

**Participatory Research and Development
for Sustainable Agriculture and
Natural Resource Management**
A SOURCEBOOK



Volume 1

UNDERSTANDING

**Participatory Research
and Development**

Participatory Research and Development

for Sustainable Agriculture and
Natural Resource Management

A SOURCEBOOK

VOLUME 1: Understanding Participatory Research and Development

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Participatory Research and Development: A Sourcebook Overview

The Changing Agenda of Agricultural Research and Development

Agricultural research and development has traditionally focused on meeting the challenge of feeding the world's hungry population. Central to this agenda is the need to increase agricultural production through the introduction of technologies and support services for improving farm yield.

Following the successes of the Green Revolution in the 1960s and 1970s, newer challenges to agricultural research and development have emerged, such as:

- ❑ Promoting more equitable distribution of benefits resulting from dramatic improvements in agricultural production.
- ❑ Sustaining productivity gains through better management of natural resources supporting agriculture.
- ❑ Shifting the focus of research and development interventions to less favorable environments and low-input agricultural systems.
- ❑ Strengthening the capacity of local farming communities to continuously learn and experiment ways of improving their agricultural livelihoods.
- ❑ Building synergy between technological change and the socio-economic, cultural and political dimensions of agricultural innovation.

Key Themes in Post-Green Revolution Agricultural Research and Development

- ❑ Pro-poor targeting
- ❑ Conservation and sustainable use of natural resources
- ❑ Development of uplands and other less-favored areas
- ❑ Local governance, decentralization and citizens' rights
- ❑ Equity for women and other marginalized socio-economic groups
- ❑ Trade globalization and supply chains
- ❑ Migration and rural-urban dynamics
- ❑ Property rights and collective action
- ❑ Agriculture and human health
- ❑ Multi-stakeholder partnerships
- ❑ Local capacity development
- ❑ Organizational learning and change

In seeking to address these emerging challenges, the dominant transfer-of-technology paradigm has proven inadequate for managing more complex second-generation issues such as: diverse biophysical environments, multiple livelihood goals, rapid changes in local and global economies, expanded range of stakeholders over agriculture and natural resources, and drastic decline in resource investment for the formal research and development sector.

The Changing View of Research and Development

Global experiences now show that the changing agenda requires new ways of thinking about and doing research and development. Fundamental to this emerging paradigm shift is reassessing the traditional notion of research and development as a process primarily concerned with generating and transferring modern technology to passive end-users. Instead, research and development is now widely seen as a learning process that:

- ❑ Encompasses a diverse set of activities for generating, sharing, exchanging, utilizing knowledge.
- ❑ Results in a wide range of knowledge products, from technological to socio-institutional.
- ❑ Builds synergy between local capacities, resources and innovations.
- ❑ Draws upon diverse sources of knowledge, from local systems to global science.
- ❑ Provides decision-support tools and information that enable various types of users to make strategic choices and actions.
- ❑ Requires a holistic perspective of both the biophysical and social spheres in agriculture and natural resource management.

These new perspectives suggest that research and development can no longer be the exclusive domain of scientists, but rather a joint process requiring the participation of a wider range of actors, users or stakeholders. More importantly, it redefines the role of local people from being merely recipients and beneficiaries to actors who influence and provide key inputs to the process.

Participatory Research and Development (PR&D)

In reconceptualizing the research and development process, there has been a growing interest in the use of participatory approaches in the natural resource management, agriculture and rural livelihoods sectors. These have included: participatory rural appraisal, farmer participatory research, participatory technology development, participatory action research, participatory learning and action, gender and stakeholder analysis, community-based natural resource management, and sustainable livelihoods approach.

These diverse yet interrelated approaches collectively represent participatory research and development (PR&D) – as a pool of concepts, practices, norms and attitudes that enable people to enhance their knowledge for sustainable agriculture and natural resource management. Its underlying goal is to seek wider and meaningful participation of user groups in the process of investigating and seeking improvements in local situations, needs and opportunities.

PR&D has partly evolved from efforts to improve technology development and dissemination. However, field experiences show that innovations for improving agriculture and natural resource management need to address not only the technological but also the socio-cultural, political, economic dimensions such as: community structures, gender, collective action, property rights, land tenure, power relations, policy and governance.

Participatory approaches are envisioned to help agricultural R&D: 1) respond to problems, needs and opportunities identified by users; 2) identify and evaluate technology options that build on local knowledge and resources; 3) ensure that technical innovations are appropriate for local socio-economic, cultural and political contexts; and 4) promote wider sharing and use of agricultural innovations. In contrast to the linear process of technology generation-transfer-utilization in conventional approaches, PR&D encompasses a broader set of phases and activities including:

- ❑ **Assessment and diagnosis:** situation analysis, needs and opportunities assessment, problem diagnosis, documentation and characterization.
- ❑ **Experimenting with technology options:** joint agenda setting for experimentation, technology development and evaluation, integration of technology components and piloting.
- ❑ **Sustaining local innovation:** institutionalizing social and political mechanisms, facilitating multi-perspective negotiation and conflict management, community mobilization and action, local capacity development, strengthening local partnerships.
- ❑ **Dissemination and scaling up:** development of learning and extension mechanisms, information support to macro-policy development, promoting networking and horizontal linkages.
- ❑ **Managing PR&D:** project development, resource mobilization, data management, monitoring and evaluation, PR&D capacity development.

In practice, PR&D is generally distinguished by key elements such as: sensitivity to users' perspectives, linkage between scientific and local knowledge, interdisciplinary mode, multi-agency collaboration, problem- and impact-driven research and development objectives, and livelihood systems framework.

Promoting and Developing Capacity for PR&D

While there is growing interest in PR&D, it remains widely perceived as incompatible with accepted norms and practices in the mainstream research community. In the field, PR&D demands a set of knowledge, attitude and skills that go beyond the typical human and organizational capacities under top-down research and development paradigms.

In addition, the value adding potential of participatory approaches have yet to be fully explored by research and development practitioners. There remains a major

need to document empirical cases and to systematically assess impact of PR&D. Similarly, there is still limited understanding on PR&D's complementary role to more conventional research approaches, and on maintaining effective linkage with mainstream science to facilitate local innovation processes.

Nonetheless, participatory approaches are gradually gaining ground across the institutional landscape – from research and academic organizations to non-government organizations (NGOs), development agencies, and local government units. To further promote and develop capacities for PR&D, it is necessary to create more opportunities for information exchange, training and networking among the growing number of practitioners and organizations seeking to explore the value-adding potential of PR&D. Among its key challenges are:

- ❑ ***Synthesis:*** Reviewing diverse PR&D experiences to identify field-tested concepts and practices for wider sharing and adaptation.
- ❑ ***Capacity development:*** Developing PR&D capacities of field practitioners and their organizations such as through training, information services, networking and development of protocols.
- ❑ ***Establishing support mechanisms for capacity development:*** Sustaining capacity development through institutionalized, locally-driven support mechanisms.
- ❑ ***Integration:*** Creating opportunities and a supportive environment for introducing PR&D in mainstream agriculture and natural resource management programs.

The PR&D Sourcebook

The development of this sourcebook supports wider initiatives in promoting easy access to systematized information on field-tested PR&D concepts and practices among field practitioners and their organizations. It addresses the need to facilitate sharing and use of the expanding knowledge on PR&D by:

- 1) Identifying and consolidating field-tested PR&D concepts and practices relevant to managing natural resources for agriculture and rural livelihood, drawn from experiences of practitioners and organizations around the world.
- 2) Repackaging, simplifying and adapting information through the production of a sourcebook on PR&D.
- 3) Distributing and promoting the use of the sourcebook, including its derived products, particularly in developing countries where access to PR&D information resources is limited.

The primary target users of the sourcebook are field-based research practitioners in developing countries seeking to learn and apply PR&D in their respective programs and organizations. They may have technical or social science backgrounds but share a common interest in using PR&D's general knowledge base. They are involved in research activities dealing with interrelated issues in natural resource management, agriculture and rural livelihoods.

As a whole, the sourcebook is envisioned to provide general reference and comprehensive overview on PR&D. In showcasing the rich, diverse perspectives on PR&D, the sourcebook is characterized by the following salient elements:

- ❑ Emphasis on information applicable to ***research- and development-oriented activities***, complementing existing publications/materials that primarily focus on the use of participatory methods for extension, learning and community mobilization.
- ❑ Broad topical coverage of the ***research and development process***. As an introductory guide on PR&D, it provides general orientation to various phases or types of activities that are specifically covered by existing method- and/or tool-specific publications.
- ❑ Focus on the application of PR&D within the framework of ***conservation and sustainable use of natural resources***. It consists of papers that share field experiences associated with natural resources being used in agriculture and rural livelihoods and/or agriculture and rural livelihoods that consciously maintain long-term productivity of the resource base.
- ❑ An integrated ***socio-technical perspective*** that takes into account both the social/human and technological dimensions of innovation required for natural resource management, sustainable agriculture and rural livelihoods.
- ❑ ***Cross-cutting perspective*** of PR&D applications, encompassing various types of natural resources, agricultural activities and rural livelihoods; this comparative mode of presenting information complements existing publications that are specific to sub-categories of PR&D applications.
- ❑ Conscious effort to seek out papers dealing with ***lesser known projects/ organizations*** in developing countries, especially PR&D experiences that have not been (widely) published.

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User's Guide

The main purpose of this sourcebook is to inspire and guide aspiring and new practitioners of Participatory Research and Development (PR&D) to learn, reflect and constantly refine the way they work. The primary target users are field-based researchers in developing countries involved in activities dealing with the interrelated issues of natural resource management, agriculture and rural livelihoods. They may have technical or social science backgrounds but share a common interest in drawing on the PR&D knowledge base.

The sourcebook is intended to enhance access to systematized information on field-tested PR&D concepts and practices among field practitioners and their organizations. It responds to demands for wider sharing and dissemination of the expanding knowledge on PR&D by:

- 1) identifying and consolidating field-tested PR&D concepts and practices relevant to managing natural resources for agriculture and rural livelihood, drawn from experiences of practitioners and organizations around the world;
- 2) synthesizing, condensing and simplifying available information; and
- 3) promoting and improving availability of information particularly in developing countries where access to PR&D information resources is limited.

As a whole, the sourcebook is envisioned as a general reference and comprehensive overview, showcasing the rich diversity of perspectives on PR&D. The sourcebook is characterized by the following salient elements:

- ❑ Emphasis on information applicable to research and development-oriented activities, complementing existing publications that primarily focus on the use of participatory methods for extension, learning and community mobilization.
- ❑ Broad topical coverage of the research and development process. As an introductory guide to PR&D, it provides general orientation to the phases or types of activities that are specifically covered by existing method- and/or tool-specific publications.
- ❑ Focus on the application of PR&D within the framework of conservation and sustainable use of natural resources. It consists of papers on field experiences associated with natural resources use in agriculture and rural livelihoods and/or agriculture and rural livelihoods that consciously maintain long-term productivity of the resource base.

- ❑ An integrated socio-technical perspective that takes into account both the social/human and technological dimensions of innovation required for natural resource management, sustainable agriculture and rural livelihoods.
- ❑ Cross-cutting perspective of PR&D applications, encompassing various types of natural resources, agricultural activities and rural livelihoods; this comparative mode of presenting information complements existing publications that are specific to sub-categories of PR&D applications.
- ❑ A conscious effort to seek out papers dealing with lesser known projects and organizations in developing countries, especially PR&D experiences that have not been (widely) published.

Sourcebook Structure

The printed version of the sourcebook consists of three volumes and each volume has several sections. The first volume on **Understanding PR&D** is devoted to overview papers; key concepts; and emerging approaches and frameworks. The second volume on **Enabling PR&D** includes papers on capacity development; strengthening institutions and organizations; networking and partnerships; policy, governance and scaling up. The final volume on **Doing PR&D** focuses on technology development, facilitation of local institutions; and organization of communities and stakeholder groups

The following more detailed framework was used by the advisory committee for assigning papers to one of the three volumes.

| Understanding PR&D | Enabling PR&D | Doing PR&D |
|---|--|---|
| <ul style="list-style-type: none"> ❑ history/evolution of approaches ❑ description of approaches ❑ definition of concepts ❑ explanation of concepts ❑ interpretation of concepts (cases illustrating concepts) ❑ reasons for doing PR&D | <ul style="list-style-type: none"> ❑ institutionalization ❑ institutions and organizations ❑ policy support ❑ capacity development ❑ resource mobilization ❑ curriculum development ❑ partnerships and networking ❑ organizational change ❑ interdisciplinarity | <ul style="list-style-type: none"> ❑ monitoring and evaluation ❑ organizational frameworks ❑ implementing organizations ❑ case examples of PR&D processes (assessment, experimentation, innovation) ❑ experiences with PR&D methods and tools ❑ PR&D research management ❑ learning from other sectors ❑ data analysis and management |

Sourcebook Development Process

The development of the sourcebook can be divided into three phases: 1) planning, 2) drafting and 3) refinement, production and distribution.

An international advisory committee and an UPWARD-led working group were formed to oversee the development of the sourcebook. The identification of candidate papers for inclusion in the sourcebook and the commissioning of new papers from invited contributors received special attention during this first phase. To gather a diverse range of materials from a variety of institutions and individuals, announcements were sent to different journals, newsletters, websites and e-groups. Once an adequate range of draft materials was identified, a first outline for the sourcebook was developed by the UPWARD working group and reviewed by the advisory committee. The working group and advisory committee also developed guidelines for the development of the sourcebook.

The second phase focused on the development of a first draft of the paper contributions. The UPWARD working group carried out a preliminary screening and many of these materials consisted of existing papers written for different purposes and audiences. Specific suggestions on how to repackage papers were developed by the working group. This was followed by a “writeshop” where papers were repackaged to shorten and refocus them on key messages relevant to participatory research and development. Some papers were merged, and others were split into several shorter pieces. When topic gaps were identified a special effort was made to search for papers or to solicit new contributions. The writeshop involved the UPWARD working group, editors, artists and layout specialists. After the writeshop, repackaged papers were sent back to the original authors for their feedback and comments. These comments guided the production staff in the development of second drafts. At the end of this process, each member of the advisory committee was provided with a copy of the full manuscript for review.

The final phase covered the refinement, production and distribution of the sourcebook. The advisory committee met with the UPWARD working group, editors, and with representatives of collaborating and donor institutions. The structure of the sourcebook was refined, each paper was reviewed and new gaps in the compilation were identified. Each member of the advisory committee took responsibility for identifying and inviting authors to develop specific papers to fill the gaps. These new submissions were forwarded to the UPWARD working group for repackaging and finalization. Out of the 155 paper contributions screened, 79 papers are included in this final compilation. A camera-ready copy of the sourcebook was prepared for final printing.

It is important to note that each article in the sourcebook is designed to stand on its own and can be read and used independently. The publishers and authors of individual papers encourage readers to quote, reproduce, disseminate and translate materials from this sourcebook for their own use. Due acknowledgement, with full reference to the article’s authors and the sourcebook publishers, is requested. The publishers would appreciate receiving a copy of these materials.

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Volume 1

UNDERSTANDING Participatory Research and Development



Volume Overview

Participatory research and development (PR&D) can be framed as “doing research and development work **with** people” instead of “doing research and development work **for** people”.

If it is as simple as that, why then are we devoting an entire volume to overview, concept, approach and framework papers? As the papers in this volume point out, participatory approaches to research and development go beyond the traditional understanding of research and development in several key ways. Traditionally, research, extension and adoption of innovations have been understood as a pipeline, where researchers develop innovations, extension workers spread them and farmers adopt or reject them. This mental model of innovation is limited for a number of reasons and many of its limitations are highlighted in different papers of this volume.

Participatory approaches, on the other hand, conceptualize farmers and their livelihoods at the center of the innovation process. Farmers have always developed and/or adapted innovations and new innovations need to be rooted in farmers’ natural, social and cultural reality in order to be useful. If research, advisory services and other organizations are to make a useful contribution to this innovation process, they need to relate much better to farmers’ reality than they have in the past. This requires some fundamental changes in the way these organizations and their staff understand their roles and responsibilities, and implies a whole range of conceptual consequences, structural adjustments and organizational changes. To really do research **with** farmers, it is not enough to learn and apply a few “participatory methods” in the field or to ask farmers for their opinions about a new technology. Unfortunately, most research organizations have been slow to tackle the more fundamental challenges like changing their concepts of what constitutes valid knowledge and how fruitful interaction between local and scientific knowledge systems can be framed.

These and other conceptual issues are discussed in the papers of this first volume. You will find that the papers we have selected do not all reach the same conclusions. Different perceptions of PR&D exist and we offer them to you so that you can draw your own conclusions and decide for yourself which understanding is most useful for your work.

The papers of this volume, **Understanding Participatory Research and Development**, are organized in four sections:

- Typologies and Concepts
- Approaches
- Participatory Technology Development
- Participatory Natural Resource Management

We hope you will find our selection thought-provoking and helpful for further developing your own understanding of participatory research and development.

Typologies and Concepts



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Definitions, Assumptions, Characteristics and Types of Farmer Participatory Research



Farmer participatory research is...

- ❑ a method in which the major emphasis is on production research, planned and carried out by and with the farmers on their own fields (Harwood, 1979).
- ❑ a systematic approach of evolving or adapting technology among the people of a community (Tan, 1985).
- ❑ a process where "the farmer acts as a subject who investigates, measures, and studies in collaboration with researchers" (Ashby *et al.*, 1987).
- ❑ a practical process for bringing together the knowledge and research capacities of the local farming communities with that of the commercial and scientific institutions in an interactive way (Haverkort *et al.*, 1988).

The term was coined by Farrington and Martin in 1987 but the approach has also been called farmer-back-to-farmer research, farmer-first-and-last research, and participatory technology development by different proponents of the approach.

Adapted from:
Selener, D. 1997. Participatory Action Research and Social Change. The Cornell Participatory Action Research Network. Cornell University, Ithaca, NY, USA.

The focus of farmer participatory research is the development of agricultural technology to increase productivity. This centers on the identification, development or adaptation, and use of technologies specifically tailored to meet the needs of small, resource-poor farmers.

A basic tenet of this approach is that agricultural technology must emerge from the farmers' needs as they identify them. Farmers conduct experiments and evaluate the appropriateness of a technology on the basis of their own criteria.

Origins of Farmer Participatory Research

Farmer participatory research emerged as a response to the generation of inappropriate technologies by scientists at research stations whose work was based on the transfer-of-technology model. Those working in this field began to develop a series of new research approaches that would result in technologies that would be beneficial to, and therefore adopted by, small farmers.

The transfer-of-technology model was predominant in the 1950s and 1960s. The fact that small farmers did not adopt the technology packages developed at research stations led researchers to conclude that farmers were backward or ignorant, and that the key to success lay in creating a better extension service. Thus, the Training and Visit System (T&V) of Agricultural Extension was widely implemented.

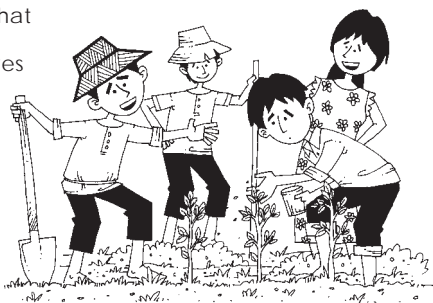
In the 1970s and early 1980s, non-adoption, still a problem, was attributed to constraints occurring at the farm level. Farming Systems Research arose as a response, emphasizing research at the farm level to diminish constraints to the adoption of new technologies.

Finally, in the 1990s, some researchers came to believe that the problem was not the farmers, but the inappropriate technologies they were being encouraged to adopt. This marked the emergence and gradual evolution of farmer participatory research, an approach aimed at creating appropriate technology for small farmers (Chambers *et al.*, 1989).

The Emergence of Farmer Participatory Research

For technical, environmental, political, social and economic reasons, the agricultural sciences have had little to offer small, resource-poor farmers. Farmer participatory research has emerged in response to this situation as a viable solution to the problem of developing appropriate technology.

Farmer participatory researchers view the lack of interaction between researchers and farmers as one of the principal weaknesses in the methods earlier developed. To correct this deficiency, proponents of this approach propose to work in collaboration with farmers to identify their most urgent agricultural problems and to develop appropriate technologies at the farm level. As a result, researchers learn about an array of interrelated matters at the farm level that need to be considered in the development or adaptation of technologies. This process involves tapping into the farmers' own agricultural knowledge. In the process, researchers come to appreciate and respect small farmers. The challenge for development workers, researchers, and farmers is to design and use research methodologies that ensure the development and adoption of improved agricultural technologies to create sustainable agricultural production that will benefit the resource-poor farmer.



Main Components and Characteristics of Farmer Participatory Research

1. The main goal of farmer participatory research is to develop appropriate agricultural technology to meet the production needs of the small, resource-poor farmers.

- ❑ It is the reverse of the transfer of technology paradigm.
- ❑ It involves small, resource-poor farmers to generate or adapt appropriate technology on-farm.
- ❑ It includes farmers in the decision-making process. It wants to find out which aspect of an agriculture practice or technology the farmer would like to work on to improve.



2. Farmers participate actively in the entire farmer participatory research process.

- ❑ Farmers become the researchers, experimenters and evaluators in this process. They actively participate in the identification of problems, needs, opportunities and priorities, in the design and implementation of experiments, and in the evaluation of results to ensure that the research will focus on their needs.
- ❑ Indigenous knowledge and the capacity for experimentation facilitate the generation of technology. Farmers' knowledge of their own farming systems, including climate and soils, and the social, institutional and economic environment, is vital to the development of appropriate technologies.

The criterion of excellence is not the rigor of an on-station or in-laboratory research, or yields in research station or resource-rich farmer conditions, but the more rigorous test of whether new practices spread among the resource-poor.

Chambers and Ghildyal, 1985

- ❑ Both farmers' and researchers' knowledge are crucial in coming up with technologies that fit local environment and circumstances.

3. Research is conducted in farmers' fields.

- ❑ The research is conducted on-farm as this is where production occurs and farmers make their major production decisions.
- ❑ Technologies developed in real conditions reflect the objectives and criteria of farmers based on their access to resources and inputs, agronomic constraints, marketing possibilities and so on. Appropriate technology is more likely to be developed.

- ❑ Since farmer participatory research is location-specific, research must be conducted on farms representative of those in other areas so the technology developed can be more broadly disseminated.

4. The scientist is an investigator, colleague and advisor.

- ❑ Scientists learn and work with farmers, facilitating and providing support. Together they set the research agenda, and experiment with and evaluate technologies.
- ❑ The scientist is a colleague and advisor who brings new ideas and/or unknown technologies to the community. He or she can also facilitate analysis of the farming system to identify potential areas for improvement and support the informal agricultural research of farmers.



5. Farmer participatory research is based on a systems perspective.

- ❑ A farm is a system composed of interacting subsystems that include land, labor, capital, crop and animal production, off-farm income, social and economic components, physical and biological components, etc.
- ❑ Farmer participatory researchers emphasize the importance of understanding the entire system. The research effort focuses on solving an agricultural technology problem in order to benefit the farm as a whole.
- ❑ Farmer participatory research promotes gradual, adaptive changes in the farming system rather than the abrupt transformation of the system.

The complexity of farms as systems is due to:

- ❑ direct physical interactions between production activities generated by intercropping and crop rotation practices
- ❑ competition and complementarity in resource use between different production activities
- ❑ the multiple objective function of the farm household

These interactions, from both biological and socio-economic sources, underlie the need for a farming systems perspective and a multi-disciplinary approach in research on improved technology.

Byerlee *et al.*, 1982

6. Farmer participatory research requires interdisciplinary collaboration between researchers and farmers.

- ❑ Interdisciplinary analysis of the farming system is imperative for successful farmer participatory research. This involves collaboration between farmers and agricultural and social scientists. The research agenda must be established and the entire process focused on farmers' real needs. Dialogue between scientists and farmers is essential.



- ❑ Interaction between farmers and scientists can be contractual, consultative, collaborative or collegial. Ideally, this is a relationship between legitimate colleagues and partners working as equals.
- ❑ Direct interaction between researchers and farmers increases the researchers' understanding of the farmers' decision-making criteria and of the conditions in which they work. Researchers have to make sure that solutions emerge from a holistic analysis by farmers and researchers together.

7. Farmer participatory research promotes innovative methodologies and flexibility.

- ❑ Proponents of farmer participatory research encourage the use of different innovative methods. Creative methodologies are necessary in developing appropriate technologies for resource-poor farmers working under very different conditions.
- ❑ Participatory research promotes low cost technologies and a minimum of external inputs by using locally-available resources and strengthening the farmer's experimental capacity. These features aim at sustainable and environmentally-sound development.
- ❑ Because this approach is broad, flexible and adaptive, scientists and farmers must be in continuous contact to agree on research procedures, monitor trials and respond to unexpected changes along the way. Because initial assumptions, hypotheses, needs and local conditions may change over time, flexibility facilitates adaptation to new circumstances.

Underlying Assumptions of Farmer Participatory Research

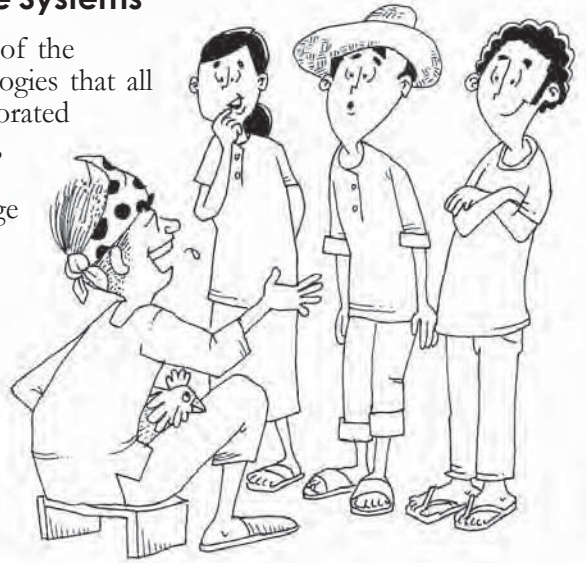
One of the principal tenets underlying farmer participatory research is that farmers act rationally in using resources available to achieve their production needs. Farmers manage a complex set of biological processes which transform these resources into useful products, either for home consumption or for sale.

Decisions about crop and livestock production, and the methods and timing of cultivation, husbandry and harvesting are determined not only by physical and biological constraints but also by economic, socio-political, infrastructural and policy factors that make up the larger milieu within which farmers operate.

In undertaking a farmer participatory research project, researchers assume that farmers: possess indigenous knowledge of their farming systems and their environment and have a capacity for experimentation that must be used and strengthened for technology development.

Farmers' Indigenous Knowledge Systems

Indigenous knowledge systems consist of the "theories, beliefs, practices, and technologies that all peoples in all times and places have elaborated without direct inputs from the modern, formal, scientific establishment" (McCorkle, 1989). Indigenous knowledge has been regarded as "backward and irrational" by researchers who rely on science-based knowledge. However, the fact that scientists are unaware of the scientific value, principle, or explanation for a practice does not mean the said practices or knowledge do not work well for farmers nor that they lack a scientific basis. It just might be that no one has conducted a research on traditional farming practices.



According to Howes and Chambers (1979), this is due, at least in part, to the dependence of officials and experts on scientific knowledge to legitimize their superior status, and in the process, pull down indigenous technical knowledge. Scientists often do not allow farmers to participate in the generation of new technical knowledge and agricultural practices. Thus, the task of scientists involved in farmer participatory research is to engage farmers in research so that the latter will gain confidence and knowledge.

Indigenous knowledge systems are concrete, practical, utilitarian, broad, detailed, comprehensive, and usually sustainable. They are based on empirical observation, trial and error, and controlled experimentation over centuries. Years of experience have led to the development of sustainable farming practices involving a minimum of risk. Indigenous knowledge systems do not focus exclusively on farming practices. In addition to agricultural knowledge, the adaptations farmers have evolved lead to knowledge about health, education, housing, community organization, management of local resources, etc.

Farmers' Capacity for Experimentation

- ❑ Farmers' capacity for research and experimentation is generally not acknowledged by agricultural researchers and society at large. However, with the growing recognition of the value and usefulness of indigenous knowledge systems, scientists are increasingly aware of farmers' capacity for experimentation resulting in the evolution and adaptation of indigenous knowledge systems to production needs.
- ❑ For 10,000 years, farmers have been experimenting to develop their farming systems which has had an evolutionary impact on plants, animals and the land. Aside from experiments to increase production, they also looked into processing and storage as well. Here, the farmer is "an active actor in the process: selecting, consciously observing, and manipulating and experimenting with plants, animals, tools, and the environment to improve production output" (Rhoades, 1987).
- ❑ Farmers experiment in order to adjust to changing circumstances. This experimentation has led to the development of productive and sustainable farming systems well suited to their needs, environment, and resources. Examples: domestication of wild species; and selection/breeding for desirable qualities of a species.
- ❑ Major breakthroughs in technology generated by scientists in experimental stations have been based on experiments conducted by farmers. Examples: invention of diffuse light storage in Peru; introduction of paddy rice production in the Amazon basin; rice production in Bangladesh and wheat in Mexico; and farmers' successful adaptations of high-yield varieties of wheat in India and Bangladesh in the 1960s and 1970s.
- ❑ The emphasis on improving farmers' inherent capacity for experimentation is an important element in the sustainability of agricultural development programs. When an organization withdraws from a region, farmers continue to conduct experiments and share information with members of farmers' groups and organizations.
- ❑ Rural communities throughout the world are more than just "passive recipients of technology that is transferred to them from Western countries or formal research and development programs" as shown by the examples given.
- ❑ The three interrelated types of information generated by farmers' informal research are: technical and organizational innovations that use scarce resources efficiently; signposts for new research that scientists in formal research and development systems might start to work on; and methods for conducting cost-effective research and classifying knowledge, with the farmer as principal researcher.

Other Benefits Resulting from Participation by Farmers in the Process of Technology Development

- ❑ improved understanding by scientists of the needs of small farmers, leading to better identification of problems appropriate for adaptive, on-farm research
- ❑ improved feedback on farmers' needs and objectives to guide applied research in research stations
- ❑ accelerated transfer and adoption of improved technology by small farmers
- ❑ efficient, cost-effective use of scarce resources in on-farm research through better linkages among farmers, researchers and extensionists
- ❑ development of organizational models, professional skills and values appropriate for demand-driven, problem-oriented technology design

Main Types of Farmer Participatory Research

Research conducted on farms can be classified according to the level of control and management exercised by farmers and researchers. This classification includes four categories (Figure 1).

- ❑ researcher-managed on-farm trials
- ❑ consultative researcher-managed on-farm trials
- ❑ collaborative farmer-researcher participatory research
- ❑ farmer managed participatory research

The first two types are not examples of farmer participatory research, but simply conventional on-farm research. The last two types are forms of farmer participatory research and, as such, reflect the characteristics and are based on the assumptions presented earlier in this paper. Between these poles, there exists a range of possibilities, combining farmer and researcher participating in the control and management of the research process. The four approaches are presented below to differentiate non-participatory on-farm trials (1 and 2) from genuine farmer participatory research (3 and 4).

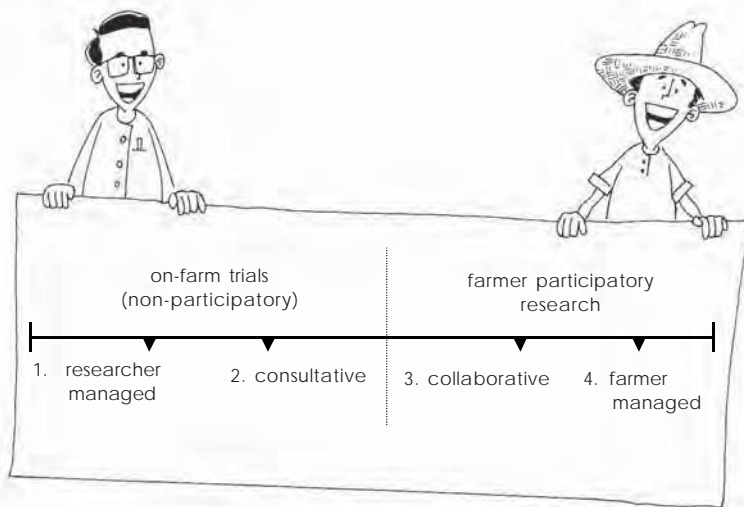


Figure 1. Types of On-farm Research

Researcher-Managed On-Farm Trials

Researchers work in farmers' fields to develop technology for farmers or to test and validate research findings obtained in the research station. They generally design, implement and evaluate the technology in the farmers' fields, or they define the research agenda and design trials which farmers are allowed to implement under their supervision. The experimental designs used in this approach are similar to those used in research stations. The relationship between the researcher and farmer is hierarchical. Researchers are the main decision-makers, setting the research agenda and designing and implementing trials. Researchers identify the problem upon which research is based.

Participation by farmers in conventional on-farm trials is minimal. Occasionally, scientists may also allow farmers to comment on the outcomes of experiments. The farmers often rent their land to researchers conducting experiments, or are paid for their labor. But farmers do not define the research agenda or participate in decision-making. Because scientists bring technology from the experimental station to the farm for testing and validation, farmers are not involved in technology generation. Ultimately, they become the passive recipients of researchers' recommendations.

Consultative Researcher-Managed On-Farm Trials

Farmers are consulted by researchers about their needs, problems, goals and preferences. They are also asked about their agricultural practices and knowledge of the local environment, resource availability, and so on. Researchers may also ask farmers for feedback on their perceptions of the new technology under study.

Although farmers may be consulted at the beginning of the research process, such consultation is aimed primarily at assisting researchers in interpreting farmers' circumstances, problems, or needs, and to arrive at experimental designs for trials which often will not include farmer participation in the initial stages of on-farm testing (Ashby, 1987). Technologies are developed for farmers based on the researchers' understanding of their farming systems.

Some researchers may allow farmers limited participation in the testing, validation and evaluation of the new technology developed at the experimental station. Experiments are conducted to answer the researcher's scientific concerns as related to farm-level conditions. Trials are designed to acquire accurate information about the response of technologies in the farmer's fields, but do not incorporate the farmer's criteria on testing or evaluation. This type of on-farm trial is the last step of research conducted at the experimental station.

Compared to the conventional on-farm trial conducted solely by scientists, this approach involves more interaction between researchers and farmers. However, researchers continue to control the research process and develop technology. The farmer's minimal involvement does not include decisions regarding the research agenda, trial implementation, or evaluation criteria. Because of this, the research is consistent with the transfer-of-technology model, and therefore likely to result in agricultural practices and technologies that fail to meet farmers' needs.

Collaborative Farmer-Researcher Participatory Research

Farmers and researchers work together in this approach on problem definition, design, management and implementation of trials, and evaluation. In the early phases of the process, scientists and farmers discuss potential areas for collaborative research and choose decision-making and evaluation criteria. By combining informal research by farmers with formal on-farm testing procedures, indigenous knowledge and science-based knowledge are mixed to meet farmers' needs. Ideally, a collaborative relationship means balanced participation in and control over the research process in order to achieve the objectives of both farmers and scientists.

Farmer-Managed Participatory Research

Farmers are the main actors and decision-makers in this approach, developing technology through a process that includes problem definition, trial design, the implementation of experiments, and the evaluation of results.

In the diagnostic phase, farmers identify the problems and needs they want to address. In the planning and design phase, they choose the most important problem, identify potential solutions, design prototype technology, and decide how to test it. In the experimentation phase, they test and evaluate the technology. Finally, in the adaptation and validation phase, farmers further test the technology developed prior to dissemination (Ashby, 1991).

The experimental capacity and indigenous knowledge of farmers are used to the maximum in this approach. The scientist's role is to assure that the community's local experimental capacity is fully utilized and to link farmers to information and resources for which the community has expressed a need but which are unavailable at the local level.

Conclusion

Experimentation by farmers cannot entirely replace conventional scientific research and conventional scientific research cannot replace farmers' on-farm research. There is a need for an approach that favors a "symbiotic relationship" between the two. The result is the incorporation of the most important and valuable aspects of each into a new system which will both benefit the small resource-poor farmer and contribute to the scientific knowledge base.

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Prototypical Approaches to Innovation Development



A review of literature on innovation development in the context of natural resource management shows that different approaches may be used in coming up with a framework to analyze participatory approaches. Three prototypical approaches are discussed in this paper. In practice, however, precise boundaries cannot be drawn among them. They constitute prototypes or umbrella terms on a continuum rather than clear-cut procedures. These are the following:

- Transfer of technology
- Farmer first
- Participatory learning and action research

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Transfer of Technology

This linear and mainly technology-driven model reflects the modernistic development perspective of the 1960s and is based on the positivist science paradigm. It includes three main actors:

- formal researchers - responsible for providing scientifically valid research results
- extensionists - 'transfer' the message to:
- farmers or other clients - the adopters or rejecters of innovations developed by others

An example of the Transfer of Technology is the green revolution of the 1970s. The green revolution packages were suitable mainly to areas of high natural potential and uniform and controllable growing conditions. This model, aiming at a widespread adoption of technologies, is likely to be successful in relatively homogenous, low-risk, natural and social environments, where farmers live under similar conditions, perceive the same kinds of challenges and share a common set of beliefs and values.



For small farmers in highly variable areas with low levels of control of growing conditions, success was very limited. Adapting the environment to fit the technology (e.g., through fertilizer application) is economically and socially not feasible in this context. As a response, farming systems research emerged. More emphasis was laid on (contractual and consultative) farmer participation to better understand their complex situation and the inter-dependencies among elements of farming systems in order to develop adapted technologies (Biggs, 1989; Farrington and Martin, 1987; Rhoades and Booth, 1982).

Today, the transfer of technology model is often viewed as the antithesis of participatory research. However, this is often not the case. In fact, much of the present participatory practice can still be classified as an expansion of the transfer of technology model because information is obtained from farmers and incorporated into scientific research. Participatory methods are used to better meet farmers' needs and to adapt technologies to site-specific circumstances at a relatively late stage of the research process.

Farmer First

By the mid-1980s, people were re-thinking the transfer of technology model. The emphasis was on the farmer. There are different types of approaches summarized under 'Farmers First':

- Farmer-back-to-Farmer
- Farmer First and Last
- Farmer Participatory Research
- Participatory Technology Development

Farmers became part of the process of generating, testing and evaluating technologies that promoted sustainable agricultural production. The main outcome expected from these approaches is the generation and adoption of new, appropriate technologies by small, resource-poor farmers to aid in solving production constraints in order to increase farm productivity and income (Selener, 1997).

The positivist paradigm is still prevalent in these approaches. Local knowledge is often viewed as a uniform 'stock', which is available for assimilation and incorporation. The role of researchers is to collect information, document rural people's knowledge, provide technology options, plan and manage research interventions. Farmers mainly act as respondents and are involved in planning and on-farm experimentation (Hagmann, 1999). Often, formal research methods and controlled comparison are used.



In the "learning selection approach" to technological change, different stakeholders experiment with a new technology (researchers' "best bet") and carry out the evolutionary roles of novelty generation, selection, and promulgation, i.e., learning selection is seen as analogous to natural selection in Darwinian evolution (Douthwaite, 2002). The innovation process is regarded as a complex, adaptive, multi-agent system.

Testing "Best Bet Options" in Mixed Farming Systems in West Africa

In West Africa, some international institutions started working together to address the dual goals of increased productivity and maintaining environmental stability through the integrated management of resources. They conceptualized an on-farm activity and started the process by prioritizing the existing problems in the area that the research could respond to (e.g., competition for nutrients, and the need to increase productivity of both crops and livestock without mining the soil). The introduced technologies were presented as "best bet options" which include the best of everything that research has produced.

The project started small in 1998 with 11 farmers in northern Nigeria; in 1999, a further 36 farmers joined the trials. The farmers, themselves, with minimum technical guidance from researchers, carried out all farm operations. The best bet options were tested against current practices used by farmers. The implications and impacts of introducing such best bet options are assessed by researchers taking into account not only grain and fodder yields, but also nutrient cycling, economic/social benefits or disadvantages, as well as farmers' reactions to and perceptions of the intervention.



Source: Tarawali *et al.*, 2000 (www.inrm.cgiar.org/Workshop2000/abstract/Tarawali/Tarawali.htm)

Participatory Learning and Action Research

In participatory learning and action research, knowledge is developed through critical reflection and experiential learning. These have several advantages.

- ❑ Practical knowledge and solutions can be developed which are directly useful to practitioners and people in the development process.

- ❑ By directly influencing the construction process of social reality, there is an increased probability that behavioral change and impact can be achieved.
- ❑ The people's capacity for experimentation and adaptive management can be developed.
- ❑ Scientific knowledge can be generated concerning action-reaction-links and factors that influence processes of change in a real life context.

Learning and action research can be considered as being an integrated process of action (development), education and research, or as Albrecht (1992), puts it, "action research entails the integration of research functions as a continuing part of a development program."



In participatory learning and action research, scientists are no longer observers or external actors; they now help people at different levels of social aggregation to learn and enhance their capacity for adaptive management. The approach favors farmer experimentation as well as platforms for negotiation and action learning at community level and with service providers (Hagmann *et al.*, 2002).

As agricultural research has long been dominated by the positivist paradigm, it is still widely assumed that the sharing of tasks within a linear research-development continuum (from basic, strategic, applied and adaptive research to extension and development) can be taken for granted. Participatory research is considered to merely fit into the area of applied and adaptive research as a means to improve the conventional technology development process. Participatory learning and action research approaches, however, require a different framework of thinking and structural changes.

Participatory monitoring and evaluation is an important instrument to integrate participatory research functions as a continuing part of the social or socio-technical development effort, and to investigate more systematically 'how' and 'why' certain changes are, or are not, taking place (Probst, 2002).

Action learning approaches operate in a constructivist perspective, where informal experimentation and indigenous knowledge are put on a more equal footing with scientific knowledge. They

draw from traditions in the applied social sciences, pedagogy, organizational development, and community development. According to Kurt Lewin (1946), complex systems can only be explored through action within the system, because a system's reaction to changes reveals its characteristics ("If you want to know how things really work, just try to change them"), i.e., the really relevant issues frequently only come up during the process of action, and would be missed through rigid planning (Hagmann *et al.*, 2002).

The table below gives an overview of three prototypical approaches to innovation, development and their respective attributes.

Table 1. Types of Approaches to Innovation Development and their Respective Attributes

| | Transfer of Technology | Farmer First | Learning & Action Research |
|--|---|--|--|
| Assumptions, Values and Beliefs | <p>Innovation is seen as a result of a linear process by which scientific knowledge is applied in practice (positivist perspective)</p> <p>There are homogenous environmental and social systems in which the innovation is of equal relevance to all, where innovations diffuse from 'innovative' farmers to other farmers.</p> <p>Modernistic development perspective</p> | <p>Recognition that farmers have something to contribute to innovation development.</p> <p>There is a 'stock' of local knowledge available for assimilation and incorporation into research.</p> <p>There are common goals, interests and power among 'farmers' and 'communities'.</p> | <p>Innovation is the outcome of a mutual learning process between actors with complementary contributions (constructivist perspective).</p> <p>There are inequitable discontinuous interactions and differentiated interests, power, access to resources between 'actors' and 'networks'.</p> <p>'Democratized' research process through broad based stakeholder involvement (political and social agenda)</p> |
| Objectives and Challenges | <p>Provision and marketing of 'best' technology for widespread adoption (e.g. for national food security, economic growth, natural resource conservation)</p> | <p>Provision of wider choices of technologies (basket of options) for resource-poor farmers in complex and diverse environments; finding locally adapted solutions</p> | <p>Enhancing adaptive management capacity, emancipation, and social capital at local level; Building of stakeholder platforms for negotiations and learning processes</p> <p>Strategic research on NRM processes</p> |
| Types of Participation | Contractual - Consultative | Consultative - Collaborative | Collaborative - Collegiate |
| Actors and Stakeholders | (National) research, public sector extension, individual/ 'innovative' farmers | Research extension, 'farmers', communities | Multiplicity of local and external stakeholders (e.g. farmers - men/women, research, NGOs, public and private sector, policymakers, etc.) |
| Role of External Actors | Development and transfer of messages and technologies | <p>Information collector of rural people's knowledge, planner and manager of research intervention</p> <p>More recently: facilitator, initiator, catalyst (provider of principles, formal research methods, basket of choices)</p> | <p>Facilitator, initiator, catalyst, provider of occasions and methodological support, visible actor / stakeholder in process learning and action ('new professionalism')</p> <p>Supporter of farmer-led research</p> |
| Role of Local Actors | Beneficiaries, target group; reactive respondent, provider of labor/land for on-farm research | Reactive respondent or active participant | Creative investigator, active participant and partner in the process of learning and action |

Table 1. Types of Approaches to Innovation Development and their Respective Attributes... *continued*

| | Transfer of Technology | Farmer First | Learning & Action Research |
|-------------------------|---|---|---|
| Procedures | <p>Outsiders analyze needs and priorities</p> <p>Static plan, rapid and widespread implementation</p> <p>'Fixed menu'</p> <p>Linear, clearly defined stages of research</p> <p>External intermittent evaluation</p> | <p>Farmers analyze needs and priorities facilitated by outsiders</p> <p>'Menu à la carte'</p> <p>Farmer involvement in planning, implementation and/or evaluation of technologies</p> | <p>Iterative loops of action and reflection in a collective learning process</p> <p>Evolving plan, adaptive management, internal continuous PM&E</p> <p>Collaborative work requiring dialogue, negotiation and conflict mediation between interest groups</p> |
| Research Methods | <p>Hard systems research (AEA, FSR, PRA)</p> | <p>Mainly formal research methods, FSR, RRA, GA; PRA, FPR, PTD</p> | <p>Soft systems learning and action research, stakeholder analysis, PAR, FPR, informal farmer experimentation, comparative case studies</p> |

Most of the current NRM research initiatives focus on the generation and provision of technologies, assume a functioning linear research-development continuum, use mostly consultative forms of participation, and consider participatory research as a tool for applied and adaptive research. Therefore, they principally fall into the categories of 'transfer of technology' and 'farmers first' approaches. Longer-term participatory learning and action research approaches are only beginning to be chosen by international agricultural research centers (IARCs) as they require a different kind of professionalism and challenge the mandate, i.e., they are considered to fall under the sphere of development rather than research. The potential of participatory learning and action research for strategic research and approach development is gradually recognized, particularly since the research system (i.e., 'research on research') has become a focus in institutional research.

Another frequently discussed issue is the question of **client-orientation** in international agricultural research. Presently, public sector agricultural research is mainly externally initiated, discipline-led and supply-driven, no matter which of the above-mentioned approaches is chosen. Research institutions write proposals according to their strengths and preferences, they manage the funds obtained for development-oriented research, and are accountable and report to donors. Local "clients" in turn have little power and influence on the research agenda. Currently, new financial mechanisms are under discussion to increase the demand-orientation and accomplish more market-led client-provider relationships.

A new concept would for example be that local organizations who have appropriate communication channels to institutions or enterprises and who have control over own and/or donated resources (or competitive funds, vouchers, etc.), initiate contracts with providers of research services to overcome specific constraints. They would act as clients who commission external service providers, and "buy-in" research services they need. Each of the three prototypical

approaches to innovation development could be chosen under such market-led conditions, i.e., local organizations could demand either the development of a technology or the facilitation of a learning and action research process. This model would put local people in a position of greatest power, as they can demand accountability, whereas external actors are responding to their requests.

What frequently is ignored in the discussion of such financial agreements, is that some preconditions need to be in place for their functioning, such as a certain level of local organizational and management capacity, the ability to identify and articulate broad based demands, etc. Otherwise, such efforts would be highly susceptible to corruption by local elites, or walk in the trap of “local people demanding more of the same”.

Participatory learning and action research approaches by nature seek to strengthen the capacities of poor farmers in marginal areas to ultimately allow the application of more market-led and demand-oriented approaches.

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Participatory Approaches to Agricultural Research and Extension



The emergence of participation as an issue to be addressed within extension approaches was slower in coming to the forefront, as compared to the attention participation received within research systems. One key element of participation is an emphasis on developing the capacity of local people as an end in itself, as opposed to the purely mechanistic emphasis of participation as a means within the technology development flow that has often characterized research and extension programs.

During the late 1980s and early 1990s, increasingly more field-based experiences emerged creating more space for methodological and institutional innovations for agricultural research and extension. Within these participatory approaches - as they became commonly known - a special emphasis was placed upon participation of local people and their communities, especially working with and through groups; and building upon the traditional or indigenous knowledge that they held (Chambers *et al.*, 1989; Waters-Bayer, 1989; Haverkort *et al.*, 1991). Table 1 situates farmer participation in a comparative context of previous and existing research-extension paradigms.

Table 1. Farmer-Led Extension Approach within Research-Extension Paradigms

| Indicative paradigm parameters | Technology development (research) | Technology dissemination (extension) |
|--|---|--|
| Processes with outsiders as major protagonists | Conventional research; farming systems research | Transfer of technology; conventional extension; farming systems research/extension |
| Processes with insiders as major protagonists | Indigenous technical knowledge; indigenous experts; farmer innovators | Indigenous communication networks; farmer-to-farmer extension |
| Processes with insiders as major protagonists, but supported by outsiders | Farmer participatory research; participatory technology development | Participatory extension; farmer-led extension |

Farmer Participation in Agricultural Research

The rise of farmer participatory research (FPR) was a deliberate effort among agricultural professionals to combine farmers' indigenous traditional knowledge (ITK) with the more widely recognized expertise of the agricultural research community. The approach aimed to distinguish itself from farming systems research (FSR) in its more deliberate attempt to actively involve farmers in setting the research agenda, implementing trials and analyzing findings and results (Farrington and Martin, 1988). FPR has gone beyond the on-farm trials which became the standard of FSR, and actually called for farmers to design, monitor and evaluate experiments - in collaboration with researchers - carried out in their own fields (Okali *et al.*, 1994). Some have argued that while FPR approaches can increase participation among farmers, as a research methodology, it has not brought about impact and output (Bentley, 1994), or may require more than short-term technology development efforts (Humphries *et al.*, 2000). Research from Africa supports this argument by showing that less than 15% of "experiments led by farmers" resulted in the definition of new knowledge or the development of new technologies (i.e., were not already in existence elsewhere). The study concluded that farmers' experiments are in fact more "complementary" than "synergistic" to formal agricultural research efforts, and that farmers' experiments are more closely linked to agricultural extension activities rather than to agricultural research accomplishments (Sumberg and Okali, 1997).

Some of the trends like the recognition of the importance of farmers' ITK, strengthening of farmers' participation, the emergence of non-government organizations (NGOs) within the agricultural technology development sphere - allowed for the development of one of the more articulate models deriving from the FPR experiences - the multiple source of innovation model (Biggs, 1989). The model states that agricultural innovation (and the systems that carry those innovations between and among farmers) can derive from several sources, rather than from a single formal source (i.e., traditional research institutions). Evidence from Ecuador, Niger and other countries supports the multiple source of innovation model by providing well-documented examples of innovations emerging from farmers' associations and NGOs, and argues that public sector research/extension institutions are neither the only nor the main agents of

agricultural technology adaptation and dissemination (McCorkle *et al.*, 1988; Bebbington, 1989; Engel, 1990). The multiple source of innovation model has allowed for greater operational space for NGOs within the agricultural technology development system, as it has provided greater legitimacy to their contribution (Farrington and Amanor, 1991).

Farmer Participation in Agricultural Extension

Despite the articulate and increasingly large body of literature on participatory research and extension approaches, much of the work that has been conducted under the farmer-first and FPR frameworks focuses mainly on the research dimension of agricultural technology development and dissemination approaches. Concrete examples of the application of the underlying principles of participation, indigenous knowledge, and the users' (or farmers') perspective to the extension function and a discussion of the implications of these considerations to agricultural extension systems have been somewhat limited.

Röling (1995) outlines the facilitation model of extension that has emerged in recent years. The model also identifies the need to support farmer networking to reinforce individual learning, centered within a process which is facilitated by highly trained outsiders (agricultural professionals - both



researchers and extension workers), thus comprising an agricultural knowledge and information system (AKIS). While the move from a linear transfer-of-technology extension model to the facilitation model is a difficult one, it is a trend which is gaining acceptance within donor and public sector institutions, but it also begs the need for further investigation into the characteristics of the approach (Röling and van de Fliert, 1994).

Engel (1991) presents a (general) typology of participation in extension which attempts to qualify levels of intensity of farmer participation as:

- participation in extension meetings or activities
- participatory diagnoses (e.g., participatory rural appraisal, problem-census, etc.)
- participation through organization

Using this typology, much of what is called farmer participation in extension falls under the first two levels. However, for extension to become more farmer-led, a greater emphasis must be placed on the third - more substantive - type of farmer participation. One example of this third type of farmer participation in extension can be noted in the experience of the Uganda National Farmer's Association that has established a "demand-driven, cost-recovery" extension system as an alternative to public sector extension in a number of districts (Carney, 1998).

Farmer participation in extension will require putting farmers first by placing real ownership and accountability of public extension organizations into the hands of the clients - the farmers, and their communities and organizations. Antholt (1994) suggests that this might be accomplished by developing mechanisms for improving public support (i.e., cost-sharing, local taxes, etc.) that would provide resources to farmers and their organizations, and allow them to choose the types of extension services that are most relevant to their needs. However, he goes on to say that this will also require farmers to assume more responsibility to determine (and pay for) extension services and programs. User-centered approaches to extension - while increasingly fashionable - are not favored by agricultural extension agencies (particularly the public sector) because of the resulting changes in their power relations with farmers (Tendler, 1993).

Drawing upon extension practice and literature, key elements of agricultural extension approaches can be identified and formulated into a comparative typology for three different types of extension approaches (Table 2). The first two columns represent two distinct extension approaches - extensionist-centered and farmer-led approaches. Using key elements of any extension approach, the table attempts to differentiate between these two distinct approaches, recognizing that these are only models and that no single extension program may neatly fit into either model. The third column represents an emerging typology of extension approach which argues for a synthesis of these two conventional models into the form of an "accompaniment" model for participatory agricultural extension - a "middle path" between the more traditional extensionist-centered approaches and the more dynamic farmer-led approaches.

This "accompaniment model" suggests that farmer-led extension approaches cannot solely focus on the farmer promoters involved in the process, as there is, indeed, a critical role for professional extension workers to "accompany" the efforts and to support the achievements of farmer promoters. Experience has shown that it is difficult to achieve quality work from farmer promoters if they are not supported by well-trained professional extension workers sensitive to the new attitudes required of them. However, the professional extension workers must also be committed to and enthusiastic about the changes brought about by farmer-led extension approaches, especially in terms of the change in roles expected of them as professionals, and the communication/capacity-building skills that are required of them in order to work effectively with farmer promoters.

