ii. Introductory site visits and planning sessions (involving a cross-section of the farming community as well as government officials), with a strong emphasis on the PRA approach, its implementation and its limitations;

iii. Data collection: spatial data (development of a natural resources map by farmers and members of the PRA team, transects for on-the-spot discussions of localized problems with farmers and government officials), temporal data (description of seasonal calendars for land and water use, major historical events, long-term trends in land and water use, changing role of local institutions); and socioeconomic data (for a cross-section of the community, information on water supply and distribution, system maintenance, agricultural production, organizational capacity and links with water users' associations, etc.);

iv. Data synthesis and analysis (with emphasis on triangulation and optimal ignorance, for production of a preliminary document on problems and opportunities);

v. Ranking opportunities (by community members, government officials, the PRA team) during a 1-2 day workshop;

vi. Prepare a Village Resource-Management Plan (VRMP), which is the workshop's main output and describes the activities planned to address the main problems of the community, with a clear definition of roles and responsibilities of the different stakeholders;

vii. Adoption and implementation of VRMP; and

viii. Monitoring and evaluation of VRMP activities.

The main output of the appraisal phase is the VRMP. This action plan identifies problems related not only to irrigation management, but also to agricultural production and marketing, health, income generation, etc., based on the relative importance of these problems for the situation and the community targeted. It clearly identifies appropriate and practical options for solving these problems, and defines roles and responsibilities in the implementation of the action plan that would improve the functioning of the irrigation systems.

In his paper, Thompson (1990) describes activities that have focused on two small-scale, farmers-managed gravity irrigation schemes of Kenya. Six weeks have been spent by a multidisciplinary team of six persons from the NES, i.e., three physical scientists and three social scientists comprising three from each gender. The main driving force of the team's approach was an active participation of local people in the appraisal of their problems and analysis of information collected. Although belonging to a governmental department, the PRA

team was seen more as a facilitator of dialogue between local people and government agencies, and even among local people themselves, than as an agent of the government.

Although the final evaluation of the approach is not reported in the paper, Thompson already provides a list of the benefits obtained because of the use of PRA. These include:

i. A very close involvement of local people in the appraisal and analysis of problems related to irrigation management;

ii. Mobilization and participation of local community members for the implementation stage (implementation of VRMP);

iii. The development of a holistic and ground-based approach not biased by any sectoral way of looking at the irrigation systems;

iv. The production of high quality information at low cost and after a short period of time;

v. A clear assessment of the capacity of local institutions in planning and implementation of specific activities, and an understanding of linkages between the different actors involved in the management of irrigation systems; and

vi. The development of a simple monitoring and evaluation method that does not require external assistance and/or large investments in terms of financial and human resources.

It is important to note that only the last three items are tangible benefits obtained through the use of the PRA methodology. It is more difficult to asses whether items i, ii and iii above are benefits[14] in themselves or characteristics of a process expected to lead to sustained interventions.

IIMI's EXPERIENCE IN THE USE OF PRA FOR IMR

Farmer-Managed Irrigation Systems in Nepal[15]

The irrigation resource inventory is the basis not only for proper planning for sustainable development strategies, but also for well-designed research on irrigation management. For

[14]Whether "local people participation" is a benefit in itself has been and still is a matter of debate at IIMI. The involvement of local people can be seen as a goal in itself, or as a means to reach desired outcomes and address the sustainability issue of these outcomes.

[15]The information used is drawn from IIMI (1994a) and Pradhan (1994).

example, it is important to collect basic characteristics of irrigation systems for financial resources allocation at the local level for new construction or rehabilitation. In addition, the selection of representative irrigation systems for micro-level and in-depth studies requires basic information on the characteristics of large numbers of irrigation systems. Inventories usually focus on socioeconomic and physical resource base information. In some cases, especially when the systems considered are rather small and managed by individuals or groups of farmers (i.e., Farmer-Managed Irrigation Systems or FMIS), information may also be required on the institutional dimension of the system.

In Nepal (and probably in most of the countries with irrigation), the main problem with FMIS is their number and their spatial dispersion. To collect information on each FMIS would be a rather cumbersome task and may prove very expensive. Thus, there is a need to develop a very specific approach to provide the information required for planning and research purposes.

Along with other institutes that simultaneously started to be involved in the inventory of irrigation systems in Nepal (IIMI 1994a), IIMI started to develop an approach that intended to address financial and implementation issues related to the inventory of the large number of FMIS. This approach was implemented with the objective of collecting the necessary information to enable decision making for assisting FMIS. One of the main thrusts of the approach is the use Rapid Rural Appraisal (RRA) and PRA, linked with a Geographic Information System (GIS) for spatial analysis of the information collected. However, the link between RRA/PRA and GIS has not been tested yet and the testing of the approach detailed below did not go up to linking GIS and RRA/PRA.

The preliminary step of the approach is the development of a checklist of topics, including water and land resources, water allocation, physical system and infrastructure, management structure, agricultural system, etc. The main objective of the checklist is to provide an initial (but comprehensive) evaluation of all the FMIS of a river basin. Based on this information, a subsample of systems is selected for RRA/PRA, based on water resources, land resources and institutional capability potential. The FMIS selected for the RRA/PRA approach are the ones with the highest potential for productivity improvement.

It is not only the tools but the participatory approach, and the rather comprehensive examination of irrigation systems that are seen as important, and have been discussed and tested. Innovations also include aspects related to the functioning and the composition of the team that implements the RRA/PRA activities. Two of the team-related innovations stressed in IIMI (1994a) are the inclusion of (i) female members, to improve and refine the assessment of gender-related issues in irrigation activities and management; and (ii) a rural-based NGO farmer as a member of the inventory team (in the case of IIMI's field-testing of the approach, this farmer had already been involved in the initial evaluation phase of all the systems of the given river basin), to improve the quality of the information collected, to better emphasis the analysis of the irrigation systems from a farmer's perspective (farmers discussing with farmers), and to enhance the credibility of the team efforts.

