Centre for Research in Agroforestry (ICRAF) and also forms the East African component of the Global Mountain Program (GMP), a global CGIAR program uniting mountain research. AHI's guiding philosophy is a client-driven approach using participatory methods and an effective research development continuum where research partners, using collaborative, synergic partnership can bring together diverse contributions to foster farmers' innovations and collective action for design and dissemination of appropriate, integrated technologies and methods for improving NRM in the diverse and complex situation (AHI 1999). AHI's philosophy and strategy have evolved rapidly reflecting the dynamic and rapidly changing field of NRM. The current program's outputs are shown in Table 1.

Table 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 conducted and syntheses are produced that improve decision making and priority setting for diverse stakeholders.
Output 3: Strategies for dissemination and scaling up of NRM technologies and approaches are developed and tested.
Output 4: Selected NARIs, IARCs and other key partners' capacity to carry out integrated, participatory NRM research and development is enhanced across the ecoregion
Output 5: Coordination, management and synergies are strengthened through strategic partnerships building upon the collaborative advantages

Increasingly, the field of NRM is giving considerable attention not only to the technology developed but also and more importantly to the process of developing and disseminating technologies. Consequently, the new focus requires that research partners not only look at the technologies being delivered as an end in themselves (THE WHAT), but also seek to understand the processes, strategies and the means of developing and delivering the technologies (THE HOW), and the outcomes and impacts of both technologies and approaches (FOR

WHOM). In recognition of these changing paradigms, AHI initiated a monitoring and evaluation (M&E) system focusing on tracking and documenting processes and outcomes of participatory research in NRM. The shifting paradigms in M&E are cognizant of the fact that participatory research and development processes have to be documented through intensive community based research, periodic reviews and reflection and open ended analysis of the research context (Mosse, et al eds, 1998). Understanding the means through which research outcomes are achieved calls for description and documentation of action and events arising from planned activities. Looking at the desired outcomes implies that stakeholders attention goes beyond just monitoring the availability of input and outputs created as thought they are linear in relation, but include the process to track projects beyond the outputs generated per se.

RATIONALE FOR OUTCOME MONITORING

The need for an M&E system was brought to the forefront as a result of an internal evaluation and regional workshop at the end of phase I of AHI. The lack of a process to monitor and assess progress, changes and outcomes was one of the weaknesses identified. This meant that research teams were not systematically collecting and analyzing information that provided feedback as to whether or not they were achieving what they set out to do. Researchers tended to collect typical technology performance information with less engagement in documentation of the processes used.

Concerns with outcomes monitoring arose from a number of pragmatic and strategic reasons. Recent shifts in AHI strategy have given more emphasis to processes and methodologies development rather than the conventional focus on technology generation, going back to the major deficits identified in research processes – leading to poor adoption. Increasingly, participatory research is less and less concerned about generating deliverable technologies (high yielding varieties, soil fertility recommendations, integrated pest management options) but is becoming more concerned with behavioural and institutional changes necessary for self-application and/or adaptation of information, materials, etc. to improve their system which needs to be sustained over time. The focus on outcomes monitoring is justified by the fact that participatory research is essentially a learning process. Outcome monitoring is therefore an alternative M&E process that provides stakeholders with timely information about their progress and achievements for systematic and collective learning, reflection and corrective action. AHI then specifically sought and received financial support (in 1998) from the International Development Research Center (IDRC) to use participatory research to develop a framework, processes and methods to enhance M&E of research outcomes in NRM activities.

This paper analyzes and shares some of the preliminary experiences learned for program improvement. The implementation of the ongoing work in M&E is being facilitated by resource persons from the International Center for Tropical Agriculture (CIAT), International Center for Research in Agroforestry (ICRAF), IDRC Nairobi and researchers from the National Agricultural Research Institutes (NARIs) in the eight benchmark sites. The collaborators in the process of implementing the M&E framework have contributed in many ways. These ranged from literature search, awareness raising at the various levels of the program, tools development for initial testing and further refinement, critical assessment of focus and content of the M&E aspects, training and facilitation in workshops, and editing of site reports and workshop proceedings.

ANALYTICAL FRAMEWORK OF OUTCOME MONITORING

Kibel (1999) defines outcomes as changes in behaviour and interactions of those being affected by development projects or programs. Thus, for effectiveness, research and development (R&D) programs must go further than information and technology creation and dissemination (Kibel, 1999; IDRC 1997, Earl, et al, 1999). Monitoring means systematic collection, synthesis, storage and use of information about progress and performance. Therefore outcome monitoring is a continuous activity that entails regular gathering and analysis of information. In the process of collecting and documenting information outcome monitoring helps researchers in checking whether inputs, activities and outputs are proceeding according to plan so that intended outcomes are realized. Therefore, the focus for AHI is on the behaviours, relationships and actions of the people and organizations with whom AHI is working with over the last five years.

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

Broadly speaking, outcome dimensions in development work introduce M&E considerations to unite intervention processes and desired state. More specifically, use of outcome monitoring methodology is useful at the planning stage of the research process so that projects set their overall intentions, strategies and mechanisms for monitoring their contribution to the achievement of outcomes and priority changes. By so doing the stakeholders involved in development work systematically think about how they intend to achieve results. Hellawell (1991) describes monitoring as a process of providing information, not results and is a means to an end rather than an end in itself. Thus AHI is investing in process oriented research to enable attainment of the regional purpose. Additionally, monitoring is periodic rather than one-off reassessment of indicators that are chosen to determine effects of certain interventions, or policies or changes in general (Abbot and Guijt, 1998).