Table 2. Comparative Typology of Extension Approaches from the Literature

| Elements | Extensionist-centered approaches | Farmer-led approaches | Participatory extension through accompaniment model |
|---|---|--|--|
| Primary goals of the extension approach | <ul style="list-style-type: none"> <input type="checkbox"/> Technology transfer <input type="checkbox"/> Agricultural productivity through yield increases | <ul style="list-style-type: none"> <input type="checkbox"/> Farmer participation <input type="checkbox"/> Empowerment <input type="checkbox"/> Capacity-building (especially farmer extensionists) <input type="checkbox"/> Creating (or strengthening) local institutions | <ul style="list-style-type: none"> <input type="checkbox"/> Increase household productivity through agricultural and other livelihood improvements <input type="checkbox"/> Encourage farmer participation and community mobilization in local development efforts <input type="checkbox"/> Build skills and capacity for local empowerment (especially farmer leaders/promoters) <input type="checkbox"/> Create (or strengthen) local institutions |
| Institutional setting | <ul style="list-style-type: none"> <input type="checkbox"/> Government extension service <input type="checkbox"/> University <input type="checkbox"/> Research institutions (local and international) | <ul style="list-style-type: none"> <input type="checkbox"/> NGOs (local and international) <input type="checkbox"/> Grassroots or farmers' organizations (e.g., cooperatives) | <ul style="list-style-type: none"> <input type="checkbox"/> Applicable to any institutional setting, including government extension service, local and international NGOs, grassroots or farmers' organizations, university and research institutions <input type="checkbox"/> Extension organization must be able to provide a policy framework and incentives to staff that support active participation of farmers <input type="checkbox"/> Professional staff must be able to focus the extension work of the institution around values and attitudes that foster farmer participation |
| Type of technology, information or innovation disseminated | <ul style="list-style-type: none"> <input type="checkbox"/> Improved seed varieties <input type="checkbox"/> Cropping recommendations <input type="checkbox"/> Market information <input type="checkbox"/> Soil and water conservation <input type="checkbox"/> Intensive animal production <input type="checkbox"/> Cash crop production (coffee, tea, vegetables, etc.) | <ul style="list-style-type: none"> <input type="checkbox"/> Soil and water conservation <input type="checkbox"/> Agroforestry systems <input type="checkbox"/> Natural resource management strategies <input type="checkbox"/> Integrated farming systems <input type="checkbox"/> Organic agriculture <input type="checkbox"/> Integrated animal production | <ul style="list-style-type: none"> <input type="checkbox"/> Relevant to almost any technology, production system or natural resource management regime <input type="checkbox"/> Farmer-centered approaches tend to focus more on pro-poor needs, priorities and contexts <input type="checkbox"/> Approaches appear to be more appropriate for extension programs that focus on food production/food security and sustainable livelihoods <input type="checkbox"/> Approaches appear to be more appropriate for complex, integrated farming systems which require more complex natural resource management strategies, or more information-intensive production systems, e.g., organic agriculture <input type="checkbox"/> Approaches appear to not be well-suited for more commercial, overtly market-based production settings |

Table 2. Comparative Typology of Extension Approaches from the Literature... continued

| Elements | Extensionist-centered approaches | Farmer-led approaches | Participatory extension through accompaniment model |
|---|--|--|--|
| <p>Level of farmer participation in decision-making for extension priorities and activities, resource allocation, etc.</p> | <ul style="list-style-type: none"> <input type="checkbox"/> None to minimal <input type="checkbox"/> Minimal to medium | <ul style="list-style-type: none"> <input type="checkbox"/> Minimal to medium <input type="checkbox"/> Medium to high | <ul style="list-style-type: none"> <input type="checkbox"/> Medium to high |
| <p>Extension methods used</p> | <ul style="list-style-type: none"> <input type="checkbox"/> Lectures <input type="checkbox"/> Demos <input type="checkbox"/> Films, videos and other audio-visual media <input type="checkbox"/> Pamphlets and other written materials <input type="checkbox"/> Farmer training <input type="checkbox"/> Radio programs <input type="checkbox"/> Farmer field days <input type="checkbox"/> Exhibitions, fairs | <ul style="list-style-type: none"> <input type="checkbox"/> Farmers as trainers <input type="checkbox"/> Farmer cross-visits or exchanges <input type="checkbox"/> Shared labor work groups <input type="checkbox"/> Demonstrations and lectures <input type="checkbox"/> Films, videos and other audio-visual media <input type="checkbox"/> Farmer training <input type="checkbox"/> On-farm experimentation for technology demonstration | <ul style="list-style-type: none"> <input type="checkbox"/> Almost any extension method may be applicable <input type="checkbox"/> Effective use of any particular method is more dependent upon the emphasis that is given to the specific and active role of farmers, e.g., farmers as trainers <input type="checkbox"/> Several methods have proven to be more effective for eliciting farmer participation, e.g., farmer cross-visits or exchanges; farmer field days and exhibitions; demonstrations; films, videos and other audio-visual media; shared labor work groups, etc. <input type="checkbox"/> Active farmer participation in on-farm experimentation for technology demonstration is a proven method that effectively channels farmer inputs and perspectives |
| <p>How do farmers participate?</p> | <ul style="list-style-type: none"> <input type="checkbox"/> Participate in external assessment of community problems, or assist in community problem analysis <input type="checkbox"/> Assist in extension planning <input type="checkbox"/> Receivers of technical messages <input type="checkbox"/> Provide feedback to extension activities and new technologies | <ul style="list-style-type: none"> <input type="checkbox"/> Facilitate community problem analysis <input type="checkbox"/> Determine extension priorities <input type="checkbox"/> Actively involved in extension planning <input type="checkbox"/> Serve as extension workers <input type="checkbox"/> Provide feedback to extension activities and new technologies <input type="checkbox"/> Monitor and evaluate accomplishments | <ul style="list-style-type: none"> <input type="checkbox"/> Participate in and/or facilitate community problem analysis <input type="checkbox"/> Determine extension priorities and are actively involved in extension planning <input type="checkbox"/> Serve as extension workers <input type="checkbox"/> Provide feedback to extension activities and/or new technologies <input type="checkbox"/> Conduct small-scale experimentation and/or participate in on-farm experiments <input type="checkbox"/> Monitor and evaluate extension accomplishments <input type="checkbox"/> Participate in (and often organize) networking and information exchange mechanisms |

Table 2. Comparative Typology of Extension Approaches from the Literature... continued

| Elements | Extensionist-centered approaches | Farmer-led approaches | Participatory extension through accompaniment model |
|---|---|--|--|
| | <ul style="list-style-type: none"> ❑ Participate in (researcher-led) on-farm experiments | <ul style="list-style-type: none"> ❑ Conduct small-scale experimentation ❑ Participate in (and often organize) networking and information exchange mechanisms | |
| Costs, funding mechanisms and control of funding | <ul style="list-style-type: none"> ❑ Generally entails medium to high costs ❑ Traditionally funded through general taxation and/or bilateral/multilateral loans or aid from the global donor community ❑ Control of funding resources is usually through the extension provider (primarily non-local levels of government) | <ul style="list-style-type: none"> ❑ Generally entails low to medium costs ❑ Grants from international donors, especially NGOs ❑ Institutional revenues (e.g., cooperatives) ❑ Control of funding resources is typically through an NGO or farmers' organizations; some examples also exist through local authorities (e.g., village councils, etc.) | <ul style="list-style-type: none"> ❑ Entails low to medium costs compared with conventional extension programs, but is not a no-cost mechanism for service provision ❑ Can include a range of funding sources, including bilateral/multilateral loans or aid from donor community; grants from international donors, especially NGOs; and institutional revenues or income ❑ Control of resources should be decentralized to the most localized level possible, e.g., local government, NGO, farmers' organizations, local authorities (e.g., village councils, etc.) |
| Program geographical coverage (area) | <ul style="list-style-type: none"> ❑ Usually covers large geographical areas, e.g., district or state | <ul style="list-style-type: none"> ❑ Tends to be on a limited scale (<100 communities) within a single administrative unit (e.g., district or state) ❑ Or, on a pilot project scale within a larger institutional/area setting | <ul style="list-style-type: none"> ❑ While not scale-neutral, these approaches can be applied at almost any scale ❑ Appear to be most appropriate on a limited scale (<1,000 communities) within a single administrative unit (e.g., district or state) |

Before we leave the discussion on participatory approaches to agricultural research and extension, a word of caution is required. Many agricultural professionals, including some of the most vocal proponents in favor of participatory approaches, are calling for a re-examination of the current fad in the promotion of these approaches and highlighting the need to be more objective in the analysis of these approaches (Biggs, 1995; Cooke and Kothari, 2002). In order to more accurately measure their effectiveness and impact, Biggs (1995) specifically underlines the importance of developing a framework for analysis and evaluation of participatory technology development (PTD) (and related) experiences - a recommendation that has been strongly seconded by others (Oakley, 1995).

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**Participatory Research and
 Development for Sustainable
 Agriculture and Natural Resource
 Management: A Sourcebook**

The Quality of Participation: Critical Reflections on Decision Making, Context and Goals



Contributing to rural transformations and sustainable natural resource management through participatory action research requires researchers to reflect on the research process. The challenge is to critically assess the kind(s) of participation that are appropriate to the different stages of the research cycle. Another way to phrase this is to ask what is *good practice* in participatory research and development. There are three complementary entry points for investigating this question: the decision making process, the research context, and the aims of participation.

The Decision Making Process: Types of Participation

Participatory research can take a variety of different forms in terms of who participates, how and when, and who decides about what, how and when. In any given participatory research activity, usually more than one form is employed, either consciously or unconsciously. *Consultative* forms of participation mean that researchers only consult with others (e.g., farmers) in order to make decisions about (community) needs and to design research interventions. *Collegial* forms imply the active involvement and equal decision making power of others in conducting the whole research process (from identification of the research problem or opportunity to final assessment), such as the involvement of

communities and user groups in decision making about new management rules and regulations (e.g., an irrigation system or a community forest) or multi-stakeholder groups/associations developing management policies covering various scales of resource management (e.g., a watershed). A useful typology is the following (adapted from Probst *et al.*, 2003, building on a classification presented by Biggs, 1989):

❑ **Contractual Participation**

One social actor has sole decision-making power over most of the decisions taken in a research process, and can be considered the “owner” of it. Others participate in activities defined by this social actor in the sense of being formally or informally “contracted” to provide services and support.

❑ **Consultative Participation**

Most of the key decisions are made by one social actor, but emphasis is put on consultation and gathering information from others, especially for identifying constraints and opportunities, priority setting and/or evaluation.

❑ **Collaborative Participation**

Different actors collaborate and are put on a more equal footing, emphasizing linkage through an exchange of knowledge, different contributions and a sharing of decision-making power during the innovation process.

❑ **Collegiate Participation**

Different actors work together as colleagues or partners. “Ownership” and responsibility are equally distributed among the partners, and decisions are made by agreement or consensus among all actors.

It is useful to differentiate between types of participation in order to understand how this influences research results. Community participation in research can be differentiated according to the level of community control over the process (who sets the agenda), when (at what stage of the research) local people participate, and the level of representation and differentiation of different stakeholders and community groups in the process. Table 1 is a useful tool to reflect on these questions in any given project or program.



Table 1. Decision Making: Different Types of Participation in Research (A Tool for Reflection)

| Type of local involvement in the research | Who controls and makes decisions? | Who undertakes activities? | Who benefits from the results? |
|---|-----------------------------------|----------------------------|--------------------------------|
| Problem/opportunity identification | | | |
| Setting of research priorities and goals | | | |
| Choosing options, planning activities and identifying potential solutions | | | |
| Taking action and implementing activities | | | |
| Monitoring of activities | | | |
| Evaluation | | | |

Source: Adapted from McAllister and Vernooy, 1999

There is no right or wrong amount of participation. However, it is always important to be honest and open to the community about the purposes of the research. If the goal of the research is social transformation, it is important to give local people as much control as possible over the research process.

The Social Construction of Knowledge

Taking part in a research process is about generating new knowledge and skills, changing attitudes, and improving practice. It is therefore useful to reflect on the nature of knowledge generation processes. Knowledge exists in different forms, which are equally valuable and legitimate. A combination local or indigenous knowledge and scientific knowledge is important to improve natural resource management decisions at the local level or at higher levels, such as a watershed.

Different groups in the community and different stakeholders have different knowledge about natural resources and may have different priorities, and there are many explanations or folk theories for a given body of facts. It is therefore very important to speak with different people in the community (women, men, poor, landless, different ethnic and social status, young and old) in order to understand their different perspectives. It is also important to be conscious that information and knowledge are not value-free, and to be aware that the selective choice of information or knowledge may empower some people and on the other hand, displace others. In other words, knowledge is always socially constructed and often disputed (Long and Long, 1992).

The knowledge and information generated from participatory action research activities are constructed by the socio-economic and political context in which the research takes place (local culture and society, resource issues, and rights); by the nature of the research questions asked and research methods used; by the attitudes and abilities of the researchers; and by the research capacity and experiences of the community (McAllister, 1999; McAllister and Vernooy, 1999). Stronger awareness of these different social factors, which can influence the research process, can help researchers better understand the results of their activities.

Socio-Economic and Political Issues in Natural Resource Management

At the community level, natural resources are governed by complex, overlapping, and sometimes conflicting social entitlements and traditional norms, such as private versus common property rights, tree versus land tenure, differential security of tenure and use rights. Social identities, relationships and roles negotiated along lines of gender, kinship, ethnicity, socio-economic status, age, occupation, and so on, can influence access to and use of natural resources. Different stakeholders – within the community and outside – have different values, perceptions and objectives, depending on individual context (how the individual experiences the social and natural environment) and social-cultural identity (McDougall and Braun, 2003).

Representation of community interests and knowledge are often produced in the context of struggles over resources through which different parties defend interests and advance claims. Power differences between different community groups and between the community and outside groups influence interaction and negotiation between them and can influence whose interests are represented in the research. Participatory processes provide an opportunity for less-powerful groups to contest existing power relations and resource rights, but also may enable more powerful or politically aware groups to assert preferential rights over resources. Here it is important to consider if the government is supportive of participatory processes.

It is often especially important to be aware of the differences in social power and resource rights between men and women, that is, to specifically incorporate gender analysis into the research process. Gender encompasses the *socially* constructed roles and characteristics assigned to men and women in a specific culture).



Characteristics of the Project or Program

Characteristics, which are specific to the project and the project's location, may influence the research; affect local people's willingness to participate; and influence the appropriateness of different approaches. It is recommended that the team carrying out the project reflect in a team-session on the following questions.

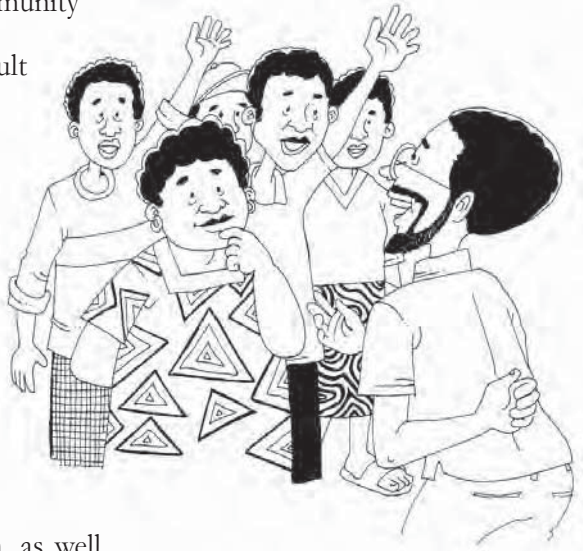
- Objectives:** Are they focused or broad? Is the emphasis on diagnosis or on transformation? Is the goal to change people's behavior and attitudes, to help them develop new technologies or management approaches, or both?
- Sector:** Does the project deal with fisheries, forestry, agriculture, or a combination? With individually or collectively managed natural resources, or a combination?
- Dimensions:** Does the research involve economic, social, ecological, political, issues or a combination of issues?
- Scale:** Does the research problem affect the local, regional, or national scale or a combination?

Community Perceptions of the Research

Previous experience of local people with research and development projects, as well as perceptions of potential benefits can influence community motivation to participate in new research activities, as well as bias their responses.

Methodologies for encouraging community participation can influence the information and priorities which result and the decisions which are made, because of who is present and because of how freely different individuals and groups are able to express their interests.

Local people may be inhibited to let researchers know what they truly think, may give "correct" or "expected" responses, or may present needs, which they feel fit the agenda of the researchers. Their responses may be based on their perceptions of what they can gain or lose by providing certain information, as well as suspicions about how the results will be used. Research activities may be perceived as both foreign and highly formal by local people, especially when more powerful stakeholders are present.



Local involvement is often time-consuming, and takes people away from their normal livelihood activities. Sometimes, individuals who have important perspectives on the project are not able to participate in participatory group activities because they are busy with making their living. This is often especially true for women. It is important to recognize the value of local people's time, and to design research activities so that they are most convenient for local people. It may also be necessary to specifically seek out the perspectives of the very poor who may not be able to spare time to participate in organized activities (go to the people, instead of have the people come to the researchers, for example – interview women in the fields where they farm), so that their important perspectives are included in research decisions.

Capacity of the Community and of the Researchers

Researcher's skills and experience with community facilitation, understanding of social and gender dimensions of research, and capacity for adaptability and flexibility all influence how research will actually be done. At the same time, the capacity of the community in terms of level of education and skills, level of organization, forms of natural resource management, approaches for managing conflict and making collective decision/taking collective action and past project experiences will have an impact as well. Other aspects to consider, include:

- ❑ What are the motivations and underlying values for becoming involved, of the community, the researchers, and the donor agencies, which support the research?
- ❑ What is the researcher and research institution's commitment to participation? Is there a commitment and flexibility to allowing the community to redirect the process? What are the attitudes and values regarding local knowledge and local people?
- ❑ Why are the community and subgroups, and possibly other stakeholders motivated to participate in process? Are local people aware of the problems the research is directed towards? Are local people committed to addressing these problems?
- ❑ Does the local culture support participation in decision making? What are the local values of hierarchy, respect, and of equity? What are the differing interests in negotiating access to resources or power?



Risk Assessment of Participatory Research: The Social and Political Project Environment

Although participatory research can result in significant benefits for local people and marginalized groups, there are certain risks associated with this approach. Risks can be considered from two perspectives:

- ❑ risk that the research will not be able to meet its goals; and
- ❑ risk that the research (in meeting the objectives or through the process) will unintentionally cause harm to the community or to specific groups within the community.

Below are guide questions for risk assessment in the context of social and political environment of the project.

1. Is there a risk that not involving certain stakeholders will provoke them to obstruct the research process?
2. Are there security and livelihood risks to local participants if they become involved in an empowering activity of which the ruling group may not approve (because of national politics and governance, community leadership, local patronage relations which place certain groups in subordinate positions, etc.)? How will the project handle this?
3. Are there political and security risks both to researchers and project staff if the participatory process is perceived as a threat to the political or local establishment?
4. Is there potential for the research approach to disempower certain groups in the process of enhancing the resource rights and livelihood security of the "community"? Who stands to benefit from the approach and how, and who may be further disadvantaged? Who is enabled or constrained? Whose economic circumstances or security of tenure is at stake? This consideration is especially important if the project deals with common property resources, and when there are conflicting uses, needs, and interests in the resources.
5. What are the potential risks to the community resulting from the misuse of participatory research methods by inexperienced researchers? Examples of such risk could include:
 - ❑ Exacerbating or initiating conflict in the community by making power relations explicit or by unknowingly directing benefits of the research to specific individuals or social groups.
 - ❑ Further marginalizing certain social groups by not understanding how the research and participatory process might affect them negatively, by not recognizing them as important stakeholders to include in the process.
 - ❑ Accidentally aiding elite members of the community in increasing their power, access and rights over resources through legitimizing their claims through "participatory" activities such as boundary and resource mapping, tree-planting which may effectively lead to land privatization.

The Research Process: Principles of Good Practice

A third way to address the quality of participation is to ask how it contributes to the central goals of participatory research for natural resource management: *positive local impacts* of research (rural transformations, empowerment); and, the generation of *valid, trustworthy, and relevant research findings*. The latter implies that these findings may be generalized, i.e., that they contribute to learning that can be applied in some way to other areas beyond the research site.

Based on a comprehensive review of (participatory research for) natural resource management case studies, five principles of good practice and selected related indicators have been put forward (Vernooy and McDougall, 2003):

1. The research reflects a clear and coherent common agenda (or set of priorities) among stakeholders and it contributes to partnership building.

- ❑ The agenda has been set collaboratively and transparently.
- ❑ The design allows space for meaningful participation of local stakeholders.
- ❑ Partnerships have been created or strengthened through dialogue, joint actions and mutual benefits.

2. The research addresses and integrates the complexities and dynamics of change in human and natural resource systems and processes, including local understanding of these.

- ❑ The analysis gives equal attention to both the inherent site characteristics and to the (impacts of) innovative management practices.
- ❑ The analysis balances and integrates natural/biophysical resource dynamics with human/social changes and innovations.
- ❑ The research uses an iterative cycle of inquiry and learning.

3. The research applies the 'triangulation principle' (i.e., multiple sources of information and methods), and links together various knowledge worlds.

- ❑ The research links the local, traditional and scientific knowledge worlds.
- ❑ The research uses a diversity of tools and methods.
- ❑ Information generation is based on multiple sources.
- ❑ Dissemination occurs throughout the whole process.

4. The research contributes to concerted planning for the future and social change.

- ❑ The research process allows for options and scenario development.
- ❑ The research has a sustainability focus and an exit strategy built in from the outset.
- ❑ The research incorporates a scaling up or extrapolation strategy, including an analysis of the uptake environment.



5. The research process is based in iterative learning and feedback loops and there is a two-way sharing of information.

- ❑ The research includes regular exchange and reflection involving key stakeholders.
- ❑ The research has regular monitoring events.
- ❑ Outcomes of monitoring events are translated into revised actions.

These principles and related indicators make up a framework that represents a potential tool for learning for researchers enabling the application of increasingly inclusive or integrative perspectives to participatory research practice. It also serves as a hypothesis-generating tool to guide future research design and planning.

A Challenge

Combining the three entry points presented here to reflect on and assess the quality of participation is a challenge. However, facing up to this challenge is at the heart of a commitment to participatory research and development.

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**Participatory Research and
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An Agroecological Basis for Natural Resource Management Among Poor Farmers in Fragile Lands



Throughout the developing world, resource-poor farmers (about 1.4 billion people) located in risk-prone, marginal environments, remain untouched by modern agricultural technology. For the most part, resource-poor farmers gained very little from the Green Revolution as the new technologies were not scale-neutral. The farmers with the larger and better-endowed lands gained the most, whereas farmers with fewer resources often lost, and income disparities were often accentuated. Although subsequent studies have shown that the spread of high-yielding varieties among small farmers occurred in Green Revolution areas where they had access to irrigation and subsidized agrochemicals, inequities remain.

Clearly, food security in the developing world will need to be increased, especially in the marginal areas where the majority of the poor people are concentrated. In order to benefit the poor more directly, a new Natural Resource Management (NRM) approach must be developed to directly and simultaneously tackle the following objectives:

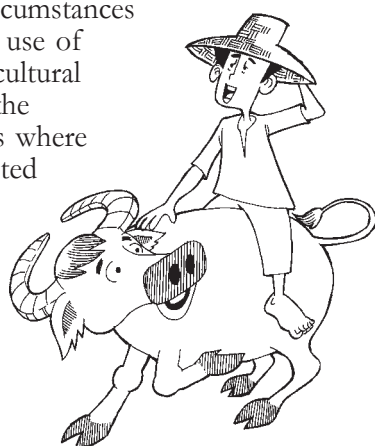
- poverty alleviation
- food security and self reliance
- ecological management of productive resources
- empowerment of rural communities
- establishment of supportive policies

The NRM strategy must be applicable under the highly heterogeneous and diverse conditions in which smallholders live, must be environmentally-sustainable and based on the use of local resources and indigenous knowledge (Table 1). The emphasis should be on improving whole farming systems at the field or watershed level rather than the yield of specific commodities. Technological generation should be a demand-driven process, meaning that research priorities should be based on the socio-economic needs and environmental circumstances of resource-poor farmers.

Table 1. Technological Requirements of Resource-Poor Farmers

| Innovation Characteristics Important to Poor Farmers | Criteria for Developing Technology for Poor Farmers |
|--|--|
| Input saving and cost reducing | Based on indigenous knowledge or rationale |
| Risk reducing | Economically-viable, accessible and based on local resources |
| Expanding toward marginal-fragile lands | Environmentally-sound, socially and culturally sensitive |
| Congruent with peasant farming systems | Risk averse, adapted to farmer circumstances |
| Nutrient, health and environment improving | Enhance total farm productivity and stability |

To be of benefit to the rural poor, agricultural research and development should operate on the basis of a “bottom-up” approach, using and building upon the resources already available: local people, their knowledge and their natural resources. It must also seriously take into consideration, through participatory approaches, the needs, aspirations and circumstances of smallholders. A relevant NRM strategy requires the use of general agroecological principles and customizing agricultural technologies to local needs and circumstances. Where the conventional technology transfer model breaks down is where new management systems need to be tailored and adapted in a site-specific way to highly variable and diverse farm conditions. Agroecological principles have universal applicability but the technological forms through which those principles become operational depend on the prevailing environmental and socio-economic conditions of the target farmer group.



Building on Traditional Knowledge

A logical starting point in the development of new pro-poor agricultural development approaches are the very systems that traditional farmers have developed and/or inherited throughout centuries. Such complex farming systems, adapted to the local conditions, have helped small farmers to sustainably manage harsh environments and to meet their subsistence needs, without depending on mechanization, chemical fertilizers, pesticides or other technologies of modern agricultural science. Although many of these systems have collapsed or disappeared in many parts of the Third World, the stubborn persistence of

millions of hectares under traditional agriculture in the form of raised fields, terraces, polycultures, agroforestry systems, etc., are living proof of a successful indigenous agricultural strategy and comprises a tribute to the creativity of small farmers throughout the developing world.

The ensemble of traditional crop management practices used by many resource-poor farmers represent a rich resource for modern workers seeking to create novel agroecosystems well adapted to the local agroecological and socioeconomic circumstances. Farmers use a diversity of techniques, many of which fit well to local conditions and can lead to the conservation and regeneration of the natural resource base as in the case of indigenous soil and water management practices in Africa. The techniques tend to be knowledge-intensive rather than input-intensive, but clearly not all are effective or applicable, therefore modifications and adaptations may be necessary. The challenge is to maintain the foundations of such modifications grounded on farmers' rationale and knowledge.

Green Manuring: A Contemporary System Based on Traditional Agriculture

Slash and burn or *milpa* is perhaps one of the best examples of an ecological strategy to manage agriculture in the tropics. By maintaining a mosaic of plots under cropping and some in fallow, the *milpa* captures the essence of natural processes of soil regeneration typical of any ecological succession. By understanding the rationale of the *milpa*, a contemporary discovery, the use of green manures has provided an ecological pathway to the intensification of the *milpa*, in areas where long fallows are not possible anymore due to population growth or conversion of forest to pasture.

Experiences in Central America show that velvetbean mucuna (*Mucuna pruriens*)-based maize systems are fairly stable allowing respectable yield levels (usually 2-4 T/ha) every year. In particular, the system appears to greatly diminish drought stress because the mulch layer left by mucuna helps conserve water in the soil profile. With enough water around, nutrients are made readily available, in good synchronization with major crop uptake. In addition, the mucuna suppresses weeds (with a notable exception of one weed species, *Rottboellia cochinchinensis*), either because velvetbean physically prevents them from germinating and emerging or from surviving very long during the velvetbean cycle, or because a shallow rooting of weeds in the litter layer-soil interface makes them easier to control. Data shows that this system grounded in farmers' knowledge, involving the continuous annual rotation of velvetbean and maize, can be sustained for at least 15 years at a reasonably high level of productivity, without any apparent decline in the natural resource base.



Agroecology as a Fundamental Scientific Basis for NRM

Agroecology is a science that provides guidelines to understanding the nature of agroecosystems and the principles by which they function. Agroecology provides the basic ecological principles for how to study, design and manage agroecosystems that are both productive and natural resource-conserving, and that are also culturally-sensitive, socially-just and economically-viable. Instead of focusing on one particular component of the agroecosystem, agroecology emphasizes the interrelatedness of all agroecosystem components and the complex dynamics of ecological processes including all environmental and human elements.

Agroecology takes greater advantage of natural processes and beneficial on-farm interactions in order to reduce off-farm input use and to improve the efficiency of farming systems. Technologies emphasized tend to enhance the functional biodiversity of agroecosystems as well as the conservation of existing on-farm resources. Promoted technologies such as cover crops, green manures, intercropping, agroforestry and crop-livestock mixtures, are multi-functional as their adoption usually means favorable changes in various components of the farming systems at the same time.

Agroecosystem Processes Optimized Through the Use of Agroecological Technologies

- organic matter accumulation and nutrient cycling
- soil biological activity
- natural control mechanisms (disease suppression, biocontrol of insects, weed interference)
- resource conservation and regeneration (soil, water, germplasm, etc.)
- general enhancement of agrobiodiversity and synergism between components

Challenging Areas for the Application of Agroecological Principles

Mimicking Nature

At the heart of the agroecology strategy is the idea that an agroecosystem should mimic the functioning of local ecosystems thus exhibiting tight nutrient cycling, complex structure, and enhanced biodiversity. The expectation is that such agricultural mimics, like their natural models, can be productive, pest-resistant and conservative of nutrients.

Enhancing Productivity through Multi-Species Agroecosystems

Many agricultural studies have shown that complex, multi-species agricultural systems are more dependable in production and more sustainable in terms of resource conservation than simplified agroecosystems. Significant yield increases have been reported in diverse cropping systems compared to monocultures. Enhanced yields in diverse cropping systems may result from a variety of mechanisms, such as more efficient use of resources (light, water, nutrients) or reduced pest damage.

Healthy Soils – Healthy Plants

The ability of a crop plant to resist or tolerate pests is tied to optimal physical, chemical and biological properties of soils, as it is now known that a diverse and active community of soil organisms all contribute to plant health. Organic-rich soils generally exhibit complex food webs and beneficial organisms that prevent infection by disease-causing organisms.

Designing Pest Suppressive Cropping Systems

Much research has shown that increasing plant diversity in agroecosystems leads to reduced herbivorous insect abundance. Insect pest species usually exhibit higher abundance in monoculture than in diversified crop systems. Plant diseases are also amenable to regulation via diversification as there is evidence suggesting that genetic heterogeneity reduces the vulnerability of monocultured crops to disease.



Applying Agroecology to Improve the Productivity of Small Farming Systems

Since the early 1980s, hundreds of agroecologically-based projects have been promoted by non-government organizations (NGOs) throughout the developing world, which incorporate elements of both traditional knowledge and modern agricultural science. A variety of projects exist featuring resource-conserving yet

highly-productive systems, such as polycultures, agroforestry and the integration of crops and livestock, etc. Such alternative approaches can be described as low-input technologies, but this designation refers to the external inputs required. The amount of labor, skills and management that are required as inputs to make land and other factors of production most productive is quite substantial. So rather than focus on what is not being utilized, it is better to focus on what is most important to increase food output, labor, knowledge and management.

The analysis of dozens of NGO-led agroecological projects show convincingly that agroecological systems are not limited to producing low outputs, as some critics have asserted. Increases in production of 50-100% are fairly common with most alternative production methods. In some of these systems, yields for crops that the poor rely on most- rice, beans, maize, cassava, potatoes, barley - have been increased by several - fold, relying on labor and know-how more than on expensive purchased inputs, and capitalizing on processes of intensification and synergy.

More important than just yields, agroecological interventions raise total production significantly through diversification of farming systems, such as raising fish in rice paddies or growing crops with trees, or adding goats or poultry to household operations. Agroecological approaches increased the stability of production as seen in lower coefficients of variance in crop yield with better soil and water management.

A recent study of 208 agroecologically-based projects and/or initiatives throughout the developing world, documented clear increases in food production over some 29 million hectares, with nearly 9 million households benefiting from increased food diversity and security. Promoted sustainable agriculture practices led to 50-100% increases in per hectare food production (about 1.71 T per year per household) in rainfed areas typical of small farmers living in marginal environments; that is an area of about 3.58 million hectares, cultivated by about 4.42 million farmers. Such yield enhancements are a true breakthrough for achieving food security among farmers isolated from mainstream agricultural institutions. (Pretty and Hine, 2000)

Scaling Up of Agroecological Innovations

Throughout Africa, Asia and Latin America, there are many NGOs involved in promoting agroecological initiatives that have demonstrated a positive impact on the livelihoods of small farming communities in various countries. Success is dependent on the use of a variety of agroecological improvements that in addition to farm diversification favoring a better use of local resources, also emphasize human capital enhancement and community empowerment through training and participatory methods as well as higher access to markets, credit and income- generating activities. Analysts point at the following factors as underlying the success of agroecological improvements:



- appropriate technology adapted by farmers' experimentation
- social learning and participatory approaches
- good linkages between farmers and external agencies, together with the existence of working partnerships between agencies
- presence of social capital at local level

In most cases, farmers adopting agroecological models achieved significant levels of food security and natural resource conservation. Given the benefits and advantages of such initiatives, two basic questions emerge: (1) *why these benefits have not disseminated more widely*; and (2) *how to scale-up these initiatives to enable wider impact*.

Obviously, technological or ecological intentions are not enough to disseminate agroecology. There are many factors that constrain the implementation of sustainable agriculture initiatives (Table 2).

Table 2. Key Constraints to Implementing Sustainable Agriculture Partnerships

| |
|---|
| <p>Macroeconomic policies and institutions</p> <ul style="list-style-type: none"> <input type="checkbox"/> Pesticides incentives and subsidies <input type="checkbox"/> Export orientation and monocultural focus of conventional policies <input type="checkbox"/> Lack of incentives for institutional partnerships <p>Pressures from agrochemical companies</p> <ul style="list-style-type: none"> <input type="checkbox"/> Political and economic power wielded against integrated pest management (IPM) <input type="checkbox"/> Advertising and sales practices <p>Funding/donor issues and sustainability questions</p> <ul style="list-style-type: none"> <input type="checkbox"/> Lack of funding, especially long-term support <input type="checkbox"/> Lack of recognition of IPM/sustainable agriculture benefits <input type="checkbox"/> Need for reducing dependency on donors and for developing local support <p>Lack of information and outreach on innovative alternative methods</p> <p>Weak internal capacities of institutions involved</p> <ul style="list-style-type: none"> <input type="checkbox"/> Institutional rigidities among some collaborators <input type="checkbox"/> Lack of experience with agroecology and participatory methods <input type="checkbox"/> Social and health concerns sometimes neglected <input type="checkbox"/> Lack of communication and cooperation skills (among some groups) |
|---|

Major changes must be made in policies, institutions and research and development agendas to make sure that agroecological alternatives are adopted, made equitably and broadly accessible, and multiplied so that their full benefit for sustainable food security can be realized. This requires:

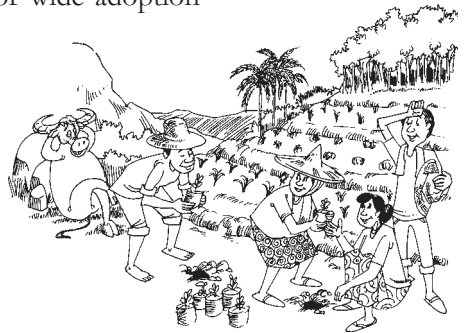
- changes in policies to stop subsidies of conventional technologies and to provide support for agroecological approaches
- appropriate equitable market opportunities including fair market access and market information to small farmers
- security of tenure and progressive decentralization processes
- increasing public investments in agroecological-participatory methods



One important factor limiting the spread of agroecological innovations is that for the most part, NGOs promoting such initiatives have not analyzed or systematized the principles that determined the level of success of the local initiatives, nor have been able to validate specific strategies for the scaling-up of such initiatives. A starting point therefore should be the understanding of the agroecological and socio-economic conditions under which alternatives were adopted and implemented at the local level. Such information can shed light on the constraints and opportunities farmers are likely to face at the regional level.

An unexplored approach is to provide additional methodological or technical ingredients to existing cases that have reached a certain level of success. Clearly, in each country there are restraining factors such as lack of markets and lack of appropriate agricultural policies and technologies which limit scaling up. On the other hand, opportunities for scaling up exist, including the systematization and application of approaches that have been successful. Thus, scaling up strategies must capitalize on mechanisms conducive to the spread of knowledge and techniques, such as:

- ❑ strengthening of organizations through alternative marketing channels
- ❑ develop methods for rescuing/collecting/evaluating promising agroecological technologies generated by experimenting farmers and making them known to other farmers for wide adoption
- ❑ training government research and extension agencies on agroecology in order for these organizations to include agroecological principles in their extension programs
- ❑ develop working linkages between NGOs, government and farmers' organizations for the dissemination of successful agroecological production systems emphasizing biodiversity management and rational use of natural resources



The main expectation of a scaling-up process is that it should expand the geographical coverage of participating institutions and their target agroecological projects while allowing an evaluation of the impact of the strategies employed. A key research goal should be that the methodology used will allow for a comparative analysis of the experiences learned, extracting principles that can be applied in the scaling-up of other existing local initiatives, thus illuminating other development processes.

From a worldwide survey of sustainable agriculture initiatives analysts concluded that if sustainable agriculture is to spread to larger numbers of farmers and communities, then future attention needs to be focused on:

- ❑ ensuring the policy environment is enabling rather than disabling
- ❑ investing in infrastructure for markets, transport and communications
- ❑ ensuring the support of government agencies, in particular, for local sustainable agricultural initiatives
- ❑ developing social capital within rural communities and between external agencies

Source: Pretty and Hine, 2000

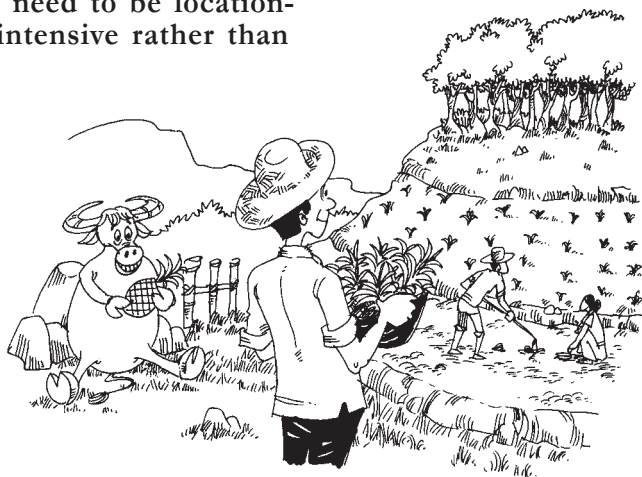
Outlook and Prospects

There is no question that small farmers located in marginal environments in the developing world can produce much of their needed food. The evidence is conclusive: new approaches and technologies spearheaded by farmers, NGOs and some local governments around the world are already making a sufficient contribution to food security at the household, national and regional levels. A variety of agroecological and participatory approaches in many countries show very positive outcomes even under adverse conditions. Potentials include: raising cereal yields from 50-200%, increasing stability of production through diversification, improving diets and income, contributing to national food security and even to exports and conservation of the natural resource base and agrobiodiversity. Whether the potential and spread of these thousands of local agroecological innovations is realized depends on several factors and actions.

1. Proposed NRM strategies have to deliberately target the poor, and not only aim at increasing production and conserving natural resources, but also create employment, provide access to local inputs and output markets. New strategies must focus on the facilitation of farmer learning to become experts in NRM and at capturing the opportunities in their diverse environments.

2. Researchers and rural development practitioners need to translate general ecological principles and natural resource management concepts into practical advice directly relevant to the needs and circumstances of smallholders. The new pro-poor technological agenda must incorporate agroecological perspectives. A focus on resource conserving technologies, that uses labor efficiently, and on diversified farming systems based on natural ecosystem processes will be essential. This implies a clear understanding of the relationship between biodiversity and agroecosystem function and identifying management practices and designs that will enhance the right kind of biodiversity which in turn will contribute to the maintenance and productivity of agroecosystems.

3. Technological solutions need to be location-specific and information-intensive rather than capital-intensive. The many existing examples of traditional and NGO-led methods of natural resource management provide opportunities to explore the potential of combining local farmer knowledge and skills with those of external agents to develop and/or adapt appropriate farming techniques.



4. Any serious attempt at developing sustainable agricultural technologies must bring to bear local knowledge and skills on the research process. Particular emphasis must be given to involving farmers directly in the formulation of the research agenda and on their active participation in the process of technological innovation and dissemination. The focus should be on strengthening local research and problem-solving capacities. Organizing local people around NRM projects that make effective use of traditional skills and knowledge provides a launching pad for additional learning and organizing, thus improving prospects for community empowerment and self-reliant development.

5. Major changes must be made in policies, institutions and research and development to make sure that agroecological alternatives are adopted, made equitably and broadly accessible and multiplied so that their full benefit for sustainable food security can be realized. Existing subsidies and policy incentives for conventional chemical approaches must be dismantled. Corporate control over the food system must also be challenged. The strengthening of local institutional capacity and widening access of farmers to support services that facilitate use of technologies will be critical. Governments and international public organizations must encourage and support effective partnerships between NGOs, local universities and farmer organizations to assist and empower poor farmers to achieve food security, income generation and natural resource conservation.

6. There is also need to increase rural incomes through interventions other than enhancing yields, such as complementary marketing and processing activities. Therefore equitable market opportunities should also be developed, emphasizing fair trade and other mechanisms that link farmers and consumers more directly.

The ultimate challenge is to increase investment and research in agroecology and scale up projects that have already proven successful to thousands of other farmers. This will generate a meaningful impact on the income, food security, and environmental well-being of the world's population, especially of the millions of poor farmers yet untouched by modern agricultural technology.

Elements and Contributions of an Appropriate NRM Strategy

- Contribute to greater environmental preservation
- Enhance production and household food security
- Provide on and off-farm employment
- Provision of local inputs and marketing opportunities
- Promotion of resource-conserving multifunctional technologies
- Participatory approaches for community involvement and empowerment
- Institutional partnerships
- Effective and supportive policies



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**Participatory Research and
Development for Sustainable
Agriculture and Natural Resource
Management: A Sourcebook**

Participatory Research and Development in Natural Resource Management: Towards Social and Gender Equity



The management of agriculture and natural resources involves interactive roles of diverse social actors. These actors usually include a diversity of stakeholders including small and large farmers, business entrepreneurs, local government authorities, resource-based user groups, community-based organizations and others. Different individuals and groups of individuals are bringing different perspectives, experiences, knowledge and interests to the management of resources, and to any associated research and development initiatives. They have different and often changing access to and control over, decision-making, and specific knowledge about natural resource management processes. These stakeholders are not homogenous or fixed groups, but differentiated by social categories of gender, class, caste, ethnicity and age.

Gender is a culturally-specific set of characteristics that identifies the social behavior for women and men and the relationship between them. Gender refers to social differences, as opposed to biological ones, between women and men that have been learned, are changeable over time, and vary widely both within and between cultures.

Gender Analysis is the systematic examination of the roles, relationships and processes between women and men in all societies, focusing on imbalances in (decision-making) power, wealth and workload. Gender analysis can also include the examination of the multiple ways in which women and men, as social actors, engage in strategies to transform existing roles, relationships and processes in their own interest and in the interest of others. Gender analysis is cross-cut by other axes of social differentiation, including class, caste, ethnicity and age.

(Adapted from European Commission in Adamo and Horvorka, 1998)

Power relations between these different actors are greatly influenced by gender, class, ethnicity, and often determine who may have access to a forest and its products, who manages the water resources in the community, who decides which crops are planted and where, etc. Groups such as the poor, socially or politically outcast, and ethnic minorities often are the most marginalized having limited access to decision-making power over how ecosystems and resources are managed. In many countries, women are particularly disadvantaged, with limited ownership and access rights to resources. They often derive little or no benefit. However, sometimes, marginalized groups, including women, may be able to ‘negotiate’ access to resources from those with more powerful access and decision-making positions. Gender issues are especially pertinent. They shape not only the different roles and responsibilities of women and men, but also the relations between women and men, and how these affect access to and control over natural resources.

‘Traditional’ research and development activities in the natural resource sector (as in other sectors) have been criticized for not reaching or involving the poor, women and other socially-disadvantaged groups. These groups have not been participants in or beneficiaries from the research and development (R&D) process. There has been increasing emphasis, particularly among gender activists, on how to include women’s contributions in planning and decision-making in research and development activities. This continues to be a challenge.

Participatory research and development (PR&D) should aim to facilitate understanding of the way social and gender roles and relations affect social, economic and ecological processes. Key questions are:

- ❑ How do women and men construct and perceive natural resource management in their communities and region?
- ❑ How do social and gender relations determine the access, use and management of resources?
- ❑ How can participatory research facilitate marginalized groups to have more ‘space’ to manoeuvre or to increase their bargaining position for improved access to and benefits from resources?

Ultimately, a sound understanding of social differences is needed to answer questions of **who participates and how**, and **who benefits and how**, from research and development interventions, projects, programs or policies.

Why are social and gender issues in participatory research on natural resource management important?

- ❑ **Developing a better understanding and awareness of the social and power relations that govern access to, use of, and control over natural resources.** This involves understanding the differences and the inequities of social actors, and is dependent on the local contexts.
- ❑ **Facilitating the recognition of the social and gendered nature of technologies, policies and interventions.** Policies and technologies are value-laden, and how women and men, and different social groups, are involved and impacted differently.
- ❑ **Creating a space for social actors (women and men) to ‘manoeuvre’, and to enhance the bargaining and negotiating power** of those marginalized and discriminated groups, leading to empowerment and transformation where they have more access to, control over, and benefits from natural resources.



How can PR&D Approach Social/Gender Issues in Natural Resource Management?

Participatory research and development activities should facilitate

understanding and awareness among researchers and community members alike **of social and power relations in the community**, and of the differences and inequities regarding the access to, control over, and benefits from natural resources. In participatory approaches to research and development, there is often discussion of working with the **'community'**. However, it is important also to remember that the 'community' (or communities) are not homogenous (and 'community' itself is not always a clear concept). Communities are made up of these diverse sets of social actors, governed by social and power relations, and various decision-making processes regarding ecosystem management and resource use. This also holds true for the level of the 'household', which is a unit made up of diverse individuals.

Participatory research processes must aim to involve the diverse social actors, and particularly those most marginalized, in a meaningful way. This means, in part, giving **representation** to these groups in the design and implementation of PR&D initiatives. It also means giving **voice** - not only the space for voice, but a process where that voice is heard and where engagement takes place.

Much research in natural resource management on social, and particularly, gender issues focus on the division of labor and roles and responsibilities. Many participatory rural appraisal (PRA) tools, like seasonal calendars and daily activity charts, are used to document and understand the ways in which resources are managed. However, many researchers 'stop' there. It is also important to try to understand the power relations, inequities and decision-making processes between these different groups as integral parts of the complexity of resource management problems and their management. Who makes decisions? When and how? Who benefits, when and how?

Participatory research and development, by definition of the term 'participation', should create a space for involvement of all the different stakeholders involved in using and managing the natural resources. These processes can enable the involvement and active engagement of those more disadvantaged groups who are generally left out of decision-making processes. The term 'participation' evokes a sense of **inclusion** of each of these diverse sets of actors in the research

initiative. However, this is not always the case, and participatory research is not automatically socially-equitable or gender-sensitive. Participation is often determined by rules, norms and perceptions of communities and societies, and these factors may disadvantage women or other social groups (Agarwal, 2001). The potential of these disadvantaged groups to alter them depend on the bargaining power and political relations within the household, community and the state.

They also depend on the participatory and facilitative nature of the project or initiative, and the commitment of the researchers to consider and address these issues.



Some Lessons Learned from Research and Capacity Building Activities in Asia supported by the International Development Research Center (IDRC)

- ❑ **Knowledge and experience of social science research among NRM researchers is limited.** Few NRM researchers with which the programs have partnered have strong conceptual background of social/gender analysis, and even less so of practical tools and methodologies. Many partners may have a basic understanding of concepts but are unsure of how to implement social/gender research and analysis in the field.
- ❑ **Social science components are not well integrated with natural science components in research.** For those projects that do contain social/gender analysis, often it is a completely distinct component and there is little discussion or interaction with natural resource scientists. Rather, it is as if there are two (or more) separate projects, and hence results are not well integrated in the development of appropriate interventions.
- ❑ **Partners have different starting points, interest and expertise about social and gender issues.** We can not assume that a single approach is the answer to meeting these different needs, but rather aim to provide different mechanisms to provide support and training.
- ❑ **'Gender blindness' or refusal to acknowledge the importance of gender issues is common.** Many researchers, community members and policymakers feel threatened by the concept of 'gender.' Gender analysis is mistakenly assumed to represent a radical feminism that these stakeholders do not identify with and so dismiss as being irrelevant or driven by Western interests.
- ❑ **Short-term training has limited impact.** While short-term training (one week or even two week) programs on social/gender issues and analysis can be useful to provide an initial overview and methodologies, many researchers return to their projects unsure of how to implement these aspects into the programs, and without much support to do so. There is a need for longer term commitment and support to our partners.
- ❑ **The benefits of networking have been strongly articulated.** Researchers have voiced their interest and advantages of learning from practical experiences of other researchers, particularly in the region. There are also benefits of a peer support network of researchers who are interested in integrating social and gender analysis in projects, and together learning how.
- ❑ **Resources on social/gender analysis and NRM in Asia are not widely available.** In Asia, most training and methodological materials on social/gender analysis do not have direct application for natural resource management (with some exceptions of course). Rather, emphasis is still on issues of "women and development." Other social/gender analysis and NRM resources are available internationally but may be in very different socio-cultural settings, and the cost of attending them may be prohibitive.



Source: Vernooy, R. and E. Fajber. 2005. Making Gender/Social Analysis Work for Natural Resource Management Research: An Umbrella Program for Building Capacity for Researchers.

There is a growing body of literature and cases that illustrate how 'participatory' approaches have actually further led to **exclusion** rather than inclusion (Agarwal, 2001; Cornwall, 2000) because they have not adequately considered, understood, or addressed the power relations and social differentiation within communities. For example, only local elites or authorities in the communities may be involved in R&D initiatives (which could be in part because they are easier to reach), and more poor or marginalized groups may be absent (who are harder to contact and involve). Or, it may be primarily male community members who meet with researchers to discuss the project and activities, and women, or few women, may be involved.

Many projects have made significant attempts to promote women’s involvement in NRM projects through participatory approaches. Some may see increasing women’s participation as increasing the numbers of women involved in a project, or having a small activity that focuses on women (the ‘add women and stir method’). However, this may not actually translate to engaging in meaningful participation. Attempts may be made to ‘invite’ women to meetings and group discussions and the like and this is considered inclusion. But these may be held at times or places where it is difficult for women to participate for example if they are looking after children, are working in the fields, or they are unable to travel long distances. Or women may be invited to participate in meetings, but are silent, or are given the task of bringing tea and food. Or women may be outspoken, but their contributions are ignored by the male elite, and do not impact on decisions made. Attention must be paid to develop strategies, depending on the local context to integrate and involve women, and other marginalized groups, into the participatory research and development processes in a meaningful way.

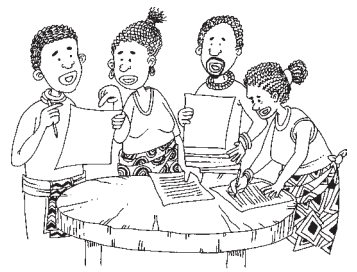
“To make a difference, participatory development must engage with questions of difference: to effectively tackle poverty, it must also go beyond ‘the poor’ as a lumpen category, and engage with the diversity of women’s and men’s experiences of poverty and powerlessness.” (Cornwall, 2001)

Participatory research processes not only facilitate involvement of different social actors, it can also support a process to understand how various interventions and policies may impact various social groups differently. These processes, facilitated through participatory monitoring and evaluation, can help generate knowledge and discussion on how the research process itself may impact on different groups in different ways.

Who Participates? How? Who Decides? Who Benefits?

Simple questions, perhaps, but also very challenging ones and it is difficult to translate these questions into participatory practice. Researchers work in complex socio-cultural, economic and political contexts, often with deeply embedded social relations. How does one try to support processes of research and development that address inequities?

The most critical point is one of awareness. This is really the first step! If researchers, and the communities with whom they are working, are thinking about these questions (who is participating? who ‘wins’? who ‘loses?’), they are better placed to consider mechanisms and strategies to address this. And, participatory approaches where research and development strategies are designed *together* with communities enable a more nuanced understanding of these issues, and a *transparency* that may facilitate change.



Participatory research and development strategies, then, must consider mechanisms to enable *meaningful* participation by the different stakeholders involved in the research. Given the social, cultural and political diversity in which projects and programs are situated, strategies and approaches will not be a

‘blueprint’ approach, but rather must be contextualized, developed and adapted by research and development practitioners -- together with the members of the communities in which they are working.

Power relations are not fixed or static, but rather are negotiated over space and time, and depend on various factors in the local context (Cornwall, 2000). Participatory approaches, and particularly emphasis on social and gender analysis, can help to identify those spaces, and also to identify strategies for supporting participatory research and development to **build on and strengthen the existing ‘spaces for maneuvering’ that more marginalized groups may have to access and benefit from natural resources.**

Stakeholders who are targeted in NRM research projects as the prime beneficiaries should be the actors and decision-makers in how the research and development initiatives are carried out, and they should have an ‘equal’ place in the process along with other more powerful actors in the community. While such an equitable footing may be overly ideal, participatory research can aim to move towards ‘leveling the playing field’ – both in terms of the research and development process itself, and more broadly on the access to, and management of the natural resources. In this way, participatory research can enable disadvantaged groups to develop or strengthen space and negotiation for access to these resources, and ultimately for better livelihoods.

Such an approach can be ‘transformative’ in addressing social and gender inequities and power relations. Cornwall (2000) adapts Sarah White’s (1996) typology of different types of ‘participatory approaches’ to discuss different ‘meanings’ of participation for stakeholders, illustrating the potential of a transformative approach (Table 1).

Table 1. Typology of Participatory Approaches and Meanings of Participation for Stakeholders

| Form | What ‘participation’ means to the implementing agency | What ‘participation’ means for those on the receiving end | What ‘participation’ is for |
|-----------------------|---|--|---|
| Nominal | Legitimation – to show they are doing something | Inclusion – to retain some access to potential benefits | Display |
| Instrumental | Efficiency – to limit funders’ input, draw on community contributions and make projects more cost-effective | Cost – of time spent on project-related labor and other activities | As a means to achieving cost-effectiveness and local facilities |
| Representative | Sustainability – to avoid creating dependency | Leverage – to influence the shape the project takes and its management | To give people a voice in determining their own development |
| Transformative | Empowerment – to strengthen people’s capabilities for decision-making and action | Empowerment – to be able to decide and act for themselves | Both as a means and an end, a continuing dynamic |

Through meaningful participatory research and development in agriculture and natural resource management, communities, government, donors and the diverse social actors can support a process of *transformative* approaches where those most marginalized groups are *empowered*, where they are able to negotiate space to improve their well-being and their livelihoods, while also ensuring the sustainable management of the resource base on which they depend.



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**Participatory Research and
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Understanding and Getting the Most from Farmers' Local Knowledge



Anthropologists have studied local knowledge since the 1960s, with a set of formal techniques and theory called ethnoscience (for example, Berlin, 1992 and Conklin, 1962, among many others that could be cited). The American anthropologist Eugene Hunn's thoughtful book *The Big River* describes how Indians along the Columbia River still rely on and know a great deal about wild plants (Hunn, 1990). The *Land Against Time* by the British anthropologist Paul Sillitoe is an encyclopaedic description of environmental knowledge of the Wola people in Highland New Guinea. Sillitoe shows that for some subjects (e.g., sweetpotato varieties), local knowledge is astoundingly complex. For other topics, local knowledge is fragmentary or incomplete (e.g., pests and diseases and geology) while for others (like soils) local knowledge is deep and detailed, yet bears little resemblance to modern scientific accounts of the same subject (Sillitoe, 1996).

There are four basic types of local knowledge (*deep, shallow, missing and mistaken*), depending on whether the things in the natural world are important to people or not, and if they are easy or difficult to observe.

Table 1 is a simple way to classify knowledge which we have found useful – it is very important that whenever dealing with farmers on a specific issue that we as scientists are clear in our own minds about which of the boxes we are working in. It is an example of a way to formalize knowledge, which is a basic function of science.

Excerpts adapted from:
Bentley, J.W. and P.S. Baker. 2002.
Manual for Collaborative Research
with Smallholder Coffee Farmers.
Egham, UK: CABI Commodities.
130pp.

Table 1. Classification of Farmers' Knowledge

| | Not of perceived importance to local people | Of perceived importance to local people |
|-----------------------------|---|---|
| Easy to observe | <p>Shallow knowledge People do not pay much attention to some things that they can observe, because they do not consider them worth looking at.</p> <p>Example: Latin American smallholders have observed web-building spiders in coffee groves, but may not have appreciated their role as natural enemies of pests.</p> | <p>Deep knowledge Farmers know in detail the things that they can observe, and that their work forces them to look at.</p> <p>Example: Coffee growers know that bored berries harbor beetles and whether or not this might affect the sale price.</p> |
| Difficult to observe | <p>Missing knowledge Local people are unaware that some things exist, because they are small, nocturnal, camouflaged, and because necessity has not forced the people to notice them.</p> <p>Example: nematodes, parasitic wasps, microscopic fungi.</p> | <p>Mistaken knowledge Smallholders know the thing exists, because it is so important to them, but misunderstand it because it is difficult to observe.</p> <p>Example: Farmers often think new pests came inside the bottles of insecticide, without realizing that insecticide selected for them, and killed their natural enemies.</p> |

Source: Adapted from Bentley and Rodríguez, 2001.

What is Ethnoscience?

The gist of ethnoscience is learning local categories for things (insects, plants, diseases, people, etc.) and the meanings of those categories. By understanding how people use their language, we get insights into how they see the world. Hence, folk categories of knowledge are formed by mental **concepts** attached to word **labels**.

These concepts are organized into **taxonomies**, which are usually **hierarchical** (“kinds of things,” e.g., a dog is a **kind of** animal.) All languages use taxonomies, although there is a fair amount of leeway in how taxonomies are formed, e.g., Quechua may not classify the condor as a bird. Many languages spoken in the Amazon do not have words for “parrot.”

This is especially true for insects, which local people often lump into broad categories which include arthropods, worms, even rodents and lizards (Brown, 1984). These are actually **minor differences** in classification and do not mean that local people misunderstand the way the world is put together.

Brent Berlin (1992) has proposed six **levels** of folk taxonomies, which are repeated cross-culturally: (1) Kingdom; (2) Life form; (3) Intermediate; (4) Generic; (5) Specific; and (6) Varietal.



Each of these levels has its own linguistic properties. Most striking is that folk taxonomies use generic and specific labels much like Linnaean names: e.g., Honduran farmers use the term *bielo negro* (where “*bielo*” is the generic term for most plant disease and *negro* is the specific name for severe disease). Folk taxonomies make much use of **residual categories**, e.g., “just a bug” to label left-over, or under-classified organisms. Some folk taxonomies are in the form of **partonomies**, or sets of categories that are “**parts of**” another, e.g., parts of an ox plough, or parts of a plant or of an insect.

Differences and Similarities of Folk and Scientific Knowledge

The main **differences** between folk and scientific knowledge is that:

- Folk knowledge is **local**, with no pretence to describing the world in universal terms.
- Folk taxonomies **do not** usually **fill each** of the six taxonomic **levels**; many are left blank.
- Folk knowledge is (usually) **stored mentally**, which constrains memory. An entomologist can have many more names for insects because they can be stored in writing.

Similarities between folk and scientific knowledge, they both:

- Have names for things (e.g., organisms) in the real world.
- Use binomial labels, for some things.
- Organize categories into taxonomies.

Sometimes there is a **1:1 correspondence** between folk and scientific categories, but often there is not, e.g., the concept of *bielo* is applied to 30-40 different bean diseases in Honduras. It is a concept of real world phenomena, but does not have any simple analogue in scientific terms (Bentley, 1991). The **structure** of folk taxonomies is heavily influenced by whether the organisms that are being classified are **easily observed and culturally important** (see Bentley and Rodriguez, 2001).

Eliciting frames (for fieldworkers) include a few simple questions like:

- What are the kinds of X?
- What are the parts of X?
- What is the difference between X and Y?



Other Formal Properties of Folk Knowledge

Emic and Etic

These are two concepts borrowed by anthropologists from the linguistic notions of phonemic and phonetic. Roughly, emic is local knowledge and etic is scientific knowledge. An emic concept **cannot** simply be described in terms of a scientific name. This is especially true of folk entomology. It is a poor definition to say that “*cogollero*” (fall armyworm) is *Spodoptera frugiperda*.

A better definition would be:

| Emic label | Etic definition |
|------------|---|
| Cogollero | The larva of <i>Spodoptera frugiperda</i> (Lepidoptera, Noctuidae), especially in later instars, especially when in the whorl of the maize plant. |

Emic and etic descriptions can also be given for **behavior**. For example, when a Honduran *campesino* uses magical rites to control grass loopers, an entomologist may give one (etic) analysis of why the magical rites seem to control the insects, while an anthropologist may provide another (etic) analysis of how the rite functions. After the rituals, the farmers may think God has answered their prayers and eliminated the pest, while a well-informed entomologist would say that the loopers have pupated.

Meaning and Knowledge

Scientific categories are based on semantic premises of necessary and sufficient conditions: an insect either is or is not a Coleoptera. It cannot be partially Coleoptera. As the above fall armyworm example suggests, folk categories may be defined so that some objects “almost” or “barely” meet the definition. For Honduran *campesinos*, small *cogolleros* are still *cogolleros*, but the bigger ones are better or more proper examples of a *cogollero*. And the same insect when found in a maize ear, is called an *elotero*, which is almost a *cogollero*, but not quite.

Lore

Defining a set of folk categories is a good start to describing folk knowledge, but local people have a deeper understanding for each of those concepts, which we also need to know if we are going to work with rural people as colleagues in research.

The Sociology of Knowledge

This may be rather complex, with different people (women, elders, ritual specialists) knowing certain things. Games and drawings can be used to elicit some of these differences (Nazarea-Sandoval, 1995). However, much of folk knowledge is shared by the entire group of people (Hays, 1983).



Memory Load

There is some suggestion that people can hold about 500 names in their head, 500 personal names of people, 500 names for plants, 500 place names, etc. This has obvious implications for folk entomology.

Chronologies

Some folk knowledge is organized into chronologies, e.g., the folk phenology of maize in Honduras.