The main participatory activities to be carried out, and involving different types of farmers of the system (head and tail farmers, rich and poor farmers, etc.) are: transects, walk-through with farmers, semi-structured interviews and development of maps. A clear objective for the RRA/PRA team is to narrow the gap among researchers, academics and farmers leading to

effective learning, experience-sharing, congenial atmosphere, and a mutual respect for each other (IIMI 1994a).

The information collected is then reported to farmers and provided to them, mainly to cross-check the information collected with a larger group of farmers from the selected FMIS. As a matter of fact, the information gathered and analyzed is perceived as useful (or effective) only if the users of the irrigation systems have access to the information generated by the inventory and they can use it for their own decisions and development strategies. The final step in the inventory methodology is the development of a database for planning purposes, including all the information collected through the RRA/PRA in the sample FMIS, and with a potential link with a GIS for spatial analysis.

As stated above, this approach has its origin in several approaches developed simultaneously in Nepal by research institutes and development agencies for the inventory of FMIS. The approach has been tested by IIMI in two projects in Nepal as described below.

In the first case, an initial survey of 160 systems of the district of Tanahu has led to the selection of 35 systems for PRA, based on the potential area for irrigation, the adequacy of the water supply during the winter and spring seasons, the potential for crop diversification, the importance of environmental problems, etc. The team comprised faculty members with a background in agricultural engineering, agronomy and sociology, along with male and female students and a rural-based NGO farmer as explained above. The information obtained through PRA has been used for ranking the different systems in accordance with priority for external assistance.

In the second case, an engineer, an agronomist, a sociologist, an environmentalist (only present during the reconnaissance survey) and a rural-based NGO farmer formed the inventory team. No female was included in this team that subsequently did not collect information on gender issues. Totally, 239 systems were surveyed in the Lamjung District during the initial phase of the approach, and 30 were selected (based on criteria similar to those detailed for the first case) for the RRA/PRA phase. Similarly, 162 systems were initially visited in the Dang District, out of which 24 were found suitable for the RRA/PRA phase of the inventory. A scoring system helped to identify systems with high priorities for external assistance.

The evaluation of the approach (IIMI 1994a) shows that improvements in the collection of information could still be made by further focusing on emerging issues of irrigation management such as gender, water rights and environment. At the same time, the improvement in the approach and techniques used are to be developed in the context of the adaptation of the approach to the capabilities of institutions and professionals of Nepal. IIMI (1994a) fully recognizes the specific requirements in terms of capabilities and skills for several individuals at the same time (to form a well-functioning RRA/PRA team), which are not necessarily readily available in institutions and research institutes involved in FMIS issues.

Although IIMI (1994a) describes the approach and its different steps, it is rather difficult to clearly assess the level of participation that took place during the different activities performed by the RRA/PRA team. Moreover, these activities have mainly involved *key informants among the water users, functionaries of the Water Users Associations and local leaders* (IIMI 1994a), and were led by the researchers who had initiated the process as summarized below.

> *One of the team members led the discussion, focused on the checklist and moderated/facilitated the respondents if they happened to deviate from the main topic, and other members recorded the information (IIMI 1994a).*

The experience, however, clearly stresses the need to deal with the expectations of farmers in a better way. The problem of farmers' expectations is seen as one of the major drawbacks of this participatory methodology. As summarized by Pradhan (1994),

> *... The (final) presentation disappointed some participants, since the FMISs in their Village Development Committees were not on the priority list... Interviewing and discussing irrigation related issues with farmers in these FMISs inevitably raised the expectations of farmers. No matter how much explanation was provided regarding the purpose of the inventory, farmers tended to expect assistance in terms of a project for their village....*

The other stakeholders involved in the exercise such as local government officials were satisfied with the exercise and its output, as the results (especially the ranking of project according to some priorities) were of direct use to them for implementing an ongoing project on assistance to FMIS.

The comparison between the results obtained by the two teams (Pradhan 1994) highlights differences in the emphasis of the analysis and identification of priorities, related to the background of the different team members. Thus, although the two teams used RRA/PRA, the team members influenced the process and did not succeed in playing only the role of facilitators in the PRA process.

Pradhan (1994) also concludes about the need for complementing this method with other methods (field observations, intensive PRA, case studies) for a fuller understanding of the dynamics of these systems and triangulation of the information obtained. However, as already tested and developed now, the incorporation of this methodology at the planning stage of any FMIS sector development program would improve the efficiency of this program. Efforts are to be made to assess what the proper role of irrigators in the approach is, and how to make them co-partners in the research process in order to readjust their expectations.

A final comment relates to the context under which this approach has been developed. The fact that the information collected leads to a national development program and the identification of priorities means that some systems (the ones not selected for the intensive RRA/PRA phase) are not provided with action plans and action programs for follow-up. Moreover, the approach seems to have a bias towards improvement with external assistance. A higher focus on possibilities of development by farmers themselves would lead to development of action plans for all/most of the systems visited.

Stakeholder Participation in Watershed Management in Sri Lanka[16]

In 1993, IIMI initiated a 3-year project titled Shared Control of Natural Resources (SCOR), to be implemented in close collaboration with the Government of Sri Lanka, local organizations and user groups and nongovernmental organizations. Participatory action-research is the key component of this project focused on the development and testing of a holistic approach to integrate environmental concerns with production objectives at the watershed level. The specific SCOR project objectives are (Wijayaratna 1995):

a. To improve the incentive and institutional context in which land- and water-related activities are undertaken in pilot watersheds through appropriate modes of production and state-user partnership to ensure both the productivity and the sustainability of these resources;

b. To get resources user groups and managers to consider environmental implications of land and water use more explicitly and to internalize environmental considerations in decision making and implementation at all levels;

c. To enhance information and the understanding (of the government, groups and individuals) about potentials of and prospects for the natural resources (land and water) base for production and protection; and

d. To strengthen the capacity of the provincial/divisional government authorities in planning for land and water resources utilization in an integrated manner, gradually transforming the strategy of development of land and water resources from a "project" mode to a "program" mode.