The implementers of AHI (1999) recommended the introduction of outcome monitoring as way to track progress. Three strategies were identified as key towards achieving the desired outcomes (AHI's purpose) and that were departures for most researchers and their organizations: interdisciplinary research (integrated team work), use of a participatory research approach, and stronger linkages and partnerships with development and policy actors. These are referred to as the "learning areas" because the program and the researchers are interested in assessing experiences in application. Researchers, like most farmers (Richards, 1989, Holland and Silva, 2000), do not deliberately systematize what they learn from the "process experiments", but if this is done, will adapt their performance in the light of the results. Hagmann (1999) indicates that experiential learning is critical among the stakeholders involved development interventions so that they adjust their strategies and context of operation.

Information needed to monitor achievements in the direction of the desired outcomes was identified and called "progress markers" also referred to as performance indicators, which are similar to milestones and enable the users of the methodology to track progress being made in the integration of 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 or actions of an individual, group or institution will change over time in the process of using the new strategies to conduct research.

A key question is: How will the behaviour, relationships, activities and or actions of researchers be changed by their interaction and use "new" AHI strategies? The progress markers describe what one would expect to see the stakeholders doing if they paid attention to the AHI strategies, to what it would like to see them actually doing, to what it would love to see them doing, thus describes a pattern of behavioural changes 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" category, while those markers that are transformative and more difficult to achieve are listed under "love to see" (Appendix 1)

Over the last 3 years, AHI has taken substantial effort to build researchers' capacities in the use of participatory research approaches, in multidisciplinary team work and in managing multi-institutional linkages, so that researchers' can improve the ways they interact amongst themselves, with farmers and other development partners for the betterment of the farmers. The hypothesis being that ultimately, there will be better adoption, feedback to research and better returns to investment for solving agricultural productivity and NRM problems. Therefore, tracking the progress made in these areas, and how they contribute to better implementation of participatory research process, in particular, has been a critical component of the regional program. Participatory research processes entail the involvement of the relevant stakeholders in all the stages of research. Ashby, et al, (1989) explain that participatory research is a process "in which the farmer acts as a subject which investigates, measures and studies in collaboration with researchers." For the researchers to allow space for the farmers to get involved in the research process, it means that researchers have to change from the conventional

ways of conducting research where they consider themselves as "experts" to one where farmer innovations and knowledge is valued and their involvement takes priority. This echoes peoples' involvement in development process as being important so that they transform their lives for their own benefit.

Methodology

AHI uses benchmark sites that were selected geographical areas for integrated, participatory research concentration in the respective countries. Research activities are undertaken with teams of national scientists in collaboration with government line ministries, NGOs with some input from IARC and university scientists.

The development and implementation of outcome monitoring followed a number of iterative steps. First a regional workshop was organized with many of the implementing stakeholders in AHI to develop a common understanding and definition of mission, focus and purpose of AHI from the point of view of different stakeholder. The core outputs of AHI as well as crucial questions for the performance evaluation were developed and agreed upon by all the relevant stakeholders

Using the regional workshop output, a small group of resource persons (from ICARF, IDRC, CIAT and AHI) was formed and consulted with NARI stakeholders to select the key strategies or "learning areas" and to develop tools for monitoring these priority learning areas: interdisciplinary teams, participatory research and multi-institutional linkages. (Although distinctly handled the three areas are interrelated.) It was decided to be selective in the areas to monitor and to start with one stakeholder group (researchers) to do the monitoring, given the newness of outcome monitoring process and the recognized need to develop and test methods first. It should be noted that the implementers (researchers) had been exposed to these areas through training courses or workshops, and that that these were deemed key to AHI's success. All these areas have stakeholder and gender analysis embedded in them. An action plan was then developed and reviewed by an AHI M&E working group (ICRAF, ILRI, CIP, IDRC, KARI) and by AHI's regional Technical Support Group (all site coordinators and some representatives of the various AHI working groups).

Subsequently, in-country and site workshops were organized where possible in conjunction with annual planning to familiarize the site teams with the newly developed AHI framework, to start to build a conceptual base for understanding M&E in a new context, and to further develop strategies and steps for testing, adjusting and institutionalizing the M&E framework. All in all there were 8 workshops with 112 total attendees over a period of 18 months to date.

A first workshop was held during the annual planning of the Kabale site team in 1999, where monitoring participatory research comprised of three impact areas: technology outputs, participatory research process, and outcomes (behavioural changes) (See table 2). Based on their specific research protocols and activities, the site teams defined their performance questions and identified performance indicators. The framework further specified the types of data or information needed, who is responsible and time frames. It was then decided that the three strategies should become focal points (as the means to the end) rather than technology generation and dissemination itself. New tools were designed to focus more on tracking desired changes in the three learning areas. These were tested in the two test sites (Kakamega and Lushoto), and then incorporated into site workshops held in other countries.

To start off the monitoring process, each of the three learning areas (strategies) were analyzed by the researchers looking at the changes in the following: (i) current status and experiences; (ii) their perception of the benefits and shortcomings; (iii) practical examples of the effects of using the approach (strategy) on their behaviors, interactions and research; (iv) suggestions on how they, as research teams, can be assisted to improve on the learning areas (approaches); and (v) future plans for using the approach (see Table 1).

The information gleaned from the workshops has been compiled and discussed with researchers in order to design the next set of tools. In the second workshop in Western Kenya, the resource people shared the output from the initial workshop and developed a monitoring plan to follow up on the integrated multi-disciplinary teamwork aspect to start with (See Table 2). Researchers were encouraged to try new ideas and modify the tools to suit their information needs.

Table 1. An example of the outcome monitoring tool

Learning Area	Status Review	Benefits	Shortcomings	Changes in Behaviour	Improvements Needed	Lessons
Interdisciplinary Research						
Participatory Research						
Multi-institutional linkages						

Table 2: Participants Action Plan from an M&E

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	Time frame (indicate when you plan to use)	Responsible and collaborator
1.						
2.						
3.						