Alternative Classifications

Povinelli (1990) claims that the Emiyenggal and Batjermal peoples of Australia classify animals in four different kinds of taxonomy (habitat, morphology, function, food criteria) depending on context. In fact, agricultural scientists do the same thing, with alternate classifications by phylogeny (e.g., horse is a kind of equine) or by function (horse is a kind of livestock). Integrated pest management (IPM) experts routinely classify diverse organisms into special categories like “pests of maize” or “pests of coffee” which are not at all phylogenetic.

Regional Synonyms

Unlike scientific classifications, folk taxonomies may use different labels for similar categories, from one place to the next.

Farmer Experiments

Farmers constantly experiment, but we often do not pay enough attention to them. Noticing farmer experiments is important for deciding how we can work with farmers as colleagues (Table 2).

Table 2. Summary of Farmer Experiments Documented in a Recent Coffee Pest Project

| Country | Farmer Experiments and Inventions |
|----------|--|
| Ecuador | <input type="checkbox"/> Aprons of various mixes of organic fertilizer to improve soil fertility, control weeds and avoid mechanical damage to coffee trees. <input type="checkbox"/> A fertilization experiment with <i>Schizolobium</i> trees. <input type="checkbox"/> A new metal tool for harvesting cacao. |
| Honduras | <input type="checkbox"/> First fruits: early hand picking of insect-damaged coffee berries. <input type="checkbox"/> Fallen coffee fruit as a proxy for hot spots (with insecticide applied only on hot spots). <input type="checkbox"/> Rapid identification of individual coffee trees with high levels of infestation, and immediate application of insecticide, but only on those trees. |
| Mexico | <input type="checkbox"/> Application of 0.25 liters of endosulfan to one <i>cuerda</i> of coffee, to see if it is effective. A <i>cuerda</i> is a land measure of 25x25 varas (0.86m), equal to 462.25 sq.m. <input type="checkbox"/> Coffee varietal trial to test for resistance. |

Smallholder farmers have knowledge, and it is organized in ways that are not as strange as they seem. Farmers also conduct experiments. In other words, (many) farmers are knowledgeable and creative, which is something researchers look for in choosing colleagues. However, farmer experiments are organized in remarkably different ways from those of formal research (Table 3).

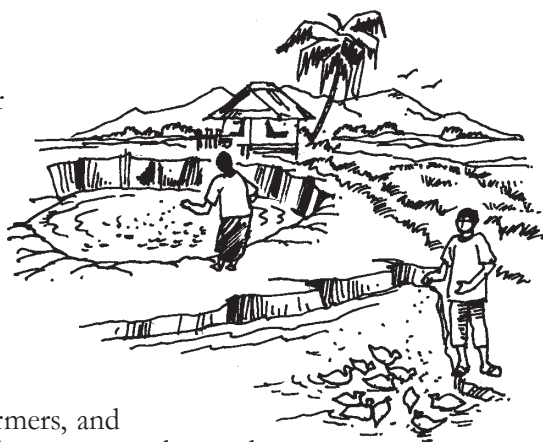
Table 3. Differences Between the Research Style of Smallholder Farmers and Scientists

| Characteristic | Scientist | Farmer |
|--------------------------|-----------------------------|-----------------------------------|
| Shape | Square or rectangular | Irregular |
| Size | The same for each treatment | Different for each treatment |
| Repetitions | A must | Not used |
| Numbers (quantification) | Important | Visual analysis, with few numbers |
| Planning | Absolutely essential | Sometimes used |
| Serendipity | Less often | More often |
| Who is it for? | Others | For that farmer |
| Replicability | Always important | Not always |
| Capital cost | More | Less |



Filling in Gaps in Knowledge

We have suggested above that there are four kinds of knowledge. Whether researchers decide there are four, three, or six kinds of knowledge is not quite as important as whether they make a serious effort to inventory farmer knowledge during the first phase of the project, as part of the assessment of research demand. Use that inventory now to prepare training sessions with the communities. During the demand assessment phase, researchers learn from farmers, and now they should return the favor, helping farmers to understand some key scientific concepts.



Each researcher has to understand what farmers know, do not know, or misunderstand, and whether the available scientific knowledge is relevant or whether it needs fundamental research. It is no longer enough to develop techniques on-station and then blame extensionists when farmers reject the ideas. Researchers may be increasingly exhorted to not only develop new knowledge but also promote it and ensure that it is put to use. In order to do this they have to create a framework of the relevant knowledge and its use and place themselves and the farmers and extensionists within that structure. Making a table or a diagram is probably the easiest way to clarify what each group of stakeholders knows. Once they have done this, they may find their work more satisfying and easier to defend against critics. Here we offer a few ideas, based on the four types of local knowledge (Table 4).

Table 4. Dos and Dont's for Teaching Ideas, by Type of Knowledge

| Type of Knowledge | Example | Don't | Do |
|-------------------|--|---|---|
| Deep | How to harvest coffee | Bore farmers out of their minds by spending a whole afternoon telling them things they already know, e.g., that the ripe, red berries are the easiest to process. | Ask the farmers themselves to explain the topic. They can often do so quickly and effectively. Add any clarifications if they are necessary, and use their remarks as a bridge into related topics. |
| Shallow | Coffee diseases | Confuse farmers by using scientific names for diseases they know by other names. Give them lots of irrelevant detail. | Use local names to discuss the diseases. Discuss why the trees become diseased and suggest improved control strategies. |
| Missing | Parasitic Hymenoptera, nematodes, etc. | Make people feel like idiots for not knowing that these things exist. | Use microscopes, rearing chambers and other devices to help farmers see these creatures. Explain their ecological roles. |
| Mistaken | Dumping coffee pulp into bodies of water | Lecture community members like they were school children. Use lots of rhetoric from deep ecology. | Show the people that you understand why they do what they do. Convince them that it is in their own best interest to save the pulp for fertilizer. |

Conclusion

Local knowledge is complex, but with certain irregularities. It may seem haphazard at first glance, but it is structured. It has formal properties. Folk biology is structured like formal biological knowledge, in some ways, but not in others. There is, of course, more to it, but the technical literature is fairly accessible. Readers who are interested can read some of the references cited below.



Local knowledge should neither be romanticized nor looked down upon. Learning the local knowledge of any topic takes some time, but it is worth doing. Whether for extension or research, learning what the local people think and know is the foundation for collaborating with them as colleagues.

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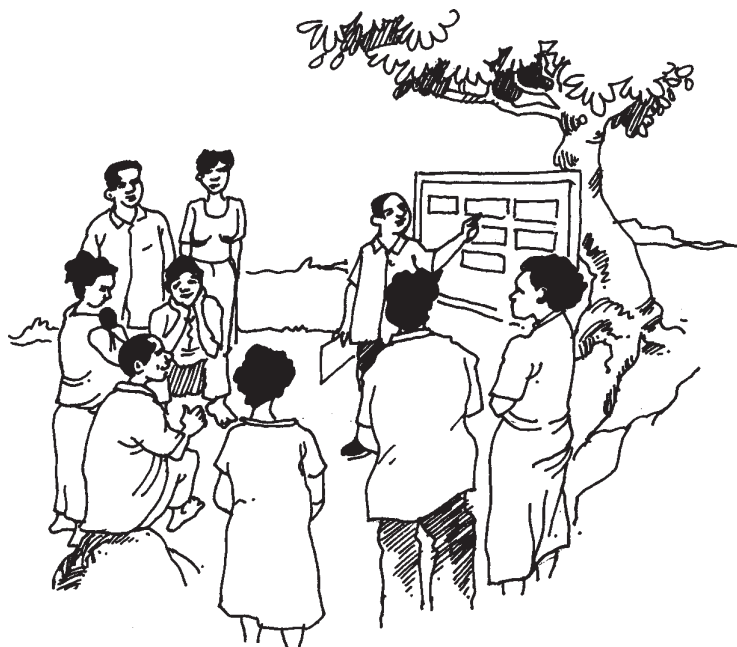
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**Participatory Research and
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Indigenous Knowledge: A Conceptual Framework and a Case from Solomon Islands



Despite unprecedented interest in local and indigenous ecological knowledge (IEK) over the last 20 years, there is still a lack of awareness of the complexity in IEK and the barriers to its effective use for ecosystem management. Development professionals and project participants often minimize the importance of social structures and biophysical features of the ecosystem that support systems of IEK and how the process of change impacts that system.

This paper describes research that attempts to expand and refine the understanding of IEK as dynamic and place-based to better inform contemporary ecosystem management. Local ecological knowledge can be understood as knowledge that emerges from a complex of *context*, *practice* and *belief* (CPB). This conceptual framework incorporates structural and organizational features of human ecosystem interaction and concepts of space and time in the understanding of IEK.

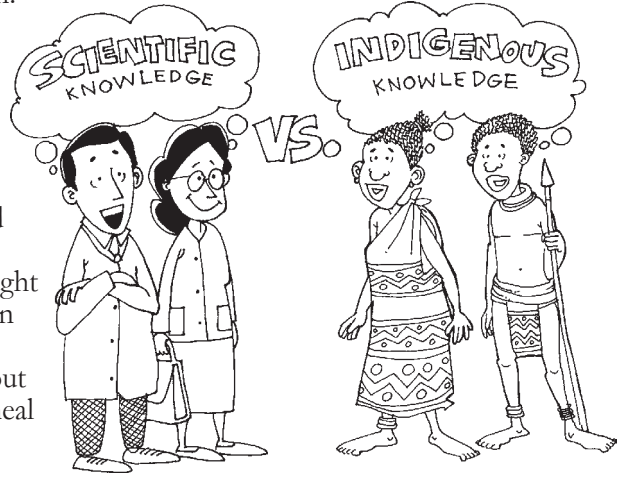
A case example from the communities of Uzamba and Valapata in the Solomon Islands shows that understanding how people are engaged within their surroundings, instead of documenting knowledge that can be articulated, can assist in bridging differences in worldviews between researchers and indigenous peoples.

Adapted from:
Woodley, E. 2004. Local and Indigenous Ecological Knowledge as an Emergent Property of a Complex System: A Case Study in the Solomon Islands. Paper prepared for the Millenium Ecosystem Assessment Conference "Bridging Scales and Epistemologies", 17-20 March 2004. Alexandria, Egypt.

Clash Between Worldviews

Researchers often emphasize the factual aspects of indigenous knowledge over the spiritual foundations, worldviews and values of indigenous peoples, and this has not served indigenous peoples nor the environment well. Documentation and integration of local knowledge over the last 10 years has done little to protect the land from environmental destruction.

Understanding the complexity of IEK goes far beyond consulting with local community members to document species names, classification systems, the local uses of plants, changing weather and animal migration patterns. This kind of 'directed' consultation usually results in one worldview being brought under the auspices of another, and in the process, the local knowledge is decontextualized as facts are taken out of context and extracted in a piecemeal fashion. Such treatment of local ecological knowledge by researchers presumes that knowledge held collectively in communities can be documented without consideration of how knowledge is a dynamic interplay of a complexity of variables.



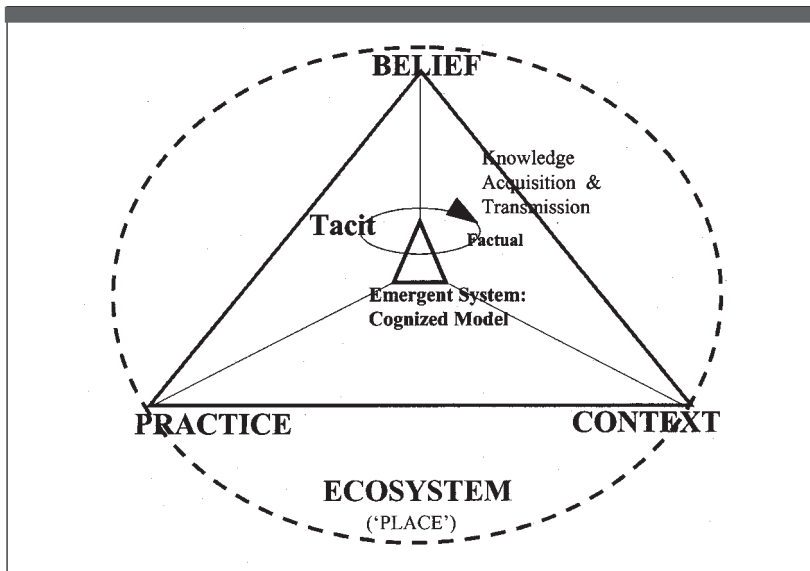
Another assumption in development ideology is that there will be epistemological compatibility between project participants. Presupposing knowledge compatibility does not acknowledge the complexity of local beliefs, practice and context operative in communities and how this shapes local epistemology, or ways of knowing. It remains a challenge to develop a 'conceptual symbiosis' (Hornborg, 1994) between all players in a development initiative, be they indigenous community members or western-trained academic scholars who have never lived in a small village. A conceptual framework is needed within which to view local and indigenous ecological knowledge – one that goes beyond the imposition of one worldview upon another and which, instead, transcends epistemological differences.

Understanding the epistemological basis of IEK is more about knowing *Why* rather than knowing *How* which tends to be emphasized more by western science.

A Conceptual Framework for Representing IEK

IEK can be represented as emerging from a complex system composed of three subsystems: context, practice and belief (CPB) (Figure 1). *Contextual* knowledge portrays learning due to history, demographic factors and biophysical features of place. Knowledge as *practice* portrays meaningful action, through physical interaction and experiential learning. Knowledge as *belief* portrays the influence that spirituality and values have on how people act within their ecosystem.

Figure 1. Conceptual Framework Showing the Emergence of IEK from a Traditional System where Knowledge is Acquired Within the Local Ecosystem



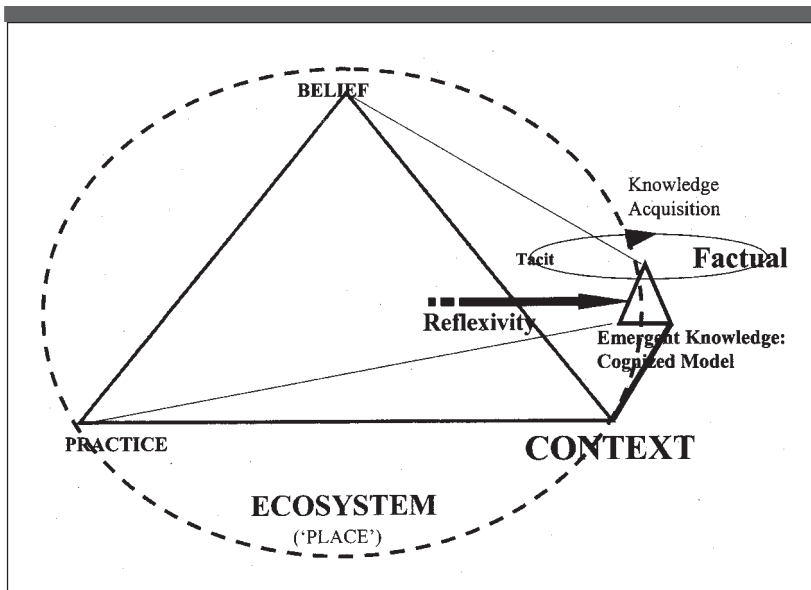
The CPB framework can be used to represent structure and organization in the complex ecosystem and it represents knowledge as engagement rather than as abstract understanding. The use of the CPB complex as a basis for understanding local knowledge systems is intended to give some order to the myriad of ecosystem variables that influence IEK. It is based on the assumption that by understanding the whole, properties emerge that are not evident in the component parts. Indigenous ecological knowledge (shown in the diagram as the triangle 'above' the three CPB components) is considered the 'property' that emerges from the interaction of multiple component parts. Structure (the CPB variables in the socio-ecological complex) and organization (cognitive process which brings forth reality) are reciprocally inter-related. Changes in structure may influence changes in cognition – changes in cognition also influence changes in structure.

Within a complex system, IEK constitutes a metaphorical mental model, which represents context-based conceptions of the environment and provides the basis for action in daily life. Mental models are not designed to conform to the reality of the outsider, but are meant to represent and engagement of people within ecosystems.

The conceptual framework also incorporates elements of scale. The spatial dimension of IEK is the holistic, embedded or 'place-based' aspect of knowledge, signifying the situatedness (at any one point in time) within the social, cultural, historical and biophysical aspects of locale or 'place'. The temporal scale of IEK is the change that may occur in any of the CPB variables and the influence this has on emergent IEK. The time scale is also shown in the diagram as the cycle of knowledge acquisition and transfer (shown as the cycle in the center of the triangle). Both factual (explicit) knowledge and tacit (implicit) knowledge constitute the mental model.

As the CPB complex changes, in time and space, IEK also changes which, in turn, influences CPB (Figure 2). The emergent knowledge is shown as displaced from the local ecosystem due to the influence of several driving forces. For example, a component of the belief subsystem is the use of specific ‘magical’ practices to cultivate the traditional crop. This has changed over both time and in space: i.e., there were several practices that were specifically linked to particular times in the year or a person’s life, that changed to practices determined by external drivers. The change in the spatial dimension is from practicing traditional forms of cultivation that included worship of deceased ancestors who resided over gardens, to an introduced belief system. The change in both time and space of this component has accelerated the loss of the local knowledge that is associated with traditional forms of spirituality. Traditional beliefs are strongly associated with the relationship to the land and resource base. As local knowledge becomes ‘lifted’ from local context, it becomes less tacit and experiential and more explicit and factual, influenced more by factors outside the local ecosystem.

Figure 2. Conceptual Framework Showing the Shifting to Disembedded IEK as Knowledge is Acquired Outside the Local Ecosystem



The process of reflexivity shown in Figure 2 emerges and influences the knowledge production cycle. Reflexivity, while displacing IEK further towards the explicit or abstract end of the knowledge continuum, is referred to as the ‘formalization’ of knowledge. It is a process that may become an important, if not critical, process enabling knowledge holders to transcend time and reclaim ‘traditional’ knowledge that was once used in a specific context and apply it within a new context. Reflexivity may also be considered part of the resilience and adaptive capacity of a community. The concept of reflexivity as introspection may be a means to locate both traditional and contemporary IEK in the current context of ecosystems management.

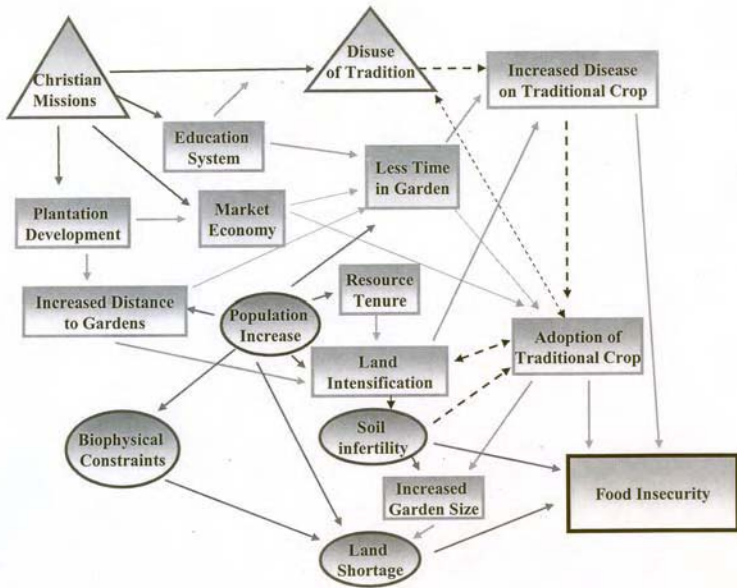
Re-articulating traditional practices, institutions and associated knowledge so that it has application within a new context is partially the 'process of knowing how we know. The process of being reflexive bridges different contexts (spatial and temporal scales) and allows for a set of beliefs or practices that are embedded in a particular context to be applied in changing contexts.

Food Insecurity and IEK: A Case Example from Solomon Islands

A critical issue and recent phenomenon in both communities of Uzamba and Valapata in the Solomon Islands is food insecurity. The introduced crop (sweetpotato) has been widely adopted and has displaced the traditional staple crop (taro), which is now showing decreased productivity. The diagram below visually tracks reasons for the decline by showing changes in the system as well as impacts to the relations between components within the system. Specific variables are shown that have specific relevance to the issue of food insecurity. The IEK specific to the issue emerges from these variables. Representing IEK surrounding food insecurity in this way both expands upon and compliments the reasons that community members give for the current food crisis.

Reasons given for crop decline of the traditional staple are:

- 1) increased disease (stated by younger community members)
- 2) loss of traditions (stated by older community members)



The drivers of this system are roughly divided into three main elements: one is the changed belief system, shown here as introduced religion; the second is the context of changing population demographics; and the third is the recent practice of the adoption of an introduced crop. Looking at the first 'driver', it is evident that introduced religion has had the multiple effects of changing traditional spirituality, changing the traditional education system, encouraging the market economy and increasing the development of plantations.

The next driver, population increase, influences the intensification of land, land shortage, the time spent gardening and biophysical constraints. The third driver, the adoption of an introduced crop, influences the decline of the traditional staple, the size of gardens, soil fertility and land intensification. Each of these factors then, in turn, affect other factors, as shown by the myriad of interconnections in the system.

Food Insecurity and IEK: A Case Example from Solomon Islands... *continued*

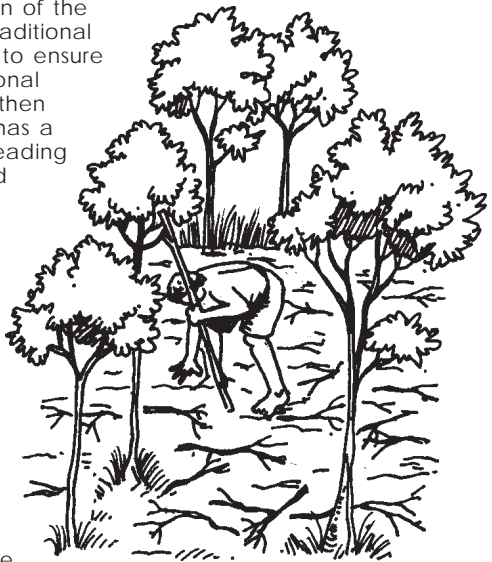
In response to changing socio-ecological conditions (the drivers mentioned above), the system 'moves away' from the original stable operating point, which was the use of the traditional staple crop that supported Vella communities for hundreds of years. In systems terms, a point was reached where a significant change in the original system occurred (decline in traditional staple) before the system began an alternate path and reorganized towards a new self-organizing and resilient operating point (the introduced crop).

To describe the system that created conditions for the shift and the characteristics of the system before and after, the diagram should be viewed from the broader context, which illustrates a number of influences acting concurrently. These interactions are explained as follows. Foreign missions and new forms of national governance that encouraged plantation development and formal education, changed the local economy, prohibited custom and thus changed traditional methods of gardening. These factors also created changes in practice, which were an increased demand for plantation work, resulting in less time spent in the subsistence garden and more time spent earning income.

There was also more time spent in church-related activities. Swidden cycles changed to shorter fallows, resulting in intensification of land use and nutrient-poor soils. Increasing population along with marginal biophysical conditions that constrain land availability also occurred. At the same time that the productivity of the traditional staple crop was being undermined by increasingly infertile soils, less attention to tending the crop, the disuse of traditional practices, which all resulted in the increase of disease and pests, there was a changing value system from traditional foods to a preference (by the younger generations) for an introduced crop as well as imported foods.

Cultivation of the introduced crop became the norm. There are two positive feedback loops, which maintain this system as dependent on the introduced crop. The first feedback loop is that the introduced crop has lower soil fertility requirements and so shorter fallow periods become the norm so that the cycle of cultivation is increased. The resulting nutrient-poor soils (which the traditional staple cannot grow in), can only support the more tolerant introduced crop, thus the cycle is maintained. The second positive feedback loop is where the adoption of the introduced crop accelerates the disuse of traditional cultivation practices, which were necessary to ensure productivity of the traditional crop. If traditional techniques are not used to control disease, then disease incidence increases, which, in turn, has a negative influence on the traditional crop leading to a greater dependence on the introduced crop.

From the diagram, it is clear that there is no simple linear cause and effect that links food insecurity solely to disease or loss of traditions. While both of these factors play a significant role in the change process, the relationships are more complex. The approach of looking at multiple variables and their interactions also transcends the conventions of analyzing problems and finding solutions from the separate disciplinary perspectives of sociology, economics and ecology. IEK as emergent from the complex web of interactions highlights knowledge as engagement. It is the unarticulated local knowledge surrounding this resource issue. The conceptualization of local knowledge as emergent from a set of CPB variables replaces the set of issue-driven facts that are often sought after by resource managers intent on using local expertise to find direct solutions to problems.



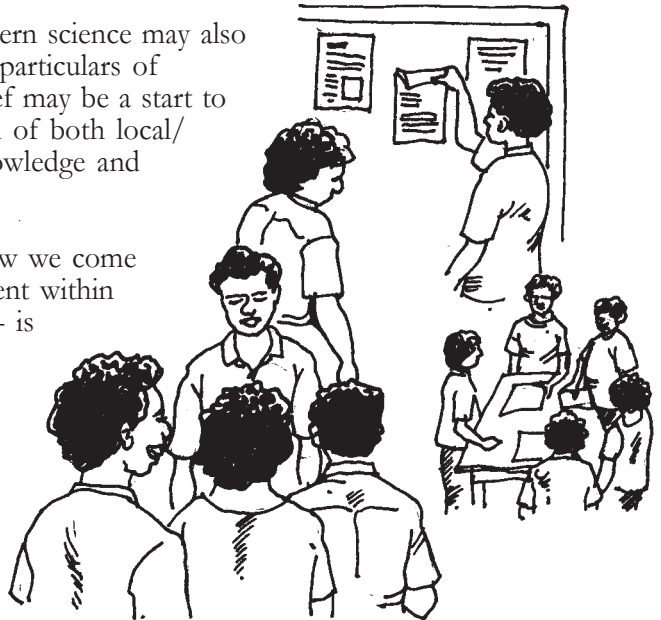
Conclusion

The concept of local/indigenous ecological knowledge as a system and deconstructing that system to understand how knowledge is known, influenced and constructed establishes common ground for bridging the epistemological gap that occurs when people with different worldviews are working together on a common issue. (For indigenous views on bridging epistemological differences, see box next page.)

Sharing knowledge turns out to be astonishingly difficult but challenging dichotomies assists in breaking down the barriers.

- ❑ The perceived dichotomy between ‘local’ or ‘indigenous scientific’ and ‘western scientific’ exists because knowledge of indigenous peoples has been essentialized as a cultural commodity and western science is grounded in the mistaken belief of universal truth. If the concept of knowledge in all societies is understood by how we know through the mode of engagement within the ecosystem, and not as an objective truth, then there is some common ground to enable multiple perspectives to contribute to ecosystems management, whether on a local, regional, national or even global scale.
- ❑ The dichotomy of absolute vs. culturally-constructed knowledge is broken down by the understanding of knowledge as effective action in a world that is constituted by engagement within the ecosystem. This approach based on an awareness of the complexity and variability of epistemology places all knowledge systems within a common conceptual framework for understanding.
- ❑ The recognition that western science may also be constructed based on particulars of context, practice and belief may be a start to more effective integration of both local/indigenous ecological knowledge and ‘western science’.

Understanding epistemology - how we come to know in our lifelong engagement within our local and global ecosystems -- is the basis for a conceptual framework (CPB) that provides a means to seek commensurability among different worldviews and perspectives and bring a more thorough understanding of human-ecosystem interactions.



Can we Bridge Epistemologies? – Indigenous Views

Excerpts from a workshop organized by the Indigenous Knowledge and People's Network in Southeast Asia (IKAP Network) on Bridging Epistemologies – Indigenous Views: Indigenous Understanding of Nature and its Changes. Indigenous Views About Science and Ways of Bridging Different Knowledges from the Perspective of Indigenous Peoples. Millenium Ecosystem Assessment, 17-20 March. Alexandria, Egypt.

There is still a great degree of unilateral emphasis on the role of science as the driving force and beneficiary on how to integrate local knowledge into western science. We proposed to go beyond it creating a space to engage in an intercultural and dialogical encounter. Each knower elaborated on three issues:

- ❑ How we perceive nature
- ❑ How we perceive science
- ❑ How we imagine a bridge for dialogue with scientists and development actors.

We feel enriched by following thoughts regarding the nature of knowledge, the interactions between different epistemic communities, the role of power and domination, the limitations of science, the potentials of other ways of knowing and imagined ways to build epistemological bridges. We would like to share these ideas.

How we perceive nature

- ❑ *"Yacha, a Quechua concept, means knowing, living, sharing. It is rooted in a positive care for everything. It is a form of appreciation of life manifested in the dialogue with my family, with the mountains, the chakra (fields), rocks, water springs, hail, frost, rain, llamas, and alpacas... Everything communicates and teaches."*
- ❑ *"Indigenous knowledge systems are manifold; there are thousands of indigenous ways of knowing, all treasures and potentials of the survival of humankind. But within this tremendous diversity of ways of knowing there are commonalities of indigenous wisdoms – we love our land, we are not separated from nature"*

How we perceive science

- ❑ *"Indigenous wisdom is not western science, it is different from and is more than science."*
- ❑ *"Science and the scientists describe how but do not explain why..."*
- ❑ *"Science lacks sentiments, use of senses and recognition of silent knowledge, the sacred."*
- ❑ *"Scientists describe us—without love and respect—without understanding—from their own world view. We also recognize that some disciplines or members of western sciences are also modifying themselves, diversifying and opening up towards a post-materialist science."*
- ❑ *"The western scientific paradigm is embedded in a worldview that is impacting the world through disciplines which impose values on governance, research, education – all of life. In this context the world view of others –of indigenous societies which are more horizontal and linked to nature – is denied and only a few elements of practice are permitted to surface. Actions are taken based on the western worldview informed by science and thus tensions between the youth and elders emerge, knowledge is lost and undermined, language is threatened and biodiversity is diminished. Indigenous world views are seriously threatened, and sometimes shattered."*
- ❑ *"Western science is separated from nature. Its separation of culture and nature, expressed in its analysis and division into discipline, is part of the western tradition and culture and based on its particular worldview."*
- ❑ *"There is an ethical responsibility on scientists to be clear about the values and world views that are embedded in their approaches and about whose purposes are being served. Scientists and development agents need to be critical and clear about the risks and benefits for indigenous people, and of course they need to engage indigenous people in this risk assessment from the outset and develop mutually- agreed positions."*
- ❑ *"Modern science will have the ultimate problem unless they incorporate culture and religion in the process because they will continue to face gaps and to exist in isolated fragments or pieces, which do not complete the integrity of humanity and the earth."*

Can we Bridge Epistemologies? – Indigenous Views... continued

How we imagine a bridge for dialogue with science and development actors

- ❑ *“Indigenous world views and knowledges are expressed through songs, poems and through languages, representations and practices not easily accessible to outsiders. Each ethnic group is different. Our memory is quick, we map things in our mind, not on paper. And we can easily share our experiences. We practice and interpret our own abstract ideas. Outsiders and brokers can help us to conceptualize our ideas, and so give back to us and our children and the not-yet-born.”*
- ❑ *“Western science and indigenous science (traditional knowledge, local knowledge, etc. are **equally** important and distinctive in their own right. Continued **respect and understanding** within and for each other’s science is needed to progress forward, without one being more important than the other. To build bridges, indigenous communities need to be empowered to translate their own science in a culturally- appropriate way for **all** people to understand and move forward and thus control how and where traditional knowledge is used, without outsiders being the experts.”*
- ❑ *“If scientists could work not just with sophisticated knowledge and rational feelings but with emotional feelings toward the future of the earth, then bridging between indigenous knowledge and scientists and between humans and nature might be possible. It is arrogant to think that science can solve all problems.”*
- ❑ *“The idea of a bridge implies the existence of communities that are distant and inaccessible, with impenetrable borders. These do not exist in our world. Building bridges requires the willingness to walk at the pace of sensing and knowing beyond the rational knowledge that has colonised our minds.”*
- ❑ *“Local people can easily cross the bridge to modern science. As a matter of fact, they have been adjusting to the modern world dominated by modern science for generations. Because of the assimilationist attitude of modern science, local people have started to realize the losses of their identity, culture and self. Local people are going back to their bases of culture, identity and self having realized the accountability attached to it. Local people have started the reconstitution embracing environment and nature.”*
- ❑ *“A bridge between epistemologies is not possible or not desirable because it produces invasion and domination. We can only – consciously – sit down at a table of dialogue, in a world where many worlds (or epistemologies) are welcome, where we can talk amongst ourselves, and also talk with modern science. But at this table we need to leave behind arrogance and the wish or attitude to dominate. We have to come with humbleness, with eagerness to learn, with openness and respect. In this neutral space of encounter, what can everyone contribute, what is our gift? What is the gift of the scientist? Is the scientist prepared for a dialogue? Is he or she able to support us? Do they have the means to talk with us? Can they enter an alliance and commitment overcoming the limitations of their worldviews?”*

Contributed by:

- ❑ Darryn Wilson, Larrakia man from Australia
- ❑ Marcela Machaca, woman from Quispillaqta, a Quechua community in the Central Andes of Peru
- ❑ Baramee Boonduang, Noi Santianurothai and Prasert Trakansuphakon, Karen people from Northern Thailand
- ❑ David Millar from Ghana
- ❑ Jorge Ishizawa from Lima, Peru
- ❑ Datu Victorino from the Philippines
- ❑ Yang Fuquan, a Naxi researcher from Yunnan, China
- ❑ Esther Camac from Costa Rica
- ❑ Veronica Arbon, Arabunna woman from Australia
- ❑ Jocelyn Davies, researcher on desert knowledge from Australia
- ❑ Malin Almstedt and Marie Bystroem from Sweden
- ❑ Maria A. Salas, Facilitator

Presentations, discussions and papers from the workshop are published by IKAP and available at www.ikap-mmsea.com. For more information, contact Timmi Tillman (ikap-mmsea@gmx.net) or Prasert Trakansuphakon (ptrakan@cm.ksc.co.th).

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**Participatory Research and
Development for Sustainable
Agriculture and Natural Resource
Management: A Sourcebook**

Participatory Research Approaches: Some Key Concepts



Participatory research has three key elements: *people*, *power* and *praxis* (Finn, 1994). It is *people-centered* (Brown, 1985) in the sense that the process of critical inquiry is informed by and responds to the experiences and needs of people involved. Participatory research is about *power*. Power is crucial to the construction of reality, language, meanings and rituals of truth; power functions in all knowledge and in every definition. Power is knowledge and knowledge creates truth and therefore power (Foucault, 1980). Participatory research is also about *praxis*. It recognizes the inseparability of theory and practice and critical awareness of the personal-political dialectic.

Participatory research makes a *participatory approach* to learning as a central part of a research process. Research is not done just to generate facts, but to develop understanding of oneself and one's context. It is about understanding how to learn, which allows people to become self-sufficient learners and evaluate knowledge that others generate. Good participatory research helps develop relationships of solidarity by bringing people

Adapted from:
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together to collectively research, study, learn, and then act. There is no off-the-shelf formula, step-by-step method, or ‘correct’ way to do participatory research. Rather, participatory methodology is best described as a set of principles and a process of engagement in the inquiry.

Conceptualizing the Research Process

Participatory research stresses the importance of creating a *participatory and democratic learning environment* that provides people (especially the underprivileged) the opportunity to overcome what Freire has called the “habit of submission”—the frame of mind that curtails people from fully and critically engaging with their world and participating in civic life (Freire, 1978). It is only through participation in learning environments in which open, critical and democratic dialogue is fostered, Freire suggests, that people develop greater self-confidence along with greater knowledge.

Participatory research challenges practices that separate the researcher from the researched and promotes the forging of a partnership between researchers and the people under study. Both researcher and participant are actors in the investigative process, influencing the flow, interpreting the content, and sharing options for action. Ideally, this collaborative process is empowering because it:

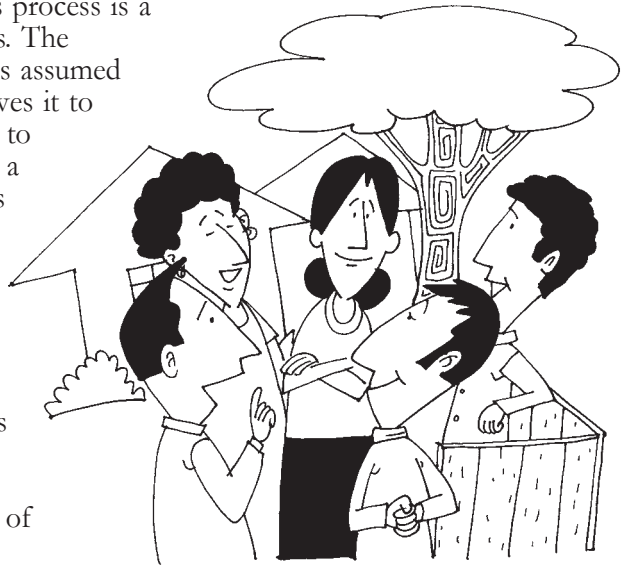
- ❑ brings isolated people together around common problems and needs
- ❑ validates their experiences as the foundation for understanding and critical reflection
- ❑ presents the knowledge and experiences of the researchers as additional information upon which to critically reflect
- ❑ contextualizes what have previously felt like "personal," individual problems or weakness
- ❑ links such personal experiences to political realities

The result of this kind of activity is living knowledge that may get translated into action.

Dialogue and Critical Reflection

A key methodological feature that distinguishes participatory research from other social research is dialogue. Through dialogue, people come together and participate in all crucial aspects of investigation, education and collective action. It is through talking to one another and doing things together that people get connected, and this connectedness leads to shared meaning. Dialogue encourages people to voice their perspectives and experiences, helping them to look at the “whys” of their lives, inviting them to critically examine the sources and implications of their own knowledge. In this context, dialogue allows to awaken participants’ voices and cultivates their participation as critical, active agents of change. This is particularly essential in the light of many social forces of domination at work in the lives of people from socially and culturally disenfranchised groups.

The role of the researcher in this process is a facilitator of the learning process. The researcher is not an expert who is assumed to have all the knowledge and gives it to the people who are assumed not to have any knowledge. Rather, it is a facilitator who sets up situations that allow people to discover for themselves what they already know along with gaining for themselves new knowledge. In this process, the researcher not only learns from the participants, but also engages in dialogue by posing questions:



- ❑ What are the conditions of participants' lives?
- ❑ What are the determining features of the social structure and social relations that contribute to creating their life patterns?
- ❑ What choices do they make, and why do they believe those are good things to do?
- ❑ What are the possibilities for their experience and action?

The researcher's sharing of his or her perceptions, questions in response to the dialogue, and different theories and data invite the participants to critically reflect upon their own experiences and personal theories from a broader context. Ideally, in such a setting, the expert knowledge of the researcher combined with the experiential knowledge of community members, create an entirely new ways of thinking about issues.

This is the meaning of conscientization, which Paulo Freire has helped popularize. Critical consciousness is raised not by analyzing the problematic situation alone, but by engaging in action in order to transform the situation. Dialogue acts as a means for fostering critical consciousness about social reality, an understanding based on knowledge of how people and issues are historically and politically situated.

Participatory Communication and Research Methods

Communication is a key methodological concern in participatory research. It draws upon creative combinations of written, oral and visual communication in the design, implementation and documentation of research. Grassroots community workers, village women, and consciousness raising groups have used photo novella (people's photographic documentation of their everyday lives) to record and to reflect their needs, promote dialogue, encourage action, and inform policy. Researchers use theater and visual imagery to facilitate collective learning,

expression, and action. Other forms of popular communication are utilized such as collectively written songs, cartoons, community meetings, community self-portraits and videotape recordings.

Critical knowledge development calls for a creative blend of traditional methods of inquiry and new approaches. Use of alternative communication methods in participatory research has both pushed researchers to re-examine conventional methods and opened up the possibility of using methods that previously would not have been considered legitimate.

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**Participatory Research and
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Property Rights, Collective Action and Technologies for Natural Resource Management



Degradation of natural resources has become a global problem that threatens the livelihood of millions of poor people. Many promising technologies for natural resource management are available to address these problems, but farmers and others often fail to adopt them. Why is this? Although many factors can be identified, lack of secure property rights and collective action deserve greater attention from policymakers and technology developers.

How Property Rights and Collective Action Affect Technology Adoption

Unlike conventional agricultural technologies, many natural resource management (NRM) technologies take years to give results. If farmers do not have secure rights to the natural resources, there is no incentive for them to adopt these technologies.

Some technologies need to be adopted over a wide area to be effective. Thus, farmers with small areas have to cooperate with their neighbors to increase the land area and adopt the technology. In analyzing how property rights and collective action affect technology adoption, one has to examine the time horizon and spatial scale of the technology.

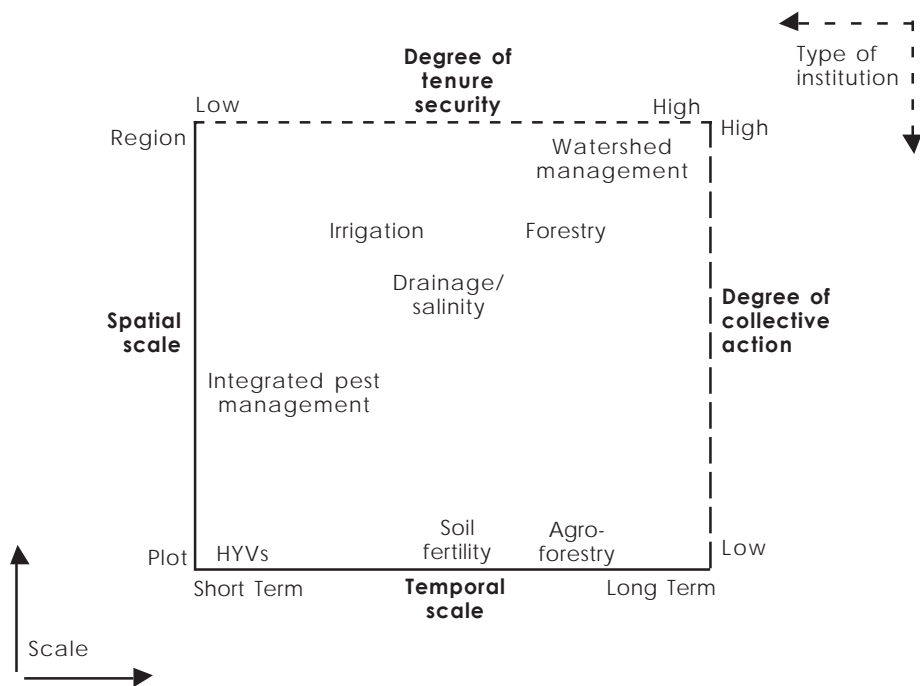
Adapted from:
CGIAR Systemwide Program
on Collective Action and
Property Rights (CAPRI) Policy
Brief Number 1, October 1999.

Some technologies require collective action over a wide area but offer rapid economic returns like Integrated Pest Management (IPM). Some technologies require long term investment but are localized in area, like terracing. Others have long time horizons and need collective action like watershed management and irrigation systems.

Figure 1 illustrates the time and spatial scale of various technologies in relation to degrees of collective action and tenure security. This framework helps determine whether the status of property rights or collective action is likely to constrain or enable various technology choices. It can also provide guidance on developing and disseminating technologies that are appropriate for an area’s institutional context. Technologies operating on a landscape (spatial) scale may be more appropriate where traditions of cooperation are strong, while those that require a long time to produce benefits may be more successful where tenures are long-term and reasonably secure.

Property rights and collective action help determine the type of technologies adopted by communities. They are also important in determining who benefits from productivity increases, both directly by determining who can reap the benefits of improvements in factor productivity, and indirectly through their efforts on land markets, access to credit and the like.

Figure 1. Property Rights, Collective Action, and Sustainable Agricultural and Natural Resource Management



Note: Location of specific technologies is approximate, for illustrative purposes.
HYVs = High Yielding Varieties

Property Rights

Property rights include not only ownership of resources as defined by laws, but also a variety of rights from customary law and local practice.

In some developing countries and in Africa, policy dictates replacing community-based land tenure institutions with freehold tenure

backed by formal titles. However, evidence shows that having titles and privatizing land ownership is unlikely to increase adoption of technologies because it tends to be insufficient for enhancing tenure security, and worse, may even weaken it.

Where indigenous property rights institutions have been effective in enforcing secure property rights for community members, a title does little to strengthen the land rights of community members. Only when local systems have broken down (because of either internal factors or external threats like outsiders attempting to claim land) does land titling appear to be needed. In highly commercialized areas, land titling may also be needed for securing credit or engaging in land markets.

For tenure security, the rights should provide:

- Excludability**, to allow those with rights to exclude others from using a particular resource
- Duration**, to provide a sufficient time horizon to reap the benefits of investments
- Assurance**, from institutions that can enforce an individual's rights
- Robustness**, the number and strength of the bundle of rights an individual possesses

Collective Action

Collective action for natural resource management can include: joint investment in buying, constructing or maintaining local infrastructure and technologies; setting and implementing rules to exploit a resource; representing the group to outsiders; and sharing information.

However, one cannot assume that collective action exists. Research shows there is greater social cohesion if the number of users is fairly small, if they are alike in terms of shared values and dependence on the resource, and if the net benefits from group membership are substantial and equitably distributed.

Collective action does not guarantee equity. In some areas, women and the poorest may have little voice in the decision-making process despite their labor contributions.

Where there are sufficient incentives but governance mechanisms are lacking, local leadership or external community organizers can facilitate collective action. But for collective action to be sustainable, governance should be institutionalized and not dependent on a single person.

Linkages between collective action and property rights are especially strong in the management of common property resources. Tenure security for users of common property resources requires the following:

- an effective local institution manages and regulates the use of the resource and ensures that members abide by the rules
- the group or community has secure ownership rights over the collectively managed resource
- individuals have secure membership in the group to be able to continue using the resources

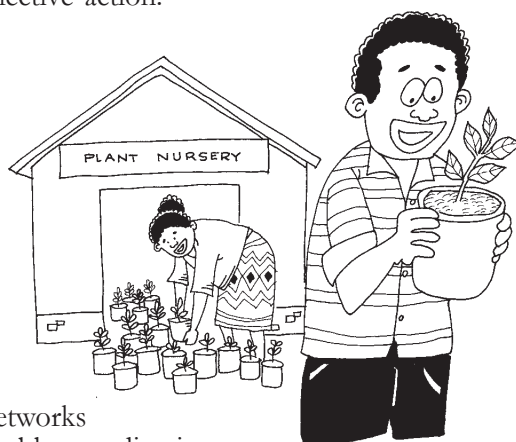
Many common property resources are under pressure from factors like population expansion and increased competition. Policies that recognize community rights and local organizations help natural resource management in such situations.

Factors Influencing Technology Options

Many other factors besides property rights and collective action keep farmers from adopting technologies for natural resource management. However, even many of those factors interact with property rights or collective action.

Information

Farmers need information if they are to adopt technologies. The distribution of information and technologies is linked to property rights. At the community level, extension services often favor landowners which give greater access to men and the wealthy. Collective action can strengthen the bargaining power of disadvantaged community interest groups, and the formation of networks among community members can facilitate access to information. Networks and other forms of collective action may also enable coordination of technology adoption efforts. For example, establishing a communally-managed seed bank may facilitate individual tree planting and provide a forum for information sharing on the technology.



Environmental and Price Risk

Risk-averse and low-wealth farmers are often reluctant to adopt technologies because they need stable income and consumption streams. The ability to manage risk can be affected by prevailing property rights and collective action institutions. Common property resources frequently function as a buffer against risk. Collective action enables risk-sharing and diversification, and inspires mechanisms for collective self-help like norms dealing with reciprocity.

Wealth

Wealth is linked to power and property rights over natural resources thus affecting people's options for adopting technology. For example, in Pakistan, farmers who own more land are wealthier and can afford to install tubewells. They, therefore, have a control over groundwater which makes them even richer.

People who are more endowed place a higher future value on medium- and long-run benefits produced by investments in technologies compared to the poor who are constrained by food insecurity and risks. As a risk-sharing device, collective action can alleviate food insecurities and other survival risks. In addition, it helps realign the distribution of gains from a resource by facilitating the adoption by the group of more advanced but "expensive" technologies.

Credit

Credit is a way of overcoming wealth constraints to investment. It is often argued that farmers need individual land title to offer as collateral for credit. Privatization gives small farmers access to formal financial services. However, these formal financial institutions remain rare in many rural settings, particularly for agricultural lending which is considered risky.

The many examples of informal financial institutions undertaking successful group lending schemes may be seen as substituting collective action for conventional property rights as a form of collateral. Credit groups may even enhance opportunities for collective action in natural resource management (NRM). If groups are already formed around a common purpose and share a common set of norms and values, this reduces the information and coordination costs of their organizing around another purpose.

Labor

Labor bottlenecks resulting from high labor requirements are also cited as a constraint to technology adoption, especially if the new technology creates a seasonal peak for labor that overlaps with other agricultural activities. Collective action and reciprocity arrangements may be employed as a means to overcome household labor shortages thereby facilitating the use of more labor-intensive technologies.

Within households, property rights often fail to correspond to labor responsibilities. In some cultures, women work in their husband's plots in order to access plots for their own production. The introduction of a new technology, like irrigation, can shift these labor demands and responsibilities.

In western Ghana, the spread of cocoa as a commercial crop has led to men's demanding a greater share of women's labor to farm cocoa crops owned by men. In some cases, men have given women a stronger claim over land as compensation, a shift that is expected to result in greater technology adoption by women.

Other Conditioning Factors

Other factors besides property rights institutions expand or constrain people's technology choices. These include laws and community rules, norms and ideas.

In Mexico, farmers' adoption of conservation tillage practices is partially attributed to state agricultural policies including a law prohibiting the burning of crop residues. On the other hand, in South Asia, taboos forbid women from using plows, thus restricting agricultural productivity and reinforcing women's dependence on men. Nevertheless, property rights institutions frequently shape and reinforce other rules, both legal and normative.

Although on the surface cultural norms that hinder technology adoption may appear to have equity, efficiency or environmental drawbacks, there are more profound implications behind this. In many rural African societies, communities promote cohesion and lessen exposure to risk through kinship and marital practices. These have implications for the distribution of property rights. In patrilineal societies, women often move to their husband's community after

marriage. They then acquire secondary use rights to the land while giving up their right to land in the place of their birth. The principles and property regimes that facilitate a cohesive community may reduce exposure to environmental risk, and preserve women's secondary rights, but with rising rates of widowhood from HIV/AIDS, the lack of rights for women creates other types of vulnerability.

Property rights and collective action are not fixed for all time but are dynamic institutions. The choice of NRM technologies inevitably shapes the institutions underlying property rights and collective action. For example, the gains from coordinated efforts in irrigation systems may lead farmers to cooperate and develop common property regimes if they have the necessary information and means to reduce transaction costs.

However, if incentives for adoption are not built into property rights and collective action institutions, if farmers lack key information, and if transaction costs of coordination and enforcement are not reduced, then technology adoption will not succeed. Hence, the ability of a society or community to efficiently adapt determines its potential for technical and institutional change.

Generally, technologies that increase the value of a resource may induce privatization, enclosure and the exclusion of some customary uses. Yet the gains to some households or individuals because of these institutional changes are frequently offset by losses to others. Empirical studies show that as household income increases, the reliance on common property resources for subsistence purposes decreases. However, privatization of common property resources may have an adverse effect on those who still depend on the commons for a range of resources.

Implications for Efficiency, Equity and Environmental Sustainability

Adoption of new technologies is not an end in itself. Rather, technological change should be evaluated in terms of its contribution to broader goals of growth, poverty alleviation and environmental sustainability.

Property Rights and Technology Adoption

- ❑ Technologies that increase production of one group at the expense of other groups do not necessarily improve efficiency.
- ❑ Privatization of common property and land under communal tenure tends to lead to loss of multiple user rights in favor of a select few. Research has linked conversion to freehold tenure to loss of access to land and other resources by smallholders, and to large-scale acquisitions by the rich.
- ❑ Evaluation of technology efficiency needs to consider risk and transaction cost. Wealthy farmers can afford the risk of adopting mechanized and capital-intensive technologies while low-wealth households may not take the same risk; rather, they will place higher value on stability of earnings. Incorporating transaction cost and risk considerations in efficiency calculations shows the rational strategies by the poor, and broadens appreciation for technologies that improve efficiency.

- ❑ Ownership of property enhances the status and bargaining power of individuals within the household and the community. Greater control over resources tends to enhance men's capacity to influence power structures, and to exert political leverage with government officials and those responsible for technology distribution, infrastructure and market development. Thus, technology will mainly reflect the interest of men who control substantial resources unless collective action emerges that is capable of reshaping policies and political outcomes to override these biases.

Introducing technologies that are unsuitable for small-scale farmers and those with less secure tenure aggravates inequality. Determining the temporal and spatial scale of a technology, and relating this to the local distribution of tenure indicates where there is likely to be a problem. For example, the scale neutrality and short-term benefits of planting high-yielding varieties make this technology more adoptable by small farmers.

Collective Action and Technology Adoption

- ❑ Collective action can be used to influence choices based on their anticipated impact on efficiency, equity and environmental sustainability.
- ❑ Collective action can enable marginalized groups to challenge property rights institutions, political and cultural institutions and technology adoption. It can also be used to prevent the use of certain technologies or to modify their features, as in the case of some Filipino fishermen who were able to stop the use of dynamites and poison for fishing. Instead, local groups constructed artificial reefs to lure more fish and increase their food supply.

Integrated community participation in decision-making not only ensures that a new technology does not disproportionately and inefficiently increase the workload of marginalized groups, but also permits reduction of overall labor inputs.

Linkages and Trade-Offs

- ❑ Inequities have environmental implications. The use of pesticides by large farmers may adversely affect small farmers if they do not have access to it, especially if the pesticide eliminates even natural enemies of pests.
- ❑ Inadequate access to land and technology by the poor can lead to overexploitation and degradation of resources. When indigenous peoples are no longer assured of benefits from investments or long-term management practices, individualization of resources can facilitate more sustainable resource management practices.
- ❑ Efficiency, equity and environmental objectives also involve trade-offs.
 - Maximizing efficiency leads to selection of some inputs (labor, capital, land) at the expense of others, leading to inequitable outcomes. In the United States, efficiency-enhancing technologies is partly responsible for the demand for skilled labor at the expense of unskilled labor.
- ❑ Efficiency measures tend to assess only the private financial costs of inputs and neglects social and environmental costs.

- ❑ Trade-offs may sometimes be overstated. Environmental degradation can raise the perceived value of products leading to investment in technologies that conserve the resource base. When efficiency criteria are placed in a dynamic framework, the value of a resource over time is captured and conservation often emerges as the optimal strategy. When transaction costs and risk considerations are incorporated into efficiency calculations, the livelihood strategies of the poor can be seen as economically rational. When productivity measures include the value of non-traded goods and services in poor households (like women's labor), an equitable distribution of resources or technologies that favor the disadvantaged may be seen as highly productive.

Appreciation of less tangible economic and social dynamics broadens the scope of technologies deemed to be efficiency improving, so that the poor are not left behind or hurt by the technologies.

Policy Implications and Areas for Research

Strengthening local institutions of property rights and collective action increases the probability that people will use many new technologies for resource management. However, no single property regime is most appropriate for a particular technology in every instance. Local law derived from a number of sources may have an equal or greater influence on actual behavior.

Collective action cannot be dictated by outsiders. However, policies such as employing a cadre of institutional organizers have been effective in fostering local organizations for voluntary resource management activities.

Property rights over natural resources can provide an important policy tool for strengthening collective action in their management. Just as individuals are unlikely to invest in technologies unless they have secure tenure, communities cannot be expected to adopt long-term practices if they lack long-term rights to the resource. Yet many governments have been unwilling to transfer rights to water, irrigation, infrastructure, rangelands or forests when they devolve management responsibility to user groups. The issues of community rights and ways of creating new common property resources (in place of government ownership) are emerging as critical issues in devolution programs.

In Namibia, an organizing partnership of communities, NGOs and the Ministry of Tourism and the Environment established participatory mapping systems and other institutions to jointly manage wildlife resources. The organizers spend time in communities encouraging local participation in both direct activities and decision-making. This approach has shown high returns in terms of adoption and sustainability of resource management practices.

Participatory Research and Development for Sustainable Agriculture and Natural Resource Management: A Sourcebook

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Innovation Systems Perspective: From Measuring Impact to Learning Institutional Lessons



While perspectives recognizing the institutional context and research have occupied only a modest amount of attention in the international agricultural research policy community, the perspective has come to dominate the policy debate and practice in other research and economic sectors. It is surprising to find that concepts that are informing international agricultural research policy were superseded a decade ago in this wider science and technology policy arena.

The contemporary debate from this parallel policy literature now takes it as given that the linear model of innovation and its neo-classical economics is of little value in evaluating and planning research and development (R&D). There has been a shift in the role of policy from examining the determinants and consequence of research, to a capacity development role where emphasis is on strengthening networks of users and producers of knowledge (Velho, 2002).

Underpinning this shift of perspective over the last two decades has been a deepening understanding of the nature of innovation as a process and the accompanying realization that neo-classical economics alone cannot explain the dynamics of economic systems.

Adapted from:
Hall, A., V. Rasheed Sulaiman, N. Clark and B. Yoganand. 2003. From Measuring Impact to Learning Institutional Lessons: An Innovation Systems Perspective on Improving the Management of International Agricultural Research. *Science Direct Agricultural Systems* 78 (2003) 213-241. <http://www.sciencedirect.com>.

The innovation system concept serves to draw different ideas together including the idea of a "national system of innovation". At its simplest, the concept recognizes that innovations emerge from systems of actors. These systems are embedded in an institutional context that determines how individual actors behave and how they interact with other elements of the system. Learning and the role of institutions are critical components of such systems. Learning is an interactive and thus socially-embedded process, which cannot be understood without reference to its institutional and cultural contexts (Lundvall, 1992). Successful systems are characterized by:

- ❑ continuous evolutionary cycles of learning and innovation
- ❑ combinations of technical and institutional innovations
- ❑ interaction of diverse research and non-research actors
- ❑ shifting roles for information producers, information users and transfers of knowledge dependent on a need basis
- ❑ an institutional context that supports interactions, learning and knowledge flows between actors

The application of this concept of a national system of innovation in the agricultural research sector is gaining ground (see Hall *et al.*, 2002.; Clark *et al.*, 2003). At the heart of this framework is the contention that R&D is always embedded in social, political and institutional contexts and that unless the influence of this environment is accounted for by decision makers, the evaluation and planning of R&D will be incomplete.



Innovation Systems in Planning and Evaluation Processes

What does this mean for the evaluation and planning process? Some of the principles that are required to relate R&D to institutional context include the following:

An inventory of Innovation Actors

The framework provides a starting point for identifying the full range of actors relevant to a particular innovation system. While many of the normal public-sector actors are present in the conventional policy schema, closer investigation reveals a wider range of individuals and organizations from other sectors.