The SCOR Project is the first watershed management project undertaken by IIMI. It draws from past experience in IMR in Sri Lanka in terms of approaches, research methodologies, etc. The project concentrates its efforts in two pilot watersheds, one in the wet zone and the other in the dry zone of the country.

The participatory approach of the SCOR Project includes several methodologies for increased participation by the different stakeholders in situation analysis, development of action plans and also (shared) management of the natural resources. PRA is one of the participatory methodologies used by the SCOR Project staff for the analysis of the situation and diagnosis of problems related to natural resources management.

PRA is carried out in sample sub-watersheds. The main objective is to assess the present natural resources use pattern (supply and demand characteristics of land and water), the status of resource degradation and the potential for development and improved management of the resources. Based on this (or assessment), an integrated plan for the improvement of natural

[16]Information reported here is drawn from Wijayaratna (1995).

resources management is developed. This plan is then implemented with each actor having a clear definition in terms of commitment, activities, roles, etc.

The PRA activities involve not only farmers, as mostly reported in the literature, but also relevant local officials and IIMI staff as catalysts. The main objective of this PRA is to prepare a detailed map of the sub-watershed with information on landholding, land and water use, main characteristics of the physical environment, information on production and productivity, and major constraints of production and conservation activities, in order to establish the baseline resource use pattern and sensitize all the stakeholders of the importance and need of such an exercise, and obtain their commitment for further actions and programs for a balanced development of the sub-watershed.

The major participatory exercise undertaken is the development of a map of the sub-watershed indicating individual landholdings, cropping pattern, type and quality of vegetation, water supply and water use, main types of irrigation methods, etc. However, the participation does not involve the drawing of the map itself as this is done by a draftsman supporting the group. The exercise is done twice, once for the current situation, and the second time (using the current situation map as a support) to identify the future development of the sub-watershed with clear environmental and production objectives. The information put together by the different participants in the participatory activities is eventually entered into a Geographic Information System (GIS) for further use by the different stakeholders.

The analysis of the current situation and the future planned land use leads to the identification of an action plan, including activities such as the introduction and adaptation of new conservation practices (increasing soil moisture retention using mulch, establishment of contour bunds and drains, reforestation of high slopes zones, agro-forestry practices, etc.) and/or the development of new commercial enterprises (cultivation and processing of medicinal plants for example), and novel modes of partnership between the different government agencies, NGOs and the end users in the management of natural resources.

End users, government participants and other project participants are also involved in the monitoring and evaluation of the project activities. Groups of users monitor their own activities (status of activities, production and protection practices implemented, farm budget) through self-monitoring and assessment. Again, a participatory resource use survey and mapping provide most of the information required for a proper monitoring.

A few issues can be discussed based on the presentation of this experience in Sri Lanka. First (and similar to the Nepal case study), it is not only farmers and resource users, but also other actors such as government officials, who have been involved in the PRA activities. Improving communication between different actors and increasing their joint understanding of specific local conditions are seen as the major benefits obtained from this mixed participation.

Second, only a few of the PRA tools have been used (mainly resource mapping). This limited use of PRA tools may be related to a formalized inclusion of PRA in a more general watershed management approach. As the tools become objectives in themselves (in this case, maps to be developed for further analysis with GIS), the flexibility of the approach and its "PRAness" in terms of match with the basic PRA principles are reduced. This was further emphasized by the fact that farmers seem to be more a source of information for the preparation of maps (prepared with the assistance of a draftsman and entered into the GIS) than leaders in the PRA exercises.

Third, this example stresses the importance of linking PRA to other data collection methods and analytical approaches. To link PRA with other participatory approaches (such a Participatory Action Research) and recent data analysis techniques (GIS in this case) may strengthen the effectiveness of PRA itself (if this mix of methods does not threaten the basics of PRA as discussed in the previous paragraph).

Performance Indicators from Water Users' Perspectives in Pakistan[17]

Although it is acknowledged that most of the irrigation systems perform poorly, little has been done to assess irrigation system performance in a comprehensive and systematic way. The importance of performance assessment was recognized by IIMI at the early stages of the Institute's development, and a separate program solely focused on performance was initiated in 1992.

The main objectives of the Performance Assessment Program (IIMI 1994a) as stated in 1994 are to:

1. Assist irrigation managers and policymakers to incorporate a performance assessment system as an integral part of the management process;

2. Develop and disseminate methodologies to enable policymakers and irrigation managers to select appropriate indicators set for use both in the systematic evaluation of the performance of irrigated agriculture and in the planning of changes in those systems to meet future agricultural requirements;

3. Establish a database which can be used for comparative information on the performance of irrigated agriculture in varying agro-climatic and management situations; and,

4. Identify management practices associated with high performance and assist agencies in their adoption.

IIMI's performance program has identified three groups with interest in irrigation system performance: policymakers, irrigation managers and farmers. The different documents describing the program objectives and planned activities recognize that the objectives, and consequently performance indicators used by and of interest to the three groups are not necessarily similar. However, nothing has been planned to identify differences and similarities between objectives and indicators of each group. For farmers, for example, only two indicators, i.e., **predictability** and **profitability** of the irrigation service, have been identified: predictability expressed by the ratio of the actual duration of the water delivery to the planned duration of

[17]For more information on this research, see Hoeberichts (1995).

water delivery; and profitability as the net values of additional output per unit of land, unit of water or unit of labor.

However, the complexity of irrigated agriculture and the difficulty to clearly identify the links between irrigation and water users' decision-making process made the choice of these two indicators appear rather simplistic. Moreover, the need to carry out activities to analyze and understand the different objectives and performance indicators used by each actor (or set of actors) was felt, as this is required not only for the analysis of performance from a given user's perspective, but also for an effective communication and dialogue with users on irrigation system performance.

