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USING PARTICIPATORY RESEARCH AND GENDER ANALYSIS IN NATURAL RESOURCE MANAGEMENT

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1.0 INTRODUCTION

The use of participatory tools and methods has increased dramatically in natural resource management (NRM) over the past decade, largely because of the recognition that sustainable NRM cannot be achieved without involving the individuals and communities who make decisions about how resources are used. Participation of resource users and other stakeholders is important not only in the management of resources, but also in research oriented toward the generation of information and innovations that shape how resources are understood and exploited. Although there is extensive literature on participatory tools and methods and a growing number of case studies of their use in NRM (Hinchcliffe et al; IDRC; Pretty), it is difficult to form a coherent overview of this body of work, much of which is unpublished. Moreover, the distinction between participatory ***research*** and participatory ***management*** is seldom made, either in case studies or in the guides to tools and methods. Yet participatory management that is not firmly linked to research—understood as a process of knowledge generation that supports technical and institutional innovation—is often hindered by a lack of new technical options, information and institutions.

There has been little systematic analysis of how participatory research (PR) methods and gender/stakeholder analysis (GSA) are being used in NRM research. [1] This study begins to fill the gap by providing a comparative analysis of over 60 participatory NRM research projects compiled by the Systemwide Program on Participatory Research and Gender Analysis (PRGA). The paper looks at who is doing PR research and GSA in NRM, where, how and with what observed or expected impact. Projects are assessed in terms of the type of participation they use, how they select participants, and whom they target as beneficiaries. The costs and benefits associated with incorporating user participation are also analyzed.

Given that the PRGA is trying to mainstream the use of PR and GSA in the CGIAR, special attention is given to differences between projects of the international agricultural research centers (IARCs). Thus the inventory will enable the PRGA to benchmark where the IARCs are compared to other institutions such as non-governmental organizations (NGOs), universities, and national agricultural research systems (NARS).

The results of the analysis are useful not only for characterizing current practices with regard to PR and GSA in NRM research, but also for helping identify priority areas and issues for future analysis. Such analyses are critical if the incorporation of user perspectives and participation are going to fulfill their promise as a means of improving the efficiency, equity, and impact of NRM research.

[1] Research is defined here as a process in which problems are identified (design stage), solutions are found and tested (testing stage), and as a result the target group adopts a technology or other type of innovation (dissemination stage). Therefore, a project must include at least one of these stages of innovation in order to be considered a research project.

This study is organized as follows: Section 2 describes the data collection process, and Section 3 describes the projects in the inventory. Section 4 looks how users are incorporated into projects, including types of participation, methods for participant selection, and the targeting of beneficiaries. Section 5 focuses on gender and stakeholder analysis. Section 6 looks at costs and benefits of using PR and GSA, as reported by projects. Section 7 compares IARC and non-IARC projects, and Section 8 summarizes and concludes.

1.0 THE SURVEY PROCESS

With the goal of obtaining as comprehensive an inventory as possible of the projects using PR and GSA in NRM research, over 500 questionnaires were sent out between October 1999 and May 2000. The main sources for potential cases were:

- ✓ The World Bank data base of approximately 400 community NRM projects[2]
- ✓ A Natural Resource Institute (NRI)-sponsored workshop on PR in NRM
- ✓ Applications (130) for small grants from the PRGSA Program
- ✓ Approximately 200 participants at PRGSA Program workshops
- ✓ A review of the literature on PR and NRM
- ✓ Recommendations from experts in the fields of NRM, PR and GSA
- ✓ Cases submitted for inventory through the PRGSA Program's listservs.

As of June 20, 61 usable responses had been received.[3] The principal reason for this seemingly low response rate is that the initial 500 cases contacted included both participatory NRM research and participatory NRM projects. The survey instrument was designed to distinguish between projects that had a research component and those that were engaged solely in NR management and development. Non-research cases would not be able to answer the questions, and would therefore not complete the survey.

Thus the cases on which this analysis is based constitute a self-designated, self-selected subset of projects doing participatory research in NRM. While we attempted to get as representative a sample as possible, several possible bias should be acknowledged. Given that a CGIAR program did the data collection, CG-affiliated projects may be over-represented in the sample. Because the survey was done via email or fax and in English, it is also likely that the results are biased towards projects with access to good telecommunications technology and English-speaking staff[4]. Additional Spanish- and French-language cases are currently being added to the inventory. Finally, it is important to note that the data collected in this survey represent a self-assessment of each project.