System Competency

Once a full inventory of actors has been established, it is then possible to examine the extent to which relationships exist among actors. The existence of relationships will depend on the policy context and the wider institutional environment. For example, strong public-private partnerships may have emerged through a liberal policy towards germplasm access. Alternatively, weak linkages may be a result of restrictive personnel policies for public sector scientists that prevent them from undertaking contract research for the private sector. Hence, analysis has the effect of directing the focus of evaluation and planning on linkages that need to be developed and on potential policy changes.

Actor Roles

Part of the relationship analysis concerns the importance of multiple roles played by some actors and the different types of relationship these roles imply. For example, an agricultural university may be both a source of information on regional variety trials, as well as a recipient of improved breeding lines from a crop improvement center. Both types of roles are important for an effective innovation system, and the evaluation and planning process needs to understand their separate but linked existences. Actors with important roles that are excluded from existing arrangements need to be recognized. Technology users and product consumers from poor communities are examples.

Cultural Context

The types of relationship that develop in a particular innovation system reflect the national context as well as different organizational cultures. For example, the national context may have a strongly paternalistic public sector culture with a mistrust of private sector enterprise. Or the public sector may have a strongly hierarchical culture, whereas the NGO sector may have a more decentralized, participatory culture. Partnerships between public agencies and NGOs will not necessarily lead to more participatory approaches because of the organizational culture of the former. The evaluation and planning process needs to account for these contextual features.

Relationship Dynamics

The importance of the nature and dynamics of relationships between the entire range of actors, from the innovation systems point of view, is that their analysis reveals that such relationships are often strongly asymmetrical, preventing interactive learning. For example, partnerships between international and national agencies are often skewed by more favorable access to resources on the part of the former, by historical patterns of interaction, and by professional and cultural norms that value "outsiders" at the expense of "locals". Local political processes, interest groups, ethnic communities, and social hierarchies will all contribute to the political economy of the innovation process. The evaluation and planning process will benefit from an awareness of these dynamics.

Reflection and Institutional Learning

The innovation systems framework regards reflection on process and institutional learning as key elements for success. For example, systems in which there is clearly a gulf between policy rhetoric and research practice have a weakness with regard to institutional learning.

Other indicators of weak institutional learning may be a reluctance to admit mistakes and confront failure and its causes, or even a reluctance to revisit key assumptions about roles or ways of working. In contrast, an organization in which senior management encourages and rewards reflection and learning and where self-evaluation is undertaken regularly, demonstrates a tendency to possess a higher capacity for continuous institutional learning and innovation. The evaluation and planning process could benefit from recognizing the importance of a learning culture within public-sector research organizations and their partners (Watts *et al.*, 2003).

This philosophical shift towards institutional learning and change entails practical changes in international agricultural research organizations. These include the following:

- ❑ Moving the focus of impact and evaluation from examining changes in technology user groups to including changes in the way the research community operates as well as its interaction with other organizations and institutional (including political) contexts.
- ❑ Introducing institutional changes that provide incentives to formalize learning as part of the practice of research organizations. This requires changes among donors and senior managers of research organizations and probably within professional bodies relevant to the international agricultural research community.
- ❑ Recognizing capacity development as an important outcome and purpose of research.
- ❑ Accepting the need to explore behavioral changes in innovation systems as a way of monitoring progress and learning, as well as a way of promoting critical institutional lessons to wider audiences in the R&D community.
- ❑ Recognizing the systems nature of capacity development so that evaluation becomes a task that needs to be done collectively with partners as well as at the individual organizational level.
- ❑ Accepting the need to embed evaluation as learning in the day-to-day procedures of research stations and administrators and acknowledging the skill and resource implications of this. This implies the need for greater numbers of social scientists in international agricultural research organizations, but with a hands-on role of facilitating learning in addition to disciplinary research contributions. It also implies the need to build learning skills among all partners and to allocate time within the research process for collective learning and reflection.

The innovation systems framework is not presented as a panacea for improving the performance of agricultural research. The aim is to draw to the attention of planners, evaluators and research managers to the need for (and the possibility of) thinking about agricultural research in a more holistic and evolutionary fashion.

A Case Study: Learning as a Way of Dealing with the Institutional Context of Research

This case study discusses how the crop post-harvest program of the Department for International Development (DFID), the UK government’s international development assistance agency, has gradually recognized the need to pay more attention to the institutional context of the research it was sponsoring and how it responded with an approach that is attempting to embed institutional learning in conventional technology-development projects.

The program is one of the 10 natural-resources research programs. These were originally established by DFID in 1995 as a way of exploiting the UK science base in support of international development. The programs were conceived in the problem solving framework of the project cycle with the “logical framework” used as the key program and project planning and evaluation tool. This was supplemented by monitoring indicators used to judge progress along a notional output pathway. The translation of technical outputs into poverty/development impacts was dealt with as a logframe assumption about the existence of “target institutions” (meaning, in this instance *organizations*) and functioning “up-take pathways”.

As projects progressed the Crop Post Harvest Program started to recognize that process and institutional issues were having serious consequences for the success of its research initiatives. For example, in a series of project commissioned in India to provide technical backstopping to parts of the export horticulture sector, it became apparent that the real problem was one of mobilizing the different parts of the public-sector research system to act in a concerted fashion. Collaboration was particularly important for export development because of the need to deal with quality management issues in an integrated production and post-harvest supply chain. In addition, the broad range of stakeholders in the supply chain, including farmers, whose agendas and circumstances provided the context for developing these solutions, made it difficult for the research organizations to respond effectively, given their prevailing way of working with stakeholders.

At this point of program management team decided to gain a systematic understanding about the way this institutional context was affecting its research. The learning process built up slowly. First there was a pilot project that continued its focus on export horticulture, but which included simultaneous technical and institutional analysis. This highlighted the need to identify a conceptual framework to help understand the wider contextual issues that were affecting the research process. It was at this point that the program started to explore the innovation systems framework.

The exploration began with a policy project in India to examine how the innovation systems idea could be used in the evaluation and planning of R&D. This project was undertaken with a view to drawing both project and program management level lessons. It was contingent on the wider program portfolio of projects in India which in effect acted as case studies. This approach allowed the program in South Asia to experiment with the innovation system idea, while allowing conventional projects to proceed. It became apparent that the arrangement was not ideal. Notably the institutional lessons that the policy project was gathering from the rest of the portfolio could not be used to redirect these projects as the portfolio was not structured in a truly action-research framework. It soon became apparent that the individual technical projects needed to concentrate on generating their own process and institutional lessons, for project management purposes as well as to gain insights of value to the wider program. However, it was difficult for projects that had been commissioned to deliver a narrow set of outputs to accommodate this expanded role.

A Case Study: Learning as a Way of Dealing with the Institutional Context of Research... *continued*

Nevertheless, the program was able to identify and document a series of research management lessons. These included the following:

- ❑ There is a need to build stronger and more consultative linkages between public sector science and other actors in the innovation system.
- ❑ Successful projects were those that focused specially on establishing a coalition of local actors around a particular problem area.
- ❑ These actors included scientists, but not exclusively, and not necessarily as the lead actor. Moreover, roles may evolve over time.
- ❑ The selection of the most appropriate actor grouping was very often an empirical issue that could not realistically be resolved at the outset of a project.
- ❑ There was a tendency, reinforced by the output-oriented, problem solving framework of the conventional project cycle, to under-report process lessons associated with technological success (or failure). These lessons were often complementary to new technological knowledge.
- ❑ The relative degree of poverty focus was related to the agendas of different project partners and the dynamics that determined how these agendas were promoted in the wider arena of the project.
- ❑ Needs assessment and participatory approaches were much less important in ensuring a poverty focus than the agendas of the stakeholder involved in projects.

The program consolidated these types of lessons through a program-commissioned formative review (Biggs and Underwood, 2001). The review was principally concerned with providing a basis to argue for changes in the program logframe. Specially, there was good reason to challenge the need to monitor direct poverty impacts at the project and program level (even though in the long-term the program and DFID would be accountable for these outcomes). A more pragmatic approach appeared to be to track behavioral (and therefore institutional) changes that the program was stimulating among project partners as milestones toward reducing poverty. The key leading indicator thus became the extent to which systems capacity to innovate in a pro-poor fashion was being developed. The review recommended that to contribute to the development of this capacity, the program needed to:

- ❑ shift to an innovation systems approach because the emphasis had to move from a problem-solving framework to a learning framework
- ❑ shift to action research protocols rather than the project cycle management tools
- ❑ develop projects that involve groupings of local partners (coalitions), where identifying partners becomes part of the research task
- ❑ use stakeholder analysis to make agendas transparent
- ❑ monitor partner and stakeholder roles and interests to maintain a poverty focus

These broad principles have informed program strategic plans for 2002-2005. As the program works through some of the wider implications of this shift, it and its project partners will have to continue to use institutional learning as a core research management tool.

(For further details, see Hall and Sulaiman, 2002)

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**Participatory Research and
 Development for Sustainable
 Agriculture and Natural Resource
 Management: A Sourcebook**

Participatory Development Communication: Reinforcing the Participatory NRM Research and Action Process



Participatory development communication (PDC) can be defined as “a planned activity, based on the one hand on participatory processes, and on the other hand on media and interpersonal communication, which facilitates dialogue among different stakeholders, around a common development problem or goal, with the objective of developing and implementing a set of activities to contribute to its solution, or its realization, and which supports and accompanies this initiative” (Bessette, 2004:11).

A participatory process involves a person's active involvement in interaction, dialogue, sharing, consensual decision-making and action-taking. Participatory communication is the foundation of this process. The most important outcomes of participatory communication are the presence of local people in decision-making, project design and implementation as well as evaluation. The people must come through the process with newly acquired skills and a sense of being in control (White, 2003).

This paper introduces PDC as an essential component of the participatory research and development process and shows how it comes into play in the diagnosis, planning, intervention and assessment phases of the participatory research and development cycle.

Participatory development communication suggests shifting away from informing people in order to change their behaviors or attitudes and focussing instead on facilitating exchanges between various stakeholders. In so doing, common problems are addressed through a joint development initiative among the stakeholders. In PDC, researchers and practitioners come in as facilitators of a process, which involves local communities and other stakeholders in the resolution of a problem or the realization of a common goal.

During these three decades the role of communication has undertaken a dramatic shift from a one-way, top-down transfer of messages by agricultural technicians to farmers, to a social process designed to bring together both groups in a two-way sharing of information among communication equals" (Servaes, 2003:15).

Acting as a facilitator does not come automatically. This, of course, requires a change of attitude. To facilitate means learning to listen to people, helping them express their views, and assisting them in building consensus for action. For many natural resource management (NRM) researchers and practitioners, this is a new role for which they have not been prepared. How then should they start the process of using communication to facilitate participation and the sharing of knowledge?

An Integrated Participatory Communication, Research and Action Model

Working with participatory development communication means involving the local community in identifying a development problem (or a common goal), discovering its many dimensions, identifying potential solutions (or a set of actions) and taking a decision on a concrete set of actions to experiment or implement. It also means facilitating interaction and collaborative action with other stakeholders who should be part of the process.

This paper suggests an integrated model of participatory communication, research and action to guide researchers and practitioners. The process is represented through the following phases, which are not separated and flow into one another (Figure 1):

- 1) developing a research relationship with a local community
- 2) problem identification or goal setting
- 3) planning
- 4) intervention (implementation integrating monitoring and evaluation)
- 5) assessment and utilization of results

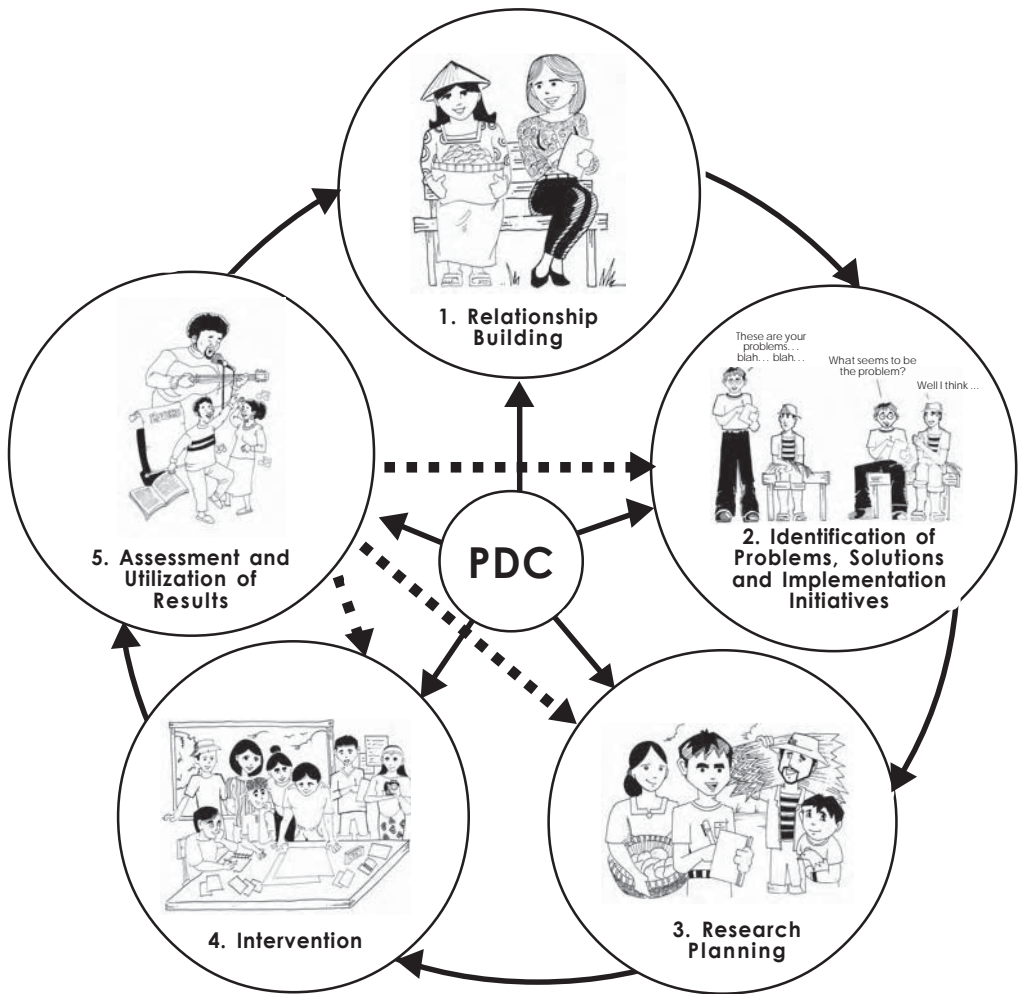


Figure 1. The Participatory Communication Research Action

Phase 1. Developing A Research Relationship with a Local Community

Building Relationships

The way by which a research relationship with the local community is established and nurtured determines the degree to which community members will or will not participate in the research or development initiatives. Within that framework, a bi-directional communication process should be employed and promoted. Building mutual trust and understanding is a major challenge at this stage and will continue to be so during the entire period of interaction between researchers or practitioners and the community.

Negotiating Mandate

One does not come to a community without a mandate or agenda. At the same time, communities also want their needs and problems addressed by resource people who come to them. Researchers and practitioners should explain and discuss the scope and limitations of their mandate with community members. In some cases, compromises can be found, like intermediating with other resource organizations that could contribute to the resolution of problems, which are outside the mandate of the researchers or practitioners.



Data Collection or Co-Producing Local Knowledge

Researchers have been trained in data collection. This emphasizes an extractive mode that does not facilitate participation. PDC, on the other hand, suggests that researchers or practitioners collaborate with community members and other stakeholders working in the area (NGOs, development projects, rural media, resource persons, representatives from government or public services, etc.) in order to assemble together and share baseline information. This effort leads a process of co-producing knowledge by drawing on the strengths of the different stakeholders.

PDC stresses the need for adapting the attitudes with the techniques. Co-producing knowledge is different from simply collecting data. It plays an essential part in facilitating participation to the decision-making processes involved in the research or development project.

Understanding the local setting usually points out to the identification and analysis of the state of natural resources in the area and to management practices and problems on which it is possible to act. However, four other areas also deserve consideration: gender roles, social stratification and power relationships, culture and beliefs, and finally, communication channels and systems.

Identification of local knowledge associated with natural resource management practices is part of the process of co-producing knowledge. It should also be linked with two other issues: the validation of that knowledge and the identification of modern and scientific knowledge that could reinforce local knowledge.

Participatory rural appraisal (PRA) and related techniques have been widely adopted in the field of Environment Natural Resources Management (ENRM), in order to assemble baseline information in record time and to facilitate the participation of community members. However, we often find situations, in which techniques such as collective mapping of the area, transect walks, problem ranking, development of a timeline, etc., are still utilized in an extractive mode and where information is principally used for the researcher's or the project designer's benefits, without consideration given to the information needs of the community and to any restitution activity ensuring the sharing of results.

Identification of Collaboration and Partnerships

In conducting a research or development initiative, other initiatives that may be attempting to engage the same community in other participatory processes should be considered. Identifying other on-going initiatives, developing a communication link with them and looking for opportunities of synergy or collaboration should be part of the methodology.

Activities with a local community also allow researchers and practitioners to identify possible partners that could be involved in the research or development process. It could be a rural radio, a theatre group or an NGO working with the same community. By establishing contacts at the outset of the project, these groups will feel they can play a useful role in the design of the research project instead of perceiving themselves as mere service providers.

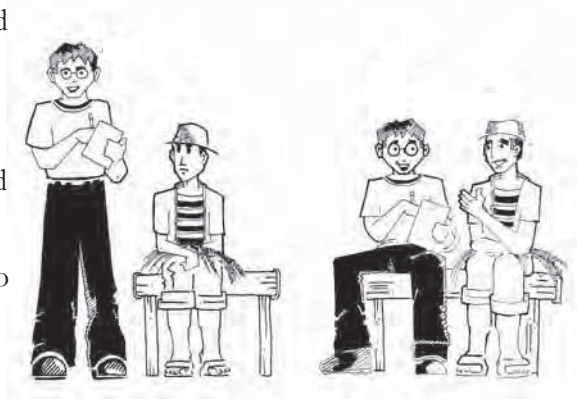
Phase 2. Identification of Problems, Potential Solutions, and Implementation of Concrete Initiative

Traditionally, researchers and practitioners used to identify problems in a community and to experiment solutions with the collaboration of local people. With participatory development communication, the researcher or the development practitioner comes in as a facilitator of a process, which involves local communities and other stakeholders in the identification and resolution of a problem or the realization of a common goal.

The communication process should bring people to identify a specific problem they want to address, discuss and understand to establish its causes, possible solutions, and come up with a decision on a set of activities to experiment. But this does not happen in the course of a single meeting with community representatives. Time must be allowed for such a process to mature.

Also, in some cases, the point of departure is not a specific problem but a common goal that a community gives itself. As with the problem-oriented process, the community decides on implementing a set of actions to approach that goal. At the end of both processes, a concrete set of actions, decided by the community, should emerge.

Ideally, this is where development and research objectives should be identified to strengthen and accompany the chosen community initiative. In general, however, such objectives have already been identified in a research and development proposal, before going to such a process with the community. A way to go around this problem is to plan a revision of the initial objectives with the community at the start of the research or development project.



Phase 3. The Research Planning Phase

The next step of the PDC process consists of the development of a communication strategy to accompany and reinforce the community initiative and the research or development activities built around it. This strategy should pursue two main goals: facilitating participation and the sharing of knowledge.

Identifying Different Community Groups

The idea here is to categorize the persons mostly affected by the NRM problem identified in the process and those groups that might be able to contribute to its solution. They may be specific community groups, or other stakeholders who are or could be involved. Addressing a general audience such as “the community” or “the farmers” does not really help in involving people in communication. Every group that makes up the community has its own unique characteristics, a way of perceiving a problem and its solution, and a way of taking actions. Community people may be grouped in terms of age, gender, ethnic origin, language, occupation, social and economic conditions.

In all cases, it is important to pay particular attention to the question of gender. In every setting, the needs, social roles, and responsibilities of men and women are different. The same is true of the degree of access to resources, of participation in decision-making processes, and in the way they will perceive a common problem or potential solutions.



Communication Needs and Objectives

Development needs can be categorized broadly between material needs and communication needs. Any given development problem and attempt to resolve it will present needs relating to material resources and to the conditions to acquire and manage these. However, we will also find complementary needs which involve communication: sharing information, influencing policies, mediating conflicts, raising awareness, facilitating learning, supporting decision-making and collaborative action among others. Clearly, these two aspects should go hand in hand and be addressed in a systemic way by any research or development effort.

Generally, in the context of NRM, they are linked to one or another of these communication functions: raising awareness, sharing information, facilitating learning, supporting participation, decision-making and collaborative action, mediating conflicts and influencing the policy environment.

PDC leads participants through a planning process, which starts with the identification of the specific groups as well as their communication needs and objectives. The research or development team, together with community members and other stakeholders involved, then identifies the appropriate communication activities and communication tools that are needed to reach these objectives.

Moreover, when the use of communication tools implies the development of messages, content or materials, the process should include not only their elaboration with members of the community but also a pre-testing phase that will contribute to their effectiveness.

Phase 4. The Intervention Phase

During the intervention phase, the communication component will focus on the implementation, monitoring and evaluation of the communication strategy and on documenting the participatory research process.

The production of a monitoring plan and of an evaluation framework linked to it, will help everyone involved in the activities to monitor what is being accomplished and facilitate its evaluation. The joint elaboration of such a plan by all stakeholders involved, the use of simple tools such as brainstorming, observation, use of pictures, prior training as well as the use of the local language, are all useful techniques.



However, no matter how important techniques and methodologies are, the most crucial issue is the way in which researchers or practitioners will approach the evaluation process jointly with their partners, the community members, and the other development stakeholders, so that it becomes a learning experience for everyone involved in the process.

Another important issue is in ensuring proper documentation of activities. This aspect is often forgotten during the heat of activities and the written story after completion, often miss key aspects. Ideally, the account of the research or development initiative should include the difficulties encountered, solutions experimented and the evolution of the partnership between researchers, practitioners, community members and other stakeholders. One way of doing this is to use a weekly “logbook” or a record of activities where all the activities during the week, the observations from the monitoring activities, and other personal comments are taken down. Other means of documenting may also be explored: a photo album, for example, highlighting communication activities with captions and commentaries for each photograph, or a collection of video sequences on each activities, etc.

Phase 5. Assessment and Utilization of Results

At the end of the participatory research or development cycle, community members, researchers and practitioners assess together the results of their activities. Sometimes, this assessment will point out to a redefinition of the problem identified at the beginning of the cycle or of the solution to experiment. Or it will lead to revisit some of the choices made during the planning phase. When the intervention has led to the desired results the next step involves the sharing of this knowledge with different groups of stakeholders as well as scaling efforts with other communities or other groups of stakeholders.



Knowledge sharing refers to making information available in different formats to different groups of users and asking for their feedback. It goes one step ahead of a simple dissemination of information. Scaling up efforts usually point out to one of the following activities of extension, reach or advocacy: extending the process to other groups in the community or to another community; replicating the process at a larger scale, involving a larger number of communities; and using the knowledge produced at the community level to act on a policy level (influencing policymakers or networking with organizations).

The first step in the process of scaling up is to determine the goal (s) to pursue. Researchers, practitioners and community members will then use the same logic as the one used for planning the communication strategy:

The problem resolution or the goal to which the research or development activity is contributing:

- ❑ What is the relevant knowledge that should be produced by the research or development activity?

The specific groups concerned:

- ❑ Apart from the participants, who could make use of the research results or of the knowledge about what has been achieved in the community?
- ❑ What are the appropriate communication strategies for reaching them?
- ❑ What are the appropriate channels and tools of communication for each of them?

The communication needs:

- ❑ What are their needs in terms of information and communication?
- ❑ What will they need to be able to use the information?

The objectives:

- ❑ What should be the objectives of the dissemination or the scaling-up activity, for each of the specific groups that we want to reach?



Developing Participatory Development Communication with Banana Farmers in Uganda: A Case Example

Banana is one of the most important crops in Uganda and in many homes. Especially in central Uganda, it forms the staple food. But since the 1970s, many small-scale banana farmers have been experiencing decreased farm yields. This is partly due to poor natural resource management (NRM) practices in which farmers rely on their own knowledge, which is often inadequate. On the other hand, researchers working on NRM issues have come up with technologies that would be of benefit to the farmers. However, there is a gap on how researchers and farmers share information regarding NRM. For several years now, researchers have attempted to disseminate information on NRM to farmers through the agricultural extension workers. But if farmers appreciate these research findings, they only do so during the period the researchers are with them.

In our experience, farmers have not really implemented agricultural research findings in their own fields. They do not own NRM research initiatives being tried out in their own gardens even when the initiatives bear positive results. When researchers visit farmers, some farmers have been known to show the researchers two plots of gardens: their own gardens and the gardens belonging to the researchers. *'This is our garden, and this one is the one which is yours'* the farmers are often heard to say. The latter are the gardens in which the farmers are putting into practice technologies as recommended by the researchers. This scenario has led agricultural researchers to question their methodology of information sharing with farmers. One of the reasons points towards the fact that researchers and extension service providers have largely relied on top-down dissemination methodologies in which farmers are not involved in decision-making regarding which NRM problem to address and which technology to implement in their gardens.

A two-year research initiative called "Communication Among Banana Growers for Improvement of Soil and Water Management" was implemented. This was aimed at developing a two-way communication model suitable for facilitating the flow of information between researchers and banana growers, enhancing farmers' participation in experimenting with different banana improvement technologies, and fostering farmer to farmer training with the help of communication tools developed in a participatory manner. The study used participatory development communication (PDC) as a tool for fostering active participation of the local community in the identification of NRM problems in banana gardens, their causes and solutions. Farmers were involved in identifying and prioritizing their NRM problems, as well as locally adapted solutions, based on a large extent on existing local knowledge reinforced with research findings. With the help of the researchers, they implemented proper NRM in their own banana plots and were amazed at the results of these practices.

Unlike before, farmers are now confident to show their banana plots to other farmers and visiting dignitaries in their community. Several of them became leaders in their communities. But the practicing farmers never lost the fact that they were only representatives of other farmers in their local communities. After they had mastered the NRM technologies, they wished to share their new knowledge with other farmers and the farmers they had represented in the initiative. They recognized that they had to use communication tools that could illustrate how to implement the NRM technologies. They used video, photographs, posters and brochures to demonstrate techniques on soil fertility, soil erosion and soil moisture retention.

With this experience, farmers also appreciated the power of belonging to a group so they organized themselves into an association through which to tackle their own community problems instead of waiting for external assistance. They have also started sharing their experiences with other farmer groups within and outside their district and are now more confident in approaching service providers regarding their community concerns.

As for researchers and other stakeholders who participated in this initiative, they have become convinced of the power of participatory development communication in the implementation of NRM initiatives together with farmers and have started incorporating participatory development communication aspects into their research initiatives.

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Conclusion

Participatory development communication is a tool that reinforces the process of participatory research and/or participatory development. It aims to facilitate community participation to their own development, as well as the sharing of knowledge needed in such a process. It integrates communication, research and action in an integrated framework, and involves researchers, practitioners, community members and other stakeholders in the different phases of the development process.

But also, most importantly, it points out to a conception of NRM research or initiatives that is directly linked to the agenda of communities and seek to reinforce their efforts in fighting poverty and improving living conditions.

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**Participatory Research and
Development for Sustainable
Agriculture and Natural Resource
Management: A Sourcebook**

Monitoring and Evaluating Participatory Research and Development: Some Key Elements



The deliberate and careful integration into the project cycle of monitoring and evaluation activities can strengthen the learning, accountability, and effectiveness of research efforts. Using a participatory approach to do so facilitates the realization that what matters is not only *what* is assessed, but *who* does the measuring and assessing. In addition, such an approach can contribute to a better understanding of *how* different concerns and interests are represented and negotiated in a research process. In other words, it helps to understand and assess how and why participation takes place or does not take place.

Monitoring is the systematic, regular collection and occasional analysis of information to identify and possibly measure changes over a period of time. Evaluation is the analysis of the effectiveness and direction of an activity or research project and involves making a judgement about progress and impact. The main differences between monitoring and evaluation are the timing and frequency of observations and the types of questions asked. However, when monitoring and evaluation are integrated into a research strategy as a project management tool, the line between the two becomes rather blurred. Participatory monitoring and evaluation (PM&E) is the *joint effort or partnership* of two or more stakeholders (such as researchers, farmers, government officials, extension workers) to monitor and evaluate, systematically, one or more research or development activities (Vernooy *et al.*, 2003).

For more information, refer to:
McAllister, K. and R. Vernooy. 1999.
Action and Reflection: A Guide for
Monitoring and Evaluating
Participatory Research. Ottawa:
IDRC. <http://www.idrc.ca/cbnrm>

In designing monitoring and evaluation activities it is useful to consider six interrelated questions:

- Why monitor and evaluate?
- For whom?
- Who will monitor and evaluate?
- What will be monitored and evaluated?
- How?
- When?

We discuss here the Why? and What? questions and also the very important issue of appropriateness. All six questions are discussed in more detail in McAllister and Vernooy (1999).

WHY to Monitor and Evaluate?

In general, goals can be:

- To assess project results: to find out if and how objectives are being met and are resulting in desired changes.
- To improve project management and process planning: to better adapt to contextual and risk factors such as social and power dynamics that affect the research process.
- To promote learning: to identify lessons of general applicability, to learn how different approaches to participation affect outcomes, impact, and reach, to learn what works and what does not, and to identify what contextual factors enable or constrain the participatory research.
- To understand different stakeholders' perspectives: to allow, through direct participation in the monitoring and evaluation process, the various people involved in a research project to better understand each others views and values and to design ways to resolve competing or conflicting views and interests.
- To ensure accountability: to assess whether the project is effectively, appropriately, and efficiently executed to be accountable to they key agencies supporting the work (including, but not exclusively, the donors) (Estrella and Gaventa, 1998).



Usually, a monitoring and evaluation plan includes a combination of these goals, but it may be necessary to put more emphasis on one of them, depending on available resources, skills, and time and on the point in the project life-cycle during which the monitoring and evaluation will be done (see Table 1 for an example).

Table 1. Monitoring and Evaluation Plan Proposed by the Guizhou Academy of Agricultural Sciences CBNRM Project Team

| | | | |
|--|--|--|--|
| Project research topic: Water resource management | | | |
| Why conduct PM&E? | | | |
| <ol style="list-style-type: none"> 1. To identify problems, to analyze reasons, to find out solutions, and to improve project plan and implementation. 2. To find out to what extent the project research meets the needs of the local people, local government and researchers. 3. To find out to what extent the project facilitates the sustainable utilization and management of natural resources. | | | |
| | Outputs | Outcomes and impact? | Reach |
| What? | <ul style="list-style-type: none"> <input type="checkbox"/> Effective management group <input type="checkbox"/> Effective management regulations | <ul style="list-style-type: none"> <input type="checkbox"/> Improved management capacity of community organization <input type="checkbox"/> Value of and attitude toward resource use | Households within or outside the project area, local governments, local hydraulic department, project researchers and visitors |
| Indicators | <ul style="list-style-type: none"> <input type="checkbox"/> Improved services of management staff <input type="checkbox"/> Fairness of water distribution <input type="checkbox"/> Increased irrigated areas (village level and household level) <input type="checkbox"/> Effectiveness of facility operations | <ul style="list-style-type: none"> <input type="checkbox"/> Timeliness of water distribution <input type="checkbox"/> Ease of water fee collection <input type="checkbox"/> Decreased conflicts in water distribution <input type="checkbox"/> Labor mobilization for building and maintenance of facility | <ul style="list-style-type: none"> <input type="checkbox"/> Number of visitors <input type="checkbox"/> Times of experience sharing with other researchers <input type="checkbox"/> Number of villages that have adopted the measures of water resource management of the project |
| Who? | <ul style="list-style-type: none"> <input type="checkbox"/> Management group <input type="checkbox"/> Beneficiary households <input type="checkbox"/> Researchers | <ul style="list-style-type: none"> <input type="checkbox"/> Local households <input type="checkbox"/> Researchers <input type="checkbox"/> Local government <input type="checkbox"/> Village committee | <ul style="list-style-type: none"> <input type="checkbox"/> Local households <input type="checkbox"/> Researchers <input type="checkbox"/> Local government <input type="checkbox"/> Village committee |
| For Whom? | <ul style="list-style-type: none"> <input type="checkbox"/> Local government <input type="checkbox"/> Target community <input type="checkbox"/> Hydraulic department <input type="checkbox"/> Researchers | <ul style="list-style-type: none"> <input type="checkbox"/> Local government <input type="checkbox"/> Target community <input type="checkbox"/> Researchers | <ul style="list-style-type: none"> <input type="checkbox"/> Local government <input type="checkbox"/> Target community <input type="checkbox"/> Researchers |
| When? | Following the workshop, during last year of project implementation | | |
| Tools | <ul style="list-style-type: none"> <input type="checkbox"/> Matrix scoring <input type="checkbox"/> Semi-structured interviewing at household and group levels <input type="checkbox"/> Sampling survey <input type="checkbox"/> Community resource mapping <input type="checkbox"/> Self-monitoring book | | |

Source: Adapted from Vernooy *et al.*, 2003

Efficiency, Effectiveness and Relevance

Underlying reasons for monitoring and evaluating are frequently framed in terms of:

- ❑ **Efficiency** refers to the amount of time and resources put into the project relative to the outputs and outcomes. A project evaluation may be designed to find out if there was a less expensive, more appropriate, less time-consuming approach for reaching the same objectives.
- ❑ **Effectiveness** describes whether or not the research process was useful in reaching project goals and objectives, or resulted in positive outcomes.
- ❑ **Relevance** or **appropriateness** describes the usefulness, ethics, and flexibility of participatory research within the particular context and for the particular research question.

Combined, these criteria enable judgment about whether the outputs and outcomes of the project are worth the costs of the inputs. Effectiveness, efficiency and appropriateness can be considered for the different methods, tools and approaches rather than questioning the value of the research approach as a whole.

In this context, the **efficiency** of a particular method or approach can consider factors such as the time involved for local people balanced against the value of the information gained and whether this information was available through other means, or whether or not the accuracy or the detail of the information gained from the research method warrants the extra time taken.

Effectiveness of particular participatory methods can consider whether or not the approaches or methods allowed representation of different local interests, whether they were able to generate desired results, whether or not they encourage strengthening of local individual and organizational capacity, and whether or not they encourage farmer experimentation.

Relevance or **appropriateness** relates to the flexibility of the process to adapt to the local context and emerging needs, whether or not the tools are suitable to the capacities of the researchers and community, and whether or not the approach is reaching stakeholders at the scales relevant to be effective for addressing the research problem.



It is important to define from the outset what weight will be given to each of these dimensions.

WHAT to Monitor and Evaluate?

Understanding the condition of the community before the project was initiated is useful in order to provide a point of comparison for monitor and evaluating changes that occur during the project and to understand how the research process contributed to these changes. Participatory baseline analysis conducted at the beginning of the project can provide a point of reference for comparison and for understanding change in the community. It is useful to distinguish between the different kinds of results generated from the research: outputs, processes, outcomes, impact and reach. These can be briefly defined as follows:

- ❑ **Outputs** describe the concrete and tangible products of the research as well as the occurrence of the research activities themselves (see the Guiding Questions 1 below).
- ❑ **Processes** describe the methods and approaches used for the research.
- ❑ **Outcomes** describe the changes that occur within the community or with the researchers that can be attributed, at least in part, to the research process and outputs.
- ❑ **Impact** describes overall changes that occur in the community to which the research project is one of many contributing factors. One such impact often expected from participatory research is social transformation (see the Guiding Questions 2 below).
- ❑ **Reach** describes who is influenced by the research and who acts because of this influence.

GUIDING QUESTIONS 1: Assessing the Quality of Common Outputs of Participatory Research

New technologies or production systems developed in partnership with local people and researchers (agro-forestry, soil-conservation, farming systems, etc.)

- ❑ Are these based on priorities identified by local people? Were local people involved in the development or experimentation process? Were gender and social factors taken into account?
- ❑ Are technologies still being used or adapted by local people? By whom?
- ❑ Have local people adapted the experimental approach to other areas of their livelihood?
- ❑ Has the innovation been taken up by other people who did not participate in the study?
- ❑ Have people been teaching each other about the use of the technologies?

Community-level organizations created or strengthened

- ❑ Who is actively involved? How did these people participate in the research?
- ❑ Is there an active leadership?
- ❑ Whose interests are represented by the organization or by the leaders? Do gender and social factors influence the functioning of the organization?
- ❑ Are the interests of less powerful groups represented?
- ❑ Are the organizations and leaders accountable to the community? Are they representative of important stakeholders? Are they legitimate in the eyes of the community? What is the motivation for people's involvement?

GUIDING QUESTIONS 1: Assessing the Quality of Common Outputs of Participatory Research ...*(continued)*

Community-based management systems

- Are local people able to systematically monitor the results of their activities and adapt activities that are not sustainable?
- Are they able to enforce sustainable practices? How do they ensure compliance?
- Is there equity in representation and participation? Do gender and social factors influence representation and participation?
- Is there an effective or improved forum or mechanism for conflict resolution concerning the use of common resources?
- Are methods for decision-making improved or more representative of various interests?
- Are less-powerful voices included in decisions?
- Is there strength in the leadership?
- Is there a system of accountability, and to whom is the system accountable?

GUIDING QUESTIONS 2: Assessing the Potential of Participatory Research to Result in Social Transformation

Strengthening local awareness of issues and options

- Is the research process increasing local awareness of issues and facilitating them to develop local options for improving their situation?

Participation of local people in decision-making, planning and action to address problems

- Is the participatory process facilitating local involvement in decision-making and action to address problems?
- Who in the community is involved and whose perspectives are being represented?

Perception of ownership of the process

- How do local people perceive the research in terms of whose research is it?
- Who controls the research questions and agenda, and to what extent are the issues and questions defined by the researchers?
- Are local people involved in identifying and defining research priorities and plans? In data collection and analysis? In defining solutions and actions? In monitoring results of their activities or experiments and in defining their own indicators and criteria for success?

Strengthening existing individual and organizational capacities

- Has the research identified and made explicit existing individual and community capacities (existing resource management norms, decision-making processes, conflict management skills, etc.)?
- Is the research process strengthening these individual or group capacities and organizational skills?
- Is the process contributing to individual and community awareness of local problems and strengthening their ability to deal with them effectively?
- Is the process strengthening community capacity and motivation to continue activities such as resource management, or is community motivation dependent on researcher facilitation?

Creating linkages between stakeholders

- Have the researchers identified existing linkages, and areas where linkages need to be made in order to effectively address the research problem?
- If appropriate to the research question, have the researchers been able to encourage participation of stakeholders at different levels of governance and create linkages between these stakeholders?
- Have they been able to create forums or networks for negotiation or information sharing between these different groups, or between groups of similar interests (e.g., farmers)?

Source: Adapted from McAllister and Vernooy, 1999

Appropriateness

Appropriateness and risks concerning monitoring and evaluating participatory research can be considered from various perspectives. In terms of risks, research may not be able to meet its goals and/or could unintentionally cause harm to the community or to specific groups within the community despite achieving its goals. For example, research aimed at sustainable community management of common resources may be manipulated by more powerful stakeholders and may unintentionally neglect representation of marginal groups or women. In consequence, these groups may lose access to important resources.

These kinds of social risks research need to be carefully anticipated during proposal development and monitored throughout the project to ensure that specific groups are not significantly disadvantaged by the research. Careful anticipation of social risks involved in the research can help establish the need for care in identifying the different groups who might be affected by the research. Potential risks from participatory research and from not recognising and involving stakeholder groups can be anticipated before the project begins. This brings us to ethics.

Ethics

Creating unrealistic expectations for concrete development interventions at the community level is a common problem for participatory research projects and causes disappointment and suspicion in the community. This can also have negative consequences for future work of the research institutions by affecting their acceptance in communities. This issue should be addressed in the proposal. There are several possible ways to deal with local expectations.

- ❑ The participatory research project could be linked to a development initiative that has the mandate to provide concrete services to the community. However, this is not always an option.
- ❑ Researchers should be clear in the proposal about how they will be transparent to the community about the goals of the research and what the community can realistically expect to gain.
- ❑ The proposal could demonstrate a mechanism for generating some small concrete livelihood benefits to the community early on in the research process, such as small rotating credit schemes or helping establish seed banks, so that local people see benefits from the time they have given to participate in the research.



Confidentiality of information and security about how information gathered from community participation will be used is important because often researchers discover activities that would be illegal according to the state (for example, capturing of endangered species or logging in protected areas). Furthermore, information concerning resource ownership could be used by the government, for example, to extract taxes. It is important that the researchers address this issue in the proposal, and that they ensure that the identities of informants are concealed in their research notes and reports. One way of doing so is by using numerical codes for interviewees, and keeping their identities separate from the research documents. In addition, aliases should be used in reports which will be made public and which include anecdotal information from specific individuals or groups.

Informed consent from local people and groups for participation in participatory research is not as simple as it seems, and in many cases, gaining genuine informed consent for community involvement in the research process is difficult. Obstacles include:

- ❑ The concept of informed consent is not always clear among researchers, let alone among community members. Researchers may not respect or understand peoples' wish NOT to be involved.
- ❑ The risks of involvement in the research process may not be apparent to either the researchers or community - therefore it may be difficult to estimate the costs and benefits of participation.
- ❑ Power relations between researchers and community, and within the community itself may result in coerced consent. Individuals may feel they cannot refuse involvement because of pressure from village leaders or government officials. In addition, cultural/social relations of respect for researchers may make it impolite or socially unacceptable for local people not to agree to participate.
- ❑ Anticipation and expectation of benefits by community members from their participation in the research process may lead people to participate, even if the limitations of potential benefits has been articulated by the researchers.



Informed consent is related to transparency of the whole research process; hence, this includes the monitoring and evaluation activities. Researchers should address the informed consent issue upfront in the proposal (see the Guiding Questions 3 below).

GUIDING QUESTIONS 3: Assessing Appropriateness of the Participatory Approach

Type of participation

- What is the level of community involvement in and control over the research and is this appropriate for the goals of the research? Have these questions been discussed up-front at the start of the research?
- Is the community benefiting from the research? Who in the community benefits?

Transparency of the research process

- Are the researchers transparent about the limitations and scope of the participatory research activities?
- Are local people aware of these limitations or do they have unrealistic expectations?
- Are local people aware of the overall goals of the research and do they understand these goals? Have they agreed to them?

Motivation for participation

- Are local people participating and how?
- Why are people motivated to participate? Is participation voluntary or compliant?
- Do local people perceive that they are benefiting from their participation in the research?
- How is the research process benefiting from community participation?

Relevance of the methods and approaches to the local context

- Is there a process for local feedback into the research design?
- Is there a systematic mechanism for occasional reflection and interaction between researchers and local people?
- Are the results from community participation informing the research design?
- Are the research goals and methods being redefined and adapted as the research proceeds?
- Are the methods and tools effective for encouraging participation and representation? For strengthening local capacity? For enabling community-ownership of the process? For reaching objectives and goals of research?

Source: Adapted from McAllister and Vernooy, 1999

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**Participatory Research and
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Participatory Monitoring and Evaluation with Pastoralists



Participatory monitoring and evaluation (PM&E) is an integral part of a participatory planning cycle that incorporates both external and indigenous knowledge and perceptions. It allows all participants in the development process to keep track of where they are going and to recognize where and when it is necessary to change track in order to reach their agreed objectives. It stimulates mutual learning by all stakeholders, including policymakers and donors. PM&E is a topic important for development cooperation as a whole, because it embraces questions of impact and sustainability.

PM&E experiences were sought by looking into official databases of published literature and in the internet, communicating within an informal network of persons and institutions working with livestock-keepers, and drawing from the authors' field experiences. Most of the documents in PM&E among pastoralists and another livestock-keepers came from Africa, Australia and New Zealand.

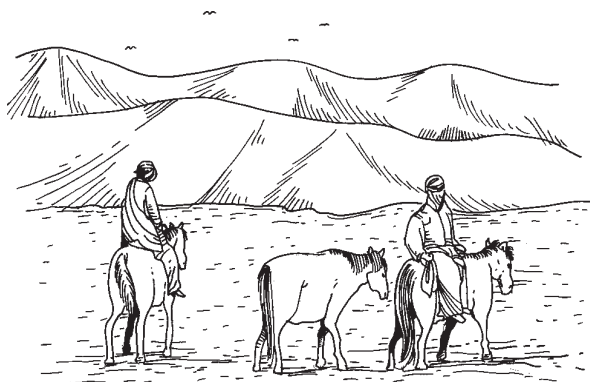
The review of documented experiences in PM&E with pastoralists was carried out as a follow-up to an earlier review of participatory planning with pastoralists commissioned by the Germany Agency for Technical Cooperation (GTZ) in order to improve development cooperation in natural resource management. GTZ felt that the opportunities for learning from experiences in PM&E with pastoralists would be great because of the particular challenges of working with these mobile and, in most cases, politically and economically marginalized resource users.

The search covered PM&E of:

- ❑ change in the condition of natural resources (environmental monitoring);
- ❑ how the resources are being managed, i.e., of local institutions and social relations of natural resource management (NRM);
- ❑ intervention projects, referring primarily to the interactions between the local resource managers and external supporting agencies; and
- ❑ participatory experimentation (on-farm/in-herd trials implemented by livestock-keepers and scientists or development workers).

The review yielded numerous reports on PM&E training, several guidebooks and plans for establishing PM&E systems, and some cases of facilitating multi-stakeholder platforms for NRM and resolving local conflicts. However, there were only a few examples of actual implementation of PM&E together with pastoralists or other livestock-keepers that gave balanced attention to concerns of both the producers and the intervening agents. For example, in several cases, projects had involved pastoralists in monitoring the use and status of rangeland resources, but seldom according to criteria and methods that were identified together with pastoralists.

The tools applied in PM&E were the same as in the participatory planning processes (e.g., maps, timelines, historical matrices, ranking, proportional piling). However, field experiences showed that it is not the tools but rather the approach taken to PM&E that is crucial for success: an approach based on negotiation between the local resource users and the external partners on what was to be monitored and evaluated, by whom and in what way.

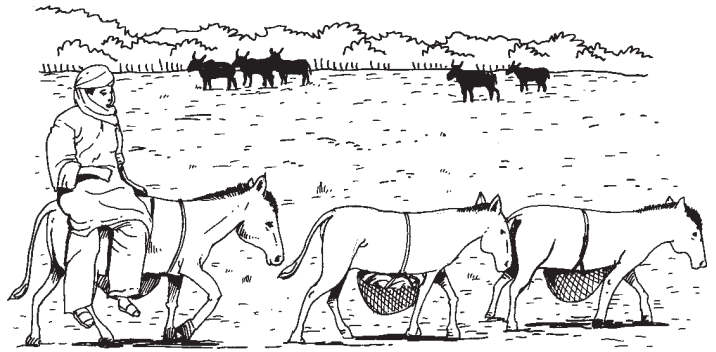


Potentials of PM&E

- ❑ In only a few cases did pastoralists find the PM&E process sufficiently beneficial for themselves to want to continue it without external project support.
- ❑ People practicing extensive livestock keeping did not want PM&E systems that involved intensive data collection. They preferred simple PM&E systems with low intensity of data collection, using methods of recording and analysis that depend more on memory and discussion than on written records.
- ❑ People who live in sparsely populated areas like the drylands appreciate the opportunity to discuss with peers. Periodic meetings during which environmental or socio-economic conditions or project processes and outputs could be discussed in a semi-structured way seemed to be preferable to data-intensive monitoring.

❑ Various visualization techniques used during meetings proved to be useful, such as before-and-after matrices, maps, proportional piling, flow and impact diagrams, and SWOT (strengths, weaknesses, opportunities, threats) charts. The repeated use of such tools in successive workshops at intervals of several months or a year can form an element of PM&E.

❑ Instead of frequent and continuous observations and records, a series of short evaluation workshops can be used to monitor progress.



❑ Indigenous or grassroots indicators, particularly with respect to NRM, offer a good entry point into PM&E. These can be part of an integrated set of indicators for a PM&E system developed jointly with scientists.

❑ Few efforts have been made to encourage local development agents to identify indigenous indicators themselves, although these are the local actors who are most likely to continue practicing a PM&E system with pastoralists.

❑ PM&E was sometimes introduced deliberately in an attempt to give a voice to previously marginalized user groups, such as women or nomads. This was sought within the framework of multi-stakeholder platforms that functioned as monitoring mechanisms for better management of common resources.

❑ Facilitated negotiation allowed the different interest groups to reach agreement on what can be done within their capacities and means, and what needs to be monitored by whom. It became evident that the negotiation process must continue through joint assessment of the very PM&E system that the platform puts in place, examining whether the concerns of all stakeholder groups have been included. Thus, platform building becomes a continuous process fed by self-evaluation.

Truly participatory M&E potentially contributes to local capacity building and institutional development. Appropriate forms of PM&E can help the local people manage their own affairs better and increase the likelihood that project-supported activities will continue after the project ends.

Traps in PM&E

The many cases of less participatory M&E systems revealed that attempts to set up PM&E systems can fall into several traps.

- ❑ Failing to answer the questions: Why monitor? Who needs and will use what information? Not all aspects of development can be and should be monitored in a participatory way. PM&E is applicable only with respect to those issues that are important enough to the participants that they are willing to invest their time and other inputs in doing the monitoring. If scientists or development workers wished to monitor certain parameters that were not of immediate interest to the livestock-keepers, or to an exactitude that only scientists wanted, it became necessary to pay local enumerators or to provide other forms of incentive (e.g., free veterinary care) to persuade livestock-keepers to take the measurements and keep the records.
- ❑ Failing to recognize the biases to which participatory approaches to collecting and interpreting information can lead, especially where pastoralists are involved who do not have a relationship of trust with outsiders or who see the exercise as a chance to seize advantages. A case in point is drought monitoring, when declaration of a state of drought can bring financial assistance to livestock-keepers. Many intervention projects were not, at least initially (and, in some cases, also not even later), aware of the extent to which PM&E of environmental trends, organizational development or project-supported activities could become part of a power play between different resource-user groups or levels of government.

Lessons Learned

- ❑ The issues to be monitored have to be of genuine interest to the partners involved.
- ❑ Indicators must be simple and capable of communicating something to the people wanting to act on the results.
- ❑ The recording needs to be done in a form that partners can manage.
- ❑ It must be noted that pastoral communities in developing countries have a strong oral tradition, low levels of literacy and little access to modern information and communication technology, with the exception of radio.



- ❑ The low population density in pastoral areas, their remoteness and their poor infrastructure in terms of roads and telecommunications can make PM&E quite costly, even if records are limited to the most essential.
- ❑ These costs are justified if the PM&E process contributes to building capacities for managing natural - including human - resources. Capacity building for PM&E is necessary not only at the level of local beneficiaries, but also among the other partners in the development process.
- ❑ Development agencies that are truly committed to pastoral development need to make long-term investments in participatory approaches within the framework of process-oriented projects and programs.
- ❑ PM&E can then be a very useful means of enhancing joint learning by pastoralists and other development planners about sustainable use of the rangelands and improving pastoral livelihoods.

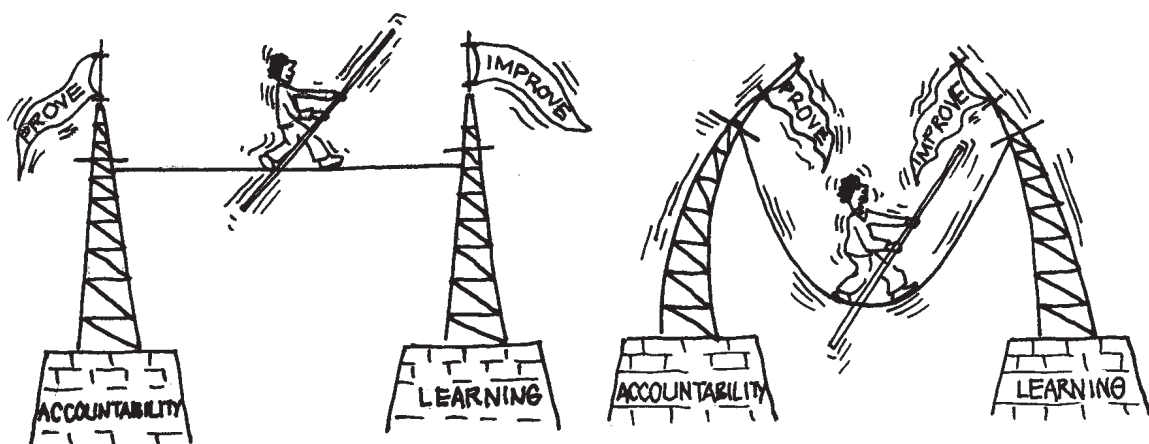
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Outcome Mapping: Striking a Balance Between Accountability and Learning



Outcome mapping (OM) is an integrated participatory monitoring and evaluation (PM&E) system that looks at both development results and internal performance within a program or project. It aims to strike a balance between accountability and learning. OM focuses on changes in the behavior of direct partners (as outcomes); assesses contributions to the achievement of outcomes; and designs in relation to the broader development context. Focussing on changes in partners' behavior, relationships or actions allows a program to:

- measure results within its sphere of influence
- obtain feedback about its efforts to improve its performance
- take credit for its contributions to the achievement of outcomes
- show progress towards outcomes

Outcome mapping looks at outcomes, for PM&E, in the context of achieving developmental goals rather than focus on pure impacts.

Outcome Mapping in the NEPED Project Context

The Nagaland Empowerment of People through Economic Development Project (NEPED) was Nagaland's first donor-supported project. The implementing team lacked capacity in management and reporting. There was a single-minded focus on executing field activities without allowing for monitoring or evaluation of

outputs. As a result, while work in the field looked picture perfect, there was absolute confusion in the office with data, information and experiences finding no apparent parking space. Lack of knowledge and capacity to fit these into an M&E format that was poorly understood was frustrating, to say the least. With the end-of-project evaluation fast approaching, the frustration turned to desperation. The work had been done well, downstream partners corroborated the quality of outcomes and achievements, and yet there was little to show on paper in quantitative or qualitative terms.

The NEPED Project (www.nagaland.nic.in) is being implemented in two phases in Nagaland, northeast of India. Both phases are strategically aimed at improving the livelihoods of Naga farmers through sustainable natural resource management. The first phase (1995-2000) introduced trees as a perennial “cash crop” on fallow swidden lands while the second phase (2001-2006) addresses the need to provide alternatives to discourage farmers from harvesting the trees sub-optimally by introducing shade loving cash crops. Both phases are strategically aimed at moving the Naga farmer from shifting cultivation to a more settled form of agroforestry.

The project is implemented by a team of 14 government officers from various line departments, headed by a team leader, and is called the Project Operations Unit (POU), an unusual arrangement that could be termed as a Non-departmental Government Organization (NGO). The India-Canada Environment Facility (ICEF) is the principal donor with research support from International Development Research Center (IDRC).



NEPED was one of the first projects to field-test outcome mapping as a tool for self-assessment and for collating and organizing data in preparation for end-of-project evaluation.

Why Outcome Mapping

The following section describes the application of outcome mapping in the NEPED Project within its two phases, focusing on the challenges addressed.

Challenges Addressed in Phase 1

Lack of Baseline Data at Inception

Given the vast reach of NEPED having worked in 1,056 villages in Nagaland, it would have been impossible to conduct a baseline study and survey. Outcome mapping was used as a simulation exercise to go backwards in memory to realistically generate data from the last five years to be used in lieu of baseline data to evaluate performance.

Four Boundary Partners Identified

- farmers
- village authorities
- other local institutions
- government agencies

After creating the vision and mission statements, outcome challenges for each of the boundary partners were made (all retrospectively!) with the wisdom of hindsight. Progress markers were formed and evaluated by rating them ‘high’, ‘medium’ or ‘low’ in the present day context.

Retrospective M&E for Impact Assessment

NEPED underwent the throes that come with any first-time project. Frequent changes in management, reporting procedures, management information system (MIS) and M&E formats, strategy, etc. disoriented the project team and caused perplexity. Through OM, the team was able to identify major accomplishments, gaps (and not omissions) in the first phase, around which the second phase is designed.

Even as each activity set was viewed as successfully performed when looking from the bottom-up, no clear-cut linkages could be established when looking at the project as a whole. In other words, there was much to show as *outputs*, but not much to link them to *outcomes*. By using OM, these linkages were established through a road map.

An interesting aspect was the role played by the body of “local experts”, NEPED’s “human data bank”. The local experts were a group of 10 highly respected and influential farmers drawn from various tribes. They had a vast repository of indigenous knowledge on best practices and provided invaluable inputs to research, monitoring and field implementation on a continuous basis. They were conduits between the farmers NEPED worked with and the project team. They were included in the OM process to bring in “voices from the field”, especially in the area of on-farm trials and farmer innovations.



To Reflect as a Team for Self-Evaluation

The project team had gained considerable experience in implementing the project at the field level, with varied levels of success that needed to be collated and analyzed for its own internal self-assessment. By using the organizational practices tool and developing success markers, even the minutest details, that would otherwise have remained forgotten, emerged with solid quantifiable data on best examples, clearly establishing how the team as an organization had evolved along with its partners.

To Share and Record Experiences

During the course of implementing the project, the team’s field journals had references to stray bits of information which seemed useful, but remained unreported as it did not fit into the logframe-based reporting format, e.g., farmer innovations, best practices, feedback, indigenous knowledge, local tweaks, etc.

Innovations and Tweaks

- ❑ In some areas, instead of digging prescribed check dams on slopes to arrest soil erosion, farmers used poles and bamboos. This proved to be less labor-intensive while being more cost effective and efficient.
- ❑ Despite being advised to plant trees evenly spaced out as recommended by forestry manuals, Naga farmers planted them closely spaced. According to them, this enhances the growth rate, smothers weeds and produces trees with straight boles.
- ❑ The need to incorporate a more complex system of agroforestry than just food crops and timber was recognized. NEPED thus began establishing special fallow management sub-projects in existing test plots as a lead-up to the second phase.
- ❑ Feedback from training NEPED farmers, both men and women, indicated that such trainings be extended to other non-participating groups. Team members were invited as resource persons to seminars, conventions and trainings that were not project-related.



The innovations and tweaks emerged from the data on organizational practices and progress markers. Interestingly, most of these examples would have been called weaknesses, deviations or challenges under conventional project evaluation. OM reflected them as achievements. With the use of outcome mapping, the external evaluation team was saved the trouble of ‘digging’ out data at the field level, having only to validate the findings with user groups.

The evaluation team was particularly impressed by the ‘honest’ self-appraisal and in-depth knowledge of the NEPED team about what it had done in the last five years - its major achievements and gaps. This was instrumental in securing their recommendation in the end-of-project evaluation that reads – “The external assessment team is very supportive and recommends continued ICEF involvement in this project.”