To address part of this issue, a preliminary study was started in December 1994 (IIMI 1994c), focused on water users' perceptions of the performance of their irrigation water supply. The main objective of the study was to analyze irrigation supply from water users' perspectives, to identify performance indicators as defined by water users, to understand how these indicators were used in monitoring and evaluating of water supply performance, and what the impact of different levels of performance on water users' decisions were, in order to identify differences between performance assessment as carried out by IIMI and performance assessment effectively undertaken by water users. Although it was not clear whether the study results would lead to modification of the performance indicators currently used in the context of the Performance Program, a change in the identification of potential improvements (for **whom**) was expected. Moreover, the research would be a first step in developing a proper communication and dissemination of results related to performance analysis to water users.

PRA was selected as the methodology for identifying performance indicators from water users' perspectives. The research site selected for this activity is the Chishtian Subdivision of the Fordwah/Eastern Sadiqia Irrigation System (South Punjab) where IIMI-Pakistan has focused most of its research efforts since 1994. Some of the PRA activities were undertaken by a group of three persons, while others involved up to eight persons with different backgrounds. In total, 4 weeks were spent in the field to achieve the following:

1. Identification of performance indicators: mix of interactions with individual water users and water user groups from several tertiary canal command areas, using different PRA tools and techniques, to identify irrigation-related problems, performance indicators used by water users, and actions undertaken as a reaction to observed performance levels;

2. Water users' perceptions of irrigation system performance: group meetings for cross-checking and consensus, with water users from one watercourse where IIMI has been working for 4 years;

3. Interactions with individuals using indicators recognized by water users during group meetings, for the evaluation of individual water supply performance (to check the practical use of the different indicators as communication tools with water users, and to compare water users' responses to monitoring data of water supply collected as part of IIMI's regular research activities);

4. Analysis of irrigation system performance from the water users' perspectives: group meetings to present analysis of performance from the water users' point of view, and compare this information with data collected by IIMI to understand reasons of differences (if any), and discuss potential changes accessible to water users and required for the improvement of the performance of the system

The main participatory tools used during field activities were the Venn Diagram (to identify the share of tubewell and canal water in total irrigation water supply), trend line (to identify periods when performance assessment is more important for water users), mapping (identification of zones with poor and good performance, factors responsible for level of performance), walk-through (to observe effects of poor performance such as salinity in fields), and chance exercise (to discuss predictability issues related to canal water supply).

The preliminary output of the study has been a clear understanding of problems related to water supply performance, and the identification of indicators used by water users for assessing irrigation water supply performance, and ultimately taking decisions (in terms of water management and agricultural practices) based on their assessment. The following have been identified:

i. Indicators used by water users such as adequacy, timeliness, tractability, hassle, quality, etc.

ii. Hierarchy among problems of water supply (timing, quantity, quality, etc.), and for different categories of water users (this has been identified by different types of water users).

iii. Solutions developed by water users to compensate for poor performance of their canal water supply.

iv. Constraints on irrigation water supply performance, and role of different stakeholders involved in the management of this water for improvement of water supply performance.

The analysis of performance from the water users' perspectives has been the first experience in PRA for IIMI-Pakistan. Thus, this activity has been a learning activity at the same time. One of the limitations of the approach has been the large number of watercourses selected for the initial phase of the research that did not allow the team to build a longer-term relationship with most of the water users interviewed. Another restriction is related to the choice of some of the sample watercourses where IIMI has already been working for 3-4 years in a more conventional way with information extraction as the main objective. In these watercourses, it was not always easy to clearly implement the participatory approach as water users did not feel IIMI could really learn something more than what it had already collected as information.

The last point relates to the use of the output of the study. As specified above, and although the study used participatory tools to put performance on the table, a potential action plan implicit in most of the PRA approaches was not a primary objective for the researchers involved in the study. At the same time, discussions with water users always led to the request for external assistance by IIMI for lining tertiary canals or increasing canal water supply at the head of the tertiary canal, activities that are not directly within the mandate of the Institute. Thus, there was a mismatch between water users' expectations and the end results for the water users, a problem also identified for the use of PRA in the irrigation system inventory in Nepal.

Summary of Experiences

The different examples of applications of PRA in IMR that have been described in the previous paragraphs are summarized in Table 5.

Table 5. PRA in practice: Practical implementation versus desired principles?.

Condition required for proper PRA	Kenya	Nepal	SCOR	Pakistan
A defined methodology and systematic learning process	Yes	Yes, but method may become rigid	Yes, but method may become rigid	Yes, but mainly by researchers
Multiple perspective	Yes	Yes, strengthened by presence of other actors	Yes	Yes, focus on water-related diversity
Group enquiry process	Yes	Yes	Yes	Yes, but individual exercises seen as necessary complementary activities
Context-specific	Yes	Yes, but possible limitation for issues not initially identified	Yes	Yes, new tools developed
Facilitating experts	Yes	Yes, but improvements identified within the limits of project activities	??	Facilitation of information-gathering attempted, but leading role of team for specific activities
Leading to sustained action	Yes (but sustainability part still to be checked); action by village community	Yes, action by line agencies and researchers, but not necessarily by communities; strong bias towards externally supported actions	Yes (but sustainability to be checked); action by local communities and agencies, but not necessarily related to the use of PRA	No, action by researchers only (modification of performance indicators and research design?)

In addition, the three IIMI case studies and the Kenyan example could be reviewed in terms of the level of participation of the water users. As described earlier, PRA is characterized by interactive participation preferably leading to self-mobilization. Table 6 provides an overview of the level of participation of each case, which makes clear that the adoption of a PRA strategy at the outset of the research activities does not necessarily lead to interactive participation or self-mobilization. Further, it should be realized that all cases are restricted by the design of the projects which narrow the boundaries and framework for potential actions. This is the reason why all cases score an "X" at the category "passive participation."

Table 6. Participation in practice: Passive or interactive?

	Kenya	Nepal	SCOR	Pakistan
Passive participation	X	X	X	X
Giving information		XXX		XX
Consultation		XXXX	XXXX	XXXX
Material incentives				
Functional participation	XX		XXX	
Interactive participation	XXXX	XX		XX
Self-mobilization[18]	XX		X	

[18]It is never clear how independent from external institutions stakeholders are in taking initiatives.