[2] Give the website here
[3] Responses that arrived after June 20, 2000 were included in the inventory, but not the analysis.
[4] Some Spanish responses were received and translated

2.0 ANATOMY OF A PARTICIPATORY NRM PROJECT[5]

According to the inventory, participatory NRM research projects are found throughout the developing world. Africa has the most projects in the inventory (22), followed by Asia (20), Latin America and the Caribbean (LAC) (13) and the Middle East (3).

The typical project works at the community level (40%), however projects range from sub-community to transnational in scale (Table 1). The "median" project works with 1000 beneficiaries households in an area 677 square kilometers, however again this is highly variable (Table 2). The mean number of households per project is 12, 528 and the mean geographic size is over 56,000 kms^2. Contrary to popular belief, participatory research projects need not be small-scale and site specific.

Projects work on a variety of resources and technologies[6]. The most common resource across all projects is soils; nearly half the projects worked on soil-related topics (Table 3). Water was the second most popular resource, followed by forests and biodiversity. Across the regions, the same resources continue to be identified as most common, however their order of priority changes.

Institutional/ organizational innovations were the most common technology on which projects reported working practices were the second most common technology in Africa; while in Asia and LAC, it was agroforestry.

Half the projects in the inventory reported working with more than one natural resource or technology, which is consistent with the fact that farmers and other resource users generally take a more integrated, holistic view of the natural environment than researchers or development workers, who are accustomed to breaking it down along sector and disciplinary lines. The average project worked on 1.9 resources, using 2.4 different types of technologies (Table 5). The number of technologies that a project works with varies significantly by scale, but the number of resources does not.

Virtually all projects are collaborative efforts between different types of R&D organizations, however in general one organization took the lead with respect to research aspects of the project. IARCs took the lead in 37% of projects, followed by NGOs (16%), universities (12%) and NARS (9%) (Table 6). As mentioned earlier, some of this IARC-dominance may be due to a bias in response rate in favor of IARCs, however these data do not suggest that NGOs and, particularly, NARS are playing a leading role in participatory NRM research. Given their focus on adaptive research, these organizations are expected by many to be leaders in participatory NRM. They are often involved in projects but not in the lead role, which suggests that they might be in a learning phase with respect to participatory research methods.

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[5] What is presented here is a brief description to give the reader a flavor of what the projects are like. For further information, the reader is referred to the extensive tables in Appendix B or to the inventory itself.

[6] Technology" is broadly defined here to include institutional innovations, agronomic and management practices, as well as more conventional biological, chemical, or mechanical innovations

The projects in the inventory are all relatively recent, with the oldest beginning in 1988 (Table 7). Half began after 1996, and the median starting year was 1997, the same year the PRGA program was established. While there was likely some bias in the response rate towards ongoing projects, the fact that projects are recent is also consistent with the relative novelty of both participatory approaches and NRM research in general. The average project lasts 4.2 years.

4.0 User participation in NRM research

The impact that user participation will have upon a project and its goals is clearly affected by both the role that participants play in the research process, and by the specific characteristics of the participants themselves.

4.1 Types of participation

To better understand the role that users are playing in the research process, respondents were asked about the types of participation that they used at different stages of the innovation process, based on a typology developed by Lilja and Ashby (1999). In this typology, the innovation process is divided into 3 stages, design, testing and dissemination. Each stage consistent of activities; there are a total of 16 activities in the innovation process. Type of participation is based on who makes the key decision in the innovation process and five different types of participation can be distinguished:

- *Conventional*. Scientists make the decision alone without organized communication with farmers.
- *Consultative*. Scientists make the decision alone after organized communication with farmers. Scientists know about farmers' opinions, preferences and priorities through organized one-way communication with farmers. Scientists may or may not let this information affect their decision. The decision is not made with farmers nor is it delegated to farmers.
- *Collaborative*. The decision is shared between farmers and scientists based on organized two-way communication. Thus both scientists and farmers know about each other's opinions, preferences and priorities; and the decisions are made jointly. No party has a right to revoke the shared decision.
- *Collegial*. The decision is made by farmers collectively in a group process or by individual farmers who are involved in organized communication with scientists. Farmers know about scientists' opinions, preferences, proposals and priorities through organized two-way communication. Farmers may or may not let this information affect their decision. When this type of PR is initiated, a scientist may be facilitating the collective or individual decision-making of farmers or may have already built the farmers' capacity to make the decision without outsider involvement. Farmers have a right to revoke their decisions.
- *Farmer experimentation*. Farmers make the decision individually or in a group without organized communication with scientists.