Challenges Addressed in Phase 2

Having realized the utility and flexibility of OM as a tool, there was no hesitation in using it again, this time for design, planning, assessing performance and M&E. The strategy maps were used to increase the project’s sphere of influence over boundary partners and even to monitor one of them, the state government.

Interestingly, the project team would be reporting to, and be evaluated on, the donor specified Logical Framework Analysis (LFA)-based M&E format – and yet chose to use *both*. OM would be used to supplement, enrich and feed data into the donor M&E format. This format is designed in pure quantifiable terms, hence OM would also be used to *seek out* both qualitative and quantitative data, and to help inform and re-evaluate future activities. OM is being used as a tool to engage with communities to understand the impact and effectiveness of the project, and information generated is being fed into another format to meet reporting needs. OM’s flexible and participatory approach better enables the team to discuss results with the communities and with other ‘boundary partners’ and to assess and redesign strategies for work ahead.

For Project Design

After being asked to imagine who/what would change if NEPED was to be “wildly successful” at the end of the project period we created the vision - mission statement, identified who would need to change (our boundary partners) and created outcome challenges for these partners.

Vision

In Nagaland, communities are self-reliant and no longer subsidy-oriented. Farmers practice sustainable agriculture, building on traditional practices and integrating agricultural innovations. Through the development of agro-business, establishment of marketing infrastructure and entrepreneurship, both women and men benefit from increased economic return and improved agricultural production. Communities are empowered and actively managing their own affairs and resources judiciously, and women play an active role in community decision-making. Government consults with communities on policies and practices that affect them. NEPED becomes a model throughout Nagaland and in the rest of the world.

Mission

To achieve the vision, the project will have a flexible approach based on farmers' needs, involving them in the planning process. The project will develop and test models for enhancing agricultural productivity. NEPED will provide technical support to women and men farmers and village institutions. Working with Village Development Boards (VDBs) and Village Councils (VCs), it will support the implementation and monitor a revolving credit system which will be used by both women and men farmers to initiate agro-based income generating activities. Through the generation of market information, infrastructure and linkages will be created and strengthened. It will create mechanisms to build linkages and relationships with government departments and institutions to foster an open exchange on project activities; ensure transparency of project activities among farmers, VDBs, VCs and NEPED and continuously build its capacity to effectively implement the project.

Example of Outcome Challenge and Progress Markers (abridged)

NEPED intends to see farmers who are less dependent on the government. They introduce local innovations and use research findings to experiment with new ideas.

Expect to See Farmers

1. Farmers are receptive, capable to work with NEPED.
2. Farmers establish nurseries of planting materials.
3. Women participate in project decision-making and accrue benefit.
4. Farmers identify proper outlets for produce.

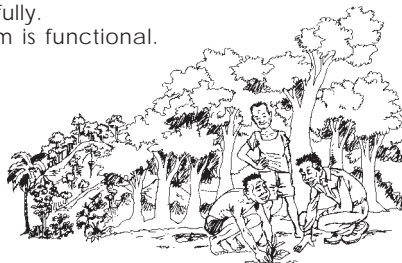
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Like to See Farmers

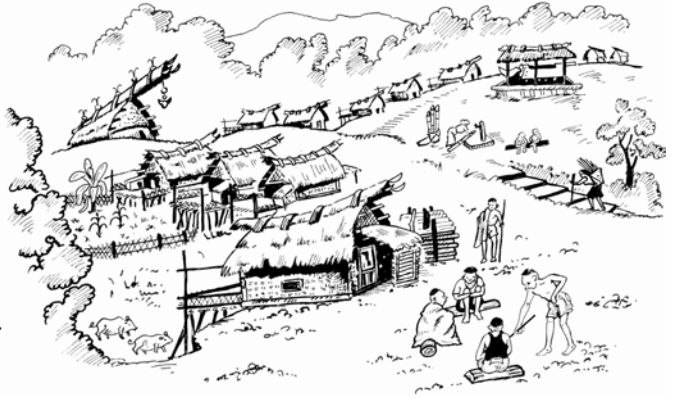
5. Farmers are eager to learn more and seek NEPED help.
6. Farmers take up new research findings in the field.
7. Farmers share success stories with other villagers.
8. Farmers put more area under cash crop cultivation as market demand increases.
9. Farmers establish market networks.
10. Women utilize their 25% share appropriately and fully.
11. Farmers ensure that the revolving fund mechanism is functional.
12. Farmers are reducing traditional *jhum* cultivation.

Love to See Farmers

13. Farmers accept innovations in the farming system across Nagaland.
14. Farmers start their own income generating schemes.
15. Women are empowered to participate in community decision-making.



The team had been actively involved in the preparation of the project proposal and hence had in depth knowledge of all project components. This really helped in weaving the vision-mission-outcome challenges around the components to come up with progress markers, strategy maps and the organizational practices. Validation was carried out by adapting elements of Participatory Rural Appraisal (PRA) tools like semi-structured interviews, focus group discussions and key informant feedback that fit in very well with outcome mapping.



For Monitoring

The team then moved on to identifying the monitoring priorities and putting together the outcome, strategy and performance journals for the next two years in order to inform itself. The team is using progress markers to monitor behavioral change induced by the project in three boundary partners: farmers, village authorities and Self-Help Groups, who are directly within its sphere of influence. Change in the remaining boundary partner, the state government, is also being monitored by assessing the quality of responses from it to the strategies adopted for it by the project.

For Evaluation

An evaluation plan has been prepared within the given framework, which is the last stage of the outcome mapping process. This was not an easy task. The second phase of NEPED is very broad-based and complex with activities ranging from revolving micro credit and agri-marketing to agroforestry and research. The ranges of partners are wide and the audience even wider.

The facilitation question “who will use the evaluation data” produced a long list of presumable recipients and as many as 27 issues to be evaluated, in trying to meet everyone’s needs. It was realized that a lot of resources and time would be expended in collecting and collating evaluation data on 27 issues. Then the awareness dawned that it was the project that was to be evaluated and not others’ expectations of it. Only four issues are being evaluated, with manageable data.

What was Gained from Outcome Mapping

It provided the team conceptual clarity on the project. The team graduated from the stereotype input-activity-output supervisors and is able to link these around outcome level issues. They can now ‘map’ their progress into the future, recognizing the major actors and forces, predict possible gaps/threats and strategically plan for it in advance.

It brought in a human dimension to the project. Outcome mapping works on the premise that development brings about change in people, especially their behavior. An OM map presents real-life pictures of human beings - their perceptions, their aspirations, their environment and the challenges to realizing them.

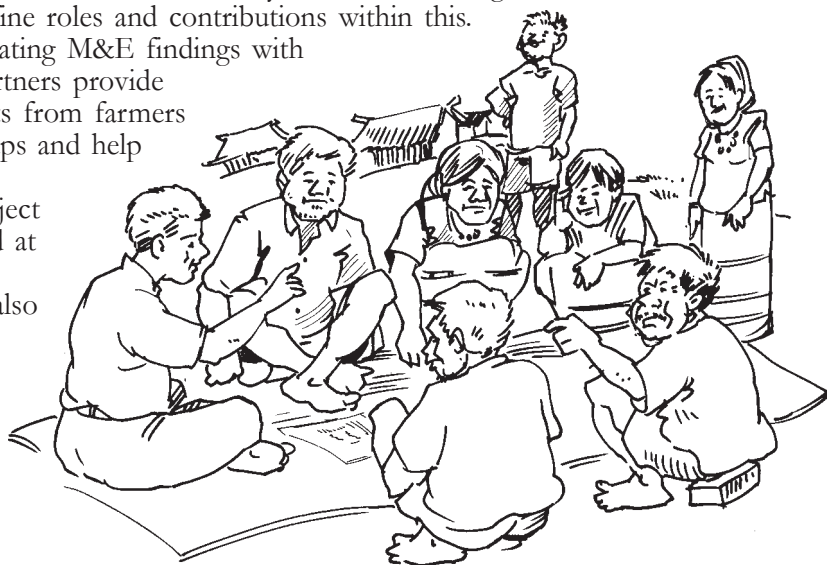
The often repeated and echoing question in OM "what or who needs to change.....?" raised the team from being providers of development achieving outputs to actually believing they were agents of change.

It was empowering. Outcome mapping is highly participatory and consultative. Although discussions are initiated within the project team thinking as a unit, validation by partners enables broadening of the canvas, acknowledging the presence of each as an indispensable unit of the whole process of development. In NEPED, there were cases where farmers deviated from the prescribed menu of activities on their own, without supervision, to come up with more cost and labor-effective innovations, being aware of what was the desired output and the long-term plan. This feeling of empowerment produces positive energy towards successful and sustainable implementation of the project.

It increased capacity and skills. One of the challenges faced in using outcome mapping was validating with boundary partners, especially at the village level. This was so different from the top-down government-sponsored development that was thrust upon Naga villagers. When consulted, it created suspicion and took a while to break down these barriers and to gain their trust and give them the feeling that they were indeed partners. The team had to be trained in formal PRA and facilitation skills. With government officials, who consider participation a threat to their authority, the approach had to be different.

It brought cohesion in the team and partners. In creating the OM map the active participation of all enabled everyone to see the 'big picture' and define roles and contributions within this.

Moreover, validating M&E findings with downstream partners provide invaluable inputs from farmers and village groups and help in constantly redesigning project delivery targeted at sustaining the program. This also enhances the feeling of ownership over the project.



Personal Reflection on the Use of Outcome Mapping

Besides the obvious uses in design, planning and M&E, outcome mapping has also been used for organizational development (vision, mission and strategy maps, along with organizational practices). It has also been used in training for problem-solving techniques by integrating strategy maps into systems thinking modules. The specific data that OM collects feed in very well to other logic models and logframe-based M&E systems (as the NEPED case demonstrated). But outcome mapping's intrinsic value as an M&E tool really emerges when used for programs that are focused on qualitative impacts like health care, education, indigenous knowledge and empowerment. This is proven with the recent users of the approach like the Thai Health Promotion Foundation, International Center for Sustainable Cities and International Center for Integrated Mountain Development. Outcome mapping can also be used for multiple projects within a program.



Some Challenges in the Use of Outcome Mapping

- ❑ Validation with grassroots partners can be very time-consuming as the jargon has to be demystified first. Strong PRA skills are required.
- ❑ Outcome mapping challenges socio-cultural biases, e.g., building a vision statement in Thailand was difficult as Buddhism believes in “karma” or fate. Likewise, in Nagaland, farmers who live on daily subsistence basis found it difficult to think (dream) one year down the line, leave aside five years.
- ❑ Acceptability by donors who consider it a threat to more traditional forms of M&E methods, also its focus on qualitative changes.
- ❑ Outcome mapping's major strength of versatility and adaptability for multiple users based on needs can actually hinder attempts to mainstream OM as different programs use it differently to suit their needs.

Ever so often, programs are caught in the trap of accounting for the resources used to achieve quantitative outputs that the “development agenda” remains forgotten. Outcome mapping enables a program to articulate its performance story, to measure and attribute the development process to the various actors involved and to take credit for achievements or outcomes. After all, development is by, and for, the people and a program can only influence, but not control, change.

Sarah Earl, Fred Carden and Terry Smutlyo of the Evaluation Unit of the International Development Research Center (IDRC) developed the outcome mapping methodology. For more details, or for a copy of the outcome mapping manual, visit www.idrc.ca/evaluation.

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**Participatory Research and
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Approaches



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Beyond the Problem-Solving Approach to Sustainable Rural Development



In a 1997 monograph entitled, “Rural Development From Vision to Action”, the World Bank posed the following rhetorical question: “If rural development is so important, why is it not happening?” The Bank posed three answers: poor commitment and capacities of countries; waning international commitment to agriculture and rural development; and poor commitment on the part of the World Bank. However, there is an additional explanation, which may be operating at a deeper level and contributing to these perceptions--the current problem-solving approach of many research and development organizations may be affecting their capacity as change agents.

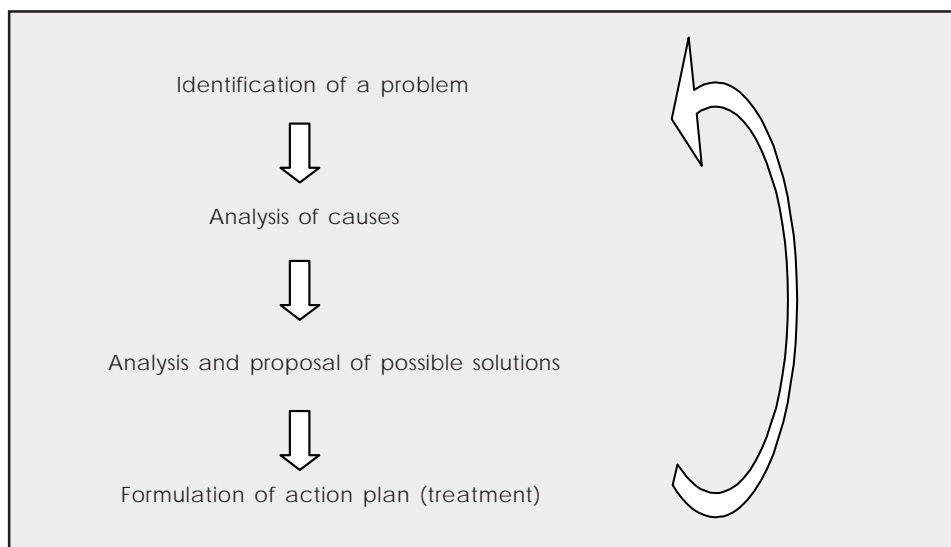
Although many such organizations have reconceptualized sustainable development in much broader and more holistic terms, and have made significant progress in evolving towards more participatory and people-centered approaches, a more positive approach is required to **complement** the problem-solving focus, as a way of ameliorating its self-limiting aspects.

Mental Models of Sustainable Rural Development

Mental models are the images, assumptions and stories that we carry in our subconscious minds about how the world works. They are powerful in affecting what we do because they affect what we see. Different observers of the same event describe it differently because their mental models influence the details that they emphasize.

The prevailing mental model of research and development institutions dedicated to sustainable rural development is that they exist to solve development problems. This has led to a diagnostic and often reactive problem-solving mode of action, and to a culture of trouble-shooting experts who develop solutions (Figure 1).

Figure 1. The Problem-Solving Process in “Research-for-Development” Organizations. An underlying assumption of such organizations is that they exist to solve problems.



Mental models have changed from the 1980's Transfer-of-Technology or Central Source model of sustainable development towards a more demand-led and people-centered approach. This approach focuses considerable attention on the importance of participation and equity, defines development much more broadly, and expands the concept of "expert" knowledge to include local, indigenous and informal knowledge as well as external, formal knowledge.

Sustainable development is defined as the process of enlarging people's choices and freedoms so that they may lead a long, healthy and secure life, acquire knowledge, and have equal access to the resources needed for a decent standard of living without compromising the prospects of future generations (UNDP, 1998).

The key dimensions of development include:

- ❑ **Empowerment** - embodied as choices, freedoms, participation in decisions, dignity, respect, cooperation and the sense of belonging to a wider community.

- ❑ **Equity** - seen as equal opportunity in access to natural and social and economic resources.
- ❑ **Sustainability** - defined as meeting present needs without compromising those of future generations.
- ❑ **Security** - encompassing freedom from violence, discrimination, unemployment and disease.

This more holistic and ecological view of sustainable rural development is framed as a positive vision or a dream to inspire us; nevertheless, the missions of research-oriented organizations dedicated to sustainable rural development, and the participatory tools and methods that they use for navigating the development process remain grounded in the problem-solving mindset.

Beyond the Problem-Solving Approach to Sustainable Rural Development

Sustainable rural development seems elusive because people and organizations are constrained by their perception that resources, and hence their capacities, are limited. Other related constraints include the need to have concrete definition of problems, and the reluctance to step into unknown territory (e.g., other disciplines and ways of knowing requisite to a more holistic perspective). Together, these constraints limit human imagination, vision and enterprise. The World Bank's explanation for the poor track record in sustainable rural development is clearly grounded in a negative view of inadequate capacity and commitment. This may be a consequence of a deeply held mental model that is currently below the level of awareness of the World Bank and many other organizations.

Negative mental models and problem or deficit-based approaches are self-limiting for several reasons.

- ❑ The energy that could create something new is diverted to preventing or containing something undesirable.
- ❑ Negative visions carry a message of powerlessness, and they are short term - once the perceived problem or threat changes, the energy and vision dissipates.
- ❑ Troubleshooting approaches are slow because they look backwards to yesterday's causes.
- ❑ They can generate defensiveness and reinforce hierarchies and the social distance created by power differences.

Sources: Cooperrider *et al.*, 2000; Hofstede, 1980



The mental model says that our world is full of problems and that is the job of governments and development-oriented organizations to help fix them. A **complementary** approach is to choose to "see" consciously and focus on possibilities, capabilities and assets rather than focusing exclusively on problems, needs and deficits. By focusing on positive elements, individuals, organizations, communities and even societies can tap the transformative and creative energies of people who believe that humans have the collective capacity to create the future they desire. These ideas are not new, but rather, are part of a paradigm shift that is gradually challenging our mechanistic view of the world and moving towards a more holistic ecological view that gives greater eminence to the role of human consciousness in constructing reality.

Appreciative Inquiry: An Example of a Vision-Based Approach

Appreciative Inquiry (AI) is one of a family of approaches that can complement problem-solving by counterbalancing its self-limiting aspects. AI is an approach for planning and working for change that identifies the best of "what is" as the grounding for pursuing a vision of "what could be." It is a cooperative and participatory search for the strengths and positive forces found within every system. The AI approach involves collaborative inquiry, based on affirmative questioning and theory building, to uncover and accentuate the positive in a community, enhancing cultural identity, spirit and vision. AI is selectively attentive to the best and highest qualities in a system.

Local people can use their understanding of the "best of what is" to construct a vision of what their community might be if they identify their strengths and then improve or intensify them. They achieve this goal by creating a provocative vision for the future that can build on past and current achievements. These visions are realistic dreams that motivate a community to reach for something better, based on an understanding of what gives them hope now. Figure 2 describes the four steps in the Appreciate Inquiry cycle.

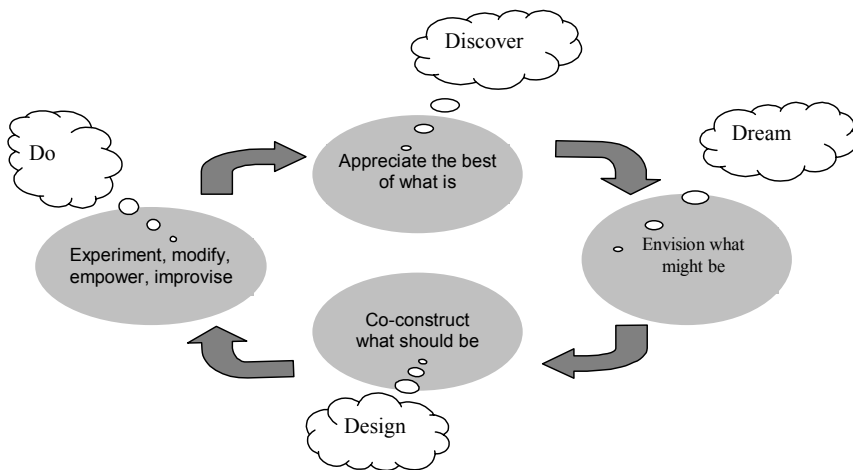


Figure 2. Four Steps of the Appreciative Inquiry Cycle

The core task in the **Discovery** phase is to uncover and appreciate the moments of excellence when people experienced the community in its most alive and effective state.

Participants then seek to understand the conditions that made the high points possible, such as leadership, relationships, technologies, values, capacity building or external relationships. They deliberately choose not to analyze deficits, but rather to systematically



identify and learn from even the smallest victories. In this phase, people share stories of accomplishments, discuss the positive attributes at the core of their community and identify the aspects of their history that they most value and want to enhance in the future.

In the **Dream** phase, people challenge the status quo by constructing practical visions that are grounded in the community's history, but seek to expand the community's potential. Images of the future emerge from the positive examples from the past.

In the **Design** phase, participants create a strategy to carry out their provocative visions, incorporating the qualities of community life that they want to protect and the relationships that they want to achieve.

The **Doing** phase involves the construction of the new image of the future. It is a time of continuous learning, experimentation and innovation, adjustment and improvisation in the service of shared ideals.

Appreciative Inquiry views collective imagination and dialogue about the future as infinite human resource for generating constructive change. This unfolds organically as people project a "horizon of expectation" that brings the future into the present as a mobilizing agent. This positive orientation can be powerfully combined with whole-brain approaches that draw upon the creative power of heterogeneous groups with a spectrum of thinking preferences and capacities (including interpersonal, emotional, spiritual, practical, organizational, administrative, logical, analytical, technical, holistic, imaginative, conceptual and integrative). Such groups can synthesize a rich collective picture of what should and could be from many individual views of the world, and the energy that derives from positive intangibles like hope, excitement, creativity, humor, inspiration, caring and camaraderie.

Appreciative Inquiry was originally developed by David Cooperrider and Suresh Srivastava of the Weatherhead School of Management, Case Western Reserve University. It has been adapted from the private sector context to a wide diversity of situations involving local and national government organizations, non-governmental organizations, educational and religious organizations.

Appreciative inquiry has helped people develop their preferred future in Africa, Asia, Oceania, Europe, and North and South America. It has been combined with other approaches such as Open Space Technology and Future Search.

Private sector companies are using Appreciative Inquiry to address organizational issues such as internal communication and leadership, and individual or group effectiveness. AI is also being used in areas like mediation in the voluntary sector, international conflict resolution, and in urban development initiatives.

<http://ai.cwru.edu> is worldwide portal devoted to the sharing of resources and practical tools on Appreciative Inquiry and the discipline of positive change.



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**Participatory Research and
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Participatory Methods in the Analysis of Poverty



Recent years have witnessed a great interest in participatory methods as instruments for poverty analysis. The insights which these participatory approaches have provided concerning the experience of poverty have contributed to the establishment of a mainstream multi-dimensional definition of poverty.

This paper reviews and analyzes the literature on participatory methods in the analysis of poverty: how they have emerged, how they have been adopted in this context and the challenges they pose.

Adapted from a more complete paper: Ruggeri Laderchi, C. 2001. Participatory Methods in the Analysis of Poverty: A Critical Review. Working Paper Number 62.QEHWP62. Queen Elizabeth House, University of Oxford.

Meanings Revisited: The Concept of Participation

Three big shifts seem to have characterized the debate on participation. In the 1970s, “popular participation” was seen as an important component of rural development and basic needs strategies, and as such figured in the programmatic statements of many international agencies. In the 1980s, it became associated with discourses of grassroots self-reliance and self-help, with non-government organizations (NGOs) often having to fill in the void left by a retreating state as a consequence of neo-liberal reforms. The 1990s saw participation being advocated on a larger scale, being moved beyond the boundaries of project or grassroots interventions to other spheres of social, economic and political life. Participation came then to be seen as a tool towards important policy objectives such as “empowerment” and “good governance”, while maintaining, at least in theory, a role as an end in itself.

Participatory methods developed in the context of Participatory Rural Appraisal (PRA) became the central tool for development agencies to embrace participation. A difference in understandings of participation and different agendas by different actors continued, so that even the adoption of similar methods could not bridge these gaps. Arguably, however, the adoption of participatory methods set in motion other processes, creating new spaces for dialogue and participation and transforming behaviors and attitudes of various kinds of actors in unexpected ways. Cornwall (2000) provides a range of examples in this respect.



This section draws greatly and, hopefully not too grossly, on Cornwall (2000), simplifying some of the arguments as they make a necessary backdrop to our subsequent discussion. It is to the original comprehensive and authoritative source that the interested reader is referred for a more in-depth discussion of the concept of participation.

Ideas and Tools: From PRA to Participatory Poverty Assessments

PRA has been defined as “a growing family of approaches and methods to enable local people to share, enhance and analyze their knowledge of life and conditions, to plan and to act” (Chambers, 1994a). It emerged in the early 1990s building on the insights and methodological innovations arising from other sources, including:

- ❑ “activist participatory research” with its use of “dialogue and participatory research to enhance people’s awareness and confidence”
- ❑ agroecosystem analysis contributing a series of tools such as diagramming, mapping, scoring and ranking of different actions
- ❑ insights provided by the work of applied and development anthropologists and those of field research in farming systems, emphasizing farmers’ capabilities of conducting their own analysis
- ❑ most notably, the development of Rapid Rural Appraisal (RRA)

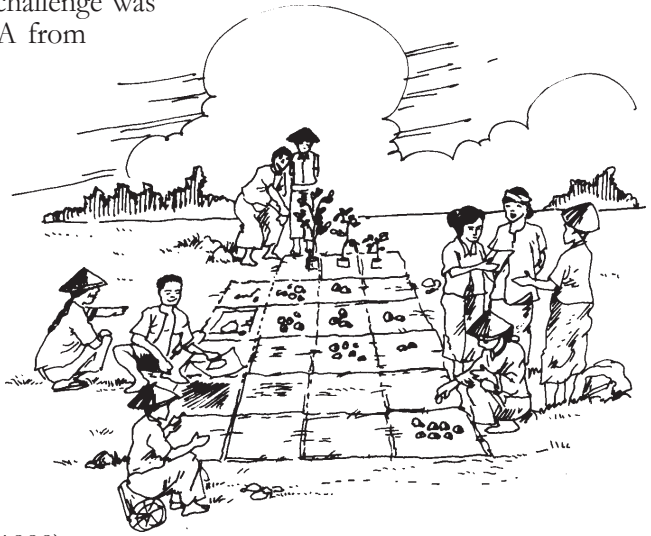
RRA had already taken in insights and methods from these other sources, and provided a quick way of gathering information on local realities building from local people’s insights. RRA questioned the urban biases implicit in outsiders’ role as development consultants (the so-called “development tourism”) by giving a more significant role to local knowledge, nonetheless still elicited for analysis by outsiders. Further, RRA challenged the way knowledge was generated, and responded to the challenges of “hard science” (McGee, 1997) by stressing the two key principles of “optimum ignorance” (find out as much as you need to know now) and “appropriate imprecision” (there is no need to know everything exactly) (Cornwall, 2000). RRA also opened the door to methodological experimentation, appearing in different forms, among which Participatory RRA emerged later developing into PRA.

The core difference between RRA and PRA is not only in the extent to which local people are included in the research, but in their ultimate purpose. “A PRA is intended to enable local people to conduct their own analysis, and often to plan and take action” (Chambers, 1994a). By becoming a way in which participation was enacted, the qualitative and often visual tools used in PRA acquired a new and distinctive characteristic. In practice, however, the extent to which these tools effectively brought about participation in all the phases of the project cycle has been questioned leading to many criticisms from those who sought a radical change in the way development efforts were conducted.

Without dwelling on the pros and cons of PRA and the way it was implemented, it is important to stress that the flexibility of the methods meant that it was possible to use them within alternative methodologies. Often in practice, therefore, it was their cost effectiveness and the timeliness with which they produced results, rather than their empowering effects, which underpinned the support they were given.

It is worth noting, however, that this view (McGee, 1997) might err somewhat in its optimism on the spread of acceptancy of PRA as a “serious” source of hard evidence on poverty. The alternative, i.e., the widespread adoption of PRA as an expensive window dressing exercise, cannot be entirely ruled out at least in some instances.

If the widespread adoption of participatory techniques challenged the extent to which their distinguishing features were maintained in practice, a further challenge was posed by the “scaling up” of PRA from project planning to input into policy making. The most evident form in which this scaling up has taken place has been the Participatory Poverty Assessments (PPA) performed by the World Bank, introduced as complement to Poverty Assessments in the face of criticisms of their exclusive money metric focus. These PPAs have spread rapidly. By 1998, half of the completed poverty assessments performed by the World Bank included a participatory component (Robb, 1999).



By delinking participatory techniques from the direct involvement with community projects and planning, the road was open for more extractive uses of the PPAs. And indeed the emphasis was initially in providing information which could provide information for better policies. A new generation of PPAs, however, seems now to have taken up the challenge of “influencing the policy process”. A wider spectrum of actors have been drawn into these processes, which place as much emphasis on the impact of their learning on their agency within the policy processes as on the information that is produced (Cornwall, 2000).

The Methodology of Participatory Poverty Assessments

From the methodological point of view, PPAs can be classified as contextual methods of analysis (Booth *et al.*, 1998) i.e., data collection methods which (taking a poverty-related definition) “attempt to understand poverty dimensions within the social, cultural, economic and political environment of a locality” or of a group of people, by prioritizing local people’s perceptions. Though different research methods can be contextual to different degrees, this categorization juxtaposes participatory methods with methods which aim to standardize data collection and analysis, as for example in large household surveys. This way of classifying approaches offers the advantage of breaking away from the quantitative-qualitative dichotomy which is generally seen as characterizing the comparison of survey and participatory data, but which does not consider the potential of obtaining quantitative information from PPAs (through rankings for example; other ways of quantifying information are more debatable).

Participatory approaches, however, are not only contextual, they also emphasize poor people’s creativity and ability to investigate and analyze their own reality (Chambers, 1994a). So, they try not only to understand reality at the local level, but they do so through local people’s own analysis. For a researcher, this involves not only adopting a set of different tools, but also completely different behaviors and attitudes. By recognizing their role as outsiders, researchers need to redefine themselves as facilitators who have to share in local knowledge and be willing to review their own values and perceptions critically. These behavioral elements are central to the success and truthfulness of the exercise, though they are also among the most difficult to standardize and to verify *ex post*, when looking at existing research.

One important challenge to participatory poverty assessments is that the non-extractive nature of the exercise and the efforts not to raise expectations that cannot be met is not easy to reconcile with the policy focus of the poverty assessment, when those policies are remote from the local level.



The Tools

Various tools are used in PRA. A classification into visualized analysis, interviewing and sampling, and group and team dynamic methods has been suggested by Cornwall *et al.* (1993) quoted by Estrella and Gaventa (1998). Examples include:

- ❑ participatory mapping and modelling: people are asked for example to make maps or three dimensional representations of their social demographics, health, environment, etc.
- ❑ time lines and trend and change analysis: describing changes in land uses, changes in cropping patterns, chronologies of events relevant to local life

- ❑ seasonal calendars: describing seasonal variations in activities, diet, labor, expenditure, debts, etc.
- ❑ wealth and well-being grouping and rankings: by categorizing households or individuals; the poorest are identified by locally-perceived well-being indicators, often as a by-product of a wealth of information on livelihood strategies, assets, access to factors of production is gathered

The variety of these methods and their flexibility distinguishes them from other methods which elicit self-perception data through structured questionnaires (as for example in identifying the minimum level of income necessary for the poverty line, e.g., Pradhan and Ravallion, 1998). As these tools are often adopted in a sequence, the assessment can be tailored to fit the context and the issues to be analyzed appropriately. Further, different tools are used to triangulate (i.e., validating through cross-checking) the results which might allow different insights to emerge.

In performing a PPA, care is needed to choose tools and sequences which are well suited to capture the core elements of deprivation in the specific context and the specific aspects of interest in the assessment. This might imply, for example, adopting different sequences for urban and rural contexts. As an example of the variety of issues which might be investigated in a PPA, we present a description of the issues and methods considered in the World Bank’s Zambian PPA in rural areas (Table 1).

Looking through the table, two main features stand out: one is the variety of issues discussed, the other is the number of methods suggested for treating every issue. The detailed breakdown shows that different issues can be dealt with jointly or sequentially, which reinforces the importance of careful planning of the sequences to be adopted, not least to avoid repetition which would be time wasting as well as boring for the participants. It is also clear that, though a PPA is meant to inform policies, not all types of poverty-related research would be equally concerned with discussing policy-options, especially if the research is unlikely to have a direct bearing on the options available. It could therefore raise expectations which could not be fulfilled.

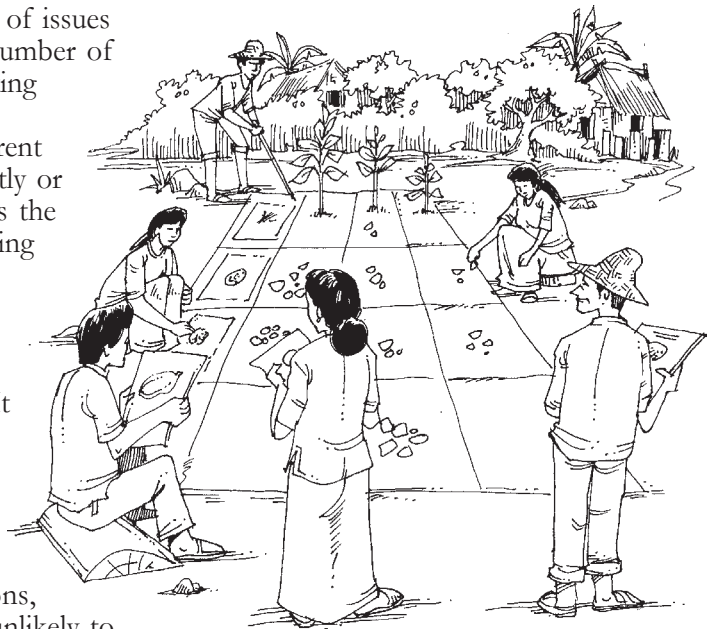


Table 1. Issues and Methods in the Participatory Poverty Analysis in Zambia (Rural Areas)

| ISSUES | METHODS |
|--|---|
| <ul style="list-style-type: none"> <input type="checkbox"/> Perceptions and indicators of wealth, well-being, poverty <input type="checkbox"/> Vulnerability, powerlessness, local terminologies and their correspondence with such ideas <input type="checkbox"/> Differences in perceptions by gender | <ul style="list-style-type: none"> <input type="checkbox"/> Wealth/well-being grouping, for criteria and indicators <input type="checkbox"/> Social mapping <input type="checkbox"/> Semi-structured mapping |
| <ul style="list-style-type: none"> <input type="checkbox"/> Perceptions of change over time in welfare, indicators, terms of trade | <ul style="list-style-type: none"> <input type="checkbox"/> Time-line (for migration, rural terms of trade, environment, etc.) <input type="checkbox"/> Income and expenditure patterns trend analysis |
| <ul style="list-style-type: none"> <input type="checkbox"/> Access to services (and usage of services) such as health, education and credit <input type="checkbox"/> Preferences –especially where choice between option is possible <input type="checkbox"/> Perceptions of services, including views (or awareness) of recent change; again, different perceptions and values for men and women | <ul style="list-style-type: none"> <input type="checkbox"/> Institutional diagramming <input type="checkbox"/> Semi-structured interviews <input type="checkbox"/> Trend analysis of services – e.g., health, education, agricultural extension, marketing |
| <ul style="list-style-type: none"> <input type="checkbox"/> Seasonal stress: food security, health, general livelihoods | <ul style="list-style-type: none"> <input type="checkbox"/> Seasonal calendar (health, food security, food intake, access to fuel, water, etc.) <input type="checkbox"/> Comparative seasonal calendars, good years, bad years, average years |
| <ul style="list-style-type: none"> <input type="checkbox"/> Assets of rural communities (access to services, common property resources, other natural resources) | <ul style="list-style-type: none"> <input type="checkbox"/> Resource mapping <input type="checkbox"/> Focus group discussion <input type="checkbox"/> Institutional diagramming (Venn/chapati diagram) |
| <ul style="list-style-type: none"> <input type="checkbox"/> Assets of rural households | <ul style="list-style-type: none"> <input type="checkbox"/> Wealth ranking/grouping <input type="checkbox"/> Livelihood analysis |
| <ul style="list-style-type: none"> <input type="checkbox"/> Coping strategies in times of crisis | <ul style="list-style-type: none"> <input type="checkbox"/> Livelihood analysis <input type="checkbox"/> Semi-structured interviews <input type="checkbox"/> Ranking exercises |
| <ul style="list-style-type: none"> <input type="checkbox"/> Perceptions of consumption levels in terms of food, clothing and relation to well-being | <ul style="list-style-type: none"> <input type="checkbox"/> Well-being grouping/rankings on expenditure outlets, social mapping <input type="checkbox"/> Semi-structured interviews |
| <ul style="list-style-type: none"> <input type="checkbox"/> Community-based support mechanism for the rural poor (community “safety nets”) | <ul style="list-style-type: none"> <input type="checkbox"/> Institutional mapping <input type="checkbox"/> Semi-structured interviews |
| <ul style="list-style-type: none"> <input type="checkbox"/> Long-term environmental trends, for example, declining soil fertility and declining rainfall | <ul style="list-style-type: none"> <input type="checkbox"/> Historical transects <input type="checkbox"/> Community time lines <input type="checkbox"/> Resource mapping at different points in time <input type="checkbox"/> Trend analysis |
| <ul style="list-style-type: none"> <input type="checkbox"/> Role of community institutions in service/infrastructure provision | <ul style="list-style-type: none"> <input type="checkbox"/> Institutional mapping <input type="checkbox"/> Semi-structured interviews |

Source: deGraft Agyarko, 1997 in IDS, 1998

The Analysis

The final phase of a participatory poverty assessment is the analysis of the outputs, and feeding back the results to the community as well as to other final users and in the case of PPAs, those involved in poverty reduction strategies. This last stage entails making sense of all the outputs produced by different groups on different media to arrive at an assessment. Ideally, it should be local people themselves who synthesize the results, but this is not necessarily the case. It is more common that field reports are given back to the community and scrutinized by them. New generations of PPAs are trying to make this “final phase” the beginning of a process of change in the community and in the way they participate into the policy process, going well beyond the production of one snapshot of poverty at a given point in time.

Individuals have complex coping strategies and their priorities reflect values, preferences and time horizons which are highly context-specific and strongly influenced by social institutions.

Understanding how the results are arrived at should be helped by the fact that participatory approaches include the documentation of all the stages of the process. In fact, the documentation of the process might help in understanding features like the interpretation given to quantitative outputs (ordinal or cardinal), or the role played by different groups (whether all have been given the same exercise or whether different people have been asked to synthesize outputs).



Documenting the process is rather ineffective as a mechanism to ensure quality – scrupulous and committed researchers will perform and document a process characterized by attentive questioning of their own assumptions, while others will perform all these tasks as steps in a recipe, without the critical awareness which characterizes good processes. Further, not unlike the case of long methodological annexes in monetary poverty assessments, it is unlikely that the readers will have much time or expertise to delve into the procedural details, so that the key findings as highlighted by the researchers are the ones which are going to have an impact.

The spread of PPAs and the challenges which they pose to other methods, especially monetary poverty assessments, has meant that quite a lot of attention has been drawn to exploring the differences between methods. Clearly, adopting a broader point of view than the one adopted in monetary assessments leads to a more complex view of poverty.

Important challenges to how truly participatory the process is arise in this final phase – the conversion of local reality as analyzed by poor people into final reports. And the problems which arise seem to be hard to face even when following best practices. Inevitably, every assessment is done for some purpose, and that purpose is likely to be reflected in the elements which are highlighted. And even the more committed and soul-searching of the researchers adopts some criteria to understand the reality she is faced with in order to make sense of its complexity.

A recent analysis of the findings of the first wave of PPA in Africa found that “certain themes were noted (in the PPAs) that have not been highlighted in the main overviews of PPA results. However, what is perhaps more striking is what is missing even from this expanded list. There are a range of other issues for poverty analysis that

seem important *a priori* but that are notably absent in the majority of cases. There are several possible ways of explaining the particular pattern of emphases and absences in the first round PPAs.”

(Booth *et al.*, 1998). They cite “obvious” selectivity at various levels due for example to “pressures on writers of country synthesis reports to highlight findings that have immediacy for policymakers” or the indirect influence of the strategic policy framework adopted by the World Bank on the way themes are organized. It is hard to see how PPAs can get away from those kind of constraints, which represent both a natural need of the researchers to refer to some known context and a logical consequence of doing analysis for a particular purpose. This raises an important foundational point:

can a truly participatory approach deal with *a priori* held beliefs?

Should it, and if so how much? To give a practical example, should a researcher prompt local people to discuss an issue which they have not mentioned on the basis of some prior-held belief that the issue is of importance?

The narrow contextualization of participatory assessments may impose limitations, preventing them from capturing a more general picture from which differentiation might emerge. For example, when analyzing different kinds of communities, one might not be able to capture the perception of the differences between them, which could be an important component of deprivation when the different communities interact.



The notion of capital is a powerful entry point for causal explanations of poverty. Capital is understood in a broad sense as any “stock” which is capable of being stored, accumulated, exchanged or depleted, and which be put to work to generate a “flow” of income or other benefits” (Booth *et al.*, 1998).

Basing an assessment on participation and consensus, however well any dissent is documented, is effectively built on the idea of finding a shared interpretation of reality. And the way in which consensus is reached and its ability to represent all the views (rather than internalized constraints and lack of real empowerment) can be challenged even when best practice is followed, as there might not be as pervasive an homogeneity as initially assumed.

New Frontiers: Combined Methods

From the debate on PRA, new insights have been gained that led to questioning the original characterization of participatory approaches as antithetical to the collection of household survey data and to attempts to use participatory and non-participatory techniques interactively, exploiting their respective strengths.

Carvalho and White (1997) synthesizes these possibilities in terms of:

- ❑ integrating quantitative and qualitative methodologies (e.g., using one type of methods to identify key categories to be studied with the other, or using insights from one method to inform the sample design to be used with the other method)

- ❑ examining, explaining, confirming, refuting and/or enriching information from one approach with that from the other
- ❑ merging the findings from the two approaches into a set of policy recommendations

An interesting example is provided by Carter and May (1999) whose identification of households in a large survey was based on a livelihood classification scheme derived from a participatory assessment (similarly, Scoones, 1995 suggests using wealth ranking as cost-effective research tool for examining issues of wealth and poverty in rural context, perhaps setting the agenda for subsequent, more detailed and focused studies into particular aspects).

However, this development could be criticized as bringing participatory techniques into the mainstream poverty analysis tool kit, therefore, changing their non-extractive nature, making it respond to outsiders’ priorities as well as bringing about the danger of a routinization of the process (Chambers, 1994b). This does not need to be the case, however. As some of the participatory methods lead to quantitative evidence, usually of an ordinal nature, there is a potential for linking qualitative and quantitative methods (Booth *et al.*, 1998) without reducing the insights from participatory methods only to those which can be quantified.

The central challenge faced in using participatory methods for poverty analysis is implicit in moving participatory techniques from the project level to policy processes. While in fact there have been examples of PPAs which have greatly contributed to the policy debate at the national level, many examples of cosmetic participatory research, performed for extractive purposes and without a commitment to empowering local people to have a greater say in policy processes, can also be found. It is important to consider instances of comparative research adopting different methods of analysis, both participatory and non-participatory, highlighting their relative strengths and weaknesses. In the light of these debates, a move to new and integrated frameworks for the analysis of poverty seem almost inevitable.



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The findings, interpretations and conclusions expressed in this paper are entirely those of the author and should not be attributed in any manner to the World Bank, to its affiliated organizations, or to members of its Board of Executive Directors or the countries they represent.

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**Participatory Research and
 Development for Sustainable
 Agriculture and Natural Resource
 Management: A Sourcebook**

Rethinking the Development, Dissemination and Adoption of Agricultural Technologies



An understanding of the processes leading to the adoption of new technologies by smallholders has been important to the planning and implementation of successful research and extension programs. At one level, a number of farm-household factors are typically associated with adoption, such as:

- ❑ age, education and personal characteristics of the household head
- ❑ size, location and tenure status of the farm
- ❑ availability of cash or credit for farm investment
- ❑ access to markets for farm produce; and so on

However, at the village level and beyond, more interesting and significant issues often arise: Why is there widespread adoption in one village but not others in the same general location? Why does one project lead to apparently successful adoption, but another, following the same procedures and promoting the same technologies, result in failure? Answers to these questions are likely to be more useful in achieving widespread agricultural development.

Adapted from:
Cramb, R.A. 2003. Processes Affecting the Successful Adoption of New Technologies by Smallholders. In: Hacker, B. (ed). Working with Farmers: The Key to the Adoption of Forage Technologies, pp.11-22. ACIAR Proceedings No. 95. Canberra: Australian Centre for International Agricultural Research.

This paper focuses on the higher order factors affecting successful adoption of technologies. Drawing on the “actor-oriented perspective” in rural sociology, it is argued that successful examples of adoption at this higher level result from a complex conjunction of people and events, with outcomes that may have been quite unanticipated at the outset. From this perspective, research and extension projects and programs are viewed as arenas in which social actors—village leaders, farmers, researchers (local and international), aid officials, municipal agents, extension workers, and traders—pursue their own short- and long-term objectives and strategies. To this end, they maneuver, negotiate, organize, cooperate, participate, coerce, obstruct, form coalitions, adopt, adapt, and reject, all within a specific geographical and historical context.

Out of this process, improved technology may be developed, disseminated, and incorporated in farming systems, and many of the actors may be made better off. However, there is nothing predetermined about this outcome. Hence, a detailed, case history approach is needed to understand and explain the patterns of success in achieving beneficial technical change.

Using an actor-oriented perspective, the processes involved in the development, dissemination and adoption of agricultural technologies are reviewed. The fruitfulness of this approach is then illustrated with a case study from an upland project in the Philippines.

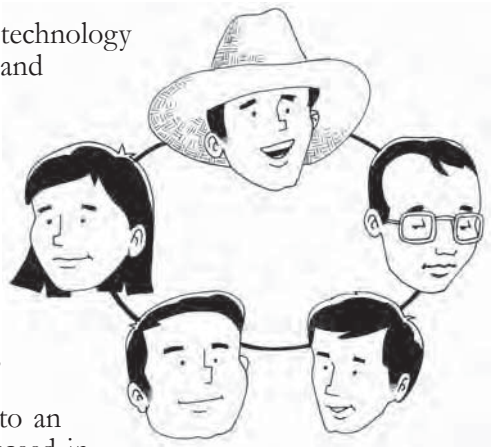
Technology Development

In the conventional or “central source” view of agricultural research and development, technology emanates from “upstream” activities in the formal research system and is adapted by “downstream” research until it is ready for dissemination to farmers. Some people have used an analogy from home economics rather than hydrology, speaking of quarter-baked (notional), half-baked (preliminary), and fully baked (developed) technology. Others have referred to the development of experimental, prototype, and off-the-shelf technologies. All these analogies imply a linear process of technology development and dissemination, culminating in the adoption of new technologies by farmers.

In practice, however, agricultural innovations are derived not only from the laboratories and research stations of the national and international centers but from multiple sources. These sources include research-minded farmers, innovative research practitioners at the local level, research-minded administrators, non-government organizations (NGOs), private corporations, and extension agencies. In the “multiple source” model, technology consists of many old and new components. It evolves and is continually modified over time. Consequently, in contrast to technology transfer, there is no clear-cut, one-way progression from research to extension to adoption.

In fact, technology adaptation cannot be separated from technology adoption. Adoption and adaptation are intertwined, in that adaptation of the technology frequently occurs in the process of implementing it on-farm (a phenomenon sometimes referred to as “reinvention”). Indeed, such adaptation is the norm, resulting from an ongoing process of “farmer experimentation.” This experimentation is not confined to a few research-oriented farmers, but is the process by which almost all farmers incorporate technology into their farming systems. Technology supplied by the formal research and extension system, thus, becomes “raw material” for farmer experimentation. In other words, technology is only fully developed or adapted as part of a specific, operational farming system.

Thus, from an actor-oriented perspective, technology development is a complex, multistranded, and multidirectional process, involving many actors other than scientists in the formal research system. Moreover, the emergence of a particular technology depends not only on its scientific merits but also on the actions of “development coalitions” or loose groupings of actors who combine their resources to push for a particular path of technical change. Hence, while it is appropriate to evaluate a given technology in itself, the result often leads to an incomplete account of what it takes to succeed in technology development. This typically involves networking, advocacy, lobbying, and other activities, which can be called “coalition building.” These activities are often excluded from conventional accounts of technology development.



Technology Dissemination

Conventional extension theory, based on the central source model of technology development and diffusion, examines the role of various organizational arrangements and communication techniques in persuading farmers to adopt a recommended technology. The Training and Visit System, promoted extensively by the World Bank in the 1970s and 1980s, exemplifies this approach. The “transfer of technology” view of extension has been superseded (in the literature, if not widely in practice) by more participatory, community-based methodologies, reflected in the currently fashionable approaches of Participatory Rural Appraisal (PRA), Farmer Participatory Research (FPR) or, more generally, Participatory Learning and Action (PLA).

Such participatory methodologies have now been incorporated in development agency manuals and training courses worldwide. A recent set of guidelines for watershed development produced by the Ministry of Rural Development in an Asian country states that project staff need to be trained in the tools and techniques of project management, PRA methods, community organization, and other administrative and accounting procedures. Such statements hint at the rigid, top-down enforcement of “participatory” procedures.

While institutional endorsement of innovative participatory approaches is to be welcomed, there is a concern that a preoccupation with methods (described as a “manual mentality”) and their institutionalization within both government and non-government agencies will lead to unrealistic expectations of their general efficacy. This may distract attention from the complex requirements for successful research and extension projects.

Rural development interventions, such as agricultural extension projects, involve a variety of social actors with diverse histories and agendas from both within and beyond rural communities. Hence, a project intervention needs to be recognized as part of an ongoing, continually renegotiated social process, not simply the execution of a prespecified plan of action with expected outcomes. Moreover, any technology dissemination activity takes place in a specific historical, political, economic, agroclimatic, and institutional context. The influence of these contextual factors may be crucial in determining the outcome of a particular extension project.



Technology Adoption

Conventional research into farmer adoption of new technology explains the adoption-decision and the timing (early or late) primarily in terms of the decisionmaker’s perceptions and inherent characteristics, with “innovators” at one extreme and “laggards” at the other. However, farmer’s decision making is generally more complex than this implies. Farmers have multiple objectives including food security, adequate cash income, a secure asset or resource base and social security.

Farmers select “livelihood strategies” to pursue these objectives with the resources available to them. Both the objectives and the available resources vary between farmers and change over the life cycle of the farm household. Some farmers sometimes may rely on off-farm work as a major source of livelihood, restricting their capacity to invest in labor-intensive conservation measures. Thus, farmers in the same environment may have different objectives and livelihood strategies, so they respond differently to a given technology.

The conventional adoption framework further simplifies the analysis of the adoption-decision by its implicit assumption of an individual “decision-maker.” Within the farm household, the ability to make decisions regarding resource use and technology varies according to age, gender and other categories. Actual decisions can depend on a complex bargaining process among household members. Beyond the household, group processes and the ability to harness them can play a crucial role

Different behavior regarding adoption may be as much a function of different opportunities and constraints as of differences in inherent characteristics or perceptions.

in adoption decisions, particularly on conservation practices. Moreover, decisions about new technology are frequently prompted by an intervention in the form of a project.

As discussed above, such interventions draw farmers into a wider arena in which various social actors are pursuing their personal and institutional strategies. Hence, the outcomes in terms of adoption decisions will be highly contingent on the interplay between these actors, including such factors as the creation of a sense of obligation to a respected extension worker, or the development of conflict between contending factions within a community.

Thus, an actor-oriented perspective leads us to expect a range of responses to the promotion of an agricultural technology, not merely a clear-cut decision to adopt or not. Differences between the environment in which the technology was developed and the environment of the “target” community will prompt farmers to adapt the technology in the process of adopting it. Differences within a given community in farmers’ goals and circumstances, livelihood strategies, and the complexity of intra-household, group, and project interactions and decision-making will result in a variety of adoption-adaptation behaviors, which should be investigated on their own terms and not pre-judged by labeling them as “poor adoption” or “non-adoption.”

Adoption of Contour Hedgerows in Domang: A Case from Nueva Vizcaya, Philippines

Domang is a village of 87 households in the province of Nueva Vizcaya in Northern Luzon, Philippines. It occupies about 200ha, with a population density of 50 persons/sq km. The village is Public Forest Land and was logged commercially in the 1950s and 1960s. A local forester advised the community to apply for inclusion in the government’s Integrated Social Forestry (ISF) Program, enabling the residents to be issued with Certificate of Stewardship Contracts (CSCs), a conditional 25-year lease of Public Forest Land requiring farmers to establish agroforestry measures for soil conservation. Eventually, Domang became an ISF project site, and by 1986 CSCs for 179 ha were issued to 64 residents.

Extension activity under ISF began in 1986. However, there was little or no adoption until 1990, when the site was selected as a model site. This involved higher levels of funding and extension support—an energetic and well-regarded extension worker visited frequently, staying at the site for up to three days per week, and farmers were paid P6.00 (10 cents) per meter of hedgerows established. One participant’s farm was used as a demonstration farm and training site. By 1991, the majority of residents had adopted contour hedgerows. After this, ISF projects no longer paid farmers to plant hedgerows.



The project recommended using *Leucaena leucocephala* and *Gliricidia sepium* as hedgerow species. Inadequate local supplies of planting materials forced farmers to approach lowland farmers for cuttings, but there was resistance because lowland farmers were using their limited stocks as a source of fuelwood and fence posts. Also, they disliked the fact that the ISF participants were using the cuttings for hedgerow development and receiving a monetary incentive to establish them.

Adoption of Contour Hedgerows in Domang: A Case from Nueva Vizcaya, Philippines ... continued

The limited availability of planting material for the recommended species induced farmers to look for alternatives. They adopted tropical hibiscus (*Hibiscus rosasinensis*) as the major hedgerow species and, to a lesser extent, banana. *Hibiscus* was locally available as it was commonly used as an ornamental plant. The use of *hibiscus* as a hedgerow species resulted from the experimentation of one of the early adopters and the encouragement of the ISF extension worker.

The Domang ISF site was devolved to the local government in 1993, after which extension activity practically ceased. In 1996, however, there were 78 adopter-households or 90% of the Domang population. Non-adopters included those who had refused to join the ISF project on principle. Hedgerows were being maintained but there was no expansion onto additional land. The alleys were used for maize, upland rice, and other commercial vegetable and field crops. Diffusion beyond the village was almost non-existent and where adoption occurred it was not well implemented due to poor understanding of the principles and techniques involved.

Thus, successful adoption of contour hedgerows in Domang occurred due to a "complex conjunction of people and events", including the dependence on CSCs for tenure security (after a decade or more of harassment and threat of eviction), the allocation of an energetic extension worker on almost a full-time basis for a concentrated period, and the payment of a subsidy for hedgerow establishment. This combination of circumstances induced rapid and widespread adoption within the community. Farmer experimentation helped resolve the problem of shortage of preferred planting materials, resulting in successful adaptation of the recommended technology. The impetus given by these circumstances appeared to be sufficient to get farmers to the point where they were prepared to maintain the hedgerows, indicating genuine adoption. Thus, the ISF program, generally regarded as an unsuccessful intervention, was galvanized into making a brief but significant impact in this location.

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**Participatory Research and
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Agriculture and Natural Resource
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Importance of Methodological Diversity in Research and Development Innovation Systems



Innovations in research and development (R&D) take place in diverse and complex human and natural landscapes that thrive within specific political, economic and institutional contexts. An innovation, as described in this paper, is neither a research product nor a technology, but rather an application of knowledge to achieve desired social, ecological or economic outcomes. This knowledge might be acquired through learning, research or experience, and may come from a variety of sources and actors, but until applied it can not be considered an innovation (Hall *et al.*, 2004).

Human landscapes and innovation systems are also dynamic in nature. This is especially true of today's globalized world, with its mobile populations, decentralizing governments and rapidly changing roles and rights. This dynamism manifests as a constantly changing mix of risks, opportunities and livelihood strategies (McDougall and Braun, 2003).

The challenges of this diversity, complexity and dynamism call for a corresponding diversity of R&D methods. The multi-faceted dimensions of communities and farmers' needs, and the multiple demands on their precious time influence the choice of methods for situation analysis, technology development and resource management, negotiation, communication and farmer education. A wide range of methods, and of actors implementing them, allows for greater responsiveness, flexibility and fine-tuning to the context and needs of specific client groups.

Diversity in R&D innovation systems can be assessed in terms of the:

- ❑ biophysical environment, including agricultural and natural resources
- ❑ political, economic and institutional contexts
- ❑ actors in the system, and their perspectives, ideas and opportunities
- ❑ research, extension and farmer education methods.

In this paper, we focus on the diversity of R&D methods, the actors, and their interface, by examining the implications of diversity at the level of individual R&D actors and at the level of national and global innovation systems.

Learning About Diversity in Innovation Systems

Multiple Versus Single Methods at the Level of R&D Actors

Individuals and organizations need to continuously assess their expertise and capacity to better position themselves as R&D actors. Some actors may specialize in methods or approaches such as participatory rural appraisals (PRA) or farmer field schools (FFS), while others position themselves more broadly as managers or facilitators of agricultural knowledge and information systems. Focusing on a single method, or skilfully deploying a few methods, allows actors to develop specific expertise, while at the same time further improving the method. Some pros and cons of focusing on a single method or approach are given in Table 1. Methodological diversity in the system allows R&D actors to tap into their own

Table 1. Pros and Cons of Focusing on a Single Method from the Perspective of an R&D Actor

| Advantages | Disadvantages |
|--|---|
| Potential to develop expertise and take a strong position as an R&D actor | Personal interests in careers may hamper a true partnership environment. Actors may become blind to innovations coming from perceived 'competitors' |
| Efficient use can be made of human and financial capital | High pressure to promote a single method globally, whereas priority and goodwill of donors may change over time |
| Scope to learn and advance the method by applying it in different contexts | Actors may demonstrate a low flexibility to adjust method to local contexts |

organizational strengths and explore what works best for them under which conditions. Diversity also enables them to play the card of complementarity. Partnerships built on the strengths of the individual actors pave the way for combining various methods available in the system. This moves away from the idea of a one-size-fits-all technology or an ideal blue-print methodology. We illustrate this with two examples, one from an organization that facilitates capacity building in national R&D systems, and another that works directly with rural communities.

Recently, the inter-governmental organization CABI *Bioscience*, with an expertise in farmer education methods for sustainable agriculture, collaborated with a UK-based private company, called Countrywise Communication, to develop competency in videos for training. Together with the Rural Development Academy and a Bangladeshi women's non-government organization (NGO), they produced videos on post-harvest that were more efficient in training rural women than face-to-face extension (Van Mele *et al.*, 2005). The partnership helped CABI to further advance its expertise in developing and implementing innovative farmer education methods.

Example 1: Institutional Learning in Participatory R&D at CABI *Bioscience*

CAB International was established in the early 20th century to foster the international sharing of knowledge from agricultural science and to help tackle specific agricultural constraints. While the users of this information were originally the national agricultural research system (NARS), in recent years, greater emphasis has been placed on how this pool of knowledge can be more effectively accessed and used by communities themselves.