Discussion and Conclusion

SUMMARY

> *HOWEVER, IF THE PHILOSOPHY BEHIND PRA IS NOT UNDERSTOOD—OR, WORSE STILL, IF IT IS NOT REALIZED THAT THERE IS A PHILOSOPHY BEHIND IT AT ALL—THEN THE SO-CALLED PRA BECOMES JUST ANOTHER FORM OF RURAL DEVELOPMENT TOURISM, WITH ALL THE DANGERS THAT IT IMPLIES. (Gill 1992:27)*

A LITERATURE REVIEW of the use of research methodologies in IMR has revealed that, in general, only a limited number of reports document the methodologies applied in an extensive way. More specifically, there is a lack of research papers that discuss the methodologies and the use of participatory approaches and PRA in IMR. This, however, does not imply that PRA has not been used in IMR, but reflects the relative underdeveloped state of a generic discussion on research methodologies and its impact on the quality of the information and the relationship with water users at IIMI and at other research institutes involved in IMR.

A general conclusion of the review of PRA applied in IMR would be that while many studies do hold elements of participatory approaches, they are not essentially interactive or truly participatory by design. Indeed, farmers are involved for reasons of cost-effectiveness and obviously as resource persons, but many of these approaches may very well be rushed with water users having no real impact on the potential biases and misperceptions of the researchers. In fact, there is a large gap between PRA core principles as presented in Chapter 3 of the present paper and experiences of PRA documented in the context of IMR.

Although the development of research methodologies is part of the research process and should receive special attention from researchers (as it contributes to the quality of information and research results, and builds the path towards comparative studies), researchers do not seem too keen to clearly describe their research protocols and approaches, and rarely write solely on methodologies. The current criteria applied for the evaluation of researchers' performance, mostly based on research findings, international-standard published articles and "successful" completion of research projects, with little space for recognition for methodology and method development, could explain this bias and move away from methodological concerns.

The examples of PRA applications applied and discussed in the previous chapter show some of the strong points and limitations of PRA. While in general the use of PRA is strongly dependant on the skills and creativeness of the practitioners, some lessons could be drawn from the reviewed (but limited) IIMI case studies in Nepal, Pakistan and Sri Lanka. These lessons are summarized in Table 7.

Table 7. Advantages and disadvantages of PRA: Analysis of three case studies.

Case study	Advantages	Disadvantages
Inventory of FMIS (Nepal)	■ Involvement of several stakeholders ■ Multidisciplinary approach ■ Large number of systems visited in a short period of time	■ Skilled team required ■ Conflicting interests of water users and other participants ■ Loss of flexibility because routine activity
Participatory Watershed Management (Sri Lanka)	■ Involvement of several stakeholders ■ Establishment of rapport with stakeholders ■ Spatial analysis accessible to all users	■ Limited use of PRA (mainly one tool applied) leading to loss of flexibility ■ Tool (to produce map) is the main objective
Water Users' Perceptions of Performance (Pakistan)	■ Incorporation of water users' broad perspective ■ Triangulation (however could have been improved) ■ Visual tools facilitating contacts and discussions	■ Skilled team required ■ Action-plan was not an initial objective ■ Conflicting expectations of farmers. Bias as areas with already intensive IIMI research activities

Based on this evaluation of PRA, two important questions emerge for PRA, to be more easily accepted as an appropriate approach and tool by irrigation management researchers (in addition to the institutional requirements which will be addressed below). These are:

i. How does PRA (qualitative, case-study-oriented) relate to more formal quantitative approaches in IMR?

Within IMR formal and quantitative research is required and should be conducted as usual. The application of PRA will enhance our ability to deal with the complex dynamics of irrigation management and quickly changing realities. It will teach irrigation researchers, for example, that water users do experiment within the boundaries of their system; that water users have different criteria for performance assessment; and, more generally, that water users' analyses provide significant insights which are different from those of irrigation managers or researchers.

ii. Scaling up: how can water users' insights (localized and highly variable within the irrigation system) provide a broader view for the whole system and be used to improve the management of the whole irrigation system?

Here the scope for PRA lies in the possibility of linking PRA with more traditional sampling techniques. Through PRA the social/organizational aspects for sampling planning, so far relatively neglected, could be incorporated. In addition, the variability of the relative importance of certain issues could be assessed through a series of participatory visits.

The main point to be made here (and valid for the two questions) relates to complementarity between methods and approaches. The main challenge for researchers working in the field of IMR is to identify the appropriate set of methods and methodologies, for research on a specific topic (i.e., the intersection between the three questions w***ho/what/how*** of the framework presented in Chapter 2). PRA is one of these methodologies (and not the only participatory one) and is an increasingly important one.

POTENTIAL USE OF PRA IN IMR

The CGIAR (IIMI 1992a) uses a typology that characterizes research by its objectives and distinguishes between:

* *Basic research* designed to create new knowledge or understanding;

* *Strategic research* designed to solve specific research problems or develop new techniques;

* *Applied research* designed to create new technology; and

* *Adaptive research* designed to adjust technology to specific needs or a particular set of environmental conditions.

Based on the strong points of PRA as identified in the case studies, it could be argued that PRA has a major role to play in adaptive research which is context-specific. However, its applicability is not limited to adaptive research alone. PRA in strategic research will be required to identify new research issues based on interactions with water users. In this case, PRA-generated information will be required to enlighten researchers how to solve the problems (Pimbert 1991; Fujisaka 1994).

IIMI's research (be it basic, strategic, applied or adaptive) consists of four different phases: (i) identification of research issues and diagnosis; (ii) planning and design; (iii) implementation and monitoring (testing) and (iv) evaluation of impacts. PRA can be applied throughout all stages of IIMI's research, and its use is to be promoted. However, involvement of water users in the first stage seems imperative, in order to focus on relevant issues and constraints that may limit potential improvements. Similarly, a proper evaluation of changes and impacts (with direct feedback to the identification of new research issues and development of research activities) is to include a water user perspective.