The vast majority of projects in the inventory report that they do consultative or collaborative research in each stage and activity (Table 8). [7] Relatively few projects report using collegial participation at any stage, which shows that while researchers are willing to share control with users, they are not inclined to cede decisions-making authority to them.

Since the data in Table 8 include all projects that reported working at a particular stage, they do not let us see how participation varies between research activities and stages within a specific project. To get a better idea of intra-project variation in type of participation, a matrix of correlation coefficients for activities was calculated for the 16 activities in the research process. These coefficients tell us how the type of participation used in one activity is related to the type used in another. A high correlation between two activities means that if a certain type of participation is used in one, it is very likely that it is also used in the other.

According to these data, the strongest correlations are found in the latter stages of the research process (Table 9). At the end of the testing stage (T11-T12) and throughout the dissemination stage (D13-D16), projects tend to use the same type of participation in all activities (Table 9). In earlier stages of the research process, the correlations among activities are much lower. In the design and early part of testing stages, projects show less correlation between activities, which means that projects jump from one type of participation to another as they move from activity to activity.

A detailed analysis of the implications of type of participation for project outcomes and impacts is beyond the scope of this paper, but wil be undertaken in a separate document (Lilja et al, forthcoming).

4.2 Selection of participants

The specific characteristics of the participants, as individuals and representatives of social, cultural or economic groups, form a crucial part of the participatory research process that affects impact and the "quality" of the participatory research process. One key to determining who the participants are is to look at how they were selected.

Self selection of participants or selection based on "efficiency" criteria such as knowledge, skills or status in the community might be expected to produce participants who not only find it easier to participate in research, but also make a qualitative difference to the process of participation because of their above - average education, literacy or other skills. Self-selection is also the approach which is probably the least pro-active and most susceptible to gender bias and/or elitism. The better-off have time and self-confidence to participate; women seldom do. Community-selection may be susceptible to the same kinds

[7] It is important to point out that these data include both completed projects and projects that are still ongoing. To the extent that expected and actual participation differ, the data would be biased toward the former. There is, however, no systematic relationship between them as there are examples of both in the cases.

of bias unless specific criteria are agreed upon that promote the inclusion of disadvantaged groups.

In order to address the question of the extent to which participatory research projects are actively seeking to improve the inclusion of poor and disadvantaged groups into the research and innovation process, the inventory asked for information on how participants were selected. Most projects used a combination of researcher, community- and participant self-selection (Table 10.) Of those projects that used only one method, community selection on the basis of knowledge, skills and/or social status was most popular, followed by voluntary self-selection.

Only 2.1% of the projects selected participants exclusively on the basis of equity criteria. Another 27% of the projects used equity as a criterion, either alone or in combination with others. These figures suggest that most projects using PR need to pay closer attention to how methods of including different social groups affect the process of participation as well as the results. In particular, if equity is not used as a criterion for inclusion, then bias may creep into the distribution of any direct benefits that result directly from participation in the process.

5.0 Use of Gender and Stakeholder Analysis

5.1 Use of GSA

Seventy two percent of projects report using gender and stakeholder analysis. While there is some variation, use of gender analysis appears to be relatively high (greater than 60%) across all geographical areas, major categories of resources and technologies, types of organizations, and scales and sizes of project (Tables 11-14). Projects that report using gender analysis have a larger average size in terms of area (77,237 kms vs 14,361 kms) and number of households (14,005 vs. 8,098) than projects that do not use gender analysis, which suggests that there is not a trade off between project coverage and use of GSA.