After the first round of capacity building meetings, follow up sessions were organized to assess the progress research teams were making in the implementation of the workshop action plans. The meetings were held at the sites, and also at the regional level with a small resource team. These meetings assisted the program and the site team in understanding the challenges being faced, the assistance needed, and progress teams were making in using the outcome monitoring framework.

The initial format (Table 3) was used again after a year's time to assist researchers in visualizing progress (or not) actually made, and served to focus analysis, reflection and action. For example, the researchers used the information collected to identify beneficial components of the strategies, as well as aspects that need strengthening or adjustment so as to optimize on the benefits. Once enough experience is gained in monitoring these areas (strategies), researchers will assess how these approaches have affected farmers and other stakeholders working in the benchmark locations. (This is now starting to take place in some benchmark sites.) To better link the information from monitoring the strategic areas to progress on the ground, the next stage is for researchers to collect information related to farmer feedback, farmer innovations and adoption. The toolkit includes mechanisms for processing this information as well as describing the processes used to implement the strategic areas in more detail. This is work in progress.

Although using this tool was the main component of the first meetings, other sites requested for more time to be spent on improving their understanding of participatory monitoring and evaluation and the underlying concepts. This was built into these workshops along with using this tool. In many of these sessions participants share information and experiences about participatory research. Facilitators have been used to help build conceptual understanding and arrive at more common understanding of the concepts and to ensure a "harvesting" of ideas and inputs. Occasionally, a knowledge assessment form has been used to assess the knowledge levels of the participants in participatory research and outcome monitoring. The participants are the taken through a Strength, Weakness Opportunity and Threat (SWOT) session to gauge their experience and to draw lessons for decision making by the program on the areas for improvement and modifications.

Table 3: An example of an M&E framework for participatory research evaluation of climbing bean varieties disseminated in Kabale (South Western Uganda) by December 2000.

Impact Categories	Indicators	Information Needs	By Who
Technical - At least 3 varieties being produced in farmers fields - Increase in yield per unit area - Multipurpose trees planted - Recommended practices adopted	- At least 60%of target farmers grow one of the improved varieties - Target farmers increase yield by 1,500 kg/ha - At least 40% of the target farmers grow multipurpose trees	- Seasonal reports - File sampling and discussions	- Principal investigator - Farmers - NGOs in Kabale
Process - Seed multiplication - Farmer selection - Farmer training - Tree nursery establishment - Follow-up visits	- 4 well established seed multipliers - Volunteers identified - Curriculum developed - 4 well established nurseries - Visits organized	- Farm records - Farmer registry - Training booklets - Field reports, visitors book	- Researchers - Farmers - Extension
Outcomes (behavioural changes) - Farmers positive on growing climbing beans - Farmers willing to pay for climbing beans - Farmers plant beans in the fertile portions of their land - Farmers re-use and buy stakes for the beans - Researchers hold joint consultative meetings - Researchers and other stakeholders organize joint monitoring visits to the farms - Farmers conduct experiments on their own - Farmers make adaptations in technologies proposed by scientists - Increased autonomy to engage in research options	- Enhanced knowledge and positive attitude to growing climbing beans - Rapport among stakeholders-	- KAP (Knowledge, Attitude and Practices) survey - PRA - Observation - Quality of Reports - Case study	- Principal investigator, farmers, extension - Site coordinator, researchers - Researchers, farmers, extension

NB: the researchers in the site planning meeting developed this framework. The above example represents one of the activities that the researchers were conducting in the Uganda site of Kabale.

The workshops and meeting process have diverse methods employed: plenary discussions, groups work with specific tasks, two person buzz groups to define concepts, feedback sessions in plenary, process group session that look at what went well, what did not go well and suggestions for improvement in future. The workshops end by the participants developing an action plan for follow up and meta-evaluation of the workshop process and content.

A fourth tool was a researchers' outcome journal that assists researchers in identifying changes they would like to see in the short, medium and long term in the behavior of farmers, researchers or extension agents. Researchers then use the tool to monitor changes over time within each of these groups (Table 5).

Table 5. Example of a researcher's outcome journal developed in Western Kenya

OUTCOME CHALLENGE: The program intends to see **farmers and farmers committees** Which are fully engaged in the research process. They are participating in the design, management and monitoring of field trials; they regularly give researchers full and frank feed back on the technologies being tested, and they share their learning and experiences with extension agents and other farmers.	
EXPECT TO SEE FARMERS AND FARMERS' COMMITTEES	
LMH (Percentage of farmers: Low = 0-40%, Medium = 41-80%, High = 81-100%)	
OOO	1. Participating in the research in accordance with researchers' guidance
OOO	2. Initiating contact with researchers
OOO	3. Continuously monitoring and reporting on their field trials
LIKE TO SEE FARMERS AND FARMERS' COMMITTEES:	
OOO	4. Frequently raising problems and questions with researchers
OOO	5. Keeping complete records on trials
OOO	6. Negotiating trial design and management with researchers
LOVE TO SEE FARMERS AND FARMERS' COMMITTEES:	
OOO	7. Promoting the feedback process among other farmers
OOO	8. Carrying out jointly planned trials and constantly feeding back assessments of the results to the researchers and to extension agents.
DESCRIPTION OF CHANGE : Four of the eleven farms visited showed up to date records of crop growth and the applications of water and fertilizers.	
CONTRIBUTING FACTORS & ACTORS: Records were kept using record sheets provided during farmer training workshops in this area and agronomic and fertilization practices were consistent with the field trials planned jointly with farmers in this area.	
SOURCE OF EVIDENCE: Monitoring visit to field sites near Kakamega on January 23 & 24, 2001. See trip report dated: 31 January 2001.	
PLANNED **U**SE OF / **R**ESPONSE TO THE **A**BOVE **M**ONITORING **I**NFORMATION: Will invite one of the record keeping farmers to attend and participate in next farmer training workshop in neighbouring village.	