Although a large range of issues can be addressed by PRA, the potential for using PRA as part of the research process appears higher for activities under Local Management, Environment, Health and Gender programs. However, it is important to stress that PRA is not applicable only for research using the farm or the household as the basic unit of analysis. The PRA activities undertaken in Pakistan, for example, indicate that the approach has a role to play for research at higher levels of the irrigation systems, including the sector and policy levels.

By referring to the simplified framework presented in the second section of this paper, PRA seems to have the highest potential for research activities related to farmers (***who***) undertaking most of the functions (from acquisition to water disposal) listed under the ***what*** question. At the same time, the link between the enabling environment and the trilogy ***who/what/how*** requires PRA approaches for a proper identification of constraints and an initial assessment of potential for improvement. Similarly, the analysis of the expected impact of changes in the irrigation management also provides opportunities for PRA.

The analysis of the three IIMI case studies highlighted the importance of water users' expectations in the implementation of PRA. Adaptive research activities would provide the highest opportunities for follow-up activities to be implemented with the water users, and would probably be able to tackle the issue of raised expectations in a proper way. For other types of research, specific attention will be given to the expectations of participants involved in a PRA exercise. The three case studies also showed the importance of involving skilled team members to ensure the quality of the PRA. To achieve this, training should be an important component of IIMI's training and staff development programs. However, it should be emphasized that one-off training workshops are necessary but not sufficient conditions for accomplishing PRA competence. A suitable institutional environment inducing participatory learning and action is required as well (Thompson 1995).

Three of the case studies (Nepal, Sri Lanka and Kenya) provide some insights in the composition of the team undertaking the PRA. The most important aspect highlighted is to include other actors (such as government agency officials and NGO members), using PRA or other methods[19] to obtain their involvement in the research process. This involvement of other actors is seen as particularly important for a proper communication among actors, and also for the implementation of the follow-up activities to PRA. For example, in the case of the identification of research issues, to involve the line agency operating the irrigation system and the extension services dealing with irrigation and farming practices would improve their understanding of the system, which might help farmers, staff from these agencies and researchers reach agreement on main issues and priorities.

[19]Several participatory approaches have been developed to involve actors other than farmers. For example, the Department of Communication and Innovation Studies, Wageningen University, the Netherlands, has developed an approach titled Rapid Appraisal of Agricultural Knowledge Systems (RAAKS) that focuses on the role of different actors and their involvement in the exchange of information and development of knowledge. This approach has been applied in irrigation management research in Senegal and will be tested in Pakistan in the context of the IIMI research program.

IMR AND WATER USERS—PROSPECTIVE FOR ALLIANCE?

This Working Paper has also attempted to discuss the important issue of what the role of water users is in influencing IIMI's research agenda, and what their capacities are to work with IIMI as active research partners, taking on key roles and responsibilities. Through the review of case studies some light was shed on the role of PRA, based on the hypothesis that participatory research methodologies are a starting point for water users to have a voice on the research agenda of the research institute.

A major conclusion of the literature review on the use of participatory approaches in IMR revealed that for whatever reasons participation in irrigation **management** has become a normal way of thinking in the irrigation world, but that participation in IMR is still fragmented and does not constitute an element of the irrigation research paradigm. This is surprising given the fact that IMR and PRA have much in common such as being interdisciplinary, collaborative, field-based and client- and action-oriented. It is even more surprising given the increasing presence of social scientists in IMR (Merrey 1994) and IIMI's focus on applied and adaptive research where there is an obvious niche for the end users. Possible factors explaining this are proposed below:

* IIMI perceives its primary clients to be irrigation management agencies, research institutes and policymakers (IIMI 1992a) and leaves the provision of services to water users to national agencies;

* IIMI's definition of irrigation is *the totality of the means employed by people to augment and control the supply of water to the soil, for the purpose of enhancing the production of crops*, where there is more emphasis on engineering and management issues than for example on irrigation and livelihood issues;

* Lack of comparative research and evaluation of the outcomes of participatory IMR which synthesize the results in a coherent way in order to influence and inform the research program of IIMI;

* Lack of a critical mass of participatory IMR activities;

* IIMI has no accountability to the end users of irrigation systems which may make the Institute susceptible to designing a research agenda which may reflect the personal interests and preoccupations of researchers; and

* Water users are still perceived as recipients of irrigation management improvements which does not alter the traditional relationship between irrigation management researchers and water users.

Our assumption is that the quality of the research outputs and the impacts on water users whose livelihoods depend on irrigated agriculture will be enhanced if participatory research

approaches are employed and if water users are engaged actively in setting the research agenda. This requires a change of attitudes, behavior and policy within IIMI as an institute.

In terms of development of partnerships with water users in research design, there is a wide area for IIMI where it could enhance its way of working. The challenge for IIMI is to become a client-responsive research institute, where client means the irrigation agencies, policymakers *and* water users. A first step in this direction would be to adopt participatory research approaches on a larger scale, which systematically consider and incorporate water users' (and other stakeholders') interests at all levels of the irrigation sector. It should be realized, however, that the adoption of participatory research methodologies alone cannot guarantee success. At least two conditions should be met in order for water users to have a say on the agenda of IMR. These are: (i) a flexible and open process of development of IMR (who decides and who prioritizes?), and ii) support to water users to influence IIMI's agenda of IMR (after Collion et al. 1992).

While a great deal of IIMI's work involved the empowerment of water users in their dealings with irrigation managers and agencies, it has devoted hardly any time to support water users in exploring and prioritizing their own research needs and how to communicate these effectively to IIMI or to the irrigation agencies. The question then is "how can IIMI's process of research design be managed and opened up to water users' participation?" Instead of using researchers or representatives from irrigation agencies as proxies for farmers (Collion et al. 1992), it should be defined at which stages water users' input is imperative to enhance the appropriateness of the research activities.

Table 8 summarizes the different roles of stakeholders in IMR (excluding other stakeholders such as donors, urban food consumers, traders, etc.) (after Collion et al. 1992). Water users' input is especially required during the stages of problem analysis, review of results of previous research, determination of research objectives, evaluation of alternative solutions and prioritization of different research projects, where they have a comparative advantage in knowledge over irrigation management researchers. The vast majority of researchers do not depend on irrigation to sustain their livelihoods and, therefore, they cannot be proxies for those who do, namely, the water users. It is they who possess site-specific and detailed information about causes and effects, and reasons for past failures and successes, and the historical knowledge necessary for carrying out analyses of viable options.