The relative prevalence of gender analysis stands in sharp contrast to the findings of the previous section which reported that few projects used selection criteria designed to obtain participation of marginalized groups such as women or the poor. In order to get a better understanding of how and why projects were using GSA, respondents who reported using GSA were asked to identify which type(s) they used.[8] Three types were identified:

- *Diagnostic GSA*. Gender differences in the client group(s) for the research are described, and different problems or preferences are diagnosed. This information is not taken into account in priority setting, design of solutions for testing or their evaluation and adoption. Diagnostic GSA may come to the conclusion that gender differences are not an important criterion for designing the research; or it may identify gender differences as an obstacle

[8] See Lilja, Ashby and Sperling (2000) for details about the gender typology. (Quito intro.)

to adoption of technical solutions for men or women members of the client group.

- *Design-oriented GSA*. In addition to describing gender differences in the client group with respect to their problems and preferences, different R&D paths are designed that take into account gender-based constraints, needs and preferences. Design-oriented GSA may result in different technologies being developed and adopted by men and women, and these may require different dissemination approaches.
- *Transfer-oriented GSA*. In addition to describing gender differences in the client group with respect to their problems and preferences, different adoption and dissemination paths are designed to overcome access to and adoption of a given technology known/assumed to be of similar importance to men and women. Transfer-oriented GSA results in the same technologies being disseminated to men and women in different ways.

Transfer oriented gender analysis is the most common (45%) followed by diagnostic and design (28 percent each) (Table 15). The prevalence of transfer-oriented GSA among projects, especially those that report working at all stages of the research process, indicates that women are being brought into the research process at a relatively late stage, when technologies have already been identified and tested and are ready for dissemination. This would be consistent with women's relatively low levels of participation in the research process, and may mean that women are expected to adopt technologies that may not be appropriate for their specific needs and constraints.

6.0 Benefits and costs of using PR and GSA

Because of the nature of participatory research, projects are likely to bring both direct and indirect benefits. Direct benefits are those that result from participation itself, and indirect benefits results from the outputs produced by the research. The former we term process outcomes, and the latter, technology impacts. While only 46 percent of projects did systematic impact assessment, most were able to give subjective estimates about incidence of impact. Using the responses of 13 projects that had either completed their activities or were expected to complete them in 2000, the following sections examine the types of outcomes and impacts reported. Before looking at the specific benefits and costs associated with participatory NRM projects, it is useful to look at who the projects intended beneficiaries were.

6.1 Beneficiaries

Ninety five percent of projects reported that their intended beneficiaries were either the community in general or farmers in particular (Table 16). Of these projects, an additional 26 percent reported targeting women, and 18 percent reported targeting the poor. No project reported targeting women or the poor exclusively. This is consistent with earlier findings regarding participant selection and gender analysis, and suggests that these groups may not receive a large share of either direct or indirect benefits.

6.2 Process outcomes

The incorporation of beneficiaries in the innovation process can affect the efficiency of the research process itself. The interaction with researchers may affect the beneficiaries as well, both at the individual and community levels, by building social and human capital.

6.2.1 *Impact on the research process*. Participation was hypothesized to affect the research and technology generation process in four potential ways:

- Feedback links are formed or strengthened between participants and researchers
- Researchers and/or research institutes change their priorities; e.g., identification of problems, solutions or beneficiaries groups
- Researchers and/or research institutes change their practices; e.g., use of participatory tools institutionalized
- Changes in the pattern of diffusions of technologies, e.g., faster adoption or higher adoption ceilings

Forming of feedback links and changing research priorities were the most common impacts on the research process, with 62 percent of projects reporting them. Fifty four percent of projects reported changes in the shape of the diffusion curve. Only thirty eight percent reported a change in research practices at their research program or system level, suggesting a relatively low level of institutionalization of participatory research as a result of the projects.

6.2.2 *Human capital impact*. As a result of involvement in the research process, the following human capital impact were hypothesized to occur among participants:

- The development of specific agricultural or project skills through training
- The strengthening of general analytical skills and problems solving capacity
- The empowerment of participants to address problems outside the context of the specific project.

Projects in the inventory were more likely to report general human capital impact such as strengthening of analytical capacity and empowerment than the development of specific, project-related skills. Specific skills were developed in 54% of the projects; and general analytical capacity and empowerment were reported by 69%. These results support the assertion that there are direct equity issues involved in selecting participants.