When reporting on the monitoring data collected in this journal, it is also be necessary to refer back to the desired behaviours identified for researchers to reflect on which actions or strategies or actions appear to be associated with the behaviour changes observed.

PRELIMINARY FINDINGS AND DISCUSSIONS

This section presents preliminary results of the use of outcome monitoring focusing on participatory research processes and related outcomes. This case examines the current status and researchers' experiences dealing the changes that have occurred in the behaviour of researchers and research teams at the sites. It discusses the key lessons that were learned in assessing the outcomes from participatory research process in Western Kenya and Lushoto Tanzania.

CURRENT STATUS AND EXPERIENCES IN PARTICIPATORY RESEARCH

In terms of general application of participatory research, both teams initially assessed that they had made significant progress in incorporating all the three areas of learning into their research approach though to different degrees. For example, researchers were particularly strong in conducting interdisciplinary research and were able to give many examples of how interdisciplinary research had improved the team's effectiveness in solving farmers' problems. However, even though there was not a common understanding of participatory research approaches,

The summary of results shows significant differences between the site teams' perceptions in their needs and knowledge in participatory research (Table 6).

Table 6. A comparison of researchers' rating of the status of participatory research in selected sites

Researchers' rating of the status of participatory research	**Western Kenya**	**Lushoto, Tanzania**	**Ethiopia**
Alright as is	5	4	0
Needs more	2	8	6
Needs less	1	1	0

While Western Kenya the site team seemed to be more confident in participatory research, site teams in Ethiopia and Tanzania feel they need more exposure to participatory research methods. These differences may reflect differences in adaptation of participatory research in NARIs in the region with the system in Kenya perhaps more exposed more to participatory research and farming systems projects.

In an attempt to review the current status of participatory research process, researchers used the tool developed to characterize trials into four types (contractual, consultative, collaborative and collegial trials) referring to the degree of farmer participation (Biggs, 1989). Difficulties were noted in trying to draw distinct lines between the types identified because researchers' levels of understanding of what the research types meant differed greatly. Researchers noted that a single trial could include aspects of the four research types thereby making it difficult to categorize the ongoing activities. Nonetheless, collaborative trials were identified as the dominant type because researchers indicated that they go through a series of discussions and negotiations with farmers and fellow researchers in all the stages of research. This was a change from predominately contractual approach in which the design of research activities took place at the research stations with minimal consultations among researchers themselves and farmers.[3]

An analysis of the types of participatory research in AHI-Kabale revealed that typically, farmers' participation occurred in the stage of technology evaluation and dissemination. Eight different stages were distinguished within AHI's participatory agroecosystem management (PAM) approach: diagnostic, solutions identification,

[3] The planning process for research activities being funded by AHI includes: constraints are prioritized by the communities in the pilot sites; researchers design research protocols to address the constraints in consultation with farmers for their ideas and suggestions; the protocols are peer reviewed by local researchers, in the national research system, and by regional AHI office and experts, adjusted for final approcal. A protocol writing checklist has been designed to help achieve a sound design with scientific merit, and guides researchers in taking account of farmer differences, systems context, ensures farmer involvement as far as needed to address the research questions.

trial planning, trial implementation, trial management, monitoring (data collection), data analysis (evaluation), and dissemination. In general, PRA exercises provided starting points to identify problems by developing problem trees with farmers, which were then used as a basis for identifying and selecting solutions and best-bet technologies that were the most likely entry points. Once the entry-points were established, PAM planning workshops were organized to develop participatory research action plans. Then scientists designed adaptive research experiments, which were established on farmers' fields, managed by farmers and evaluated to select and adapt best-bet options to disseminate to farmers. The major thrust of AHI is to promote greater participation of farmers in all the research process, moving from the consultative to more collegial type of participation. However, after 3 years there are few "official" examples of farmer-led experimentation reflected in actual practice. Researchers still lack confidence and ability as well as institutional backup to change roles.

An example of how the mode of research changed over time is that on improving potato production in Kabale Uganda. In 1995, farmers identified a disease problem in their potatoes (later identified by researchers as bacterial wilt) as a primary constraint to increased production of potatoes. As a result the farmers and markets in the neighboring urban center did not have clean potato seed for planting, and further, the disease was spreading via infected seed (mode not known at the time) threatened the area's production of this important food and cash crop. Strategic research started (supported by CIP under AHI) to identify the pathogen and to work out integrated cultural and varietal methods exacerbating its spread and related to control. After 3 years of research, some involving farmers, the researcher embarked on using a farmer research group approach – to test and work with perceptions, practices and to get feedback from farmers. He used the link between the farmers and the local extension to contact villages and self-organized farmer groups. Researchers from the national agriculture institution (NARO) were brought in to jointly develop an adaptive research program with the farmers, which included clean seed production. Eventually, various local organizations have taken up the technology and currently farmers are identifying their fields where they multiply seed. The harvest is shared among the members of the group or sold non-group members. Members of the farmer group perform all the operations of the seed production activities. They only seek assistance to researchers when they need information about markets, pest and agronomic practices or when seeking new foundation seed. The involvement of farmers has been variable, depending upon the stage and need for farmer involvement. Thus the mode of research went from consultative, to collaborative to fully being managed by farmers.

Researchers went on to evaluate the details of trial implementation and felt that they were strong in some areas such as: participatory trial implementation and providing technological options for farmers to choose from (Table 7). Some researchers felt they were strong in participatory trial implementation because they involved the target communities in designing of the research protocols. Secondly, farmers' responded by providing land and labour for conducting experiments and at the implementation stage farmers played a critical role of managing the experiments (planting, weeding, harvesting, monitoring and recording progress). These outcomes benefited both the farmers and researchers, from the researchers point of view.