In the early 1990s, the formerly independent institutes of CABI *Bioscience*, the scientific division of CAB International, had little experience of participatory R&D though many years of working in developing countries and with tropical agriculture. A new role began to emerge as a provider of technical backstopping to the Food and Agriculture Organization (FAO) FFS programs in Asia. Over the years, CABI supported FFS across the globe, helped to expand the training curriculum from insect to disease management, and adapted the method for use in perennial crops such as cocoa, coffee and fruit. CABI's ecologists, taxonomists, biotechnologists and senior management all became familiar with the concept of FFS. New staff were hired with broader field experience, new types of partnerships emerged with commercial companies, and interest grew in developing a 'new' sustainable, organic, equitable and fair agriculture. More recently, collaboration with anthropologists and communication specialists from outside the organization has given rise to innovations such as community plant health clinics, "Going Public", and the use of videos in farmer education.

It is difficult to see how such innovations might have arisen in a research institute or university, where staff advancement depends on academic publications. CABI *Bioscience* has a more flexible approach, using the pro-active development of initiatives and project impacts to reward staff achievements. Operating as a learning organization and driven by demands from its member countries, CABI has been able to respond to emerging international needs through multiple innovations and as part of larger learning networks.

The second example illustrates how two farmer education methods, each pioneered by a different international organization, found fertile ground in one and the same national implementation agency. The Bolivian non-profit foundation, Fundacion Promocion e Investigacion de Productos Andinos (PROINPA), saw complementarity in local agricultural research committees (CIALs) and FFS and consciously decided to work with them in an integrated manner. Through several cycles of fieldwork, PROINPA learned how to coordinate the complementary use of these methods. Where simple knowledge is sufficient to address a specific problem, they use workshops and presentations at local markets. The latter is a new method called Going Public, developed with CABI *Bioscience* (Bentley *et al.*, 2003).

Example 2: PROINPA's Decision Criteria for Applying Complementary Methods

Apply CIAs when....

- Farmers give high priority to solving specific problems or constraints in the production system
- There is strong leadership in the community or an interest group with the organizational capacity to form a CIAI
- A community has experience with participatory approaches and collective action (CIAIs are formed easily in communities that had FFS)
- There is some financial support and commitment to follow-up from seed money provided by R&D organization or from the local government

Apply FFS when....

- There is community interest in initiating collective action
- There is local demand for training on specific issues of recognized importance
- Appropriate technology and knowledge is available that can be incorporated in the training process
- There are sufficient financial and human resources to operate FFS

Oscar Barea (personal communication)

These examples illustrate the need for R&D organizations to become more familiar with existing methods, to assess their appropriateness, to build synergies with their own methodological expertise if possible, and to innovate when necessary.

The Need for Diversity at the Level of R&D Innovation Systems

While focusing on one or a few methodologies may have advantages for an individual R&D actor, the propagation of a single method at the national or global level has some important drawbacks. Quality issues are likely to emerge when a single method is scaled up massively, as shown by the FFS experience. This, however, does not mean that farmer education with a strong emphasis on discovery learning has no global significance (Röling and Wagemakers, 1998).

Methods that are promoted globally may be perceived as imposed by those who implement them. They may be viewed as a damper on local methodological and institutional innovations. Just as the lack of local ownership of technologies may result in non-adoption, the same holds for methodologies and working philosophies, especially complex ones.

The promotion of a single blue-print approach or method is risky when it ignores the economic, political and institutional context in which actors operate. A well-known example is the Training and Visit (T&V) system of extension, previously promoted by the World Bank and part of the "Transfer-of-Technology" or "pipeline" model of innovation. This led to a wave of participatory approaches and a new cycle of learning from failures and successes. Recent critiques of participatory approaches (Gujit and Shah, 1998; Cooke and Kothari, 2001) further emphasized that development-oriented research processes need to be tailored to particular circumstances. Research has multiple dimensions and each includes a spectrum of possibilities. Conventional and participatory research are not independent or discrete activities. To ensure quality, researchers are encouraged to focus on skilfully combining elements from the different dimensions in order to tailor research to specific circumstances (McDougall and Braun, 2003).

Promoting Diversity in Innovation Systems

National Policy

Clearly, the strength of an innovation system depends on the strengths of its components and the management of its linkages. Developing a clear understanding of the historical, political and institutional dimensions of the system and its components is crucial to draft national policies that not only help to build capacity in individual R&D actors, but also to create incentives and support mechanisms for institutional learning and partnerships that will improve the system performance overall.

Policymakers may be put under pressure to promote a single method, at the expense of overall system adaptability and robustness. While developing national research and extension policies, decision-makers need to be aware of the human dimensions of R&D. The impetus for methodological monocultures is often associated with strong lobbyist groups and personalities. Decision-makers need to ensure that the promotion of a method builds on local social capital and on previous methodological experiences. This can be done by shaping an environment where creativity can flourish, and multiple methods and partnerships can be assessed objectively in response to new emerging needs.

As innovations come from multiple sources (Biggs, 1990), including the farmer community, the education system and the private sector, research and extension policies need to be better coordinated with rural development, education and trade policies, as these directly or indirectly shape the innovation system.

Donor Policy

The new challenge for donors is to approach R&D from an innovation systems perspective, recognizing that multiple sources of innovation exist within economic, political and institutional contexts. Donors can facilitate the testing and fostering of partnerships between R&D and private businesses, or between R&D and the education system.

Identifying champions with expertise in one method may not be too difficult, while finding facilitating actors or setting up structures that can bring multiple sources of expertise together in an open learning environment is more challenging. Mapping out actors, assessing their organizational cultures, and creating early opportunities for them to interact, share experiences and build trust may be a first step in the right direction to boost methodological and institutional innovations (Van Mele *et al.*, 2005).

Creating an open learning culture requires commitment, flexibility and fundamental changes in norms and values, not only within implementing organizations, but equally within the donor community. Allowing for flexibility is letting go of control. Mechanisms need to be developed that allow actors in the R&D system to capitalize on the diversity of perspectives, ideas and opportunities that arise when implementing a project or program. An example of a successful approach that promoted methodological diversity was managed by the International Rice Research Institute (IRRI) from 1999-2004.

Example 3: IRRI Promotes Methodological Diversity in Bangladesh

Funded by the UK Department for International Development (DFID), The Poverty Elimination Through Rice Research Assistance (PETRRA) project approved and supported 45 sub-projects between 1999 and 2004. These had a focus on pro-poor policy, technology development, or on uptake and extension.

Sub-projects were approved at different stages through a competitive bidding mechanism. More than 50 partner organizations, including NGOs, government organizations and private sector, worked in partnership, some in turn involving a broad range of local NGOs and community-based organizations. Many innovations emerged from building on the organizations' own strengths and enabling cross-fertilization between sub-projects. Innovations ranged from partnerships to develop a pro-poor market for mobile pumps, to pro-poor seed systems, to "picture-songs" that combine song and dance with large paintings of, for instance, rice insect pests and their natural enemies.

Flexibility and ownership were the keys to mainstreaming methods. Both at management and sub-project levels, PETRRA linked underlying values of the learning organization – empowerment of its members, rewards and structures fostering initiatives, and experimentation – with values required to address gender and poverty in rural development (Van Mele *et al.*, 2005).

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**Participatory Research and
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Participatory Technology Development



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Farmer Innovation as Entry Point to Participatory Research and Extension



Farmers innovate due to necessity, changing conditions and curiosity, doing informal experiments on new ideas either from their own ingenuity or learned from other farmers, researchers, extensionists and other information sources like the mass media. However, research and extension pay little attention to the importance of local innovation for agricultural development.

Two regional development projects in Africa have found that technologies generated by farmers from locally-available resources are likely to be more relevant to the majority of smallholder farmers than introduced technologies that depend heavily on external inputs. From 1997 to 2001, the Indigenous Soil and Water Conservation (ISWC) project in Tunisia, Burkina Faso, Cameroon, Ethiopia, Tanzania, Uganda and Zimbabwe, and the Promoting Farmer Innovation (PFI) project in Kenya, Uganda and Tanzania, identified indigenous innovations of about 1,000 farmers in land and water management as entry points to joint experimentation to further develop "home-grown" ideas.

Main Components of the Approach

Training in Participatory Methods

Training workshops in Participatory Rural Appraisal (PRA) and Participatory Technology Development (PTD) helped change how many researchers and extensionists regarded themselves as superior to the illiterate farmers. In Tunisia, the PRA and PTD training workshop in 1997 was the first of its kind in that country. Trainers were flown in from Senegal and Burkina Faso, which was an innovation in itself, as southerners training northerners in Africa is uncommon.



After the follow-up courses, like designing experiments with farmers, the researchers and extensionists treated them with greater respect and were impressed by their innovativeness, creativity and capacity to explain what they do. Some researchers even referred to farmer innovators as "professors" in their own right.

Identifying Farmer Innovators

The projects defined a farmer innovator as "someone who develops or tries out new ideas without having been requested by outsiders to do so". "New" is something that was started in the farmer's lifetime and not inherited from parents, like a farming technique or a different way of organizing things.

When first asked to identify farmer innovators, many extensionists, students and researchers are surprised to hear that they exist. "We're always in the field and we haven't seen them", said an NGO staff member in Cameroon.

After the training, extensionists can more easily recognize and document new things that farmers are developing and trying out.

Aside from asking fieldworkers, innovators are identified through keen observation, interviews with groups and key informants, contests and radio programs, among various other means. In Tunisia, innovators were identified through a weekly regional radio program on "Agriculture and Innovation", where farmers reported their innovations to the radio station by phone and mail.

Initially, innovator seekers tend to focus on individuals, usually men. The projects encouraged them to also identify innovations by women and groups, such as in modifying traditional irrigation systems or developing new ways of managing pasture.

Analyzing Innovators and Innovations

As there is a dearth of documentation about farmer innovation, the ISWC and PFI projects tried to gain a better understanding of outstanding innovators and their motivations.

Most outstanding innovators were resource-poor when they began experimenting 15 or 20 years ago but, because of their improved land husbandry practices, many of them became relatively rich. Through experimentation and successful innovation, they gradually expanded and diversified their farming activities. Many previously poor innovators now harvest enough to meet family food needs even in drought years.

Over three-quarters of the identified innovators were men. However, more women innovators were found in countries where women were involved in identifying innovations.

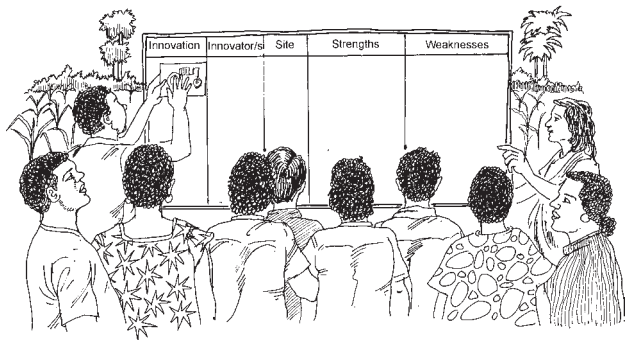
Some innovators are quite young, but most of them are relatively old. Many had been migrant laborers and some had been refugees or soldiers in other regions, where they learned ideas that they tried after returning home. Innovation became continuous, as an innovation led to a new situation and another innovation. For instance, increased yields prompted farmers to devise quicker harvesting methods and to create improved marketing channels.

The ISWC and PFI projects focused on land and water management and found innovations in water harvesting, gully control, tillage methods, pest control, introducing new species or varieties, developing or improving tools, and managing crop residues, soil fertility and biodiversity.

Monitoring and Evaluation (M&E) Systems

Monitoring and evaluation is not just about measuring the number and impact of innovations, but also about analyzing the process of enhancing the farmers' capacity to adapt and improve livelihoods and natural resource management. Who has done what innovation, where, how and why is documented by all partners as a source of learning and guidance for future work. Observations and recording are limited to the smallest possible number of key indicators of interest to those involved.

Project partners and illiterate farmers in Burkina Faso developed a pictorial system of self-recording work inputs. Farmers were keen in recording and deciding what data to collect, as they regarded this as useful in managing their farms better by keeping track of and analyzing the levels of inputs and outputs.



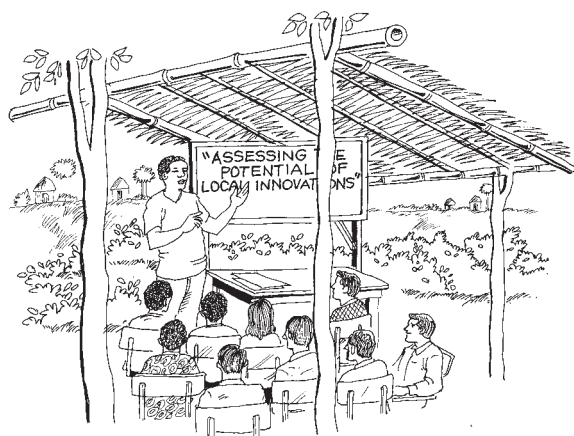
Exchange and Study Visits

Farmer innovators appreciate exchange and study visits as ways of gaining new experience, knowledge and techniques, which they informally experiment on at home. Farmer-to-farmer communication is more effective when visitors and hosts are well prepared, and if both groups review the usefulness of the exchange and deliberate on the reporting of lessons learned.

The PFI project encouraged innovators to organize themselves into clusters of about eight farmers each and exchange experiences within and between clusters. The ISWC project gave innovators the liberty of organizing themselves the way they wanted. In Tanzania, some farmer innovators started forming local groups with neighboring farmers after returning from the exchange visits.

Farmers' Evaluation of Local Innovations

Village workshops organized by extensionists assess the potentials of local innovations for joint experimentation or application to reduce isolating innovators and to stimulate community-led social development processes inspired by farmer innovation. The Bureau of Agriculture in Tigray, northern Ethiopia, brings innovators and their neighbors together in farmers' fora to examine the usefulness of local innovations and technologies from research stations.



Stimulating and Supporting Joint Experimentation

Before joint experimentation, farmers and scientists agree on a research agenda based on local priorities to avoid the danger of scientists defining the experiments and imposing them on the farmers. Advice is offered on designing simple experiments so that both farmers and scientists have a firmer basis for evaluating results. Scientists also explain the reasons behind findings to help farmers understand better the principles and less visible factors influencing the outcome of experiments. Scientists assist in generating hard data to validate findings in conventional scientific terms for convincing other scientists, policymakers and donor agencies. The scientists were amazed that “simple” farmers could state clearly and concisely what they want and need from research. Respecting the local agenda led to more relevant designs of joint experiments in subsequent workshops.

In the first joint workshop of farmer innovators, extensionists and researchers in northwest Cameroon, a farmer innovator stood up and said: “We have our priorities and we know that you have yours. Let’s first work on our priorities and then we will help you with yours. Our priorities are the following...” He then listed three questions on managing soil fertility.

Farmer-to-Farmer Dissemination of Innovations

Farmers cannot and do not wait for the scientists' “go ahead” signal to disseminate approved and validated innovations or technologies. New ideas are spread primarily through farm visits and other forms of farmer-to-farmer communication.

In Burkina Faso, two farmer innovators in neighboring villages developed two systems for disseminating ideas on improved traditional planting pits or *zai*. One innovator organized annual "markets" where farmers from over 100 villages exchange experiences in adapted tools, specific crops or varieties or growing trees in pits. Another innovator brought together different groups of farmers for on-the-job training. They jointly dug improved pits to rehabilitate very degraded land.

Other Forms of Farmer-to-Farmer Dissemination Facilitated in Different African Countries

- Exchange visits between farmer innovators
- Visits by "ordinary" farmers to farmer innovators to learn new techniques
- Visits by farmer innovators to other farmers to train them on new techniques
- Travelling seminars involving innovators interacting with a wider group of local farmers at each site

Awareness and Policy

Strategies in raising awareness on farmer innovation and favorably influencing policy include:

- documentation and publication in working papers, reports, proceedings, conference papers, newsletters and journals;
- local newsletters on farmer innovation;
- exposure in print and broadcast media;
- inclusion of policymakers in Steering Committees of country programs to enhance policy dialogue;
- exposure tours of policymakers to farmer innovators; and
- conference-workshops on farmer innovation approach in francophone and anglophone Africa with ISWC and PFI project partners, policymakers and staff from other projects.

Institutionalizing the Farmer-innovation Approach

The ISWC and PFI projects realize that it is not easy to fully integrate the farmer innovation approach to participatory research and extension into the regular activities of national institutions. The concept of farmers as innovators and researchers is still new for many people in these institutions. However, virtually all project partners and decision-makers are greatly impressed by the knowledge of farmer innovators and are enthusiastic about the approach.

The farmer-innovation approach needs allies in addressing the challenges of institutional integration, especially in scaling up of concepts and methods in agricultural education. In Cameroon and Ethiopia, integrating the concepts and practice of the approach into the university curricula has been started.

New Roles for Researchers, Extensionists and Farmer Innovators

Researchers and extensionists need skills and a conducive environment for stimulating and supporting farmer-innovation processes. This approach requires considerable change in the roles of the actors involved.

For Extensionists

- Identify innovative farmers and groups
- Stimulate community-level assessment of innovations
- Help farmers and groups link up with other actors in research and development
- Encourage community-led research for development
- Support formation of farmer organizations and networks
- Facilitate preparation, implementation and follow-up of exchange and study visits to enhance learning
- Collaborate in monitoring the process and impact of farmer-led research and extension

For Researchers

- Deepening scientific understanding of local innovations and innovation processes
- Stimulating and supporting farmer- and community-led experimentation
- "Feeding" local experimentation, or providing new ideas that go along the directions of what local people are exploring and want to explore
- Studying the impact of innovations and processes to stimulate innovation

For Farmer Innovators

- Showing and explaining innovations to scientists and policymakers
- Conducting more systematic experimentation on behalf of the community
- Monitoring aspects of experiments and the environment of interest to farmers
- Engaging and expanding involvement in farmer-to-farmer extension

Opportunities and Challenges

This participatory research and extension approach growing out of farmer innovation has generated great enthusiasm and energy. Recognition given to farmer innovators stimulates further experiments and wider sharing of ideas. Because their knowledge and abilities are valued, farmers are empowered to enter into partnership with researchers and extensionists on a more equal footing.

Many researchers who discover farmer innovators begin to regard them as colleagues with special knowledge and skills in exploring common interests. Researchers are stimulated by opportunities to apply scientific knowledge in concrete and relevant ways. Extensionists are motivated because they can escape from the unappreciated role of convincing or forcing farmers to adopt technologies they do not trust. The new task of encouraging farmers to innovate and participate in research and development makes the extensionist feel appreciated by farmers.

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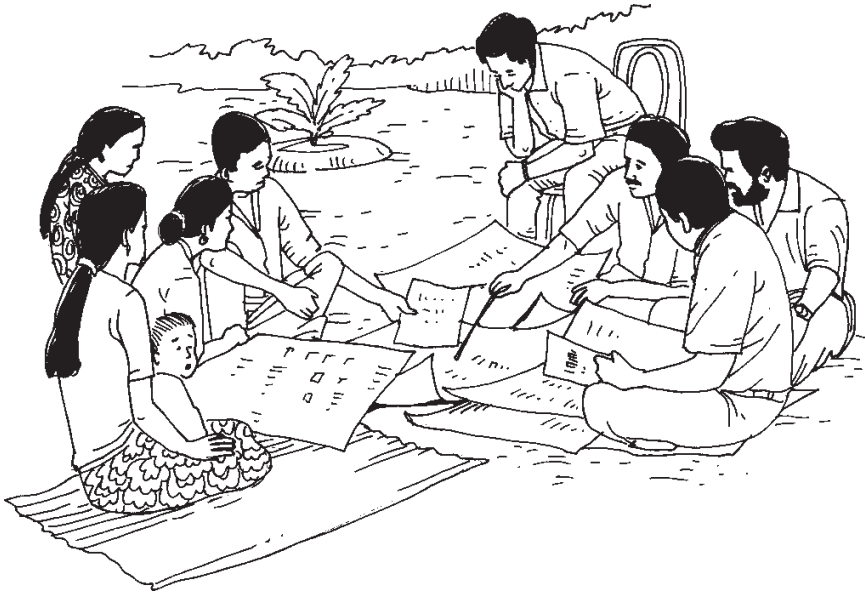
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**Participatory Research and
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Participatory Technology Development Where There is No Researcher



Participatory Technology Development (PTD) is a creative process of joint experimentation and research by farmers and development agents in discovering ways of improving farmers' livelihoods. The growing number of documented examples in recent years reveal that PTD is now accepted as a research approach to agriculture and natural resource management (NRM). It has been recognized that research is effective in improving farmers' livelihoods if farmers play a vital role in the process.

Most documented experiences on PTD refer to farmer participatory research where scientists interact with farmers to test and adapt the scientists' ideas. Successful technologies are then disseminated through extension. However, these cases are a drop in the ocean of PTD research.

There are very few research scientists in proportion to millions of farmers and the immense diversity of agro-ecological environments and situations in which different types of farmers live and work. In fact, local farmers and natural resource user-managers have been carrying out most of the experimentation, discovery and innovation in agriculture and NRM since time immemorial until today.

According to Rocheleau in 2003, "thousands of field workers conduct isolated, undocumented research in extension and development programs on forestry, agriculture and conservation." PTD is practiced as an approach to extension, with development workers supporting farmers in learning-by-doing without involving researchers.

Farmers' Research and Innovation

Experimentation and innovation are natural and necessary to farmers. Before formal research and extension services existed, farmers' own experimentation allowed adaptation to new situations, to survive and to improve their livelihoods, where conditions were favorable.

Worldwide, there are countless cases of farmers adapting extension recommendations to fit particular situations, or extracting components from otherwise seemingly useless packages.

This is still the case today, even where farmers have access to external support. Scientists who develop technology packages for extension seldom realize the extent to which farmers conduct informal experimentation with components of these packages.

In Malawi, for example, high-yielding maize varieties were promoted in a package of seeds, fertilizer, instructions and credit. Most smallholder farmers continued to plant local varieties using the fertilizer intended for the new seeds. A few farmers carried out small, informal experiments to determine the best timing and amounts of fertilizer application on local maize.

Most scientists cannot recognize and understand how farmers experiment. Yet, many field workers of non-government organizations (NGOs), development projects and extension agencies are appreciating farmers' informal experimentation as a springboard for developing locally appropriate technologies. These development workers and farmers are engaging in PTD, regardless of whether or not they have support from researchers.



Promoting PTD in Sri Lanka

Promoting Multi-functional Household Environments (PMHE) was a project that promoted PTD as a means of stimulating farmer-led experimentation in an irrigation settlement area in Mahaweli System C, Sri Lanka. Farmers moved to agro-ecological conditions that were completely new to them. The government research service, through extensionists, provided information on farming the new environment, like crop selection and fertilizer regimes. However, farmers experienced many discouraging failures in applying these recommendations.

Farmer-led research in the absence of scientists developed a variety of locally-appropriate solutions in crop diversification, weed control, soil fertility management, nursery management, among others.

PTD aroused the farmers' inherent curiosity and creativity and increased confidence to continue experimentation. As an informal process, PTD resulted in farmer-to-farmer networking that rapidly and efficiently spread the ideas. This changed the way of thinking of the government agency managing the irrigation systems. The involvement of extensionists and farmers in research was recognized and incorporated into many of its new programs.

Extensionists trained in PTD by PMHE have a fairly sound knowledge of practical tropical agriculture, did not have the same academic bias of their colleagues from research stations and could "speak the language" of farmers.

Encouraging Farmer Experimentation

PTD where there is no researcher happens wherever there are development workers encouraging farmers to experiment, innovate and adapt new ways of managing agricultural and natural resources. Instead of transferring a "best bet" technology pre-selected by scientists on behalf of farmers, development workers can choose from the following approaches in PTD (Table 1).

Table 1. Participatory Technology Development Approaches to Farmer Experimentation

| PTD Approach | Role of Development Agent | Benefit to Farmers |
|---------------------------------|---|---|
| 1. Learning from farmers | <ul style="list-style-type: none"> ❑ Identifying farmer-innovators ❑ Understanding farmers' experiments ❑ Getting insights into farmers' priorities | <ul style="list-style-type: none"> ❑ Sharing of experiments among farmers |
| 2. Testing new options | <ul style="list-style-type: none"> ❑ Suggesting options and ideas to farmers ❑ Encouraging farmers to compare options and ideas with current practices | <ul style="list-style-type: none"> ❑ Farmers are free to test, adapt or reject technologies without pressure from development agent |
| 3. Filling local knowledge gaps | <ul style="list-style-type: none"> ❑ Enhancing farmers' awareness on resource management principles ❑ Providing information on phenomena that farmers cannot observe on their own | <ul style="list-style-type: none"> ❑ Local ways of applying principles to farming |
| 4. Facilitating mutual learning | <ul style="list-style-type: none"> ❑ Facilitating the generation of insights and options within the community | <ul style="list-style-type: none"> ❑ Critical exchange of ideas among farmers ❑ Minimal dependence on technology from outsiders |
| 5. Improved experimental design | <ul style="list-style-type: none"> ❑ Studying current methods of informal experimentation with farmers ❑ Reaching an agreement with farmers on more systematic forms of experimentation | <ul style="list-style-type: none"> ❑ Ways of experimenting and learning improved ❑ Position and confidence of development agents and farmers strengthened |

The first biggest challenge of development agents in farmer-led research is not choosing among the PTD approaches but increasing their awareness and knowledge on farmer innovation and experimentation.



Strengths of the PTD Approach

The PTD approach to extension strengthens local research and adaptive capacities by involving a vast number of community-based researchers: men and women farmers and field agents of various government agencies, NGOs and development projects. Research and development planning incorporates local realities, potentials and limitations from the start.

This approach greatly reduces the time spent between problem identification and development of applicable solutions, especially for problems that can and should be tackled at the farmers' level. Results from site-specific, farmer-led research and innovation in one locality can rarely be replicated exactly elsewhere but can serve as sources of ideas for farmers in other areas.

PTD with No Researchers But Too Many Politicians

A local NGO called CAATINGA introduced in 1994 a small underground dam that enables small-scale farm families to cultivate an extra hectare of land during the dry season in the semi-arid north-eastern Pernambuco State in Brazil. The underground dam is a wall of clay built between the impermeable soil layer and the surface to keep water from running off through the sandy soils. Local farmers plant a variety of fruits and crops in small gardens near the dam.

After four years, an evaluation revealed a great variety of farmer experiments in adapting the technology to local needs and interests. Among these were:

- building U-shape dams to retain more water;
- constructing earthen walls on top of the dams so water would stay longer to penetrate the soil;
- use of cement, instead of only clay, to close the bottom of the dam;
- discovering the kinds of soil suited for the dams; and
- monitoring the salinity within the plots.

In joint experimentation farmers and NGO field staff compared all innovations with that of the original proposal. After a couple of years, the technology became much better suited to local conditions.

The government replicated the successful idea by building 5,000 underground dams in 18 months throughout the State as part of a new policy for surviving the drought. There was great political pressure for the application of new technologies in the semi-arid area of the country, especially in a year of severe drought.

The government funded the building of dams that could hold enough water to benefit 10 hectares each. However, only a few farmers were capable of cultivating so much land. Construction of the dams was awarded to contractors who arrived at the farm, built the dam using tractors instead of hands, and left the next day.

Frequently, the dams were built in inappropriate places. Farmers could not explain what was being built, or what their plans for the area were. They had absolutely no ownership of the whole process. Many dams failed, were destroyed by soil erosion or abandoned by farmers.

Technology adapted to local conditions through farmer experimentation cannot be simply transferred to farmers in adjacent areas without further analysis and adaptation. Moreover, previous experimentation had generated local ownership of the technology, which is a fundamental element of sustainable land use. Unaccompanied scaling-up of technology improved through a PTD process did not lead to improved livelihoods. The intention had been political, more than anything else.



(Wongtschowski, pers.comm. 2003)

PTD where there is no researcher is a cost-effective approach as it does not require highly-paid scientists. Development agents involved in the approach live closer to the farmers, use local services and facilities, and tailor their work to use resources at hand more efficiently. Focusing on local knowledge and resources makes development agents and farmers more equal as partners in their research pursuits.

Challenges

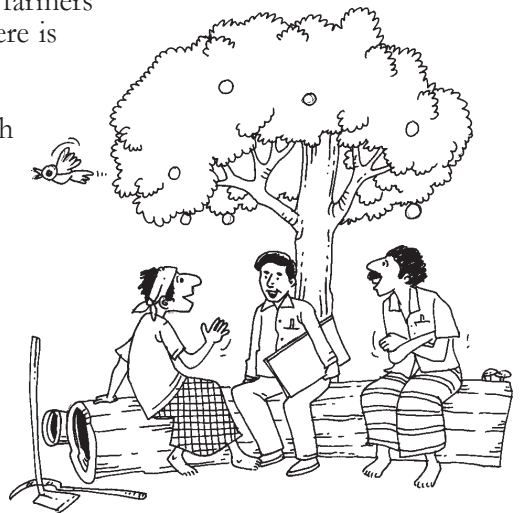
Many development agents lack the confidence to enter into this open-ended approach because of possible sanctions for not meeting expectations in transferring technologies from research stations. Development agents are restricted in encouraging farmers to try things on their own terms on a small scale. Situations must be created that lead to attitudinal change of development agents and their superiors towards accepting that farmers' knowledge and innovation are complementary to their knowledge and skills.

The success of PTD where there is no researcher cannot be judged by conventional scientific criteria, but by contribution to solving local problems.

Substantial time is needed to support PTD training, with brief learning sessions being interspersed with longer implementation periods. Learning sessions should include real cases of farmer- or community-led experimentation, and design of follow-up assignments by the trainees themselves. At the end of each implementation period, trainees should reflect jointly on their experiences.

Public funds for extension services to farmers and the number of development agents are both decreasing rapidly as privatization expands. The same applies to research, where scientists are obliged to do work more relevant for farmers. This can be done by linking with farmers and development agents in PTD where there is no researcher. Scientists and policymakers seeking such links have to re-think their definition of research and its interface with development.

Creativity is needed to capture both the innovations and the process of participatory innovation development -- in written, audio and visual forms for sharing. Good documentation helps farmers and development agents deal with formal researchers and policymakers in demanding policy support for PTD.



Are Researchers Still Needed?

Researchers are still needed even if farmers and development agents undertake PTD because they can support the farmers' research efforts in various ways. However, researchers need to accept first that, in PTD, there are various forms of research that are valid for different purposes.

For example, in a workshop in Tanzania, farmers, extensionists and research scientists, results of the first joint experimentation revealed that data collection and monitoring assigned to scientists were not done as agreed upon. Extension workers argued that they could have handled most of the activities with farmers rather than wait for a researcher to arrive from the station a hundred kilometers away.

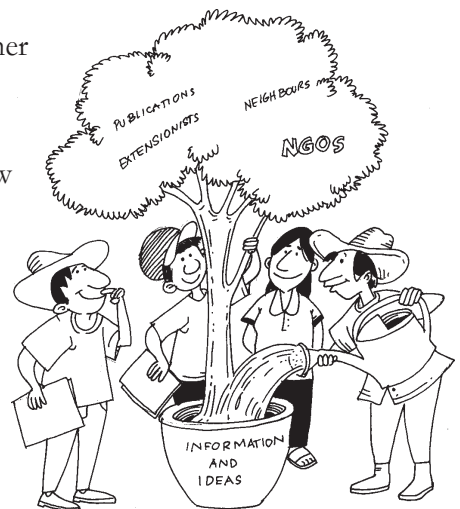
Researchers can realistically support PTID where there is (almost) no researcher when they begin to perform the following tasks:

- ❑ Documenting the process and results of PTID for wider sharing and recognition.
- ❑ Training development agents in methods of experimentation and data collection that are suited for field application.
- ❑ Providing development agents and farmers with new information on research findings or specific technical insights useful in PTID.
- ❑ Suggesting new options that farmers and development agents could try out.
- ❑ Giving technical support to PTID, like soil and chemical analyses.
- ❑ On-station research of critical issues that farmers and development agents regard as important but cannot study in the field due to high risks and/or the need for controlled conditions or sophisticated equipment.



However, the challenge is to determine whether on-station research is really the best way to address issues being raised by farmers.

Research led by farmers aims at exploring new possibilities or solving local problems affecting their livelihoods. The experiments need to be only scientific enough to produce results useful to farmers - as a contribution to development more than to science. These PTID practitioners develop their own theories based on their observations, and a formal researcher would be an ideal partner in exploring the reasons behind them.



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**Participatory Research and
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Agriculture and Natural Resource
Management: A Sourcebook**

Developing Agricultural Solutions with Smallholder Farmers: How to Get Started with Participatory Approaches



Farmers are natural experimenters. They are always trying new ideas and technologies to improve their farming practices. Before government extension services existed, farmers based this experimentation on their own knowledge and the experiences and ideas of other farmers in their area. Only in the last few decades have governments established research and extension agencies to help farmers improve agricultural production. Extension workers in these agencies usually promote technologies developed by researchers (such as new rice varieties), implement government programs (such as livestock credit schemes) and administer government regulations.

In some cases, this approach to agricultural development has worked well. For example, improved rice varieties and fertilizers have helped farmers in lowland areas to increase yields. In other cases, such as for smallholder agricultural systems in upland areas, this approach has not worked well. We have to ask ourselves 'Why not?'

This paper is an edited version of an entire guidebook with the same title. For more details, refer to: Horne, P.M. and W.W. Stür. 2003. *Developing Agricultural Solutions with Smallholder Farmers: How to Get Started with Participatory Approaches*.

- ❑ Often we simply did not understand farmers' needs, assuming that improved productivity alone was enough to ensure adoption.
- ❑ The huge variation in resources, opportunities and constraints between farm households, particularly in upland areas, means that no single technology will be appropriate for all farmers.

- ❑ Farmers seldom adopt fully developed technology packages. Rather they look for 'ingredients' or 'building blocks' which they can put together in different ways to fit their particular needs. They ADAPT rather than ADOPT technologies.

The use of participatory approaches, based on an active partnership between farmers and development workers, such as researchers or extension workers, can help you overcome these limitations.

What Type of Approach Should I Use?

There are many ways that you can work with farmers. These range from simply **consulting** with them to forming partnerships which result in **active decision-making** by farmers. The 'right' type of relationship between you and farmers will depend on your goals.

Consulting with Farmers

In some situations, it is appropriate for development workers to simply consult with farmers to better understand their needs or their reasons for selecting one technology option instead of another. Renting a farmer's field and asking the farmers' opinions about the trials you plant, for example, may be appropriate for screening a large number of new maize varieties to identify a smaller range of varieties for future farmer evaluation. In this kind of partnership, farmers provide information but development workers make the selection.

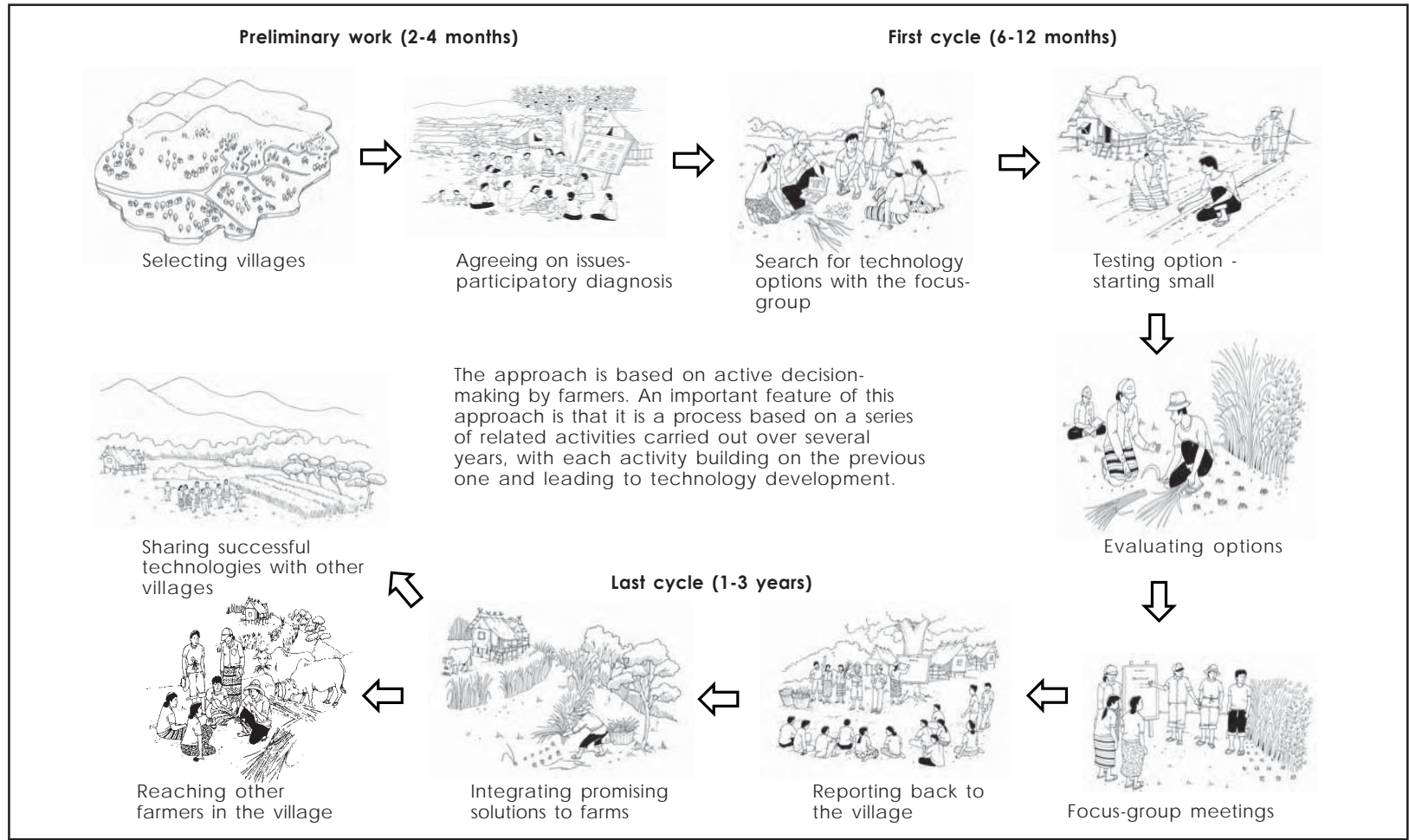
Active Decision-Making by Farmers

In many situations, it is more appropriate for development workers and farmers to work together to solve complex problems, such as livestock feed shortages in the dry season. In these situations, you need the active, decision-making involvement of farmers to be able to combine their local knowledge with the information, ideas and technology options that the development workers have to offer. In this kind of partnership, the farmers and development workers should work together to decide which technology options to test, how to test them, and how to adapt and integrate them on their farms.



Active partnership means that development workers and farmers work together to find solutions to problems identified by the village.

Figure 1. A Participatory Approach that has Worked for Us



Main Elements of a Participatory Approach

Selecting Villages

Your first decision is to choose one or more villages where you can start working with farmers. How can you do this?



In our experience, many projects have encountered problems because they selected villages for their convenience rather than considering which villages have the highest potential to benefit from the skills, knowledge and technologies that the project had to offer.

Some development workers are assigned to work in a particular village and have no choice in this matter. Others may be able to select from a range of villages so will need to think about site selection very carefully to ensure they have best chance of encouraging impacts to emerge and of achieving their social goals (such as poverty alleviation).

The questions in the following table will help you make this decision.

| | |
|-------------|--|
| Question 1: | Do farmers consider that the issues facing them are important enough to commit their time to work towards a solution? |
| Question 2: | Are there many farmers in this and nearby villages who face the same issues? |
| Question 3: | Are some farmers already trying to find solutions? |
| Question 4: | Are there potential options that you can offer farmers and which may provide substantial benefits? |
| Question 5: | Can you achieve the social goals of your organization (e.g., poverty alleviation) by working in this village? |
| Question 6: | Are you or other active local groups able to commit the time and resources needed to work with farmers in this village to improve their farming systems? |

Agreeing on Issues: Participatory Diagnosis

You have now selected one or more villages where you would like to work, but it is only you who has concluded that there are issues that can be solved with your help. You cannot be sure that the farmers will draw the same conclusion.

They will only be interested in working with you if they feel that this issue is more important and pressing than others they face at this time.



Participatory diagnosis (PD) is a method which helps the farmers make this decision. In a participatory diagnosis, the farmers meet to:

- ❑ identify and prioritize the problems to solve
- ❑ identify who in the village is most affected
- ❑ nominate who in the village will be responsible for working with you to solve these problems (e.g., form a focus-group)

Participatory diagnosis is often the first time that a village experiences being equal partners in the development process. It helps to build trust and understanding between farmers and the development worker. The outcome of a PD is an understanding between you and the village on which problems to solve, and how you will work together to find solutions. More information on how to conduct a PD and on the tools you can use are contained in the book from which this article has been extracted.

Participatory diagnosis is NOT a process for extracting information from farmers so that you can draw your own conclusions. It is the first step in engaging with a village as partners in searching for ways to improve their farming systems. Do not do it unless you are committed to following up with action!

Searching for Technology Options with the Focus-Group

Now that you and the farmers have agreed on the issues, you need to analyze them in more detail and identify potential options to test. It is not your role to make these decisions alone! You need to work with the focus-group to understand the underlying causes of the problems and issues, so that you can look for technology options to test.

Often, it is helpful to identify “technology entry points” that provide early benefits to farmers, building trust and enthusiasm.

Three Principles in Searching for Technology Options

Start evaluating options with farmers as soon as possible.

There is no need for you to wait until you fully understand the complexity of the farming system before testing technology options. With their in-depth knowledge of the farming system, farmers will quickly decide which information and technologies are likely to provide substantial benefits.

Search for a broad range of technology options.

Each farmer and each farm is different and no single technology will be appropriate for all farms. Make sure you do not offer only your favorite technologies but a broad range of options that are relevant to the issues identified in the PD, and realistic within the resources available to the village.

Offer basic ingredients of technologies, not 'fully developed' technologies.

Often researchers and development workers feel that they cannot offer technologies to farmers until they are 'fully developed'. They may, for instance, feel reluctant to offer farmers forage varieties without also telling them exactly how these should be grown, managed and fed to animals. In practice, this is not necessary. Farmers need to develop management systems to fit their own circumstances. It is better to provide them with ideas and principles rather than specific recommendations. This will help them to make informed choices about each option.

Evaluating Technology Options: Starting Small

Once the focus-group has selected technology options to test, the next question to answer is: "How do we test and evaluate these options?"

There are three guiding principles to do this:

- ❑ **Start on a small scale.**

Typically, farmers will first want to test technology options on a small scale as this minimizes risk and gives them the opportunity to experiment with the options.

- ❑ **Keep the trials simple.**

Large numbers of technology options are difficult to manage and compare. We have found that farmers can easily handle up to six new technology options.

- ❑ **Encourage farmers to "play with" the technology options.**

Farmers adapt rather than adopt technologies. They are looking for 'ingredients' or 'building blocks' which they can put together in innovative ways to fit their particular needs.

Avoid promoting only your 'favorite' technologies. Make sure you offer a broad range of technology options. Farmers may see other problems they can solve or changes they can make to their farming practices to take advantage of new opportunities presented by the technology options.



As farmers test and adapt new technologies they are continually evaluating them. They are looking for benefits, watching for problems and considering ways of using the technologies on a larger scale. You need to understand which technology options farmers prefer or reject and their reasons for these choices. How can you do this?

- ❑ **Regular monitoring.** As you visit farmers you will begin to learn which technology options they prefer and why by talking to farmers about their experiences, using open-ended and probing questions, and observing the results yourself.
- ❑ **Measurements.** Sometimes measurements, such as yield, are needed to quantify differences between the technology options.
- ❑ **Formal evaluations.** Towards the end of the trial period (e.g., the cropping season) it is useful to conduct a more formal evaluation with each farmer in the focus-group to record which technology options they prefer and why. The methods for analyzing farmers' preferences are described in the book from which this article is extracted.

- ❑ **Focus-group meeting.** Organize a focus-group meeting at the end of the trial period, in which you present a summary of the main results (e.g., yield) and the experiences of all the farmers in the focus-group (based on the results of the preference analysis). This will stimulate a discussion of experiences the farmers have had in common. This is a good time to discuss potential benefits of each option, analyze particular problems that were encountered and what they would like to do next.

Three Tips...

- ❑ Always plan your visits to villages carefully. Before going to the village, ask yourself: 'What are my reasons for going to the village this time?', and 'What outputs do I want to achieve during my visit?'
- ❑ Often, when you arrive at a village, things do not go according to plan. Be flexible and adjust your plans with your goals in mind. There is always something else you can do to help you achieve your goals!
- ❑ Keep a record of each visit. Summarize why you visited the village and what you have learned.

Reporting Back to the Village

Once a focus-group has completed the first cycle of evaluating technology options, the rest of the village will want to know what they have learned.

If the focus-group farmers found that some of the technology options are looking promising they will want to expand and integrate these options on their farms. Other farmers in the village may also want to start evaluating these options themselves. Create opportunities for new farmers to benefit from the experience of the focus-group farmers, especially through field days. You can also encourage new farmers to join the focus-group.

Integrating Promising Solutions on Farms

Once the focus-group farmers have seen the potential benefits of a new technology they will start to search for ways of expanding and integrating this technology on their farms. With forages, for example, they will begin to explore ways of planting forages in or around their crop fields or home gardens. It is only once farmers have these 'integrated solutions' that they start to receive substantial benefits from new technologies.



Helping farmers make the transition from testing technology **building blocks** on a small scale to developing integrated solutions can be a challenging step for a development worker. Every farm and every farmer is different. No single solution will be appropriate for all farmers.

You can support farmers by doing the following:

- ❑ **Providing ideas on how technologies can be integrated onto farms.** As farmers move from testing options on a small scale to integrating the most promising ones onto their farms, they will encounter new problems and have new questions about how to integrate on a larger scale. This needs technical support for the transition to succeed.
- ❑ **Stimulating innovation.** Encourage farmers to experiment with new ways of integrating technologies onto their farms. Often, they will generate novel approaches if encouraged.
- ❑ **Facilitating the exchange of experiences between farmers.** This exchange can be promoted through discussion groups and visits to other farmers who have already started to integrate technologies on their farms.
- ❑ **Overcoming bottlenecks that limit local expansion.** These could be physical limitations such as the availability of seed or institutional issues such as winning the support of decision makers.

Reaching Other Farmers in the Village

Until now, you have been working closely with only the focus-group farmers. By offering them the best available technology options and using participatory approaches that encourage the focus-group farmers to innovate, significant impacts should start to emerge. As this happens, other farmers in the village will have seen what the focus-group farmers have been doing and will want to start testing these technologies themselves. Very quickly, you will find that there are more farmers testing technologies than you can visit and work with individually. How can you manage this situation?

- ❑ **Work with 'local champions'.** The farmers in the focus-group have learned a lot about the technologies. They have gained confidence in how to experiment with new technologies. Often, they will be proud of their achievements and eager to share their knowledge with other farmers in the village. They can become 'local champions', helping you reach more farmers.
- ❑ **Forming farmers' groups.** You could encourage your focus-group to grow into a broader 'interest group', with many more farmers, so that new farmers can learn from the more experienced farmers.
- ❑ **Conduct field days.** You can organize field days to give many farmers in the village an opportunity to see the technology options and discuss the advantages and disadvantages of each.
- ❑ **Support expansion.** Be ready to support new farmers with the basic resources they need (e.g., with seed) to start their own production systems.

Sharing Successful Technologies with Other Villages

News of your work in a village spreads quickly. Even while the technology focus-group is still evaluating the technology options, farmers from other villages will have heard about the emerging impacts and some will want to try the new technologies for themselves. Sometimes, the technology options will spread rapidly and spontaneously as has often happened with new crop varieties. At other times you will need to actively promote the sharing of experiences between villages.

Do not try to expand to many new villages too early. It is better to work intensively with one or two villages, helping them become 'islands of success' which you can then use as 'learning centers' for other villages.



It is seldom possible to take the successful technologies developed by farmers in one village and simply 'transfer' them to new villages. In most cases, new villages will have to go through a similar learning process as those in the original villages. You have a significant advantage in that you already have 'islands of success' in nearby villages and 'champions' of the new technologies. These can help you to accelerate the process of expanding to new villages.

Successful technologies can seldom be 'photocopied' from one smallholder farm to another without the new farmers going through a learning process - starting small, gaining confidence and slowly building their own solutions.

The guidebook from which this paper was extracted is the third in the International Center for Tropical Agriculture (CIAT) in Asia Research for Development Series (CARDS). The first two booklets are 'Developing Forage Technologies with Smallholder Farmers - how to select the best varieties to offer farmers in Southeast Asia' and 'Developing Forage Technologies with Smallholder Farmers- how to grow, manage and use forages'.

All three booklets are available in Chinese, English, Indonesian, Khmer, Lao, Thai and Vietnamese.

For further information, please contact CIAT (ciat-asia@cgiar.org).

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**Participatory Research and
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Participatory Market Chain Approach



The rapid growth of the urban population presents special challenges for small-scale farmers in developing countries. They are under increasing pressure to fulfill the new market requirements of powerful supermarket chains and agroindustry, which demand product quality, volume, and continuity of delivery. Most farmers in rural areas agree: "The worst pest we face nowadays is low prices and researchers so far have not found adequate measures to help!"

Many agricultural research and development (R&D) institutions have realized that small-scale farmers' key concern is not only agricultural productivity but also better market access.

The Challenge to Involve Marketing Chain Actors

The strategy for R&D institutions seems obvious. Given existing or potential business opportunities, marketing chains must be modified so that all actors of the marketing chain benefit, particular small-scale farmers. Two options are possible:

- ❑ to gain efficiency in the marketing chain by lowering costs (i.e., production and/or transaction costs); or
- ❑ to add value in the marketing chain by increasing consumer prices (i.e., products and services supplied are of higher value).

What is less obvious to R&D institutions is how to create these new beneficial marketing settings that involve different marketing chain actors, who normally compete and mistrust each other in their daily business. Attempts in recent years to promote collaboration along marketing chains have often not generated the wished benefits. The main reasons for this limited success are:

❑ **The lack of market-oriented participatory method expertise of R&D institutions.**

Many agricultural R&D organizations have struggled with reduced funding, which has limited institutional investments to enhance capacities outside of the core (agricultural) activities. Few have staff trained in both marketing and action research.

❑ **The lack of methods that effectively integrate the different marketing chain actors and build trust among them.**

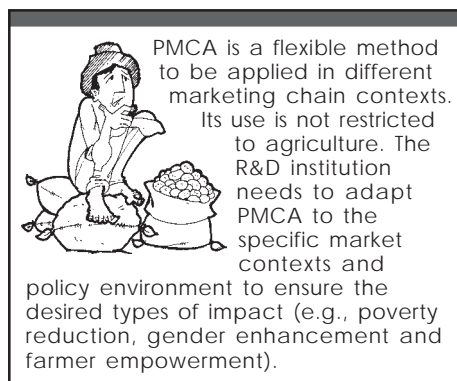
Most participatory R&D methods focus on agricultural contexts and do not explicitly involve other market chain actors. In addition, many relevant diagnostic approaches such as Participatory Rural Appraisal (PRA) and Rapid (or Relaxed) Appraisal of Agricultural Knowledge Systems (RAAKS) stop with the elaboration of a work plan and do not move to implementation of development activities.

Much marketing chain analysis is very theoretical and lacks practical advice on how to implement a functional exchange of information and build trust, to make price-competing market chain actors collaborate.

The Participatory Market Chain Approach

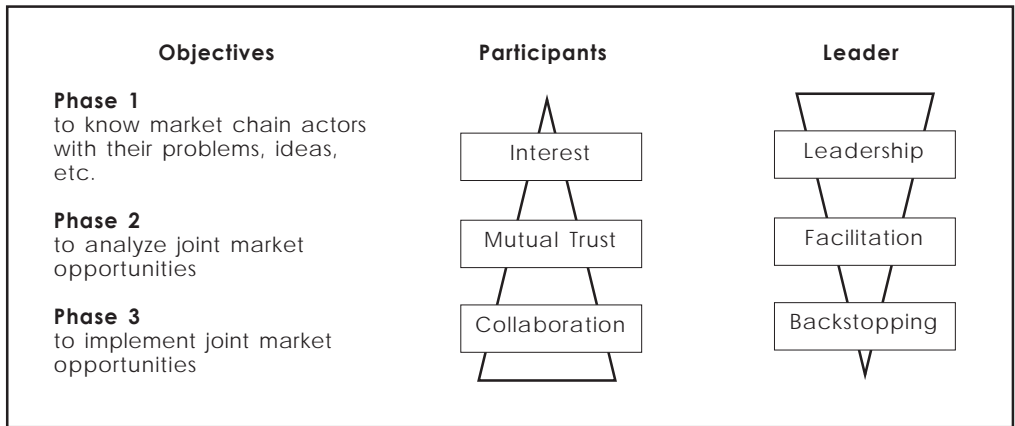
The Participatory Market Chain Approach (PMCA) is a participatory R&D method that has recently been developed. Involving the different actors of market chains, it seeks to generate group innovations based on a well-led and well-structured participatory process that gradually stimulates interest, trust and collaboration among members of the market chain. These innovations can be new products and processes, new technologies or new institutions, benefiting the different actors of the marketing chain directly or indirectly.

This paper documents the theory behind the method, critical factor and an initial application in Peru. Current application of the PMCA under different circumstances in Peru, Bolivia and Ecuador will help improve the approach. A first user guide is planned to be published in the coming months.



The only fixed elements of this approach are its three phases, with flexible duration depending on how the process advances. Each phase has a specific objective and a closing event. At the final event of each phase, results are presented to a larger group of participants and further steps are discussed. It is important that the institution that leads the PMCA process understands the "sustainability logic" of this three-phase structure, gradually seeking to empower key actors involved in the process on the cost of the R&D institution, which progressively reduces its importance and influence on decision making along the process (Figure 1).

Figure 1. The Participatory Market Chain Approach



Phase 1 of PMCA is diagnostic research, typically taking two to three months and involving between 20 and 40 qualitative interviews. In contrast to conventional market research, the gathering and evaluation of technical or quantitative information is less important than getting to know and understanding the key actors of the market chain, with their interests, problems, and ideas. Contacts established through the interviews help to motivate these actors to participate in the first public event of the project, where also other actors of the market chain, representatives of research and government institutions are invited.

In the first part of the event, findings from the interviews are presented and discussed in plenary. Then two or three smaller working groups are formed, based on topics of joint interest identified through the interview session. In this sense, this event is used as a first occasion to share ideas and interests among the different stakeholders.

Phase 2 of PMCA aims in each thematic group to define and analyze potential business opportunities. For every working group, the R&D institution provides a facilitator who ensures optimal interaction and mutual learning. The group meetings have a strong demand-oriented focus, not giving room for never-ending, supply-driven discussions. Six to ten meetings might suffice to analyze carefully the different joint opportunities. To support the working groups with in-depth studies, the leading R&D institution might want to contract marketing specialists at this stage.

At the final event of this phase, the identified market opportunities are represented by each working group and discussed with a wider audience. This event provides an opportune momentum to integrate new actors into the R&D process, to complement the working groups with requested but lacking knowledge and capabilities.

Phase 3 of PMCA concentrates on the implementation of all activities needed to put in place the suggested market opportunities. The time needed for their implementation might vary according to working groups and projects: complex settings require more time, while availability of support staff and frequent meetings speed up the process. In any case, three to six months are necessary to satisfactorily implement the planned activities and launch the generated innovations at the closing event of the project. In contrast to previous events, invitations to this last event are sent to a much wider group, such as press people, politicians, and public donor agencies. The idea of this last big event is to optimally capitalize on the project's outcome and empower those actors who will be prominent to sustain the innovations over time.

PMCA explicitly finishes with this big last event, seeking to pass full responsibility over to those market chain actors who, at this stage, are the owners of the engendered products. Nevertheless, this does not impede the R&D institutions from following up with specific activities to help consolidate all achievements: new products, processes, and institutions. The degree of involvement will be different from case to case, depending much on the nature of the innovations and the capabilities of the market chain actors to move forward independently. Further support is especially necessary when new institutions are formed, which need initial resources to start to operate properly.



Application of PMCA in the Peruvian Potato Sector

The International Potato Center (CIP) has been developing and applying PMCA in the Swiss Agency for Development and Cooperation (SDC)-funded INCOPA project that aims to create new marketing opportunities for small-scale potato farmers in Peru.

After the diagnostic study of Phase 1, and based on 24 qualitative interviews applied on different actors of the market chain (i.e., farmers, NGOs, traders, processors), two working groups were formed to analyze existing and potential marketing opportunities during Phase 2. One working group developed a marketing system for a quality wholesale potato product. The other working group decided to analyze the development of a new industrial product. In this latter case, a marketing study was conducted to determine the market potential of native potato chips. After the public event of Phase 2, where the results were presented to a larger audience and new key actors were involved, both working groups started to implement step by step the necessary activities to launch the different innovative products. In the final event of the project, all these innovations were presented by the project participants themselves:

- ❑ "Papy Bum": a registered potato chip brand made of native yellow potatoes.
- ❑ "Mi Papa - Seleccionada & Clasificada": a registered brand name for a standardized 50-kg wholesale potato bag with well-selected and well-classified potatoes, to be applied on different commercial potato varieties.
- ❑ "CAPAC PERU": a new formal association working as a platform involving actors from the whole agri-food chain with the objective to promote quality marketing of Andean crops, owner of the brand "Mi Papa" and with its own homepage: www.capacperu.org.
- ❑ "Papa al dia": a daily bulletin with actual potato wholesale prices, including more than 20 potato varieties and classes.
- ❑ A new potato grader: a flexible machine at relatively low cost to be used in different locations of the Andes, capable to grade different potato varieties and sizes.

Altogether, PMCA was implemented in Peru to create a functional platform where farmers, private sector actors, and supporting R&D organizations could interact. PMCA became a mechanism not only for generating market chain innovations but also to make market chain actors' demand more explicit to R&D institutions. The biggest challenge for CIP was to ensure that the PMCA enables farmers to express their needs. Given the distance between Lima and the main potato production areas, they could only sporadically be involved in the process, mainly in the closing events of each phase. CIP trusted the different NGOs to advocate farmers' needs in the R&D process and build the last link in the market chain within the production region helping "their" farmers respond to the new business opportunities discussed in the working groups.

Advantages of PMCA

PMCA has not been widely used yet, but the first application and its initial results were well analyzed in a participatory setting, where R&D experts from different Andean countries participated. The following advantages were identified:

❑ PMCA achieves practical outcomes.

The approach covers a range of activities from diagnostic to the implementation of coordinated concrete activities. Many participatory research methods tend to stop with the definition of a work plan of activities that should be implemented.

Our experience shows that research input is important during all three phases, being more conceptual in the initial phases and more technical to support initiatives during the implementation phase. In any case, the continued backstopping of the R&D institution in the implementation phase is crucial to avoid losing group dynamics until innovated products are launched and institutional innovations are consolidated.