A NEW IMR PARADIGM?

Similar to what took place in the 1970s with the development of the Farming System Research and the criticisms of the linear technology transfer (from the researchers via the extension services to the farmer), there is a felt need to change the actual links between research institutes, clients (as defined by IIMI) and beneficiaries (i.e., water users) in IMR. Direct contacts are to be developed between research institutes and farmers, between research institutes and clients, and between clients and beneficiaries. At the same time, accompanying the shift from irrigation management to irrigated agriculture, the number of actors to be involved

in the information and knowledge system on irrigation management has increased and this has to be taken into account while designing and implementing research on irrigation management.

Table 8. Research design incorporating stakeholders' inputs.

Stages in Irrigation Management Research Design	Main Actors				
	Research Institutes	Water Users	Irrigation Agencies	Policy-makers	IIMI
Sector analysis of irrigated agriculture	*			*	*
Problem analysis of irrigated agriculture (constraints, causes and effects)	*	*	*	*	*
Assessment of research findings in the sector relevant to issues identified in sector analysis	*	*	*	*	*
Determination of irrigation management research (objectives and strategy)	*	*	*		*
Assessment of alternatives and identification of research projects	*	*	*		*
Prioritization of projects	*	*	*		*
Irrigation policy recommendations for implementation in the sector	*		*	*	*

Source: After Collion et al. 1992.

Pretty and Chambers (1994) argue that the CGIAR of which IIMI is a member is not adequately alert to fill two global lacunas which exist in international agricultural research. These are:

* The development and dissemination of methods for analysis conducted by farmers themselves; and

* The approaches and methods for changing the behavior, attitudes and beliefs of scientists.

The important shift in research focus which recently occurred at IIMI from the management of the irrigation system towards irrigated agriculture offers a good opportunity for water users to participate in IMR. While it can be concluded from the reviewed case studies that IIMI has been conducive in creating room for water or resource users to form a partnership with IIMI

professionals, this does not necessarily mean that farmers had a voice on the research agenda. In all three IIMI examples the research design was primarily done by the professionals.

This conclusion suggests that, shifts are required in IIMI's research development procedures (as described above) and that different approaches and methodologies are needed to facilitate researchers to conduct their work in a different manner. The matter is obviously "how?" Through experimental training approaches, through a revised recruitment policy, through a redefinition of the irrigation paradigm, adjusting its focus to more adaptive research, or through wider collaboration with other International Agricultural Research Centers (IARCs) or National Agricultural Research Centers (NARCs)?

All of the above seem to be pleading for different choices of clients, new professional attitudes and values and research design and methodologies in irrigation IMR—in other words for a new paradigm for irrigation research. Basically, the new irrigation research paradigm seeks to enable water users (and other stakeholders) to identify research priorities in IMR and to remain involved in the subsequent stages of the implementation process (including monitoring and evaluation of the impacts and effects).

The emergence of this new irrigation paradigm at IIMI runs parallel to the need expressed by Conway et al. (1994) to exploit new research paradigms in international agricultural research. This vision statement for the CGIAR[20] proposes guidelines which should assist the CGIAR in its role in the international research effort. Two of these principles are: (i) subsidiarity, the responsibility for a research activity should be placed at the lowest level of the hierarchy; and (ii) CGIAR research centers should seek partnerships. Applying these principles, Conway et al. envisage, among others, collaborative strategic research programs as a type of global research programs. An example would be: *development and understanding of user participatory approaches in the design and management of irrigation* (Conway et al. 1994:57). Thus, the opportunity is there and only to be seized by IIMI.

FOLLOW-UP FOR IIMI

At IIMI, priority should be given to find ways to expose researchers in a systematic way to methods and methodologies, for them to have an improved choice of appropriate methods and methodologies at the design stages of their research activities. Practically, this would mean to initiate an in-house discussion on this issue, and publish widely on problems and opportunities of different research methodologies which IIMI staff has been using under a wide variety of environmental, socioeconomic, institutional and agro-ecological conditions.

In the short term, IIMI should seek partnerships with national and international institutes which have a wide experience with farmer-led research and application of participatory research tools. Some of these institutes could be sisters of the CGIAR (e.g., ICRISAT, CIAT), while other links with NGOs could be pursued as well (e.g., AKRSP, IIED). In addition, IIMI should take an active role in contributing to the PRA Networks which have been established all over the world.

[20]This paper quotes the IIMI-Nepal example as a case of farmer participation in agricultural research and development.

IIMI has already made a few steps in the direction advocated in this paper. In addition to the SCOR Project which has been extended, there are several other projects in which PRA will be applied. A collaborative study, focused on the role irrigation plays in water users' broader livelihood strategies, has been developed by IIMI and IIED (IIMI and IIED 1995) and is envisaged to commence in 1996. The German Agency for Technical Cooperation/Ministry for Economic Cooperation, Germany (GTZ/BMZ) will support a research program on privatization and self-management of irrigation systems in developing countries. This project of IIMI's Local Management of Irrigation Systems will apply PRA to *elicit and depict farmer perceptions of the turnover arrangements and process how turnover has affected irrigation system performance, gender roles in irrigated agriculture, cost of water and agricultural productivity and profitability (IIMI 1995b)*. IIMI and IFPRI are developing a research titled *Institutional Framework for Improved Sustainability and Productivity of Irrigated Agriculture in Pakistan* (IIMI-IFPRI 1995). In this project, an interdisciplinary methodology of combining PRA and other in-depth research methodologies will be applied to analyze and quantify the impact of institutions on the performance of irrigated agriculture. Finally, in a Dutch-supported project in Pakistan, IIMI will use PRA and stakeholder analysis to explore perspectives of the different actors of a particular irrigation system in the Punjab.