Table 7. Components of participatory research and their use by the 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 design of trial	1	7	2	3
Involve farmers in implementation of trials	10	3	2	0
Involve farmers in evaluation of 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 the researchers that answered the questions. Although a total of sixteen researchers attended this workshop, not all of them provided responses

Nevertheless, they decided that generally, research activities needed strengthening in areas such as designing and farmer evaluation trials, adaptation of participatory research tools in general, and in the analysis of the outcomes beyond technological adoption and economic profitability. Referring to the table below, the zeros against the components that researchers 'never used' also present other possible areas that require capacity building in participatory research activities.

During the plenary sessions that reflected on the above table, a lot of learning took place. One researcher defined and elaborated experiences on the differences between community resource flow mapping and nutrient flows. A consensus was reached that, community resource flow mapping meant the assessment of resources that move in and out of the defined community boundary, while, nutrient flows referred to the movement of nutrient in and out of a household, farm or plot. The researcher whose disciplinary background was in livestock production was resourceful in explaining what participatory mapping and analysis tools were to the rest of the group. This was contrary to the notion that this knowledge was a reserve for sociologists alone. The foregoing example showed to the participants a case of a livestock scientist learning from social sciences, and therefore had gained skills through interactions.

- Researchers would like to learn more about the following aspects of participatory research.
- How to work with farmer groups in a micro-watersheds.
- How to involve farmers in evaluation of trials especially in documenting and understanding integration of farmers' and researchers' performance assessment criteria.
- How to experiment with farmers as partners
- How to use participatory tools for improving the design of experiments
- What types of participatory research (when, where and why to apply them) are more effective for what conditions
- How to help farmers to monitor and evaluate experiments on their own.
- How to document socio-cultural dimensions of research outcomes
- How to facilitate participatory evaluation of technologies, data collection and analysis with farmers.

POTENCY OF PARTICIPATORY RESEARCH PROCESS

Researchers involved in the outcome monitoring have pointed out several key lessons and benefits of participatory research when doing their analyses. On the positive side, participatory research:

- Facilitates the dissemination of technologies being introduced. An example from Lushoto was where coffee experiments were adjusted to fit into the farmers planting practices without disrupting the planting pattern used by farmers. In an experiment on monocropped maize the intercropping patterns used by farmers were accommodated, that is, intercropping maize with pigeon peas.

- Enhances interactions among researchers of different disciplines, and between researchers and farmers by facilitating joint learning, sharing of results and improving feedback and feed-forward to research programs.

- Accommodates various types of experiments and builds confidence among researchers, extension, and farmers. Farmers are consulted and involved in decision making in the research process in determining the research agenda Farmers prioritized activities and decided on the community leaders that would be involved.

- Ensures that farmer's indigenous technical knowledge is more likely to be respected and integrated into the research process. An example was the use of *tughutu* in the soil fertility experiments in Lushoto Tanzania.

CHALLENGES OF PARTICIPATORY RESEARCH

The facilitator led the researchers in discussing some of the challenges in trying to implement participatory research posed under research's current operating system. One of the difficulties is potential disruption in trial

implementation if there is *untimely release of funds* or if *researchers get engaged in other research activities* and meetings. There were several cases in point. Currently the participatory research process is still relying heavily on researchers, however, if farmers were more self-reliant, this "dependency" and the negative results would not occur. Delays in funds can also damage the farmers' confidence in researchers.

Dealing with *farmer expectations and dependencies* created by past organizations or policies[4] is a big challenge. Although researchers explain to farmer research groups that the support they are getting from the research institutions is not elastic, nor long-lived, many farmers often expect larger amounts of free handouts as the relationship unfolds. Researchers have to constantly push for self-sufficiency to avoid dependency.

The team noted that nearly all of their trials were conducted in a collaborative mode, and that they needed to learn more about how to manage other modes, such as collegial trials, and include them in their research program. The regional and site coordinators of AHI have noted that *developing new roles and skills* requires more than a one-off training, but a consistent mentoring. It also requires stronger institutional support so that in the NARI research protocol reviews, farmer-led research is accepted.

Participatory research requires researchers to *accommodate different types of participants* including researchers from different disciplines, who may have different ideas, methods, and professional biases. For example, the biophysical scientists must and are learning to accommodate the views of agricultural economists, and likewise, the agricultural economists are learning about the other aspects (such as agronomy, pests and diseases management) from the biological scientists. It took time to work in a team mode, which requires more open sharing of information and methods – previously, never shared. It was humbling to the researchers because they get more input and personal critique from colleagues. Trust had to be built over time.

Participatory research requires *good communicate skills and time* allocated to interact with farmers. Researchers had 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 to find out how the farmers really feel. Communication skills are acquired over time, and some scientists never feel comfortable in this mode.

Time and resource management become more important when coordinating team work to conduct participatory research. Many researchers found *logistics* the biggest challenge, given busy schedules and felt that participatory research is expensive, especially in time and transportation, although the exact costing was not calculated. Perhaps, once trust and understanding is established between researchers and farmers, farmer led experimentation could be used more frequently along with village based facilitators, then activities would be less dependent on visits from researchers.

Although researchers know in theory that there are *different target groups* of farmers (by gender, wealth, etc) the participatory research approach has brought them in actual contact with farmers having different resources, preferences and circumstances. This has posed a challenge to them, and is resulting in changed R&D agendas. For example, Ethiopian scientists are working on soil fertility practices for livestock and non-livestock owners.

OUTCOMES OF USING PARTICIPATORY RESEARCH

The major outcomes expected from using participatory research are related to behavioural change, resulting benefits and finally impact. The outcome monitoring process has been used to assist researchers in action learning in the seven strategic areas:

1. First-hand appreciation of the diversity of farmer problems

Four out of twelve researchers in Western Kenya said they had greater appreciation of farmers' problems, and as a result adjusted their research programs 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

[4] There are some GOs and NGOs that provide inputs to the farmers free of charge over along time periods. This creates high expectations and dependency of farmers.

varieties, but farmers had strong preference for varieties that ratooned as a labour saving strategy, particularly in female headed or HIV affected households. Breeders' selection criterion has been adjusted for this client group.

