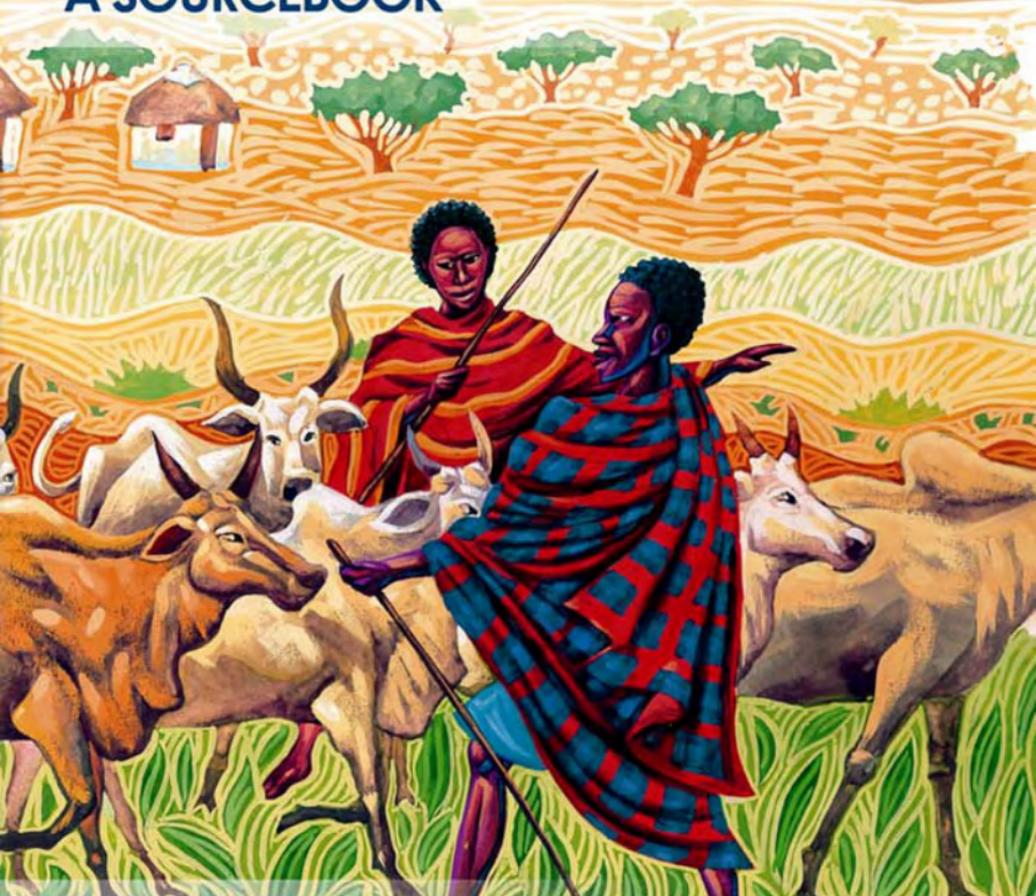


**Participatory Research and Development
for Sustainable Agriculture and
Natural Resource Management**
A SOURCEBOOK



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

Edited by

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INTERNATIONAL POTATO CENTER-USERS' PERSPECTIVES WITH AGRICULTURAL
RESEARCH AND DEVELOPMENT (CIP-UPWARD)

INTERNATIONAL DEVELOPMENT RESEARCH CENTRE (IDRC)

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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

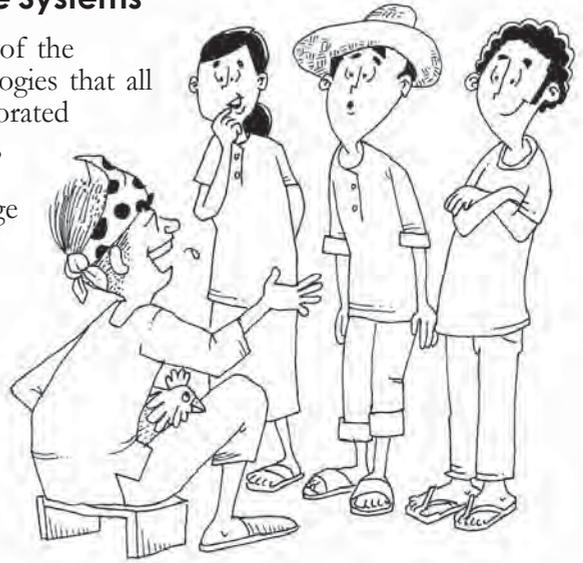
One of the principal tenets underlying farmer participatory research is that farmers act rationally in using resources available to achieve their production needs. Farmers manage a complex set of biological processes which transform these resources into useful products, either for home consumption or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