❑ **PMCA is flexible.**

The approach consists of three explicit phases with a clear objective, but its implementation is highly flexible as it responds to different contexts and user needs. Many key actors are identified in later stages of the process, when concrete marketing opportunities are analyzed and implemented, but specific key knowledge and capacities might be lacking in the working groups. In this sense, the approach has shown to be very effective in functionally pooling information and skills during the different phases while optimally combining development with research activities.

❑ **PMCA focuses on real interests.**

The approach is strictly demand-oriented and responds to collectively identified business opportunities seeking to link consumer-oriented demands to technological innovation. Supply-driven discussions are minimized and put into the context of the market chain. This allows giving more room to those actors who are closer to consumers, and therefore crucial for identifying and analyzing valid joint marketing opportunities.

❑ **PMCA benefits participants in different ways.**

The approach generates differentiated and continuous benefits for all involved in the project. Group meetings generate tangible benefits for participants: access to new and relevant information, skills, and business contacts. The leading R&D institution is on the winning side as acquired knowledge and contacts help to better respond to concrete needs and opportunities. In this sense, PMCA provides an interesting concept to determine technological innovation at the farm level based on market demands.

❑ **PMCA builds trust.**

PMCA has been very successful in bringing together actors with different backgrounds, such as traders, farmers, processors and R&D institutions, who previously mistrusted each other. It allowed the creation of confidence among them to the point that they shared the same project interests and they were willing to invest considerable time and money to take forward the group's activities.

Disadvantages and Critical Success Factors

PMCA per se does not guarantee a successful project. Failures might result from bad application or a difficult context, when, for instance, certain key actors dominate a whole marketing chain and alternative commercialization solutions do not seem feasible. In any case, the following factors need to be addressed to enhance PMCA's successful future applications:

❑ **PMCA might appear too abstract.**

The approach works with new and rather unconventional mindsets and concepts that are not always easily understood, especially by R&D institutions related to agriculture, where most staff members have been trained in production sciences. If the R&D institution does not have the technical expertise and social skills to apply PMCA, it would be wise to access consultants who have the desired skills.

The fact is that inadequate leadership frustrates voluntarily participating "market chain experts," putting at risk their active project involvement and thus mutual learning as a first important step in stimulating desired group innovations.

❑ **PMCA might challenge the direct involvement of main project beneficiaries.**

The approach is market-oriented and prioritizes the identification and implementation of marketing opportunities. This initially gives less attention to production-oriented problems and the actors behind them (i.e., farmers). These production-related activities are tackled at a later stage when the marketing opportunity is constrained by production quality, volume or prices.

If the geographical distance between the production areas and the market impedes active participation of producers as the main beneficiaries, the R&D institution needs to maintain a firm position in favor of producers and focus only on those activities that ultimately generate direct and/or indirect benefits for this target group. Moreover, field trips might be planned to improve the links with farmers.

❑ **PMCA might be restricted by rigid funding.**

The approach requires a flexible allocation of funds to support those activities that participating actors jointly identify as important for the project. It will be important that donor agencies move away from activity-based towards objective- and process-oriented funding. This would help the R&D institution to better respond to demands from market chain actors and make research activities more relevant for achieving development goals.

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**Participatory Research and
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Participatory Varietal Selection and Participatory Plant Breeding: The Last 10 Years



Growing new varieties produced by plant breeding is an attractive option for farmers. The varieties yield more grain; and the only additional labor needed is for harvesting this extra grain. Farmers in more favorable areas have benefited the most from modern plant breeding while those cultivating more marginal lands have suffered from a dearth of suitable, new varieties. Even in the more productive environments, plant breeding has often resulted in low on-farm varietal diversity, and benefits have been lower than were possible because obsolete cultivars are all too commonly grown.

Making plant breeding more market-oriented can help solve diverse problems. The new varieties are more likely to better meet farmers' particular needs for specific environments. Market-oriented plant breeding increases the speed of varietal replacement and often increases on-farm varietal diversity.

Public-sector plant breeders particularly in developing countries have not used market-oriented approaches. Instead, a linear process of research and extension has been almost universally adopted, where breeders first develop, test and release new varieties, with limited involvement of farmers, and the extension services that promote them. In contrast, the private sector has long used market research where farmers test potential new varieties before their commercialization. Research and extension overlap because testing creates a demand for the successful new varieties.

When public sector plant breeders use the market-oriented approaches of the private sector, they are described as 'participatory'. However, better terms might be “market-led”, “client-oriented”, or “farmer-centered” breeding. The term “collaborative plant breeding” is an alternative but also describes a particular type of participation (Biggs, 1989).

Market-led techniques have been usefully classified by the stage of the genetic material involved. Farmer-centered plant breeding concerns the entire breeding process (“participatory plant breeding” or PPB) whereas farmer-centered varietal selection (“participatory varietal selection” or PVS) is limited to the testing of finished varieties.

Varietal Selection

PVS tests varieties in farmers' fields not on research stations that might not represent these fields so accurately. Research focuses also on traits other than just high yield.

Farmers evaluate all of the traits that are important to them and then trade the traits off against each other. For example, they may accept varieties with lower grain yields but higher grain quality because they consider overall returns more important than just yield. They may also trade lower grain yields for earlier maturity because they want to have a second cropping.

PVS is a simple and more direct way of using multiple traits to assess the value of a variety to farmers. Quality traits can be assessed that are difficult or expensive to evaluate in conventional trials, e.g., the milling percentage obtained when large quantities of grain are milled, cooking and keeping quality, taste, and market price.

Varietal selection that is client-oriented is not controversial; breeders have long used on-farm trials. However, these traditional on-farm trials are commonly renamed as PVS even though they involve farmers to a limited extent. Conventional on-farm trials give farmers a limited choice of varieties that the breeders have already pre-selected. Trials are managed under a recommended package of practices decided by scientists, and do not use powerful techniques, such as matrix ranking, for discriminating among varieties.

Nonetheless, PVS is now acceptable even to national research institutes and non-government organizations (NGOs). Several international agricultural research centers help facilitate substantial networks of national program partners for PVS. Some examples include Centro Internacional de Mejoramiento de Maiz y Trigo (CIMMYT) for maize in southern Africa and for wheat in marginal areas in South Asia; the West Africa Rice Development (WARDA) for rice in West Africa; and the International Rice Research Institute (IRRI) for upland rice.

All PVS use some form of mother and baby trials even if they are not named in this way. Mother trials that are fewer in number than the baby trials compare all of the test entries. In the baby trials, each farmer runs trials for only one or two of the test entries.

PVS has been greatly successful in many crops and countries when used in marginal areas with low-resource farmers. It is also effective in more productive environments where it contributed to increased on-farm varietal diversity and faster varietal replacement. However, for productive environments, on-station trials can represent quite well the situation in farmers' fields so the advantages of PVS in favorable environments, while they can still be substantial, tend to be less than those for marginal areas.

Client-Driven Plant Breeding

PVS is both the building block for PPB and the means of testing its new products. Farmer-accepted cultivars identified by PVS make ideal parents for farmer-centered breeding programs. When these produce potential varieties, farmers can immediately test them. This is one of the greatest advantages of working with farmers in a system where research and extension is done in parallel. Typically, seven to 10 years are saved so the rate of return on the investment in plant breeding is considerably increased.



Results from PPB programs are fewer and generally more recent than those for PVS because breeding takes longer than simply testing varieties. The need to involve farmers in breeding is also less accepted than in the case of varietal selection. Examples include rice breeding in India and Nepal; maize in India; cassava and beans in Latin America and barley in Syria.

In PPB, selection is in the target environment--farmers' fields--and this should result in faster genetic progress in that environment. Evidence, so far, shows that this advantage is not outweighed by any reduced economy of scale because PPB varieties are still adopted in large areas.

Farmers can be involved in breeding programs in several ways:

- Breeders can consult farmers in order to set more realistic goals and choose more appropriate parents.
- Farmers can evaluate material grown on the research station.
- Farmers can collaborate by growing and selecting breeding materials in their own fields.

The choice will depend on the available resources, the socio-economic environment, and the extent to which control of pollination is needed. Rice, for example, is easy to select because it is a self-pollinating crop. Maize, which is cross-pollinated, would require more effort because isolation distance and pollination control are required.

In most conventional breeding, farmers participate little in setting breeding goals particularly in programs that aim to produce widely-adapted varieties for many farmers. Involving farmers in goal setting is market research. It helps in targeting varieties that will be accepted in defined physical or socio-economic environments. In many cases, early maturity, perhaps even earlier than that of existing landraces or cultivars, is found to be as important a trait as higher yield.

In farmer-oriented breeding programs, traits are identified that breeders had not considered important or of which they were previously unaware such as pericarp color or appetite delay in rice (farmers want varieties that satisfy appetite longer). There are also strict requirements for ease of threshing in rice (the number of beatings required) in areas where threshing is done manually.

Changes in Breeding Methods to Maximize the Advantages of Collaboration

Targeting breeding programs more closely to farmers' needs can be done using conventional breeding methods and such programs have been successful. However, methods can be adapted to maximize the benefits of working closely with farmers. Farmers are willing to grow large populations, but will usually find it difficult to test many entries unless assisted or trained by scientists. Hence, in several published examples of PPB, a modified breeding strategy was used that minimized the number of entries any farmer grew but maximized population sizes. In in-breeding crops, only one or two crosses were made each year but the size of the populations derived from them was large. In the out-breeding crop maize, a single population per target area was improved by recurrent selection.

Theory strongly supports using few crosses with large populations. However, the choice of crosses is critical for success so at least one parent of any cross is a variety or landrace already popular with farmers or accepted by them in PVS trials.

In most public-sector breeding for marginal environments, rarely are there any private-sector competitors. Thus, the goal is simply to breed a variety better than the ones farmers are growing. This has not proven to be difficult with only a few, carefully-chosen crosses.



In in-breeding crops, bulk-population methods are particularly suited to participatory approaches because they benefit from the opportunity to use large populations. Bulk breeding has been very effective when farmers have selected, in their own fields, from heterogeneous bulks of populations of nearly homozygous lines. The evaluation by farmers and breeders of unreplicated nurseries of lines

derived from bulk populations (which can be termed pure-line-from-bulk breeding) has also been very effective. All the lines that proved, over time, to be the best were selected by both farmers and breeders demonstrating the value of using multiple judgments.

In out-breeding crops, simple approaches such as mass selection, have been effective in PPB in maize in both eastern and western India. Avoiding unwanted cross-pollination in crops grown in farmers' fields was difficult so it proved easier to carry out selection on populations planned, by researchers, to have some degree of isolation (by time or distance) from other crops.

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**Participatory Research and
Development for Sustainable
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Decentralized Participatory Plant Breeding: A Case from Syria



Conventional modern plant breeding has been recognized to be more beneficial to farmers in high potential environments or those who could profitably modify their environment to suit new cultivars, than to the poorest farmers who could not afford to make the necessary modifications. As a consequence, low yields, crop failures, malnutrition and poverty affect a large proportion of humanity.

The reason for the relative low degree of success of plant breeding in marginal environments has to be largely attributed to the widespread use of research stations for the selection, and often for the testing work (centralized non-participatory breeding). Therefore, several cycles of selection, during which the breeder decides what to select and what to discard, are conducted in a relatively uniform environment and controlled condition. This has little in common with the target environments characterized by heterogeneous conditions and complex interplay of factors. Centralized breeding becomes “participatory” when, for example, farmers are invited to the research station(s) to express their opinion about the breeding material.

Several data indicate that when the differences between selection environment and target environment are large, genotype x environment (GXE) interaction effects are generated. Thus, the lines performing well in the selection environment perform poorly in the target environment, and vice versa (Ceccarelli, 1989). Apparently, an obvious solution to this problem is to conduct selection in the target environment, a strategy defined as decentralized breeding (Ceccarelli *et al.*, 1994, 1996).

Steps in an International Breeding Program

Produce early segregating populations from crosses targeted to specific environments



Send them to National Agricultural Research System (NARS)



Allow national program scientists to select both between and within populations

The best selections are eventually used in further cycles of recombination and selection. At the national level, selection and testing are conducted by breeders directly in a number of target environments (decentralized non-participatory breeding). According to Cooper (1999), target environments are identified on the basis of repeatable genotype x location interactions (i.e., two locations represent two different target environments when they consistently discriminate differently among breeding lines over time). By contrast, locations which cause unpredictable and not repeatable genotype x location interactions are considered to belong to the same target environment.

Decentralized breeding does not necessarily respond to the needs of the farmers for two reasons:

- ❑ International breeding programs are often merely involved in the transfer of selection from one research station to another.
- ❑ In national breeding programs, the definition of the target environment does not include farmers' (men and women) preferences and needs.

In the latter case, farmers in areas which are classified as one target environment on the basis of GXE interactions may actually prefer different types of germplasm. This may increase the number of "effective" target environments to a number which is beyond the capabilities of most national programs in developing countries.



The participation of farmers in the very early stages of selection offers a solution to the problem of fitting the crop to a multitude of both target environments and users' preferences (Ceccarelli *et al.*, 1996, 2000). Although farmer participation is often advocated on the basis of equity, there is a sound scientific and practical reason for farmer involvement to increase the efficiency and the effectiveness of the breeding program. It is also expected that decentralized participatory plant breeding could be particularly effective in situations where seed is supplied by the informal seed system.

From Centralized Non-Participatory to Decentralized-Participatory Plant Breeding

At the International Center for Agricultural Research in Dry Areas (ICARDA), the gradual change from centralized non-participatory to decentralized participatory plant breeding was implemented in Syria between 1997 and 2003. This was done in three steps and was gradually applied in Tunisia, Morocco, Eritrea, Yemen, Jordan and Egypt.

Table 1. Steps and Features of Decentralized Participatory Plant Breeding

| Steps | Features |
|--|---|
| 1. Exploratory Step | <ul style="list-style-type: none"> <input type="checkbox"/> builds human relationships (building the team) <input type="checkbox"/> understands farmers' preferences <input type="checkbox"/> measures farmers' selection efficiency <input type="checkbox"/> develops scoring methodology <input type="checkbox"/> enhances farmers' skills |
| 2. Methodological Step | <ul style="list-style-type: none"> <input type="checkbox"/> implements breeding plan <input type="checkbox"/> chooses and tests appropriate experimental designs and statistical analysis <input type="checkbox"/> refines farmers' selection methodology <input type="checkbox"/> initiates village-based seed production |
| 3. Institutionalization and Scaling-up | <ul style="list-style-type: none"> <input type="checkbox"/> organization of workshops <input type="checkbox"/> conduct of extensive training programs |

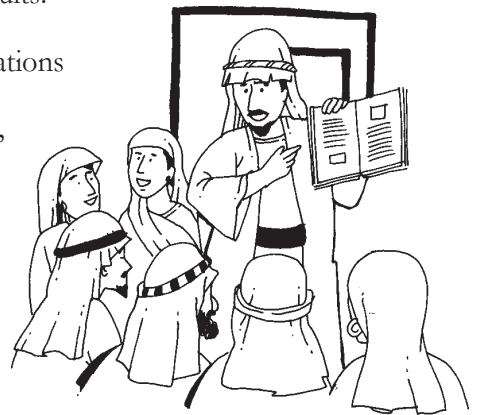
Exploratory Step

This includes the selection of farmers and sites, and the establishment of one common experiment for all the participants. The experiment, described in detail by Ceccarelli *et al.* (2000, 2003), included 208 plots and was grown in two research stations and nine villages. All possible combinations of selection were conducted:

- centralized-non participatory (breeders on station)
- centralized-participatory (farmers on station)
- decentralized non-participatory (breeders on farm)
- decentralized-participatory (farmers on farm)

The exploratory step generated the following results:

- Farmers were able to handle large populations of entries, to take a number of observations during the cropping season, and to develop their own scoring methods.
- Farmers selected for specific adaptation.
- For some broad attributes, such as modern germplasm versus landraces, selection was mostly driven by environmental effects.



- ❑ There was more diversity among farmers' selections in their own fields than among farmers' selections on research stations, and among breeders' selections, irrespective of where the selection was conducted.
- ❑ The selection criteria used by the farmers were nearly the same as those used by the breeder.
- ❑ Farmers were slightly more efficient than the breeder in identifying the highest yielding entries in their own fields.
- ❑ The breeder was more efficient than the farmers in selecting in the research station located in a high rainfall area, but less efficient than the farmers in research stations located in a low rainfall area.

There is much to gain, and nothing to lose in implementing a decentralized participatory plant breeding (PPB) program.

Methodological Step

The model of plant breeding used in Syria and in a number of other countries is a bulk-pedigree system. The crosses are done on station, where F1 and the F2 are grown. On the other hand, yield testing of bulks is done in the farmers' fields (Figure 1).

The activities in farmers' fields begin with the yield testing of bulks (three years after making a cross), in trials called Farmers Initial Trials (FIT). These are unreplicated trials with 170 entries and 30 checks randomly distributed. Plot size is 12 sq.m.

As in the first phase, in two of the eight locations, the farmers requested two sets of the same FIT to expose the genetic material to different environments or practices within the same village (two different rotations and two soil depth).

In parallel, pure line selection is conducted on station within the bulks selected by the farmers in their fields by collecting individual heads. The F4 head rows are promoted to the F5 screening nursery only if farmers select the corresponding F4 bulks. The process is repeated in the F5 and the resulting families, after one generation of increase, return as F7 in the yield-testing phase. Therefore, when the model is fully implemented, the breeding material which is yield-tested included new bulks as well as pure lines extracted from the best bulks of the previous cycle.

The breeding materials selected from the FIT are yield tested for a second year in the Farmer Advanced Trials (FAT). These are replicated trials grown by between four to eight farmers in each village. All the FAT grown within a village contain the same entries, while the type and the number of entries and checks varies from village to village and from year to year.



The number of FAT in each village depends on how many farmers are willing to grow this type of trial. Each farmer decides the rotation, the seed rate, the soil type, the amount and the time of application of fertilizer. Therefore, the FATs are planted in a variety of conditions and management. During selection, farmers exchange information about the agronomic management of the trials, and rely greatly on this information before deciding which lines to select.

The entries selected from the FAT are planted in the third level of testing, called Farmer Elite Trials (FET), with plot size of 144 sq. m. These entries are also used on station as parents in the crossing program. The three types of trials are entirely managed by the farmers.

Some farmers practice the selection at various stages but the majority does the selection when the crop is close to full maturity. A scoring method is used with 0 = discarded to 4 = the most desirable. During selection some farmers are assisted by a researcher to record both quantitative and qualitative data.

In each trial, scientists record the following data: plant height, spike length, grain yield, total biomass and straw yield, harvest index and 1000 kernel weight. On station, scientists record the days the heading and days to maturity. The data is subjected to different types of analysis (Singh *et al.*, 2003; Yan *et al.*, 2000).

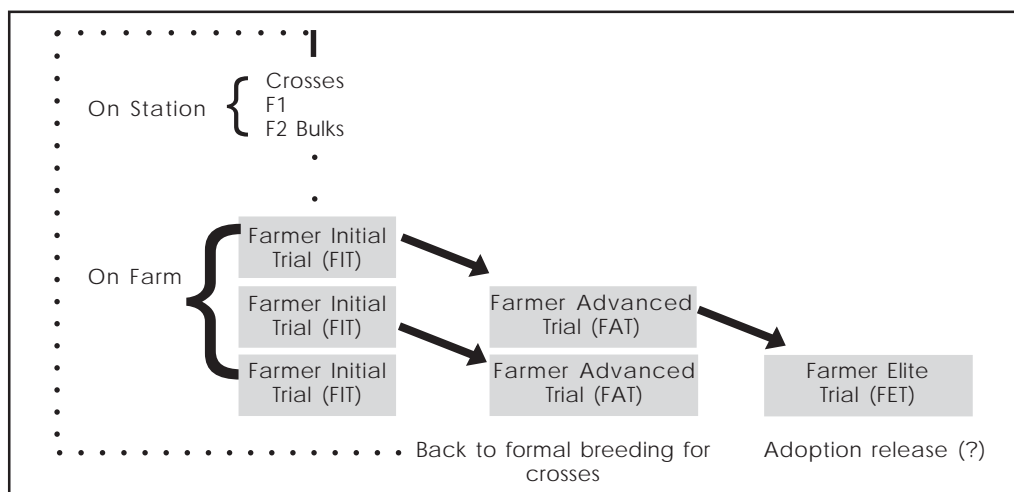
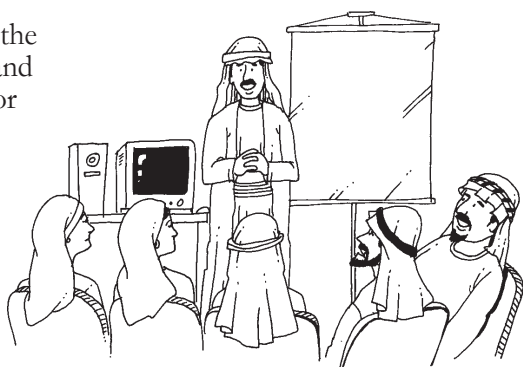


Figure 1. The Scheme of Decentralized Participatory Barley Breeding Implemented in Syria. The scheme shows only the three stages of testing and selection of bulks.

Institutionalization and Scaling-Up

In 2003, the process of institutionalization and scaling-up in Syria started. The first step in this direction was the organization of a workshop participated in by about 20 farmers from the villages. A large number of researchers (including heads of research stations of agricultural offices from most provinces, the main research policymakers, the seed organization, the extension service and the Minister of Agriculture) participated as well.

The workshop was a useful forum to discuss the relationships between PPB, seed production and variety release. The mechanism agreed upon for scaling-up PPB was a gradual transfer of responsibilities from ICARDA scientists to scientists of the General Commission for Scientific and Agricultural Research (GCSAR) and the staff of the Extension Service. At the end of the process, each province implemented all the various PPB activities within its boundaries, with the overall coordination shared between ICARDA and GCSAR. Thus, one important component of the initial steps of scaling-up was an extensive training program of the GCSAR scientists and of the extension staff on all the aspects of PPB, partly supported by the International Development Research Center (IDRC).



Success Story

One of the best examples of success that the PPB project has is the variety Zanbaka. About 10 years ago, it went through the conventional system and was rejected from being released. When it entered the PPB program, it began to be slowly adopted, until the drought in 2000 forced the farmers to use all the available seeds to feed their sheep. Afterwards, seeds were distributed and planted on a 50ha plot. Within two years, the variety has reached 3,500ha in an area receiving 150-250 mm rainfall and where conventional breeding never had any impact. Similar initial successes have been observed in Egypt where new barley varieties out-yielding the local by between 30% and over 100% are multiplied in four villages, in Jordan where two barely varieties are being released, and in Yemen where two varieties of barley and two of lentill have been adopted by farmers.

Lessons Learned

Lessons learned were derived not only from participatory barley breeding conducted in Syria, but also from Jordan, Yemen, Egypt, Tunisia, Morocco and Eritrea.

- ❑ The cost to the institutions and to the farmers of decentralized participatory plant breeding is not necessarily higher.
- ❑ Farmers' selection is effective, and this allows addressing a larger number of target environments than in decentralized non-participatory breeding.
- ❑ New varieties are spreading in areas where centralized non-participatory breeding had no impact.
- ❑ Participatory plant breeding has a large positive effect on diversity because different breeding lines are selected in different locations.
- ❑ The methodology is continuously evolving, also as a consequence of farmers' improved skills.

- ❑ Participatory plant breeding methods can be very different, even with the same crops, depending on current farmers' practices.
- ❑ Participatory plant breeding projects have to be developed primarily with the institutions responsible for plant breeding in order to successfully scale-up.
- ❑ Participatory plant breeding projects have a large effect on farmer empowerment even if this is not explicit in the design of the projects. When the model described above was fully implemented, the farmers controlled all the crucial steps of the breeding program including the crossing program, even if the crosses were technically executed by the breeders on-station.

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**Participatory Research and
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Participatory Natural Resource Management



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Participatory Natural Resource Management Research:

A New Integration Domain in the Agricultural Sciences



Over the years, the focus of agricultural science has evolved. Some experts say this is because agricultural science is a “quasidiscipline”: research topics are not defined by the internal state of the field (as in physics or mathematics), but rather by problems defined outside of the field. Problems in real life are best solved through a multi-disciplinary approach. If new problems arise, different disciplines might be integrated to solve the problems.

The emergence of new domains depends on two critical factors: 1) an understanding of the interrelations between problems and the ability to deal with these interactions in the research methodology; and 2) public concern about major issues. Indeed the emergence of natural resource/ecosystem management (NRM) as a domain in international agriculture research is paralleled by the appearance of new tools and instruments for data storage and processing such as geographic information systems and modelling. At the same time, worries about food production and global hunger have been amended by an increased public concern about the rapid deterioration of the Earth’s ecosystems (particularly since the 1992 Earth Summit in Rio) and increasing levels of poverty.

Adapted from:
 Probst, K. and J. Hagmann with contributions from Fernandez, M. and J. A. Ashby. 2003. Understanding Participatory Research in the Context of Natural Resource Management--Paradigms, Approaches and Typologies. ODI-AGREN Network Paper No. 130. <http://www.odi.org.uk/agren/>

In the last 30 years, different integration domains have been pursued in agricultural sciences (Table 1). This paper particularly discusses participatory natural resource management as a new integration model.

Table 1. Different Integration Domains Evolving Through the Years

| Time Period | Integration Domain (Focus of Agricultural Sciences) |
|------------------------|--|
| Early 1960s | farm management which includes farm economics, engineering, planning and home economics |
| Early 1970s | crop ecology including physiology, pathology, entomology, genetics and agronomy |
| Mid-1970s to mid-1980s | Farming system research |
| Mid-1980s | sustainable production, later sustainable natural ecosystem management which includes geography, meteorology, ecology, hydrology and sociology |
| 2000 | Integrated natural resource management |

What is Natural Resource Management?

Definitions of NRM or integrated NRM are still evolving.

- ❑ INRM can be defined as the responsible and broad-based management of the land, water, forest and biological resources base - including genes - needed to sustain agricultural productivity and avert degradation of potential productivity (TAC 1997).
- ❑ INRM is an approach to research that aims at improving livelihoods, agroecosystem resilience, agricultural productivity and environmental services. It aims to augment social, physical, human, natural and financial capital. It does this by helping solve complex real-world problems affecting natural resources in agroecosystems (CGIAR Inter-Center Working Group on INRM, 2000).
- ❑ NRM involves not only agronomy, but also spatial and temporal scales and interdependencies, on-site and off-site effects, trade-offs of different management options, the need to involve a wide range of stakeholders - often with conflicting interests - in collective action (Probst, 2000).

In short, NRM involves technical skills and knowledge about biophysical processes as well as the social component, i.e., negotiation of rules and sanctions, policy formulation, organization development, land use planning, conflict and information management.

While international agricultural research centers (IARCs) acknowledge that NRM is multifaceted, these centers cannot deal with all issues. They tend to focus on improving production of specific commodities (crop, livestock, forest and fish outputs) that have impacts on poverty reduction and food security, like integrated water and watershed management, social forestry, living aquatic resource management, and soil management.

There is a growing belief, however, that local people’s perspectives need to be in the center of research efforts for development. In order for these research initiatives to have an impact, the innovations need to be “owned” by local users. To achieve ownership, the people should be part of the development and implementation of the innovation.

Over the last decades, a wide variety of participatory research (PR) approaches, concepts and methods has evolved. However, it is still not yet well understood which types of approaches are useful for what kind of research questions, goals and contexts. Especially in the field of INRM, participatory research is conceptually and operationally still in its infancy and a wide range of distinctly different activities are labeled ‘participatory research’.

Current Practice in NRM Research


Over the past 30 years, the international agricultural research community has significantly contributed to raising agricultural productivity, particularly through its commodity research and germplasm improvement. Their research goals have also expanded to include efforts towards poverty reduction, food security and environmental sustainability. Reductionist commodity research can no longer deal with this complexity and a reorientation towards NRM and farmer participatory research is gradually being accepted. This change was also fostered by donors who demanded more visible impacts through development-oriented research, especially in smallholder farming.

The focus of the current practice in this relatively young NRM research domain may be summarized into four major issues.

| | |
|---|--|
| <p style="text-align: center;">Impact Orientation What kind of impact do NRM research projects strive for?</p> | <p style="text-align: center;">Research Focus What is their research focus and who are the intended beneficiaries?</p> |
| <p style="text-align: center;">Pathway/Strategy to Impact What is their pathway or strategy to achieve an impact at the local level?</p> | <p style="text-align: center;">Role of Participatory Research What is the role of participatory research in the project strategy?</p> |

The following description and assessment of the state of the art is based on a review of literature and internet sites, insights gained from conceptual workshops and project evaluations and a study of 53 research projects within the Consultative Group of International Agricultural Research (CGIAR) and its partners.

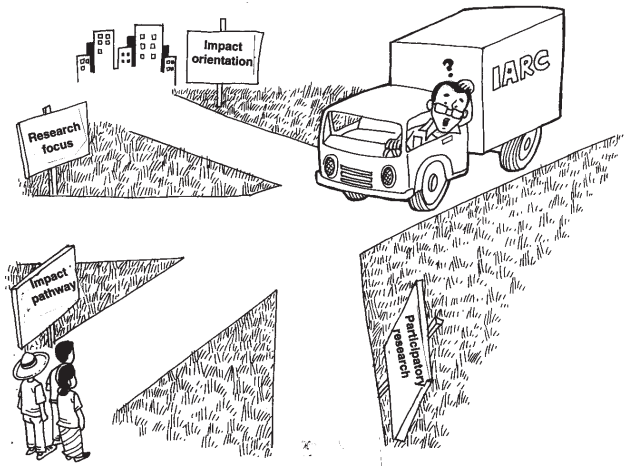
The projects within CGIAR included participatory research projects covering a broad range of topics in NRM (e.g., soil and water management, crop/livestock management, agroforestry, integrated pest management, conservation of biodiversity, watershed management, etc.). The project was carried out in 1999 by the CGIAR Program for Participatory Research and Gender Analysis, using a questionnaire which was responded to by projects, mostly while attending international workshops on the topic.



Impact Orientation

International agricultural research centers face an apparent paradox with regard to impact. Some donors want to see impact at the level of the resource poor farmers, while others emphasize that the mandate and comparative advantage of the IARCs is to conduct **'strategic'** research and to produce **'international public goods'** that can be extrapolated to other locations at the regional and global level. Basically all centers have incorporated highly

aggregated development goals such as poverty alleviation, increased income, food security, and sustainable resource use into their overall research objectives.



Some projects started engaging in larger scale extension and development activities (e.g., capacity building, organization development, etc.), without necessarily integrating research functions as a continuing part of these development activities. Some actors, however, see strategic research as an 'upstream' phase in the research-development continuum. International researchers need not be involved in participatory processes at the field level.

When formulating goals, NRM research managers tend to put different impact levels into one sentence without necessarily clarifying what exactly they want to achieve. Some projects put the natural resource system and technical improvements into the center of perspectives.

Other initiatives put more emphasis on changes in the management strategies of local resource managers. These projects focus on research impacts that build local capacity for collective action, and foster people's own efforts to improve management systems (adaptive capacity). This includes their ability to articulate interests and demand, to manage conflicts, etc.

Though most IARC projects show strong impact orientation, the goals and objectives defining the desired impact are rather unclear as to what the research can realistically contribute. This is a general pattern observed in many research projects – participatory or non-participatory.

Example

"Enabling communities and organizations to plan collective action aimed at better management of resources in hillsides." (CIAT: Community Management of Hillside Resources)

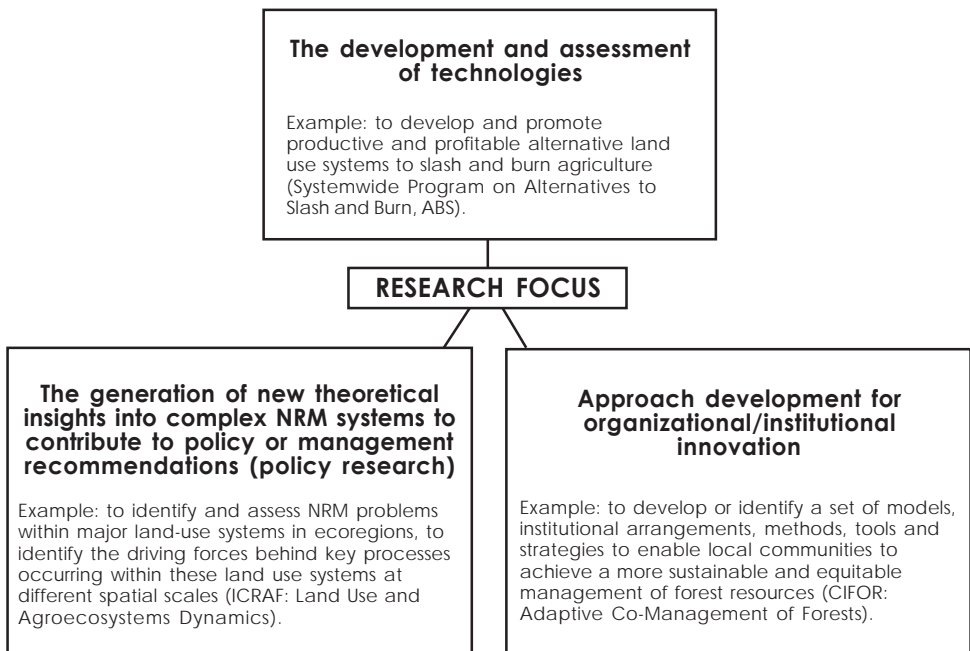
"Enabling local communities to achieve more sustainable and equitable management of forest resources and human well-being in a multi-stakeholder environment. Enhancing the ability of forest management systems to be self-improving, which will require strengthening the process of management and policy making. The emphasis is on institutionalizing conscious learning." (CIFOR: Adaptive Co-Management of Forests)

‘Hard’ impacts related to physical, natural and financial capital and ‘soft’ impacts related to social/human capital are not clearly separated, even though they would require different strategies. This often results in a diffuse and unclear strategic orientation which defines the connection between the research outcome and the development impacts. Unfortunately, participatory NRM research particularly requires a strong impact orientation to guide a flexible and dynamic process of socio-technical development. The research products need to be derived clearly from the strategic orientation.

Research Focus

While covering a broad range of topics, the analysis of NRM research projects revealed three major research foci.

Basically, all Centers work on the three research foci, and some projects address more than one aspect. Though most projects focus on technical innovations (improved varieties, farming practices, etc.), organizational innovations and local capacity building has increasingly gained importance as a focus of NRM research.



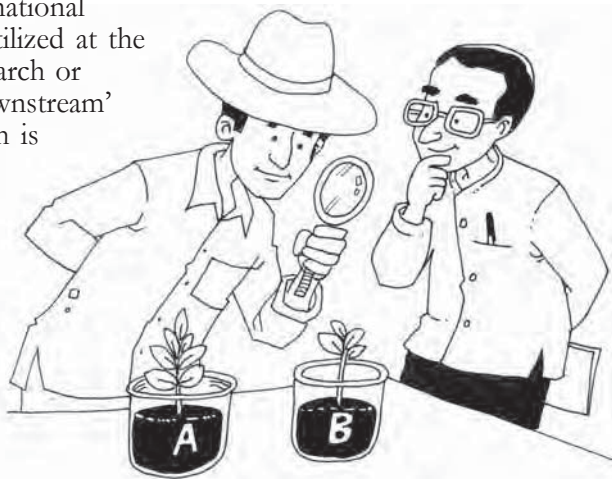
Pathway/Strategy to Impact

To disseminate the results of their research, most IARCs collaborate with ‘**adaptive research and dissemination partners**’, such as National Agricultural Research Systems (NARS), extension services, non-government organizations (NGOs), development agencies and farmers’ groups. These partners are forming the focal mechanism through which IARCs attempt to reach out to farmers in pilot development projects.

Even though the linear ‘transfer of technology’ model to spread innovations is a concept which has been questioned from many sides, it is still widely assumed within the scientific community that research outputs just need to be fed into an existing and assumingly functioning research-development continuum.

Role of Participatory Research

Participatory approaches in international agricultural research are mostly utilized at the level of applied and adaptive research or even technology transfer, i.e., ‘downstream’ applications. Participatory research is primarily seen as a means to obtain (qualitative) data about local people’s knowledge and demand to assimilate and consider this information in scientific research; and a better approach to technology transfer and adaptive research, which is, however, not considered to be the task of IARCs (Becker, 2000).



Some scientists think that participatory research should be done by other bodies like extension services, NGO and NARS, and not by IARCs. In fact, NGOs report they have more participation of local people in their projects.

While many researchers might be familiar with the concept of participation, scientists with actual, long-term field experience in participatory research processes are still a minority.

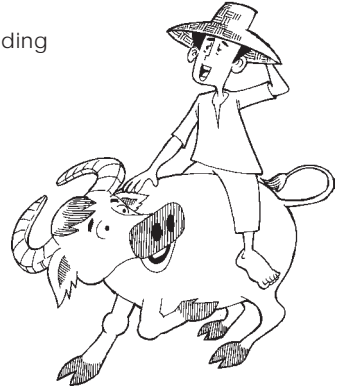
Did you know that...

- ❑ Most IARC projects utilize consultative participation; most non-IARC projects report collaborative participation. Women and marginalized groups are brought into the research process at a relatively late stage, when technologies have already been identified and are ready for dissemination (Johnson *et al.*, 2000).
- ❑ There are only few examples of partnerships between formal researchers and local stakeholders in which the latter are driving the research process at local level, seeking solutions for constraints they have identified.
- ❑ Most researchers perceived their role as facilitators that would strengthen local innovation development and strengthen local peoples’ self-help capacities. About 70% considered local people as equal partners in a joint innovation process, however 54% regarded the role of local people as receiving innovation packages that the latter could adopt, refuse or adapt (Fernandez, 1999).

Epistemological Assumptions, Values and Beliefs

Two frequently cited epistemological perspectives surrounding participatory research are positivism and constructivism.

Positivism is an endeavor to obtain an objective view of reality. Positivist science is based on direct empirical evidence that can be observed and measured through scientific methods (Crotty, 1998). Through appropriate research methods, one can discover the true nature of that reality. From a positivist viewpoint, objects in the world have meaning prior to, and independent of, any human consciousness. It is assumed that there is an objective, value-free, external reality driven by natural laws controlling cause-effect relationships.



Constructivism refutes this. Meaning or truth is not discovered but is constructed. Through communication and learning processes, different social groups develop an inter-subjective system of concepts, beliefs, societal and cultural norms, or a set of theories that they consider to be reality. There is no 'objectively' best solution to a problem because different actors have different sense of what is needed and what can be achieved.

In designing a research approach, these epistemological views have to be considered. It is critical to be aware about the assumptions one is making. These assumptions have implications on the definition of objectives, roles, methods, etc.

For example, it might be assumed that there is a 'stock' of uniform, systematized body of local knowledge available that can be incorporated into any research conducted by 'outsiders'. In contrast, this knowledge might be seen as multi-layered, fragmentary and diffuse, and as something that can only be generated as a result of interaction and joint-learning among different actors with complementary contributions.

Another example would be an assumption that innovations, because they are successful in some areas, might be successful everywhere, and that these innovations will easily spread among the users. On the other hand, innovations might be needed in diverse and complex social and natural environments. Actors might have different interests, relationships, values, power and access to resources which are conditions in which rapid and widespread dissemination of a particular innovation is unlikely.

Thus, the underlying paradigms will imply the choice scientists make in their investigation – whether they work for, on or with their clients (e.g., farmers). Paradigms will influence whether systems are seen as a real, existing thing that can be studied from the outside, or as an 'abstract concept' which is socially constructed. The choices will determine whether the research process is through experimentation or organized as a system of learning.

Challenges

Based on these preliminary analysis and experience, the major challenges to increasing the effectiveness of the IARCs' NRM research can be summarized as follows:

- ❑ **Greater impact orientation and strategy.** Many development-oriented research projects define highly aggregated overall goals, but in reality lack a clear strategy of how to achieve these impacts and induce changes through research. The focus is frequently on a technology or land use practice without considering that changes are required at the level of individual and collective resource users to achieve a development impact (i.e., the link between the desired impact and produced output is missing).

- ❑ **Less discipline-driven and supply-led research agendas.** The research focus and products are more derived from a supply-led and discipline-led perspective rather than from a strategic orientation.
- ❑ **Greater integration and operationalization of ‘interdisciplinarity’.** Even though NRM is supposed to be looked at from a more holistic perspective, research projects hardly achieve a true integration of different disciplines and stakeholders from different levels. Projects tend to address many compartments of the whole system, rather than the system as a whole and the interaction of its parts.



The NRM challenges to be addressed through research are rather diverse. Inappropriate technologies and methodological approaches, organizational deficits, limited social capital and capacities are challenges to be dealt with at the local level. In the external environment, structural problems like policies, land tenure, institutional environment, information management, etc. need to be addressed. Depending on the challenge, different kinds of innovations are required: technical, social/organizational innovations and new methods and approaches. To most of these challenges, research can only contribute, but not deal with the entire development dimensions. The expected research outputs might be applicable at different geographical levels and be targeted to different users.

- ❑ **Revising the assumption of a functioning research-development continuum for scaling-up.** It is still widely assumed that the sharing of tasks within a linear research–development continuum functions and can be taken for granted. In reality, however, there are fewer and fewer cases and countries where this continuum is really functional. Alternative scaling-up strategies are still rare.

Research-development continuum



- ❑ **Use of participatory research beyond ‘downstream’ applications.** Participatory research is, to a large extent, considered as a means to improve the conventional technology development process. The role of research institutions as providers of solutions and expert knowledge for local people is rarely being challenged. The potential of facilitating longer-term participatory learning and action research while pursuing strategic research has hardly been explored.

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**Participatory Research and
Development for Sustainable
Agriculture and Natural Resource
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A Livelihood Systems Framework for Participatory Agricultural Research: The Case of UPWARD



While rootcrop agriculture is an important means of livelihood for the poor, it is only a part of the diverse portfolio of livelihood activities managed by farming households. Enhancing the contribution of rootcrops to sustainable livelihood of poor households is the overall goal of the Users' Perspectives with Agricultural Research and Development (UPWARD), an Asian participatory research network sponsored by the International Potato Center (CIP).

UPWARD's research and development (R&D) framework has evolved mainly through an inductive learning process, capitalizing on its cumulative field experiences since its launching in 1990. In particular, the development of UPWARD's R&D framework has been marked by three key "phases": thematic, integrated, and livelihood systems.

Thematic Framework

In its early years, UPWARD conducted intensive assessment and documentation to fill in critical knowledge gaps in rootcrop agricultural systems in Asia. This initial work also led to the identification of key thematic areas that UPWARD then chose to focus on. These were the following:

- ❑ **Production systems** - identifying and characterizing production systems typologies; assessing local management of rootcrop agriculture; strengthening local seed systems; improving management of crop nutrients, pest and diseases; and utilizing homegardens for food security

- ❑ **Genetic resources conservation** - documenting local germplasm and associated indigenous knowledge; conducting participatory varietal evaluation; and piloting community-based approaches to genetic resources conservation
- ❑ **Processing, marketing and consumption** - creating opportunities for adding value rootcrops; improving postharvest handling and storage; developing small-scale rootcrop processing enterprises; and promoting family food consumption and nutrition

UPWARD organized its activities based on this three-pronged R&D agenda. It launched field projects which focused on particular challenges under each of the identified thematic categories. As examples, there were projects on conserving local sweetpotato cultivars, evaluating soil conservation measures, and piloting starch processing technologies.

Integrated Framework

The initial thematic R&D framework proved to be useful in identifying and mobilizing interdisciplinary expertise in response to a particular problem. But in the course of working closely with users, it became increasingly clear that field-level challenges could not be neatly divided according to UPWARD's three thematic categories.

For instance, it was seen that farmers' interest to participate in season-long field schools on integrated pest management (production) was highly influenced by fluctuations in market prices for sweetpotato (marketing). Similarly, sustainability of community-managed genebanks (genetic resources conservation) hinged on whether the cultivars being conserved were perceived by local people to have any specific use-value (consumption).

These field experiences suggested the need for an integrated R&D framework that would take into account the links among production systems, genetic resources conservation, and processing-marketing-consumption. The R&D focus of UPWARD projects thus shifted from being theme-specific to integrated multi-thematic. While these integrated projects chose a particular theme/problem as R&D entry point, the expanded framework encouraged them to equally consider other constraints and issues related to the main problem being addressed. Examples were projects on varietal selection for sweetpotato pigfeed and promoting homegardens for biodiversity and household food security.

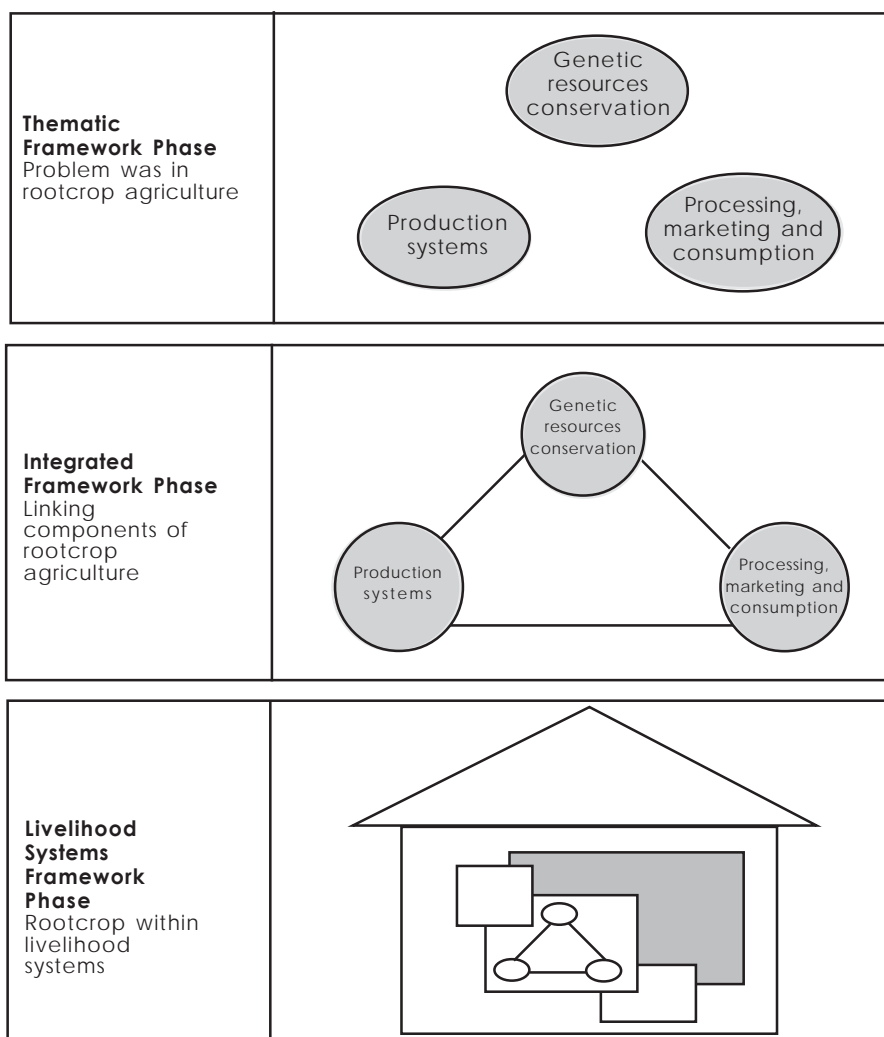
A Livelihood Systems Framework

An integrated R&D framework promoted a more holistic perspective of rootcrop agriculture, especially of the multiple problems faced by farmers. However, in seeking to assess R&D impact, UPWARD found it necessary to adequately capture the dynamics of household decision making and action, which an integrated but still mainly crop-focused framework was not likely able to adequately deal with. This has led to UPWARD's recognition of the relevance of livelihood systems.

Participatory assessments have sought to understand how households make decisions to adopt rootcrop technologies and to pursue rootcrop agriculture. However, rootcrops are only one aspect of the broader interests of households, as they invest limited resources in livelihood options which are expected to yield the most benefits. In other words, poor households take rootcrop agriculture as part of a livelihood diversification strategy for better risk management and income optimization.

Farmers across Asia have been seen, for instance, to shift from sweetpotato to other crops, and vice versa, in response to market demand and price trends. For rootcrop livelihood to remain an attractive option for households, it has to maintain its comparative advantage over on-farm and off-farm livelihoods. One route towards this end is helping poor households exploit value-adding opportunities from rootcrops.

Figure 1. Evolution of UPWARD's Program Framework



Livelihood Systems

Activities, assets (material and social resources), and access that jointly determine the living gained by an individual or household compose a livelihood. While livelihoods are generally associated with monetary or material rewards, poor people also use the concept to refer to less tangible benefits like a sense of greater social acceptance or of being more empowered.

A focus on livelihoods, as Farrington *et al.* (1999) explains, puts emphasis on:

- ❑ people and their activities
- ❑ the holistic nature of people's activities
- ❑ the links between the micro and macro

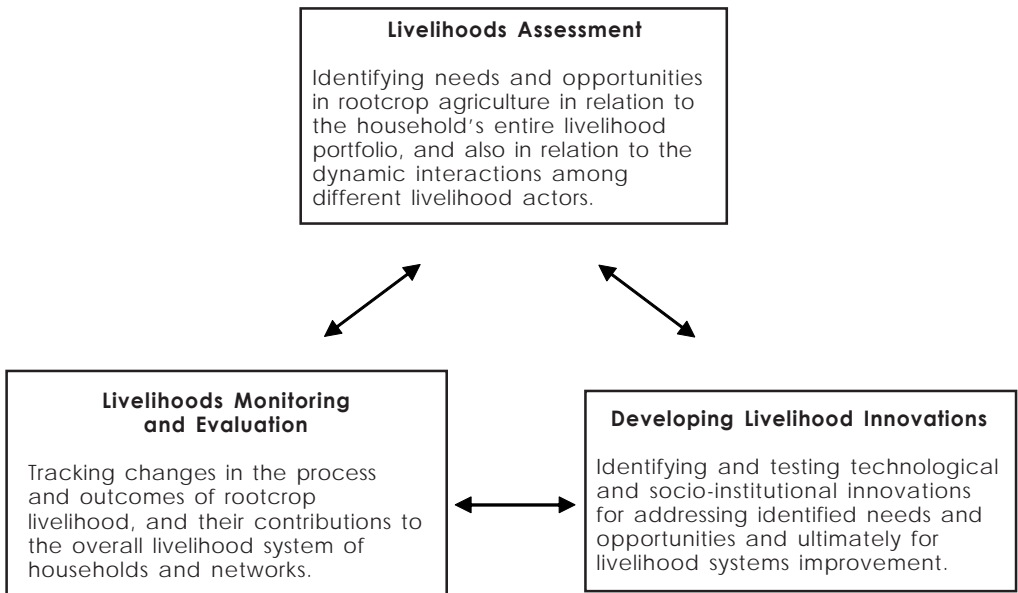
These core characteristics of livelihood systems framework support UPWARD's user participatory approach in at least three ways:

- ❑ assessing livelihood opportunities and constraints from the perspectives of users rather than from a strictly sectoral or disciplinary viewpoint
- ❑ promoting a broader context for agricultural R&D by considering rootcrop agriculture as only one of the many livelihood entry points
- ❑ recognizing the multiplicity of actors and factors that determine successful rootcrop livelihood and which people inevitably deal with

Generally, the concept of livelihood systems is applied at the household-level-- to identify portfolio of livelihood activities, to understand desired outcomes and goals, and/or to examine strategic management of household assets. A household-level livelihood systems framework is used for example in analyzing various on-farm, off-farm and non-farm livelihoods of individual farming households; as well as in inventorizing different types of livelihood capitals available to a household.

In addition, UPWARD has applied the concept at the level of livelihood networks-- to identify livelihood activities organized around a particular set of commodities, products and/or resources. This livelihood systems perspective helps examine structures, relationships and processes among interdependent livelihood clusters including individual households, enterprise groups and communities. UPWARD has used this in identifying livelihood activities and strategies associated with sweetpotato (e.g., crop production, input supply, marketing and processing). More importantly, it is a useful tool in mapping different actors forming a livelihood network (e.g., cultivators, traders, seed producers, processors, consumers) and in examining key relationships and processes.

Figure 2. Livelihood Systems Perspective in Participatory Research



A Case from Central Luzon, Philippines

Participatory Livelihood Systems Assessment

Sweetpotato is traditionally a post-rice crop in Central Luzon. Following a major volcanic eruption in the early 1990s, the crop has achieved greater livelihood importance for two main reasons: 1) the crop's ability to survive under marginal growing conditions compared to rice; and 2) increasing demand for the crop both by fresh roots markets and food processing industries. From 1990 to 2000, the area planted to sweetpotato increased over 125%.

Besides providing cash income, sweetpotato consumption helped households save on food costs and earn cash income to procure inputs for the subsequent rice crop. For households engaged in cattle raising, 30%-75% of animal production costs were reduced by using sweetpotato as feed. Moreover, on the average, sweetpotato livelihoods contributed 26% of total household income, estimated at an average of US\$780 annually. In Tarlac province, the contribution reached 43%. This is higher than the combined income contributions from off-farm and non-farm livelihoods of households in the same province.

Sweetpotato cultivating households, however, are only part of a broader sweetpotato livelihood system in Central Luzon. There were four main clusters of households and enterprises engaged in livelihoods associated with the crop: 1) producers of planting materials; 2) producers of sweetpotato roots; 3) traders of sweetpotato roots; and 4) processors and consumers. The trading cluster appears to be highly differentiated, consisting of six types of trading actors. A comparison of net incomes among the livelihood clusters revealed that traders earned the most

whereas farmer-cultivators earned the least. In Bataan province, farmers not only produced sweetpotato roots but also engaged in commercial production of planting materials, which is a significant source of additional 70% cash income.

Developing and Introducing Livelihood Innovations

UPWARD's better understanding of sweetpotato's niche in local livelihood systems has guided the planning and implementation of research and development projects, such as:

1. Community-based production of clean planting materials: establishment and operation of low-cost nethouses for commercial production of clean planting materials. Aside from becoming a major income-earning activity, it has also strengthened livelihood linkages between farmers who specialize in planting materials production and those engaged in sweetpotato cultivation.
2. Improved market orientation of local cropping systems: modifying the agricultural production calendar in order to harvest post-rice crops such as sweetpotato and vegetables when market prices are high. Participatory on-farm trials have been conducted to assess potentials for producing off-season crops, early maturing varieties and/or advancing the planting schedule.
3. Optimal use of local feed resources, including sweetpotato, for cattle raising: increasing the productivity of cattle production through year-round availability of good quality feed. Participatory trials and farmer training activities have been conducted to develop cattle feeding systems that utilize sweetpotato residues and other locally-available feed resources.

Livelihoods Monitoring and Evaluation

With a research and development perspective that locates “sweetpotato within livelihood systems”, UPWARD has also sought to apply a framework for assessing project outcomes that overcomes single-commodity impacts and attributions. The key evaluation question now becomes “What have been the key improvements in local livelihood systems and how has sweetpotato contributed to these?” Findings of such livelihoods monitoring and evaluation have included:

1. A more diversified agricultural livelihood portfolio, away from overdependence on rice as cash crop, has enabled farming households to better cope with environmental shocks and stresses. In Central Luzon, sweetpotato has effectively served as buffer crop when other livelihoods are threatened by agro-ecological and economic crises. Conversely, farming households turn to other livelihood crops when sweetpotato markets suffer from price fluctuations.

2. The value of a particular livelihood crop is not limited to its direct income contribution to the farming households. Besides providing cash income, sweetpotato has made multiple contributions to the overall livelihood system, e.g., enhancing soil productivity for the following rice crop, enabling farming households to make productive use of degraded land that would otherwise be unsuitable for other crops.
3. Increased profits and other economic benefits from agricultural livelihoods do not automatically bring about sustainable livelihood outcomes for the household such as poverty alleviation. In some cases, farming households re-invested net profit by acquiring physical assets for the farm. However, in other cases, surplus income was spent for recreational activities rather than to meet basic needs (e.g., food, education).

Learning to Manage Livelihoods

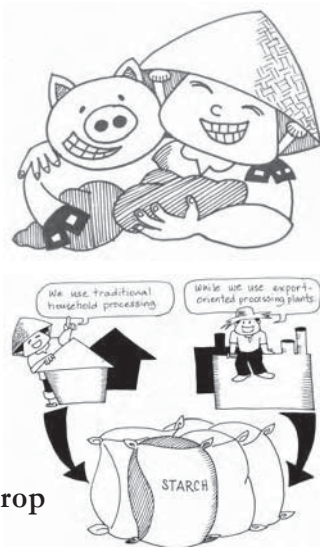
UPWARD'S field projects have increasingly explored and assessed the wide range of livelihood options offered by rootcrops. These project experiences have offered key insights:

- ❑ **There is a much wider range of livelihood options and high value-adding potentials from rootcrops than what is usually recognized.**

In the Philippines, urban home gardeners have experimented with snack food products from potato; in Indonesia, rural women are trying out sweetpotato flour in local bakery products; Vietnamese households are exploring increased use of sweetpotato for pigfeed.

Even one particular type of rootcrop livelihood can vary in terms of organization or level of operation. Sweetpotato starch, for example, is made through traditional household processing in Vietnam while in the Philippines, there are export-oriented starch processing plants.

- ❑ **The viability and sustainability of these rootcrop livelihoods are being threatened by emerging socioeconomic and agroecological constraints.**



In the Philippines, sweetpotato starch manufacturers compete with ordinary household consumers for fresh sweetpotato. They also face rising public concern over the environmental health impact of wastes and by-products.

In Nepal and China, potato is a staple food and cash crop especially among poor households in remote communities. Yet the inability of these households to effectively manage disease outbreaks is leading to declining quantity and quality of harvest.

- ❑ For rootcrops to make a greater contribution to overall household livelihood, it is necessary that an adequate support system is put in place. This may take the form of appropriate institutional arrangement, policy support, and favorable marketing environment.



To help determine the feasibility of tapping sweetpotato for pigfeed in Vietnam, it is necessary to assess the broader feed and pig marketing systems. In Indonesia, appropriate institutional set-ups and relevant program priorities of both government and non-government organizations (NGOs) are important for the scale-up of field schools on integrated crop management.

There are, however, key challenges in moving towards a livelihood systems orientation. First, adapting UPWARD's existing methods and tools to adequately address livelihood elements. Second, forging R&D alliances with different groups and institutions to be consistent with the framework's multi-sectoral and multi-level character. Third, acquiring new knowledge, attitude, and skills of project teams as they consciously pursue rootcrop R&D in the context of livelihood systems. Fourth, overcoming tendencies to lose program focus by keeping in mind that UPWARD's interest in livelihood systems is primarily to put rootcrop R&D in a wider, locally-relevant context.