2. Incorporation of farmers' criteria into technology design and technology evaluation

An experiment on grain legumes provided farmers with three bean root rot resistant bean varieties to compare with local varieties. The researcher leading the experiment realized while attending farmer group meeting discussions that farmer's judged bean varieties using a number of weighted criteria in addition to resistance, such as early maturity, seed colour, size and taste. End of season meetings that involve more than the trial farmers are now used routinely to collect feedback which is used by researchers.

3. Multi-disciplinary teams increase appreciation of socio-economic factors by biophysical scientists

In an experiment that was promoting high yielding bean varieties, researchers included data collection on the effect on household labour sharing, post harvest processing, utilization and marketing in addition to measuring the usual yield variable. The additional variables were added by the biophysical scientists due to appreciation gained by working with an economist.

4. Identification and use of ITK and appreciation for farmer innovation adds value

An experiment on farmyard manure (FYM) combined with Minjingu Phosphate Rock (MPR) changed significantly from the original researcher derived trial plan because farmers in Lushoto did not have enough FYM. Through discussion with farmers, the trial was modified to use 'tughutu' (a local shrub that farmers have been using to enhance their soil fertility) instead of FYM. Subsequently, researchers and farmers are testing a wider range of uses of 'tughutu' in mulching, compost making, etc.

5. Expanding the integrated application of technologies through farmers adaptation and use of system improvement principles

In Areka farmers have been provided with several soil improving legumes and have learned about nutrient cycling through their interaction with researchers. Farmers became aware of higher levels of nutrient concentration on their enset fields (an indigenous food security crop) with depleted levels in outfields. As a result, farmers have started to move some of the enset to their outfields (a new practice) combined with the soil improving legumes as a strategy to enhance fertility and improve nutrient cycling. They hope to reduce the levels of inorganic fertilizer use and save money. This innovation came about through farmers own initiative (Amede et al, 2000).

6. Generation of win-win technologies (those that improve food, feed, income and environment) using farmer-led experimentation

In Areka, sweet potato is a major food source planted year round as a sole or intercrop under maize, and is damaged by sweet potato butterfly. Controlling the pest is one strategy for increasing household food security. By planting sticky vines of desmodium around sweet potato fields, farmers reduced pest incidence. They have also used desmodium as a protein source for dairy cows (together with carbohydrate-rich elephant grass) and improved soil fertility, as it is a nitrogen fixing legume. This technology has become very popular among the communities (Amede et al, 2000).

7. Collaborative activities and synergies between farmers, development partners and researchers have improved chances for change

CBOs and farmer organizations collaborating partners provide structures that facilitate smooth entry into the community and spreading of the ideas and technologies being developed. For example, activities in Madagascar were linked to local organizations focused on improving water management. AHI supported the

construction of microdams[5] which in turn increased interest in working with researchers on soil fertility improving technologies after the farmers were able to see the benefits of sustainable harvesting water on their rice fields.

In summary, researchers have analyzed the effects of participatory research on themselves, on their research programs and on farmers highlighting the impact of the increased interactions with their colleagues and farmers. They all indicated that they had improved their skills in managing the interactions in the various stages of research (diagnosis, planning, M&E and evaluation) In addition, researchers were enlightened about each other's disciplines which was reflected in the design of the activities they were involved in and felt that "team work", although initially difficult, was paying off. Some examples from the two sites in Ethiopia are shared in Table 8 below.

Table 8. Comparative assessment of interdisciplinarity when conducting participatory research in Areka and Ginchi, Ethiopia

Site	Effects on scientists	Effects on the research program	Interactions with colleagues	Interactions with farmers
AREKA	Enhance problem solving capacity at farm level	Embrace interdisciplinary and commodity research	Increased interactions	Understanding of farmers problems and opportunities
	Learning from other disciplines	Complementarity of disciplines	Increase communication	Learn about farmers ITK
	More workload	Research work more open to comments	-	-
GINCHI	Researchers appreciate contributions of others	Improved the quality (content and methods) of research	Better understanding & communication	Understand farmers problems
	Researchers develop better skills of working as a team	Improved acceptance of results	Flexibility	Know more about ITK
	Time constraints	Improves communication	Understanding of production constraints	Learning from one another
	Help avoid disciplinary bias	-	-	-

Another outcome, from the perspective of the farmers and their involvement in the research process, is considerable evolution of the process that increases their involvement in the research, including the evolution of farmer group structures that potentially increase their visibility in making demands upon researchers. Some farmer groups have chosen or sought volunteers from the community that experiment on a new idea from which the others can benefit. The group structure provides a forum for discussion and accountability of the experimenting farmer to the others. Although farmers have typically been involved in planning in all AHI sites, the process has evolved from a consultative one to where the generation of research protocol starts with community diagnosis meeting or an end of season evaluation where the experiences and lessons learned are amalgamated, discussed and are used as a basis for planning activities for the next season. Now in some sites such as Antsirabe Madagascar, farmer group representatives present their needs at the site committee level (which involves the 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.

Researcher and farmer roles in the research process as well as institutional relationships, in terms of who contributes or specializes in what, is under dynamic change in the East and Central African region.[5] During a

[5] Support provided cost-sharing, design advice and facilitation of local organization.

number of AHI site and regional workshops members discussed allocation of specific roles of IARC, regional and national scientists. In addition, there is ongoing debate as to what roles farmers and researchers have to play in what types of research and what the "intellectual" division of labor actually is between scientists and farmers.