This list of examples of (potential) research programs indicates that PRA will one way or another find its place in IMR. This Working Paper is a starting point for more integrated thinking on PRA approaches in IIMI, that may lead to a steady development and "institutionalization" of the use of PRA for IMR. However, a key factor in the success of this "institutionalization" will be a comprehensive evaluation of PRA methodologies tested for their relevance and usefulness in IMR.

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Appendix I

Description of PRA Tools and Techniques

THIS OVERVIEW IS almost entirely drawn from Chambers (1994a), with additions from Pretty and Scoones (1991) and Mascarenhas et al. (1991).

PRA TOOL	DESCRIPTION
Secondary sources	Files, reports, maps, aerial photographs, satellite, imagery, articles and books
Semi-structured interviews	Mental or written checklist, open-ended and flexible
Key informants	Who are the experts and finding them (local resource persons)
Groups	Various kinds (casual; specialist/focus; deliberately structured; community/neighborhood); important element of PRA
Do-it-yourself	Asking to be taught, being taught, and performing village tasks
They do it	Villagers as investigators and researchers; they do the analysis and present the results
Participatory analysis of secondary sources	For example, analysis of aerial photographs (1:5,000) to identify village conditions
Participatory mapping and modeling	Local people use the ground, floor or paper to make social, demographic, health, natural resource, service and opportunity and farm maps, or construct three-dimensional models of their land
Transect walks	Walking with or by local people through an area, observing, asking, listening, discussing, identifying different zones, soils, land uses, vegetation, crops, etc.; seeking problems, solutions and opportunities and mapping and diagramming the zones, resources and findings

(Continued)

PRA TOOL	DESCRIPTION
Time lines and trend and change analysis	Chronologies of events, people's accounts of the past, of how things have changed
Oral histories and ethno-biographies	Oral and local histories of, e.g., a crop, an animal
Seasonal calendars	By season or month to show seasonal changes
Daily time use analysis	Indicating relative amounts of time of activities
Livelihood analysis	Stability, crises and coping, relative income, expenditure, credit and debt, multiple activities, often by month or season
Participatory linkage diagramming	Linkages, flows, connections and causality (cause-effect-local response relationships
Institutional of "Chapati" or Venn diagramming	Identifying individuals and institutions important in and for a community, or within an organization, and their relationships
Well-being and wealth groupings and ranking	Identifying groups or rankings of households according to well-being or wealth leading to the identification of key indicators of well-being
Analysis of difference	By gender, social group, wealth/poverty, occupation and age. Identifying differences between groups, including their problems and preferences. Contrast comparisons: asking one group why another is different or does something different, and vice versa
Matrix scoring and ranking	Matrices and seeds to compare through scoring, e.g., varieties, development alternatives
Estimates and quantification	Local measures, judgements and materials, sometimes combined with participatory maps and models, matrices, card sorting and other methods

(Continued)

PRA TOOL	DESCRIPTION
Key probes	Questions which can lead direct to key issues such as: "what are your major problems in irrigated agriculture?"
Stories, portraits and case studies	Household history and profile, coping with a crisis; how a conflict was or was not resolved
Team contracts and interactions	Contracts drawn up by teams with agreed norms of behavior; modes of interaction within teams, including changing pairs, evening discussions, mutual criticism and help; how to behave in the field, etc.
Presentation and analysis	Maps, models, diagrams and findings are presented by local people, or by outsiders, and checked, corrected and discussed
Sequences	The use of methods in sequence, e.g., participatory social mapping leading to the identification of key informants or analysts, or leading to the sequence: household lists -> wealth or well-being ranking or grouping -> focus groups -> matrix scoring and preference ranking
Participatory planning, budgeting, implementation and monitoring	Local people prepare their own plans, budgets and schedules, take action, and monitor and evaluate progress
Group discussion and brainstorming	By local people alone, by focus groups of local people, by local people and outsiders together, or by outsiders alone
Short standard schedules or protocols	Either for very short and quick questionnaires, or to record data (e.g., census information from social mapping) in a standard and commensurable manner
Report writing	As soon as possible preferably in the field before returning to office or headquarters

(Continued)

PRA TOOL	DESCRIPTION
Night halts	Interaction between outsiders and villagers are facilitated by staying in the village, which is an explicit indication of commitment by outsiders to village and village life
Self-correcting notes and diaries	Private diaries, what should go better next time, what lessons to learn?
Survey of villagers' attitudes	Helps ensure outsiders to be explicit about their work
Intriguing practices and beliefs	To encourage outsiders to give credence to indigenous practices and beliefs (which do not necessarily coincide with scientific thinking)
Traditional management system and local resources inventory	How do local people manage water, trees, credit, etc., using local classifications
Folklore, songs and poetry	Reveals values, history, practices, who knows and who does not
Futures possible	How would you like things to look in a year's time? What would happen if nothing is done?
Slide inventories	Slide programs for villagers by taking a projector and showing what has happened in other PRAs which encourages cross-connections between different villages

Sources: Chambers (1994a), Pretty and Scoones (1991) and Mascarenhas et al. (1991).

IIMI's IMR Principles and Types

IIMI HAS ADOPTED the following principles (IIMI 1992a) for its research program to improve the performance of irrigated agriculture.

* Research will involve the measurement of irrigation performance at various levels, and the use of quantitative performance measurements as objective criteria for defining environmentally sound and lasting improvements in irrigated agriculture;

* IIMI's research process will include the formulation of objectively testable hypotheses about the cause and effect linkages in irrigation management processes. In this way, the consequences of interventions can be predicted;

* IIMI's research process will include an analysis of interactions between the design of an irrigation system and its management in a given environment. The constraints imposed by physical conditions will be distinguished from those imposed by management conditions.

In its research program IIMI employs mainly the following types of research: *collaborative field research* which is normally conducted through specific projects in active collaboration with national agencies; and *generic research* which entails evaluating and comparing the findings and results emerging from field research across countries and regions, yielding results with multi-country applicability. An important element of the latter type of research is **undertaking research on research methodologies** in the special context that irrigation management provides, i.e., a socio-politically complex topic in an area of unreliable or nonexistent data.