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Challenges of Participatory Natural Resource Management Research



Participatory natural resource management research emphasizes the importance of **multiple stakeholder analysis and involvement**. Increasing concerns about the (mis)management of the natural resource base stimulated the development of such an approach in which both ecological and sociological aspects of resource dynamics are often addressed more at an aggregated level, such as, for example, a micro watershed, a watershed, a rangeland or a (community) forest. It allows dealing more systematically with the dynamic and often complex interactions among components of a natural resources system or a production system (e.g., farming, fishing, forestry, herding, collecting edibles).

Stakeholder involvement refers to the **active and meaningful participation** of small farmers, large farmers, entrepreneurs, local authorities, local groups, non-government organization (NGO) staff and policymakers at different levels who together analyze problems and define research and development initiatives and work towards reconciling conflicting or diverging points of views and interests. In particular, the active involvement of NGOs, local governments, grassroots groups and farmers/herders/fishers associations is now a feature in many participatory natural resource management research projects. This joining of forces and learning from each other is called collective action. It stands at the heart of this new approach.

Local Perceptions and Action

Participatory (action) research emerged to make science respond more directly to the ideas and needs of those people most affected by poverty, oppression and resource degradation. Foremost, the aim of a participatory research and development approach is to learn from the women and men living in the rugged mountainous areas, desert margins, stressed coastal basins or other “marginal” areas who are struggling to make a living under often very difficult conditions. The **key questions** that this kind of research is trying to answer are: How these women and men perceive what is happening in their community, watershed or region? And, how can they use action research processes as a resource to create more space to manoeuvre?

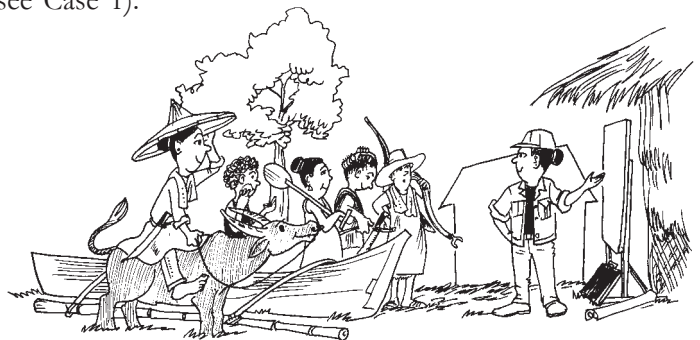
The challenge then is to do research that facilitates both a better understanding of the complexities of social life and a sound(er) base for action. At the heart of this approach is a collective effort by professional researchers and non-professional researchers:

- 1) To set research priorities and identify key problems, issues and opportunities.
- 2) To analyze the causes that lead to these problems, issues and opportunities.
- 3) To take actions to find both short-term and long-term solutions for the identified problems, and to make use of opportunities.
- 4) To learn from these actions and make changes as needed.

It is expected that such an approach will have a positive impact on effectiveness: an increased use and acceptability of research results; on efficiency: making better use of resources/reduce costs of project execution and delivery of results; and on capacity: the ability to do research through increased conceptual and methodological expertise (see Case 1).

Transformative Learning

This approach is guided by what is called **transformative learning**. In this approach, learners together build a more integrated or inclusive perspective of the world. Through the learning process, they jointly transform some part of their world view, for example, their understanding of social relations in their own community forest. Manifestations of transformative learning in resource management include, for example, new values or patterns of decision-making that farmers generate and apply outside the immediate arena of the learning intervention. This approach to learning has linkages to the people-centered, emancipatory research approaches, such as participatory action research. This approach to research, ideally, integrates knowledge sharing, systematic inquiry and human interpretations of the world. Moreover, it intentionally and consciously *activates* the ‘praxis’ (i.e., practice informed by theory) as a means of (self)-empowerment of marginalized people and improvements in human systems.



Case 1: Collective Watershed Management in Nicaragua

Since 1997, in the central hillsides of Nicaragua, the International Center for Tropical Agriculture (CIAT) has been working with a number of organizations (universities, NGOs and government) on the sustainable management of the natural resource base in the Calico river watershed. The “Hillsides” project employs a collaborative participatory research methodology including natural resource mapping, an analysis and monitoring method developed by the team in Nicaragua. The research addresses questions such as: What is happening and according to whom with the natural resource base at the micro-watershed level? What are the main problems, (research) gaps and opportunities related to the use and management of land, water, flora and fauna?

The multi-tool method is based on the hypothesis that the micro-watershed level is a conceptually and practically useful scale at which to work. This was considered to be the case because it represents a space where resource flows and dynamics (e.g., soil erosion, pests, water pollution) interact continuously and visibly with socio-economic relationships, such as land, tree and water tenure and access relationships, with labor-exchange ties and with local rules and arrangements that have been established over decades.

The research team worked with carefully selected small groups of local key informants in each of the 15 micro-watersheds. These informants included farmers, local *técnicos* from the various NGOs, *promotores* (from the NGOs and grassroots associations) and assistant mayors better known as *alcalditos*. As much as possible, the research included diverse local people – i.e., women and men, the politically influential and the marginalized, and both landowners and the landless. Despite these efforts, male informants were ultimately in the majority, as it proved difficult to find women who were able or willing to spend a whole day with the project. As a result, researchers also made efforts to capture a gendered perspective through interviews on other occasions, and the involvement of women from the local farmer research groups (known in Spanish as CIALs).



Integrating Planning and Implementation Across Levels

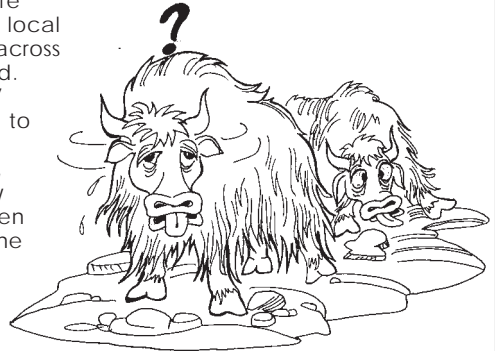
The ultimate goal in developing more sustainable resource management practices is to meaningfully and usefully **integrate** planning and implementation efforts from the smallest management level (farm, or range, or fishing area) to higher levels, such as a micro-watershed, a watershed, or eco-region. This requires exploring if and how to bring together the direct users of the resources who are living and/or working at the smallest management level. However, outside or external (often indirect) users of the resources may also exist, and efforts will need to be made to likewise involve them in planning efforts. They may have different interests compared to the users living at the local or community level; this would require bridging or negotiating internal versus external interests. Therefore, integration and working together towards common goals are important in the research management and organizing processes. One particular form of this is co-management. Co-management is the sharing of authority and responsibility among government and stakeholders, a decentralized approach to decision-making that involves user groups as consultants, advisors, or co-equal decision-makers with government (see Case 2).

Case 2: Towards Grassland Co-management in Mongolia

In Mongolia, grasslands and steppes are currently home to over 25 million head of livestock and 192,000 herding families. Nomadic livestock producers are the backbone of the economy. Livestock production accounted for over a third of gross domestic product (GDP) in 2000 and employed almost half of the country's labor force. More than these numbers can indicate, herding is a way of *life* rooted in the country's long history. However, nomadic herders in most regions are facing very serious grassland degradation problems that have been aggravated by three consecutive extremely severe winters (2001-2003). Addressing these problems not only requires dealing with the biophysical and social dynamics of natural resource management, but also unlearning "Soviet-style rule" and responding to "the economic and political opening up" that the government has been promoting since 1992.

A multi-disciplinary project team, housed in the Ministry of Nature and the Environment, is addressing this challenge through a combination of participatory and multidisciplinary field research in three of the major ecosystems. Methods include participatory rural appraisal, social and gender analysis, and participatory monitoring and evaluation. The team is also directly involved in national policy-making including the drafting of new laws. Two innovative and crucial activities have been the formation of community herder groups supportive of traditional systems and the establishment of pasture co-management teams involving herder or community groups, local government and civil society members. The team's continuous, diversified and multi-level capacity building efforts supportive of a participatory action agenda, are resulting in new thinking and doing, and providing space for active and meaningful roles for herders and government officials alike.

Field research and insights gained from conversations amongst government officials and herders make it clear that pasture degradation is very serious and widespread: local carrying capacities – they differ significantly across mountain ranges and valleys – are exceeded. Most herder groups graze too many animals/animal units per hectare. This problem needs to be seen in context: in Mongolia the pastures are still used in common, there are no fences, and most herders move four times/year. They are also dependant on the government given that the State owns the land. There is only one way out of this problem: collective reflection and action with the involvement of all stakeholders.



The project team is trying out a series of experiments in collective action. Among these are:

- The formation of genuine *bag* or sub-district level herder (interest) "community groups," based on kinships or neighborhood relations as the basic units of social organization. Currently, more than 15 community or herder groups exist in the project study area, with about 13 to 32 herding families in each group, and new groups are also being formed. Herders living in the same area (watershed, mountain) join one community. Each is considered relatively homogeneous, economically (they live and herd together in one camp), socially (they are neighboring households), or ecologically (they herd in the same watershed or mountain valley).
- The formation of *sum* or district level co-management teams, involving the sum governor, bag governors and other community leaders. These teams discuss and define roles and responsibilities of both the herders and the various government bodies, as stakeholders or co-management parties. Once consensus is reached, so-called Co-management Agreements are written up and signed by all parties. These Agreements include guidelines for herding movements, monitoring mechanisms, and ways to settle disputes or conflicts.
- Women are forming groups to find alternatives responding to some of their interests, particularly, to increase incomes.

Case 2: Towards Grassland Co-management in Mongolia ... *continued*

The team, together with herders, are also carrying out other experiments. Small community funds are made available to support these experiments. These include:

- Animal breeding to improve resilience, and productivity.
- Joint hay making, pasture improvement, and pasture rotation practices.
- Introducing new economic opportunities such as value-adding to raw materials (e.g., felt and wool), and vegetable growing (e.g., potatoes).

All these experiments provide the opportunity to defining locally appropriate, new common rules and regulations. Encouragingly, more and more herders are showing interest to join these groups or to form new groups. However, legal issues remain an issue. The team is now considering to further strengthening this work, expanding the number of herder co-management groups and ensuring good participatory monitoring of the efforts. This will require training local facilitators/researchers who could respond to the growing interest of herders to connect with the process. Considering equity, the team aims to pay more attention and dedicate resources to women and women's groups, and to their involvement in the project and process of change at large.

Community-Based Natural Resource Management

Often, problems related to the sustainable management of natural resources are most critical in fragile agro-ecosystems such as mountainous or uplands areas, dry steppes and coastal zones. Here, natural resource degradation can lead to irreversible loss in food systems and the breakdown of ecosystems with loss of habitat. A widespread force influencing these processes is the privatization by elites of natural resources such as forests, wetlands and rangelands which were previously collectively managed. Privatization may lead to productivity increases in some situations, but frequently it also increases poverty because poor people (often women) who previously had access to these resources are now excluded.

While circumstances differ in different countries, there is a striking convergence of interest in questions of governance decentralization and local resource management. Structural adjustment in some countries is leading to reductions in the technical and enforcement capability of the State. In others, major policy transitions are affecting all aspects of government interventions in the economy also leading to more local control and management of natural resources. External pressures due to expanding trade and investment, and large-scale development projects in parts of the region previously isolated from international markets, are also having a dramatic effect on local resources use with large companies being the only winners in many cases. Local governments and grassroots organizations are at the same time becoming more assertive and articulate in their identification of resource questions -including the expression of *their* views and interests.

“Traditional” policies and research have often discounted the role of local people in designing and implementing measures, projects and programs. Community-based natural resource management (CBNRM) proposes an alternative approach. In a CBNRM approach, researchers work with the local men and women most directly involved with natural resource management. Often they are the poorest of the rural poor or belong to ethnic minorities which are politically and

economically isolated. Such an approach recognizes that these men and women may have intimate knowledge of the local resource base, that they may have (countervailing) views on resource use and management, and that they are motivated to improve productivity if they can be assured of receiving benefits.

A central feature of CBNRM is that it focuses on the systematic integration of expertise in the natural sciences with social science perspectives on the interplay of community decision-making processes and supra-local institutional forces and contexts (see Case 3).

Case 3: IDRC's CBNRM Program Initiative

The International Development Research Center's CBNRM program initiative (<http://www.idrc.ca/cbnrm>) has been operational since 1997. The program supports a variety of projects and research organizations (including NGOs, universities, and government agencies) in Asia. Given that Asia is a very large and heterogeneous region, the program focuses its resources on the poorest countries, and on some of the poorer regions of the larger countries (i.e., the Philippines, Vietnam, Laos, Cambodia, South-west China). Considerable efforts go into strengthening institutional capabilities and academic skills in the social sciences given the dearth of expertise in this field. Research efforts examine how biophysical and social forces interact, how productivity enhancements can be achieved without resource degradation, and how local management and organizational capacities to manage resources sustainably and equitably can be strengthened. CBNRM projects consider such issues, research questions and actions as:

- The nature and dynamics of indigenous or local environmental knowledge generation, experimentation processes and strategies for livelihood security: How to analyze and assess such processes? How to account for gender and social differentiation? How to build on local people's experimentation and adaptation efforts? How to gain (more) recognition for these efforts? How to provide incentives for local innovation?
- Social heterogeneity, stakeholder analysis and conflicts: How to analyze the realities of social heterogeneity which often exist at local levels? How effective are stakeholder-based approaches? How to better understand and deal with conflicts? How to foster participatory processes for a better understanding of diverging viewpoints and interests? How to strengthen collective action (e.g., co-management)?
- Governance, policy-making and the roles of government: How to analyze, inform, support and experiment with new policy making processes? How to more meaningfully and effectively link citizens to policymakers? How to contribute to a dialogue about the legitimate and supportive roles for governments in resource governance and management? What policies lead to efficient, equitable, and sustainable natural resources systems? What policies are supportive of the livelihoods of the rural poor?
- Micro-macro interactions and interdependencies: How to properly analyze, reshape and monitor the interactions between the micro and macro levels?
- Culture, perceptions, meanings and institutions: How do values, norms, rules and regulations impact on resource access, use and management? How do struggles over meaning take place?



Insights from the Field

Research experiences from the above mentioned cases and others are accumulating. They have allowed the identification of a number of CBNRM research action principles. They are presented here as food for thought:

- ❑ Building and involving local organizations is a means of changing the ways in which local groups interact with each other and with the broader society. This is aimed at amplifying the range of options of the less privileged, enhancing their involvement in policy making, providing space for more people to make their voices heard and for improving the quality of their participation.
- ❑ Natural resources are often used by a variety of direct and indirect users with different and sometimes opposing or conflicting views and interests. This is particularly true in the highly agroecologically diverse, complex and fragile environments such as can be found in the hillsides of Central America, illustrated by the Nicaraguan case, or by the Mongolian grasslands. To begin building and organizing for sustainable management, we must therefore identify these different “voices” and be aware of the differentiated responses of people to change.
- ❑ Action research can contribute to the creation of “fora” for analysis, discussion, and negotiation where ideas can be exchanged and (new) initiatives planned, such as the community groups and co-management teams in Mongolia. This is why it is important to create (new) opportunities for meaningful participation. The building of trust is essential, but may take time and patience. These processes of organizing often imply struggles over the definition of (new) rules and norms.
- ❑ Local-level monitoring of resource use is required to ensure compliance and regulation. To achieve better resource management practices through cooperative actions, rules and sanctions, local people and those cooperating with them must have a good understanding of the resource dynamics, e.g., soil dynamics, nutrient flow and water cycles. Monitoring will help raise awareness among local decision makers about the interdependencies of resources and, if carried out collectively, can easily create ownership, skills, confidence and credibility. Both the Nicaragua and Mongolia cases are good examples of this.
- ❑ Building linkages between local communities and the level of national institutions and policymakers can help local actors exert a demand for services and influence policy agendas. This includes the integration of government into the local planning process so that interests and concerns are taken into account, and the sourcing of technical assistance and expertise transfer.

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**Participatory Research and
Development for Sustainable
Agriculture and Natural Resource
Management: A Sourcebook**

Research Through Action with Nomadic Pastoralists in Iran



The geo-climatic characteristics of Iran contributed to the country's suitability for pastoralism more than crop cultivation, particularly in the Zagros and Alborz mountains of the central plateau. History illustrates that nomadic pastoralists have been the main users of these resources, from times which probably preceded any settlement by sedentary people (Lambton, 1953).

The nomadic pastoralists had been able to achieve some sort of "balance" between their environment and their economy through a long-time co-adaptation. But this has changed over the recent decades as nomads are now being held liable for the significant degradation of the rangelands, over which they migrate with their livestock. Efforts to improve the natural resource status of rangelands have traditionally been attempted through the use of technology transfer and centralized top-down planning.

Natural resource degradation seems to be the most important and growing concern, and this has not been addressed by resource redistribution, technological and conservation strategies.

Key Issues in Nomadic Pastoralism

1. Nomadism is responsible for the degradation of the natural resource base. Extensive soil areas erode due to over-grazing. Yet, roughly 1/3 of the total area of Iran (164 million ha) is unusable for any purpose other than pastoralism. There are very limited productive options for this land in a way which will benefit the national economy.
2. The utilization of the rangelands by nomadic pastoralists is characterized by low levels of productivity. Although they represent only a small proportion of the population, even in rural areas, the nomads are the main breeders of indigenous species of livestock in Iran. They provide the breeding stock for the rest of the livestock industry in the country, including large-scale commercial livestock enterprises.
3. Poverty and low levels of social welfare among the nomadic peoples are causes for significant concern to government agencies committed to matters of equity and social justice. But while a large proportion of the nomadic population now wish to improve their own welfare through settlement, the government does not enthusiastically support such a strategy for a number of different reasons including those above.
4. There is an increasing national concern about the deterioration of the diverse cultural identity and heritage of the nomads, yet equally, with their capacity for independent action, there are concerns that the nomads pose potential problems of control by the government.



The relatively limited achievements in nomadic development and natural resource conservation stem from the fact that policies are based on a reductionist viewpoint and analysis, which separates theory from practice, and neglects the diversity, complexity and recursiveness of the different dimensions of nomadic life. These policies are also developed on the basis of government perceptions of the nature of the issues confronting nomads rather than on the basis of shared concerns with the nomads themselves.

The current approach to development activities needs to shift from conventional empiricism, with its linear logic and power relationships, to models which endeavor to establish systemic and mutual recognition and accommodation of change among "clients" and the researcher as facilitator.

Research Process

Three phases of inquiry characterized a "research through action" effort of the researcher in Iran, which when taken altogether, represent what might be termed a "system of participatory methodologies".

Aim of Participatory Methodologies for Each of the Three Phases

- **First Phase** - explore the complexity and diversity among current problematic situations
- **Second Phase** - assist both nomads and different government agencies in understanding each others' perspectives and go beyond the "symptom" and to find common issues/goals
- **Third Phase** - facilitate organizational change within the Forest and Rangeland Department

Phase 1: Ethnographic Exploration

The first phase of the research comprised an ethnographic study of the Bonkoh as a "human activity system" (Checkland, 1981). The question involved what the nomads themselves perceived as the threats to their welfare and cohesion as a purposeful group of nomadic pastoralists.

The Bonkoh is territorially identifiable and acts as a "system" for purposes of environmental management both in summer and winter quarters. Secondly, it acts, for a number of other purposes, as a cohesive group, providing a basis for collective action, even if the higher level of tribal organization does not function any more (Emadi *et al.*, 1992).

Critical reflections on this phase of the research from the researcher-as-participant/observer confirmed the following:

- ❑ the complexity of the current situation as perceived by the nomads themselves
- ❑ the unease of the nomads at their present situation
- ❑ the lack of any signs of improvement in future trends as they saw them
- ❑ an essential need for a mutual understanding between government officials and the nomads.

Without the necessary changes, the Bonkoh believe their circumstances were "not improvable".

Phase 2: Assisting Nomads and Government Agencies Understand Each Others' Perspectives

The perceived "non-resolution" of the issues between government agencies and the nomads suggested the need for an approach grounded in a context of "Research through Action for Development".

In the action-oriented approach to research, the researcher was extremely conscious of the two quite different "traditions" which characterize it. As Brown and Tandon (1983) have pointed out, one can recognize profound differences between what he has termed the "northern tradition" of action research (AR) - with its emphasis on organizational change through problem solving - and the "southern tradition" of participatory action research (PAR) - which has been developed in the context of the "empowerment of disempowered communities" of the so-called Third World.

At first glance, each of these two approaches would seem to have relevance in the present context. The "northern" tradition is perfectly relevant for exploring changes in the organization of government agencies to more closely fit the self-espoused needs of the nomads. The "southern" tradition, on the other hand, is highly appropriate to the nomadic communities in their search for greater empowerment and their participation in the planning and decision-making processes.

The researcher chose an approach which combined both mechanisms: adopting a more or less conventional AR approach to work with agents from relevant government departments who in turn, practiced a PAR approach to encourage much greater participation of the nomads in the quest for "improvements in their situations". Thus, action research teams were formed comprising of local officers of different government departments concerned with nomadic issues. The researcher served as facilitator.

| Tasks of the Research Action Team | |
|-----------------------------------|--|
| <input type="checkbox"/> | understand the general situation of the nomads in terms of various issues |
| <input type="checkbox"/> | explore the nomads' views about their situation and their main concerns, interests and issues |
| <input type="checkbox"/> | discover, with the nomads, possibilities for improvement in the provision of government services |

Collective reflection on, and explanation of, the social context led to an environment in which all participants were able to look at the situation in the same social context. When the officers had conceptualized their findings, theoretical discussion was introduced to inform their findings and practice.

At this time, some nomads were invited to share their views and perspectives on the various projects with the government officers. This was an attempt to seek the views and perspectives of the nomads on the situation. When their logic was interpreted and contextualized by the facilitator, the participants became more familiar of the nomads' indigenous knowledge and its importance in the process of decision-making for change and development. The nomads were able to see and understand outcomes of various projects while they were in the planning stages.

Regular group discussions among team members were conducted as a means of collective reflection on daily personal observations and the organizational perspectives of each member. The role of the facilitator was to establish an environment for negotiation between participants and at the same time create an opportunity for all to see the situation in a different way, in a broader and longer term framework considering different viewpoints.



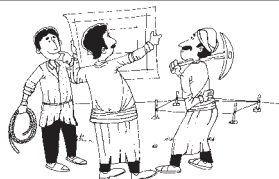
Creating and maintaining a learning environment among all members was the most crucial task. Appreciation and respect for the personal, professional and organizational perspectives of others and, more importantly, keeping in mind the nomads and their perspectives in the discussions of the daily observations and activities, were the major elements in the process of learning. The action face of the research included "actions to broaden the perceptions of the government agents" as well as "actions to practice novel participative researching approaches". Taking a wider perspective, rather than a purely organizational one, and focusing on Bonkoh, enable them see the effects of various organizational strategies and their inappropriateness within the social context and nomads' needs.

Summary of the Regular Meetings and Discussions Between the Nomads and the Government

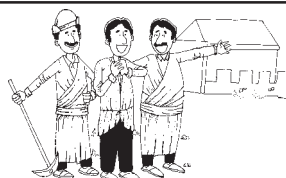
1. equalizing the context and facilitating interaction for effective communication between team members and nomads



2. facilitating a learning environment in which all participants were informed and could consider other perspectives that were presented



3. exploring the possibilities and facilitating the processes to improve the situation



During each session, the whole process was reviewed from the meta-level to see "what we learned" and "how we learned" (Bawden, 1990). Combining social practice and research (action research), introducing learning from experience (experiential learning), and systems thinking, were very unfamiliar activities to all participants at the early stages of this research. On many occasions they were very uneasy with the situation and the new way of thinking and viewing situations.

What came as a surprise was discovering the unique possibilities to improve the situation for all the members of Ghareghani and the action research team to improve the situation without any fundamental investment or transfer of technology.

Among the outcomes of this (second) phase of the research were clear agreement within the action research teams of the failure of their conventional approaches to the "problems with the nomads", and the particular transformation of that worldview into one more accurately portrayed as the "problems being faced by the nomads" (including that of the perceived failure of achieving any sense of shared meanings between the nomads and the government agents).

Phase 3: Facilitating Organizational Change Within the Government Agencies

Reflection on the outcomes of the second phase of the research showed that changes in the attitudes and beliefs of practitioners to "see things the other way around" are very crucial. To start and maintain these crucial changes in attitudes of practitioners and specialist toward people and resources needed new strategies for institutional change and action research in organizations for "learning to learn, and learning to help in participatory ways".

The reasons mentioned above, on one hand, and the need for up-scaling the outcomes of the research on the other hand, led to an intensive workshop for officers from the Forest and Range Organization (FRO). Learning process and the learning strategies behind this phase of research could be summarized as follows:

- ❑ creating a critical learning environment
- ❑ collective reflection on past experience and current problems
- ❑ assisting the participants to see their views toward the problematic situation from a meta-level
- ❑ introducing systems thinking as a new way of looking at the situation
- ❑ supporting participants in creating a new strategic plan for the next action
- ❑ reviewing and evaluation of the whole process as a new way of monitoring, planning, researching and learning

The program of the workshop was carefully designed by the facilitators to meet the proposed goals and follow the theoretical position and the learning strategies. The major learning themes of the workshop focused on three different areas:

- ❑ fundamentals of experiential learning
- ❑ systems thinking
- ❑ people's participation in natural resource co-management

The workshop was designed for 13 working days in such a way that the four major learning tasks complemented each other to maintain a continuous process of action and reflection. At the end of each task and, after personal questions and comments of participants, a group discussion was conducted to facilitate group reflection on the content and process of the workshop.

The Learning Process was Facilitated Through Four Learning Tasks

- ❑ group discussions and team work
- ❑ propositional inputs including lectures and learning packages
- ❑ field trips
- ❑ personal reflection on the process through preparation of a paper by each participant

The essential metaphor introduced during this workshop, was that of the organization as a learning system as distinct from a regulating system. During the workshop, there was a difference in perception about local people and their role in natural resource destruction. But this has shifted toward recognizing the impact of social issues on ecology.

Due to the tremendous diversity of personal, professional and organizational backgrounds of participants, there were significant clashes about ways of looking and conceptualizing the experience and collected data. What made these clashes fruitful to all participants was the applied methodology which considered this diversity of viewpoints. Considering the same reality from different angles and perspectives helped all participants to move from their strict discipline toward multidisciplinary perspectives to an interdisciplinary approach to analyzing the situation. Evaluations confirmed that most of the participants found the inputs and lectures of invited academics and researchers irrelevant to their current complex and changing issues.

Feedback from the participants confirmed that there had been significant transformations in ways of thinking about the complex relationships between nomads in Iran, the environments in which they live and work, the technologies that they use as pastoralists, the agents of government departments concerned with these aspects of sustainable development, and Iranian society at large.

The outcomes of this phase showed that there will need to be some significant changes in the way we go about our "seeing" and our "doing" if we are to improve on current, apparently intractable complex situations within the organization as a learning system.

Conclusion

It would have been quite unrealistic, given the limits of these particular projects, to have expected major and permanent changes in the way the complex issues of nomadic pastoralism in Iran are approached by the various stakeholders involved. Yet, there was evidence provided that the methodologies used in the course of these inquiries have a potential to empower the nomadic pastoralists for sustainable development the integrity of their rangeland environment.

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**Participatory Research and
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Action Research as a Strategy for Advancing Community-Based Natural Resource Management



This paper presents a perspective on the use of action research to manage natural resources at the community level.

Conventional natural resource management (NRM) may involve some local participation but decision-making is heavily biased toward expertise and power by centralized NRM agencies and staff; by contrast, effective community-based natural resource management (CBNRM) places strong emphasis on community-level institutions for managing natural resources, usually involving co-management arrangements with NRM authorities but with decision-making biased toward local expertise. The advantages of CBNRM are increasingly recognized for situations where local people have strong interests in sustaining natural resources. However, achieving a shift from conventional NRM to CBNRM will require new knowledge, significant institutional changes, and especially, new roles and capacities by many different stakeholders in NRM and CBNRM.

Research can and should play a lead role in improving NRM, including the development of CBNRM. The challenge in NRM and especially in CBNRM is to achieve appropriate research. Conventions in research usually pose a problem for achieving appropriate research for NRM and especially for CBNRM. To understand this, one needs to examine what is meant by research, and to consider how to adapt research to ensure its appropriateness and relevance.

What is Research?

- ❑ Research is usually understood as a linear process:

START



STOP

- o problem and hypothesis definition
- o data collection and analysis
- o conclusions and recommendations
- o optional: knowledge transfer to user(s)

- ❑ Research is usually conducted by researchers - experts who are trained in research methods, and who usually bear a professional title or designation as a 'researcher.'
- ❑ Research is often conceived as requiring 'uninvolved objectivity' wherein the researcher is external to the subject/system being studied.

In this conception of research, the research output (new knowledge) is usually transferred to practitioners, usually through extension.



In this conventional type of research, practitioners may be the subjects of the study but they are not involved in actually conducting the research (except sometimes as data collectors).

- ❑ Researchers expect the research output to be used or adopted by practitioners.

| Conventional Research | |
|---|--|
| Works when... | Does not work when... |
| 1. Subjects/systems are relatively simple: <ul style="list-style-type: none"> ❑ a single type of knowledge is adequate (typically, within a 'sector' or 'discipline') ❑ when causality is linear. 2. Subjects/systems can be 'bounded' (and hence, research can be 'controlled') 3. Researchers are separate from the subject/system 4. New knowledge can be transferred, used, and applied with relative efficiency by practitioners | 1. Subjects/systems are complex: <ul style="list-style-type: none"> ❑ Multiple types of knowledge are needed such as multiple 'sectors' or 'disciplines' ❑ When causality has 'feedback' effects and is not linear 2. Subjects/systems cannot be easily 'bounded' (and hence research cannot be "controlled") 3. Researchers are not separate from the subject/system 4. New knowledge cannot be used and applied with relative efficiency |

Research for NRM

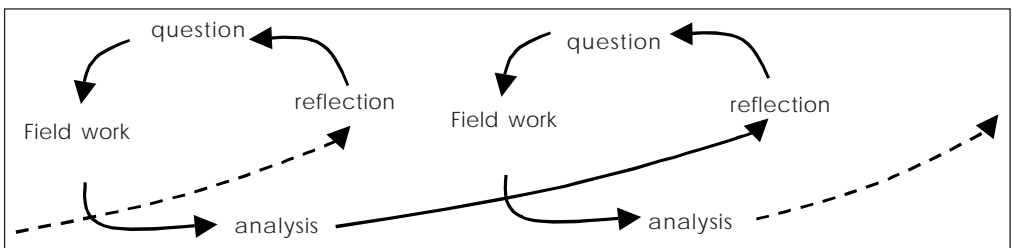
A number of key characteristics of natural resource systems and NRM need to be recognized in terms of their implications for effective and appropriate research.

1. NRM involves understanding and managing complex systems that interact with other complex systems.
 - ❑ **Ecosystems.** Natural resources rarely if ever exist in isolation; they usually exist in ecosystems that have complex bio-physical patterns and processes across space and time.
 - ❑ **Social and economic systems.** Natural resources exist in human systems that determine their value and use. Influencing the use of natural resources requires shaping the complex values and relationships of human cultures and economies as they relate to natural resources.
 - ❑ **Policy and institutional systems.** Natural resources exist in the political relations that reflect power and decision-making in societies, usually involving complex relationships of cooperation, competition, and conflict over natural resources at local, national, and often international levels.

NRM involves understanding and managing what could be termed multi-dimensional complex systems.

2. To adequately address these complexities, NRM requires multiple types of knowledge and expertise, and research needs to 'capture' and integrate these into new knowledge.
3. In complex systems, causality has 'feedback' effects ('non-linear' relationships). NRM research needs to be characterized by spiraling cycles, rather than as linear causality.

Figure 1. Research as Spiraling Cycles.



4. NRM systems cannot be rigidly 'bounded' for study, in terms of sectors or disciplines, space (physical dimensions), or time. NRM research needs to cope effectively with indefinite and/or changing boundaries.

5. Researchers engaged in NRM research are interactive parts of the NRM system. They do not have 'uninvolved objectivity.'

For example, the 'sector', 'discipline', and institutional position/relationship of a researcher introduce 'bias' into the NRM system and process which is impossible to exclude. So research and researchers need to be recognized and understood as part of and influencing the 'NRM system', not as external to it. The integration and interaction of researchers as active and engaged as part of the NRM system has major implications for researchers' roles and capacities (knowledge, skills and attitudes) relative to roles and capacities associated with conventional research.

6. For NRM research to be worthwhile, the research output (new knowledge) needs to be used and applied with relative efficiency by practitioners. New knowledge needs to reach many different actors and stakeholders efficiently -- and in ways that they can use the knowledge and benefit from it. This implies that the conventional research-extension model will not be effective.

Action Research for NRM

Action research differs from conventional research in a number of ways that make action research more appropriate and effective for natural resource management.

Action research engages NRM practitioners in studying their own problems and practices to improve their own decisions and actions. In action research:

- ❑ those involved in "the problem" are involved in doing the research aimed at solving the problem
- ❑ the approach to research is based on practitioners trying out ideas in practice as a means of increasing knowledge about and/or improving practices

The long-term objective of action research in NRM is sustainable resource management. This requires strategies, mechanisms and capacities for effective multi-stakeholder participation in NRM. Effective multi-stakeholder participation in NRM involves:

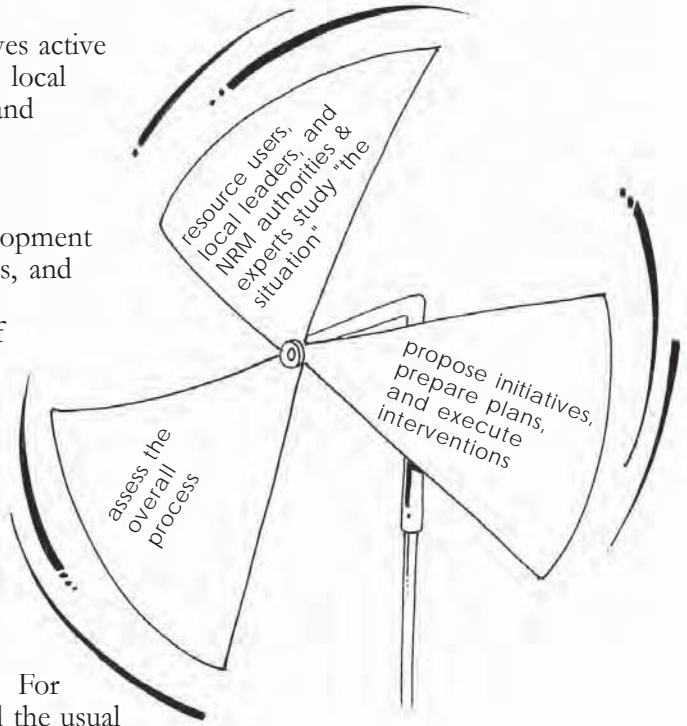
- ❑ enabling effective communication among stakeholders
- ❑ fair sharing of benefits and reconciling conflicts between stakeholders



Therefore, a critical first step in getting to the longer-term objective is to undertake action research aimed at identifying and testing options for enabling effective communication, fair sharing of benefits, and reconciling conflicts among stakeholders.

In NRM, action research involves active participation of resource users, local leaders, and NRM authorities and experts, who together:

- ❑ study "the situation"
- ❑ propose possible development initiatives, prepare plans, and execute interventions
- ❑ assess the outcomes of interventions and the overall process, to learn how "the situation" has changed, and to identify further possible improvements



Action research is a dynamic approach to research for NRM. For researchers, it goes well beyond the usual 'technical' aspects of NRM, into social, institutional and policy dimensions. It engages researchers in 'real world' problems. For authorities, extensionists and local leaders, action research moves beyond the shortcomings of "recipe" approaches to NRM, into an approach that is site-based and locally adapted. Action research involves new roles and relationships, develops new capacities and works collectively in search for better answers.

How Does Action Research Relate to CBNRM?

Engaging effectively and efficiently with local people usually requires engaging with local communities. In many NRM situations, local communities are an important social framework that influences how local people:

- ❑ use resources in their livelihoods and settlements
- ❑ regulate resource use and invest in resources for the future
- ❑ resolve conflicts arising from competing claims for resources
- ❑ relate to other communities and to authorities



Community relationships, institutions, and authority for regulating local use of natural resources are an essential part of NRM and any NRM strategy that fails to positively engage communities will be ineffective. Strengthening community-level capacities for NRM is a key strategy for improving NRM. Action research for NRM, therefore, needs to engage with local people through local communities.

CBNRM is committed to community empowerment. It believes that communities, acting in their collective interest, can and will manage natural resources sustainably. CBNRM also recognizes that government has a crucial role in creating the conditions that make NRM possible, including CBNRM. This perspective differs, however, from the assumption that the role of government in NRM is to directly manage resources, or to use communities as a 'tool' for NRM.

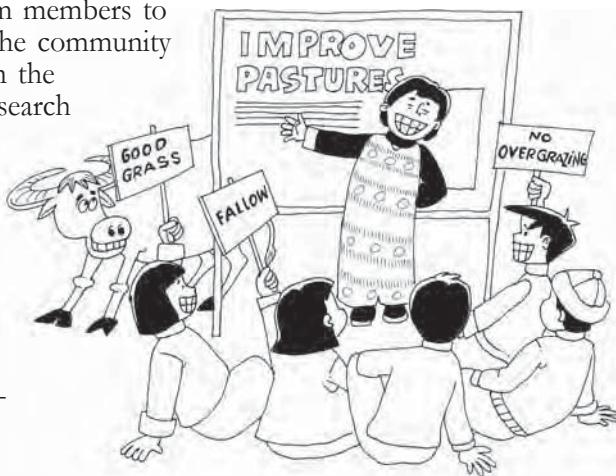
To invest in CBNRM, a community requires:

- ❑ an interest in the natural resource that extends into the future
- ❑ a perception that investment is necessary to ensure future resource supply
- ❑ assurance that it will be able to obtain resource benefits (tenure), at a level adequate to justify its investment in CBNRM
- ❑ capacities to undertake NRM (including organizational, technical and financial capacities)

Action research on CBNRM should be undertaken using an approach that:

- ❑ is site-based and centered in communities that use resources, and not resource-centered
- ❑ involves teams and collaboration, enables multi-stakeholder participation in research
- ❑ is flexible and learning-process oriented, not resource-use prescriptive or 'rule rigid'
- ❑ can involve 'outside' team members to assist resource users in the community and other stakeholders in the conduct of the action research

'Outside' team members can include researchers, extensionists, NRM agency staff, local officials and others, who support participatory processes and communication, documenting and sharing, and encouraging creative community-based approaches for managing resources.



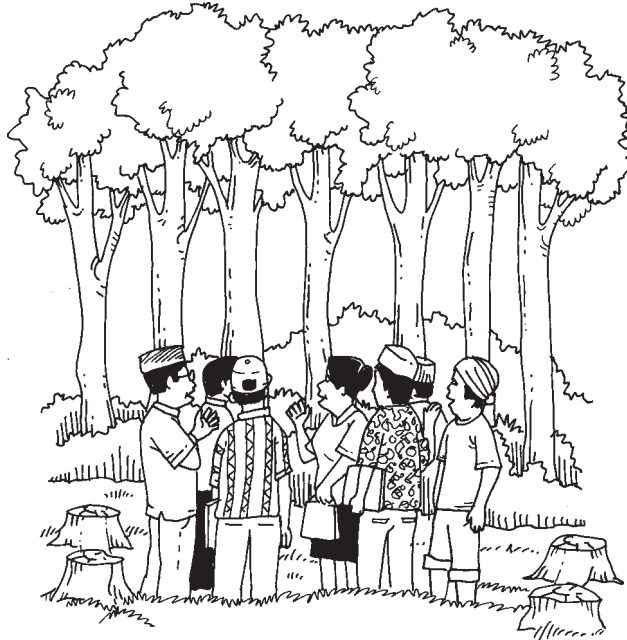
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**Participatory Research and
Development for Sustainable
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Adaptive Collaborative Management



The situation in most tropical forests and among inhabitants is very discouraging. In many areas, forests have been used for plantation or resettlement programs. Also, forests are being steadily degraded by unsustainable harvest of various products (timber, rattan, bamboo, wildlife) that have been or are being commercialized.

On the other hand, people living in or near the forests are often denied access to its products. Also, they have little say in decision-making processes that somehow affect their future. The most troubling aspect of this scenario is the speed with which environmental degradation and human impoverishment are progressing. In order to address these problems, the Center for International Forestry Research (CIFOR) used adaptive collaborative management (ACM).

Adaptive Collaborative Management

It is a value-adding approach whereby people who have 'interests' in a forest, agree to act together to plan, observe and learn from the implementation of their plans (recognizing that plans often fail to fulfill their stated objectives).

ACM is characterized by conscious efforts among such groups to communicate, collaborate, negotiate and seek out opportunities to learn collectively about the impacts of their actions.

(Adapted from Prabhu *et al.*, 2001)

ACM assumes the following:

- ❑ both forest and human systems are complex and adaptive
- ❑ surprise is inevitable in such systems
- ❑ prediction, in any precise sense, is impossible

These assumptions suggest that centrally-planned answers to development and conservation problems do not make sense. Instead, a process needs to be initiated or catalyzed that will enhance local communities' abilities to deal with surprises and changes more effectively.

Dimensions of Adaptive Collaborative Management

The ACM approach includes three prongs: horizontal, vertical and iterative dimensions.

Horizontal Dimension

This refers to an attempt to catalyze collaboration between forest communities (or sub-groups within communities) and other stakeholders (i.e., neighboring communities or ethnic groups; representatives of local government; timber or plantation companies; and conservation projects). The



rationale is that the divergent management goals of the different stakeholders interfere with effective and benign forest management (which is defined to include human well-being), unless there are conscious efforts to harmonize these goals or identify complementarities.

Dealing with Diversity in Nepal

In Nepal, the issue of diversity was raised explicitly early on, both in communities and within the forestry bureaucracy, as a subject in need of attention. There was widespread recognition of the stranglehold the elites, in collusion with District Forest Officers, had on so-called "community forest management." The desire for greater equity emerged in informal discussion and in the earliest community workshops initiated by the project. These workshops were organized around the development of shared criteria and indicators for sustainable forest management (including human well being). Over the next two years, as these criteria and indicators were used for monitoring, significant progress was made.

First, much of the decision-making related to formal management, which had been in the hands of the centralized Forest User Group Committee (FUGC), was devolved to the hamlet (*fole*) level. The hamlet groups were smaller and more homogeneous. Men and women felt freer to express their views in these more like-minded groups. The issues raised at the hamlet level were then fed to the FUGC for further discussion and ratification.

Second, new elections were held in which a wider representation of caste, ethnicity and gender was elected to the FUGC.

Third, the constitution and operating plan were revised to reflect community interests and concerns better. Community-wide efforts were made to promote widespread understanding of these revised documents, including friendly competition among neighbors to excel in their knowledge of their contents.

(Adapted from McDougall *et al.*, 2002)

Vertical Dimension

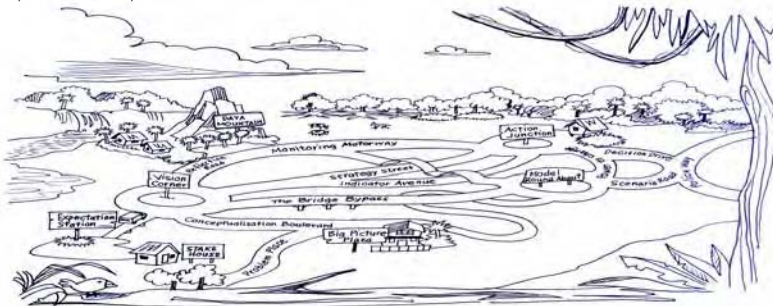
This refers to the strengthening of the voice of members of forest communities in their interaction with actors at a larger scale. In most cases, this has referred to community groups' interactions with government. The lack of power among forest dwellers to influence events that affect their lives is quite evident. In this case, CIFOR tries to work with communities to develop mechanisms for effective communication, lobby political action, level the playing field, and try to secure additional sustainability by bringing these policymakers on board.

Iterative Dimension

This refers to one's concern about social learning. Feedback mechanisms are seen as central to good management, of both human and natural resources. Thus, monitoring mechanisms were developed to help communities assess their own successes and failures as they plan various kinds of collective action. Initially, criteria and indicators for sustainable forest management were anticipated to be good monitoring tools. And indeed, they were in some locations. On the other hand, qualitative approaches to social learning and/or computerized tools seemed to work better in others.

Computer-Supported Facilitation for ACM: Co-Learn

Effective management of natural resources requires sophistication in dealing with complexity. To confront the complexity of managing natural resources, a management system that is fairly sophisticated and seems very complicated was advocated. This created obvious problems of communication (promotion of a seemingly complicated management approach, rather than a blueprint solution) and capacity (the ability to translate a management concept into action). It is this problem that the computer program, Co-Learn, seeks to address.



'Map' of the Management Process Used by Co-Learn

Co-Learn uses the metaphor of a map with bus routes that present to the users several options. It aids them in getting from any point in an abstract management landscape to another, by a route of the user's choice. It uses a simple map to present information that might seem complicated and confusing in a more conventional form. Co-Learn is an interactive map on a computer that allows the users to access resources, information and tools to make their journey easier and more likely to be successful.

It is an interactive, user-friendly, innovative, process support and facilitation tool that helps users discover where they are, where they are going and what they can expect to find along the way. Its uses include group learning, planning, technical support and record keeping. The present version is a full-fledged 'proof of concept' demonstrator released explicitly for testing and evaluation.

(Adapted from Prabhu, 2003)

An important prelude to categorizing social learning is the conduct of some rather conventional context studies:

- ❑ stakeholder identification
- ❑ historical trends
- ❑ policy
- ❑ criteria and indicators assessment of the biophysical and social context
- ❑ assessment of adaptiveness and collaborativeness in the communities

After gaining a fairly full understanding of local conditions and having established a good level of rapport, the "heart and soul" of ACM, which is participatory action research, was initiated. This method involves researchers, community members, and other stakeholders working together to bring about mutually-agreed upon goals. Community members (and others) learn important research skills. They also learn to trust one another and work together. Thus, the skills learned can be carried over into other contexts and into the future as well.

Armed with experience in addressing human and environmental problems in tropical forests, a team consisting of CIFOR and its partner researchers in 10 countries (Bolivia, Brazil, Cameroon, Ghana, Indonesia, Kyrgyzstan, Malawi, Nepal, Philippines and Zimbabwe) was formed to address human and environmental problems in tropical forests. They began doing fieldwork in 2000 and 2001. The advantages of being able to make cross country comparisons and the uniqueness of each site and set of circumstances were both recognized. The strategy used in this approach provided rough guidelines and granted considerable autonomy to field researchers to pursue leads and opportunities they have identified with local communities. Different teams adopted different strategies.

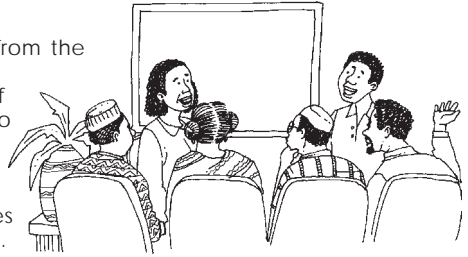
- ❑ The Zimbabwe team identified a passive attitude towards outsiders and their interventions in the community. They used Training for Transformation to address this issue, so critical for the kind of social learning and collective action sought in ACM.
- ❑ In several sites, cross visits to other communities with experience in activities that ACM communities wanted to do (e.g., marketing flowers and increasing the profitability of small-scale logging in two Philippine sites, introducing women to the day-to-day conduct of logging in Bolivia) were organized.
- ❑ Some teams (Bolivia, Zimbabwe, Philippines, Nepal) brought stakeholders together for a future scenario exercise wherein the participants imagine the future they would like to see, and then make some progress toward planning how to get there.
- ❑ In some sites (Cameroon, Philippines, Nepal), the teams used criteria and indicators for sustainable forest management in a similar fashion, to discuss joint or complementary goals, and think together about how to attain them.

The Inadvertent Resolution of Longstanding Conflicts in Ottotomo, Cameroon

As a result of collaborative planning in Ottotomo, which involves all the concerned stakeholders (forest administration, local communities and the NGO), the participants realized that the previous state of conflict between the forest administration and the local communities had been diffused. This occurred because these stakeholders agreed to work together to resolve differences vis-à-vis forest issues through collaborative planning. Collaborative planning was not intended as a method or approach to manage conflict but the consequences of working together were far reaching, including conflict management.

During a participatory planning workshop facilitated by ACM, the stakeholders identified their goals, constraints and opportunities. In so doing, they agreed on a common vision. The workshop effectively shared ACM notions such as criteria and indicators, participatory action research (PAR) and collaborative monitoring. The workshop also enabled the bringing together of science and participation through the stakeholders' own collection and analysis of data on burning conflicts, mutual perception of collaboration, and clarification of stakeholders' rights and means to act on various management issues.

The workshop ended with a fresh commitment from the stakeholders to clarify interests, reduce conflicts, and improve collaboration for the well-being of both society and nature. This has contributed to diffusing tensions and facilitating mutual understanding between the local communities and the forest administration. Both parties can now "sit together" to discuss other pertinent issues aimed at seeking practical solution to problems.



(Adapted from Jum *et al.*, 2003)

The most important commonality was the participatory approach, which was found to be critical for obtaining community views, catalyzing their creativity, and sustaining the adaptive and collaborative process. The figures below show how the participatory action research process worked in all the ACM sites, with a specific example from the Philippines.

Figure 1. Steps in Participatory Action Research

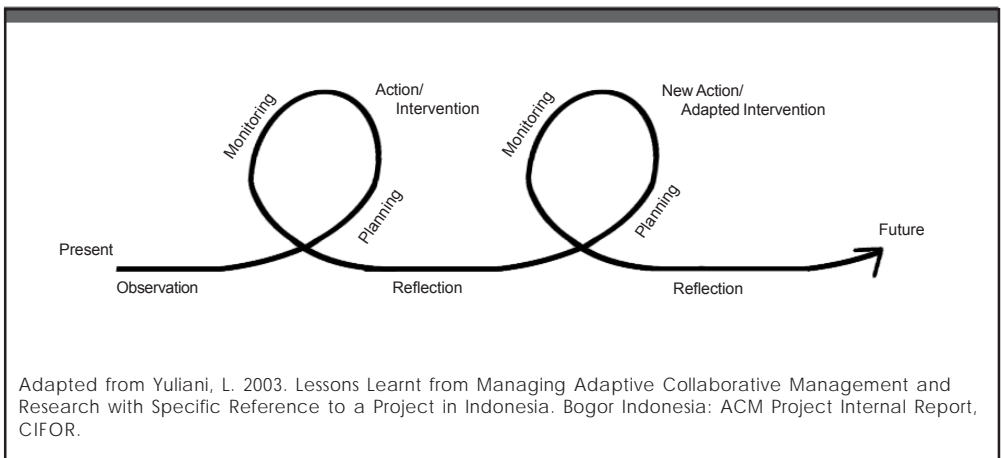
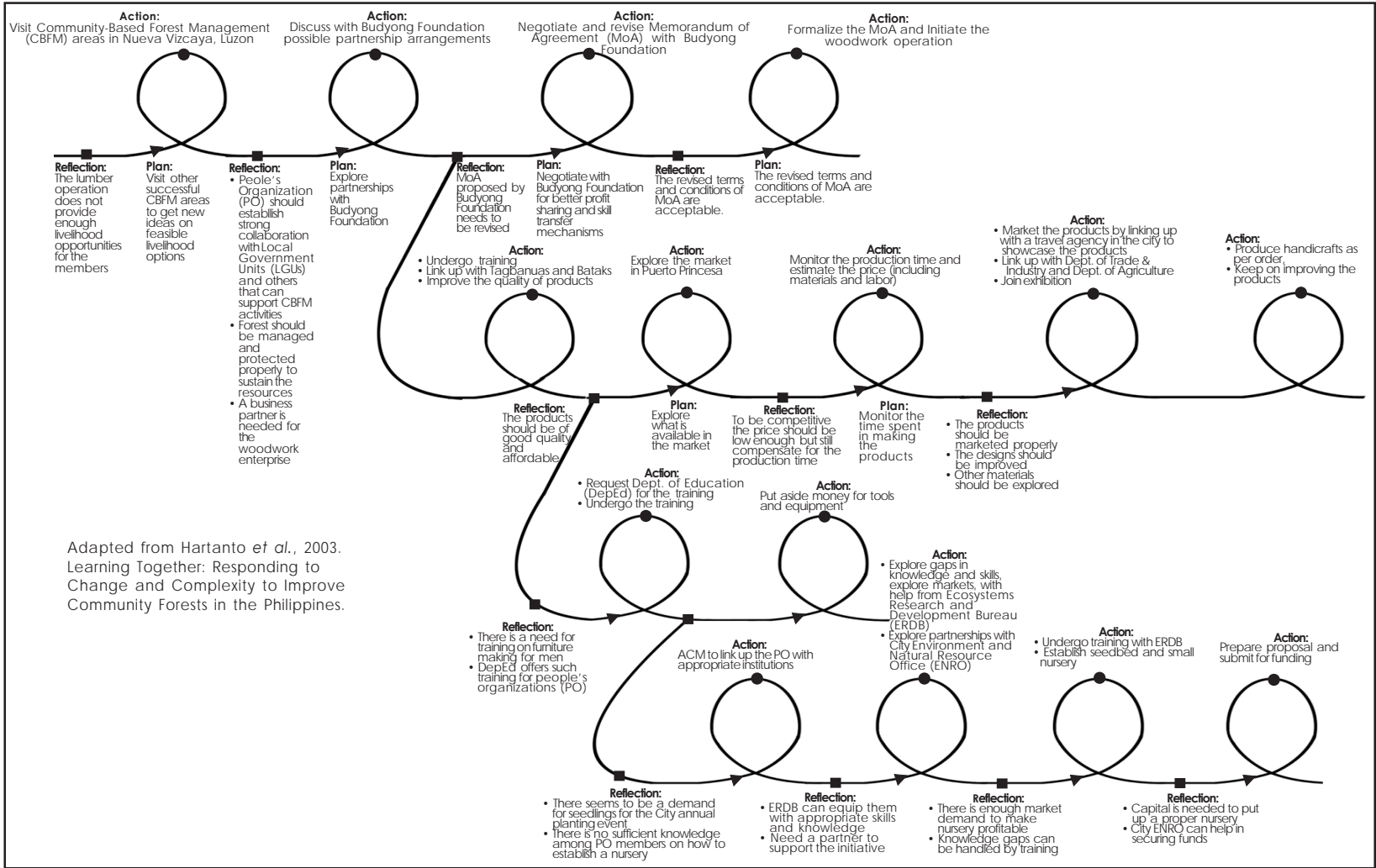


Figure 2. The ACM Process in Creating Better Livelihood Options in the Philippines



Adapted from Hartanto *et al.*, 2003. Learning Together: Responding to Change and Complexity to Improve Community Forests in the Philippines.

Measuring Impacts of ACM

Measuring impacts, as we focused on the shared processes of stimulating local collective action and social learning, is difficult. This can, however, be done by categorizing sites into three categories: from high impact to low impact--recognizing that ACM is still at a preliminary stage, and that even low impact sites can, through iterative self-monitoring, improve their performance. The assessments can be made qualitatively on the basis of progress from an imaginary starting point combined with level of activity and enthusiasm on the site. The kinds of results collected so far have been most dramatic in the areas of increased mutual understanding, self-awareness pertaining to the systems in which participants function, equity for marginalized groups (including women, and lower caste and ethnic groups), capacity for political action, and more self-conscious group learning.

There have been some small improvements in more conventional impact assessment areas such as income and environmental quality, but these results have not yet been dramatic. It is estimated that the time required to initiate the kinds of self-sustaining processes necessary in communities (e.g., collective action and social learning) is 5-10 years.

Recommendations

There have been some important areas for further work.

Scaling Up

Insofar as the ACM approach works, how do we expand the benefits beyond the small number of communities in which professional researchers can catalyze this kind of research and development (R&D)?

Further Progress on Equity

Women in most sites, despite the best efforts, do not have the access to forest benefits or the opportunities to influence policy that men do. Similarly, hunter-gatherer groups have been difficult to reach. One approach to address this is to strengthen attention to health and population issues. These are of concern in all communities, and women often have more central, traditional roles in addressing these issues.

Building on the knowledge, experience and creativity of local forest communities is the best way forward in improving forest management and human well being. It is not an easy way forward, but it allows acknowledgment and respect for the rights of people living in forests. It also potentially catalyzes people's commitment to their environment (in the interests of their children), to keep other, more

Three Possible Approaches to Scaling Up

- ❑ Integrate the approach into a governmental extension or other service. This will require new behavior from most bureaucrats.
- ❑ Partner with non-government organizations (NGOs), which reduces the scale and increases transaction costs.
- ❑ Rely on university faculty and graduate students, which reduces the scale still further. We are trying all these approaches at this time.

powerful stakeholders in line. The involvement of outsiders and various local stakeholders in a common search for more equitable access to forest benefits and decision making should result in better forest management and improved human well-being.

Experience has shown that capacities to work together in one sphere often carry over into activities in other spheres--and this can be applied to the approach to equity issues. Two additional benefits include:

- ❑ a better global “handle” on the relationships among health, human well being and sustainable forest management
- ❑ possibly improving the balance in tropical forest areas between people and resources, leading to a simpler management context

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About the Collaborating Institutions



The International Potato Center (CIP) is a scientific, non-profit institution engaged in research and related activities on potato, sweetpotato, Andean root and tuber crops, and natural resources and mountain ecologies. CIP is a Future Harvest Center supported by the Consultative Group on International Agricultural Research (CGIAR).

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International Development Research Centre (IDRC) is one of the world's leading institutions in the generation and application of new knowledge to meet the challenges of international development. For more than 30 years, IDRC has worked in close collaboration with researchers from the developing world in their search for the means to build healthier, more equitable, and more prosperous societies.

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The International Fund for Agricultural Development (IFAD), a specialized agency of the United Nations, was established as an international financial institution in 1977 as one of the major outcomes of the 1974 World Food Conference. The Conference was organized in response to the food crises of the early 1970s that primarily affected the Sahelian countries of Africa. Unlike other international financial institutions, which have a broad range of objectives, the Fund has a very specific mandate: to combat hunger and rural poverty in developing countries.

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Users' Perspectives With Agricultural Research and Development (UPWARD) is a network of Asian agricultural researchers and development workers dedicated to the involvement of farming households, processors, consumers and other users of agricultural technology in rootcrop research and development. It is sponsored by the International Potato Center (CIP) with funding from The Government of The Netherlands.

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