Discussion

LESSONS LEARNT IN THE APPLICATION OF OUTCOME MONITORING

The following lessons have been consolidated through the application of the outcome monitoring tool in AHI benchmark sites:

- Researchers had always focused on biophysical aspects of the research process, but due to emphasis on the need to reflect on how the research process is affecting them, their research programs and interactions with colleagues and farmers has now been recognized as important aspects.
- Workshop series and periodic performance review meetings have given the team members an opportunity to openly discuss the challenges in adapting the outcome monitoring tools, the participatory research process, modifications, and areas that require further capacity building and institutional support.
- When facilitated, researchers could highlight lessons learned but had difficulty in changing documentation and reporting habits. Some confessed that they did not think it was important to report on the qualitative changes that are not tangible and quantifiable.
- Organizational constraints that limited the use participatory research approaches such as logistics, availability of collaborators, and expectations from the national programs were difficult to overcome given the current organization of research.
- Identifying the specific areas to be monitored during site planning meetings ensured commitment.
- This approach to monitoring helped to demystifying the negative connotation given to monitoring as a component that serves a policing function and promoted dialogue that furthered fine-tuning and integration.
- The group approach used provided an opportunity for joint learning and sharing among the different researchers and target communities. Those researchers lagging behind could learn from those that are pacesetters.
- Concept definition is important to create confidence among the team members and ensures everyone is on the same wavelength.
- Implementation has to be flexible and needs to allow for adjustments and modifications.

REGIONAL SYNTHESIS AND SCALING UP

AHI, as a regional program, seeks to use the benchmark site activities, experiences, outcomes as learning experiences. From a regional perspective, the sites are considered as "case studies", and the information generated is meant to be synthesized and shared across sites and with others using regional fora and the work of the regional research fellows to do so. The synthesis stage has not yet taken place for the outcome monitoring given the need for some lead-time to gain experience and allow for evolution and development.

Generally AHI's scaling up strategy is to expand the use of methods and approaches, including the outcome monitoring tools, through the institutions that are direct collaborators (currently around 16), through many local organizations, and to more distant practitioners. In addition, AHI hopes to move from the three strategic areas and the one stakeholder group (now researchers) started in a pilot mode, and expand to other areas and groups. Systematic documentation, analysis, synthesis and sharing of methods, approaches and processes will be key outputs of Phase 3 of AHI starting in 2002. Thus, the preliminary experiences on outcome monitoring presented here will be expanded upon in future.

[5] The contributions of research and extension organizations, division of labour between NARIs and IARCs and between IARCs, and relationships to farmers, the private and NGOs have undergone recent scrutiny in numerous strategic planning workshops held by the CGIAR, SPAAR, among others.

In addition to cross-site analysis and sharing, a practical guide is being developed and will be piloted by selected sites in 2001 so that its usefulness and modifications will be suggested in the regional synthesis forum planned for 2002. In terms of regional scaling up, it is hoped that participating partners can spread the use of this sort of monitoring tool as well as other approaches to other projects, partners and areas; ASARECA's (the Association for Strengthening Agricultural Research in East and Central Africa) 19 regional commodity networks[1] and IARCS working in the ecoregion can disseminate outcome monitoring methods as a means to promote the three strategic areas to other countries where AHI does not operate, but who have expressed an interest.

To ensure continuity and accountability in implementing the outcome monitoring, the site teams each have 'champions' or focal persons, usually the team's economist in charge of impact assessment, that ensure follow up. The teams also allocate time in the quarterly meetings to discuss the progress of integrating monitoring and evaluation and participatory research approaches. Reporting formats have been modified so that the site coordinators report on the three areas of learning in addition to their other issues. These mechanisms are meant to assist the teams in self-evaluation and installation of a "learning" culture. The site progress reports are collated at the regional level and form basis for discussion at the regional steering committee and technical support group meetings.[2]

Once researchers are confident in using the outcome monitoring and conducting self-assessment sessions, the next step would be to expand facilitate self-assessment sessions with farmers, NGOs and CBOs. This will help the team gather information about how the different stakeholders are reacting to the on-going research activities and will provide information to farmers and groups on how they are progressing. The information collected assists in making decisions on the directions and areas that need future work and capacity building.

FURTHER INSTITUTIONALIZATION

Ultimately, it is the intention that the use of participatory research methods currently implemented by individual researchers in a pilot mode should be incorporated and supported more broadly by their institutions. Outcome monitoring, concentrating on the changes of behaviour leading to beneficial change and impact, has contributed towards instituting a "learning and change" culture among the research teams involved in the pilot study. This methodology, along with participatory research in general, has not been widely used by AHI's research organizations in the past. However, M&E for the purpose of monitoring whether an activity was completed or not, and the use of logframes which provide logical relationships between goals, purpose, and outputs are not new to these organizations. Nevertheless, there is a upsurge in thinking that researchers and their organizations must take a longer view geared to increasing impact and in so doing, take stock of the approaches they are using. . Ashley and Hussein (2000) contend that to improve impact of development and poverty reduction projects, assessments must take a longer-term view looking at both intended and unintended consequences of the activities across a variety of livelihood concerns. Institutionalization cannot be separated from issues of organizational change. Many of the research organizations are currently bogged down with various challenges, notably:

- Organizational culture (such as resistance to new ideas and limited emphasis on cultivating a learning culture)
- Lack of incentives and rewards for the personnel
- Limited skills and competencies among the staff
- Limited focus on the processes and approaches
- Limited resources are committed to documenting and analyzing methods. Carney (1996) observed that for institutionalization changes to occur, the challenges that impede transition process have to be

[1] Currently the ASARECA regional networks cover various cereals, various legumes, various roots and tubers, livestock, policy, information links, soil and water, trees, genetic resources, post harvest .

[2] These two committees at the high level that looks at the overall focus and technical direction of AHI. They draw members from the NARS and IARCs and is therefore a useful forum for information sharing and consolidation of feedback.

minimized. These challenges are indeed that some of the gig issues that AHI has to grapple with in phase three (2002-2005).