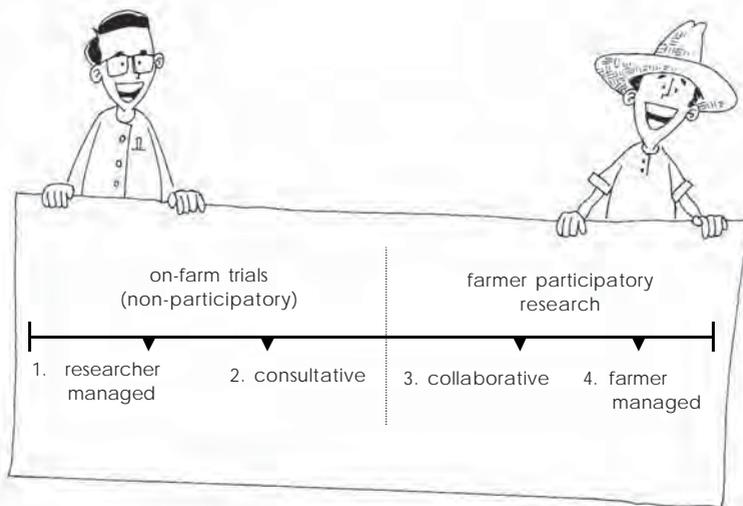


Figure 1. Types of On-farm Research

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

Adapted from:
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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
Level of farmer participation in decision-making for extension priorities and activities, resource allocation, etc.	<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
Extension methods used	<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
How do farmers participate?	<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 	
<p>Costs, funding mechanisms and control of funding</p>	<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.)
<p>Program geographical coverage (area)</p>	<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
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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:

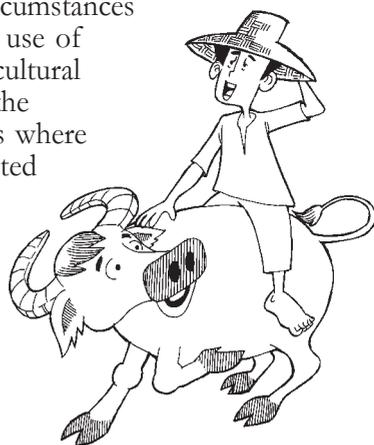
- poverty alleviation
- food security and self reliance
- ecological management of productive resources
- empowerment of rural communities
- establishment of supportive policies

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:

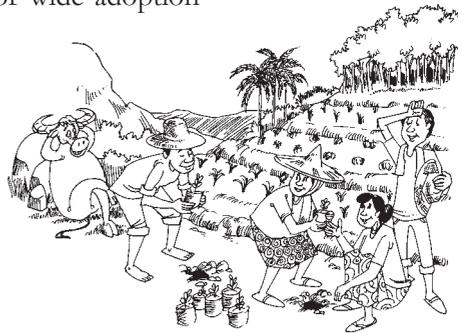
- changes in policies to stop subsidies of conventional technologies and to provide support for agroecological approaches
- appropriate equitable market opportunities including fair market access and market information to small farmers
- security of tenure and progressive decentralization processes
-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

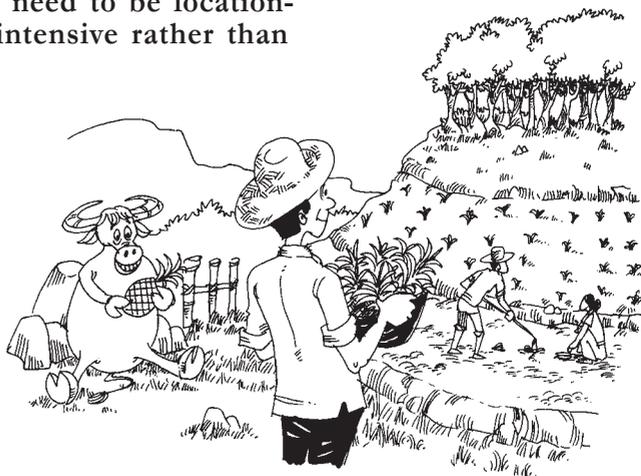
Outlook and Prospects

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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