In addition, the outcome framework used 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 for adjustment. The outcome monitoring framework has the advantage of being more process-oriented, participatory and is used as a tool for critical analysis, learning and self-reflection.

As AHI has been in existence for a relatively short time, the process of monitoring research outcomes and conducting participatory research still has a ways to go; for example, there is still relatively little farmer-led experimentation. During the last 2-3 years, AHI has been emphasizing capacity building and gaining practical experience as a first step. The following list provides some examples of what has been taking place:

- Facilitate farmer's organizations to improve themselves and enhance collective action in addressing their problems and find solutions
- Train farmer research groups to manage research activities and link them with new economic opportunities, other than farming.
- Train researchers in participatory methods and facilitation skills to enable then work better with farmer groups
- Develop a checklist for writing research protocols for funding to help ensure clear involvement of farmers in the different stages of the activities.

This has been done using a mixture of:

- Regional workshops[6] with a few representatives from each site
- Site level workshops with broader groups of stakeholders including sensitization activities are carried out at all levels
- Individual farmer and farmer group meetings, training sessions and tours
- End-of-season evaluation meetings for researchers, farmers and combined
- Quarterly meetings by the site teams and partners
- Annual planning and review meetings by the site teams and at national level
- Provision of literature on participatory research to research teams
- Foster cross-site learning through regional meetings and field visits (two times per year) to exchange experiences between sites, countries and research organization representatives
- Two external reviews were conducted to encourage discussions and comments from independent experts and internal dialogue

As mentioned, various strategies are either in place, being improved or will be developed to enhance and understand institutionalization[7] of participatory research methods. Multiple tactics are required and some of these include: developing and implementing a capacity building strategy for researchers, managers and farmer organizations; improved design and installation of a monitoring, documentation and reflection system (building the elements of a learning culture); improving links and involvement of a wide range of stakeholders in planning, implementing and evaluating research, as well as in budgeting for research. This approach has been used in South America (especially in Ecuador) when participatory research was being institutionalized through inclusion of relevant stakeholders in the budget setting discussions, 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 (both among farmers and

[6] These have included such courses as: participatory techniques in diagnosis and characterization, enhancing farmer experimentation, planning, monitoring and evaluation, social analysis skills including aspects of gender and the poor, and Participatory Agroecosystem Management (PAM) workshops.

[7] Ashby and Sperling (1994) define institutionalization as the process of mainstreaming a phenomenon within a specific context. Furthermore, Sperling and Ashby (1996) stated that institutionalization means that the process or an aspect being introduced will have to be scaled up.

researchers) in encouraging skeptics to try and join in the change process. The regional nature of AHI provides unique opportunities to share experiences, synthesize lessons for wider application, and to promote learning across countries. Although iteration and 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 recognized by a number of AHI partners, and the further development methods to influence and build institutional learning cultures, both with farmer and research organizations, will become a new focal point of future AHI work.

Conclusions

Research teams recognized the benefits, problems and challenges of outcome monitoring of the strategic areas, including the participatory research approach. There were large differences in understanding of key concepts and components of participatory research; therefore, team members needed to learn more about them and gain experience in application, and it was necessary to iteratively clarify the new concepts. The workshops and interactions with the site scientists, particularly at the two initial test sites, was useful to develop and adjust practical tools for monitoring the progress made in the priority areas by the researchers according to site information needs. For example, workshop facilitators initially wanted to focus the site workshops only on outcome monitoring, but it became apparent that a conceptual framework for M&E of the participatory research process was needed because of the limited capacity for the site teams to evaluate the process of participatory research. Furthermore, researchers initially found it difficult to assess the effects of participatory research on themselves, their research programs, and their interactions with colleagues and farmers. Initially it had not occurred to them that self-reflection and assessment of progress could assist them in moving forward in developing and applying the new approaches. In addition, the potential benefits and challenges of participatory research are important to monitor so as to draw lessons on performance and guide application. Tracking the progress is also important for understanding changes in researchers' behavior, relationships, activities, and actions, but requires timely and adequate facilitation.

As mentioned, collection of feedback on the usefulness of the tools and framework in order to make subsequent modifications was extremely useful. In addition, by involving a small resource group at regional level, the site feedback could be analyzed and used to further refine the tools, etc, ensuring that they were linked to the regional framework developed in 1999. The workshops provided space for collectively assessing status of the learning areas with practical examples as well as individual assessment and documentation of experiences. Generally, scientists have tended to work within their commodity program having minimal interactions with researchers from other disciplines. Researchers also tend to specialize in their own scientific fields, tend to limit consultation with colleagues and tend to work with a few farmers. Teamwork and increase in multi-institutional contacts has started to increase consultation. However, the fact that the research team members went to the field together did not necessarily result in interdisciplinarity. Teams are being encouraged to more deeply engage 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 a joint field visits. The interrelated nature of problems in NRM calls for integration of efforts and is helping to bring people together. Researchers said that as a next step to encourage improvement is that teamwork needs to be supported by their research organizations.

Over time the interaction between farmers and researchers has definitely improved and both sides are learning from each other, with many concrete examples. Farmers and researchers feel that they are both gaining from the interactions, and they will continue working together because the benefits are noticeable. They are also promoting the ideas within their own networks.

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The AHI Working Papers Series

The AHI Working Papers Series was developed as a medium for AHI staff and partners to synthesize key research findings and lessons from innovations conducted in its benchmark site locations and institutional change work in the region. Contributions to the series include survey reports; case studies from sites; synthetic reviews of key topics and experiences; and drafts of academic papers written for international conferences and/or eventual publication in peer reviewed journals. In some cases, Working Papers have been re-produced from already published material in an effort to consolidate the work done by AHI and its partners over the years. The targets of these papers include research organizations at national and international level; development and extension organizations and practitioners with an interest in conceptual synthesis of "good practice"; and policy-makers interested in more widespread application of lessons and successes.

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