6.2.3 *Social capital impact*. Incorporating users in the research process was expected to have the following potential impact on social capital

- ✓ New organizations formed
- ✓ Internal organizational capacity strengthened
- ✓ Capacity of community to work with external organizations strengthened
- ✓ Conflict reduced

In general, the incidence of social capital impact is lower than the other types of process outcomes. The most common social capital outcome was the strengthening of organizational capacity (62%). Only 46% of the projects reported establishing new organizations, which suggests that a significant number of projects are trying to work through existing community organizations rather than establishing new ones. The same number of projects also reported observing an improvement in the communities' ability to work with outside external organizations. Conflict reduction was reported by 31% of the projects as a result of their activities.

6.3 Technology impacts

While the previous section focused on process outcomes, this section focuses on the impacts of the final technologies and other innovations produced by the projects. Respondents were also asked whether they had observed any of the following socioeconomic or environmental impacts:

- ✓ Adoption rates
- ✓ Production increases
- ✓ Increased income
- ✓ Effects on welfare/poverty
- ✓ Equity effects

Seventy three percent of projects reported observing adoption. Sixty four percent reported income increases associated with adoption. Only 27 percent reported production increases, which suggests that this is not the path through which NRM technologies generate benefits. Forty five percent of projects observed equity effects, which mean improvements in resource distribution. Twenty seven percent reported effects on poverty and or welfare.

Eighty two percent of projects reported observing environmental impact.

6.4 Costs of using PR and GSA

Both the costs and cost effectiveness of PR and GSA are important topics about which relatively little is known. While the cost-effectiveness issue was not addressed directly, respondents were asked whether they thought that incorporation of these approaches affected costs. It is hypothesized that the costs of PR would be higher for than conventional research at the onset because project staff need to acquire new skills in this area. Moreover, the cost of interacting with the beneficiaries is an additional cost compared to conventional research. In the long run, however, some of the research costs would be transferred to the beneficiaries as they become involved in the research, contributing their time, skills and resources. It is also to be expected that benefits would occur earlier than in conventional research, which would affect the overall cost-effectiveness of PR.

Almost half the respondents (46%) felt that PR increased the costs of doing research, while 33% felt that it decreased costs. The category "don't know"

(20%) includes two types of responses: those who said that costs first increased and then decreased without indicating a net effect, and those who did not answer because there was not an appropriate counterfactual for comparison.

According to the data, using gender analysis has less impact on costs than PR. Over half of respondents (55%) that used GSA said it did not affect costs. Twenty three percent said that it increased costs, and 3 percent said it decreased costs. Nineteen percent were not able to answer the question. Since the projects in the inventory all involved stakeholder participation in the research process, these results must be interpreted as the marginal costs of using gender analysis in a process that is already participatory, not as the cost of doing gender analysis in general. They should not be interpreted as costs of actively trying to incorporate women into the research process, since few of these projects appear to have done that.

7.0 IARC vs. Non-IARC projects

One of the goals of the inventory is to benchmark IARC projects with respect to projects of other research organizations. This sections examines difference between IARC and non IARC projects in terms of project structure and orientation, use of PR and GSA, impacts and costs.

7.1 Project characteristics

IARC and non-IARC projects do not differ significantly in terms of the location, scale, size or duration of projects. They do differ with respect to the number and type of technologies they work with. IARC's work with fewer resources per project than non-IARCs, 1.38 for IARCs versus 2.22 for non-IARCs (Table 17). Most IARCs are mandated to work with specific commodities and/or in well-defined agroecological environments. This, combined with their strong emphasis on research, is consistent with a narrow project focus. Universities and multi-institutional partnerships had the highest number of resources and technologies per project.

The more narrow resource focus of IARC projects is reflected in the data on the resources the different types of organizations work on (Table 18). Non-IARC projects report working on 9 of the 10 resource categories while IARCs only work on 7. Of the main resources worked on by both IARC and non-IARC projects (soils, water, biodiversity, and forests) a larger percentage of non-IARC than IARC projects reported working on each one. This is simply another way of showing the more narrow focus of IARC projects and their lower level of overlap among projects in terms of the types of resources studied. This is consistent with the fact that IARCs are part of a global system in which mandates are set in a coordinated manner to minimize duplications, however it may also imply a less integrated approach to dealing with NRM issues.

With respect to technologies, projects may not differ in number of technologies per project but they do differ with regard to the types of technologies used (Table 19). Non-IARC projects are significantly more likely to report working with institutional innovations and agronomic practices than IARC projects.

IARC projects are significantly more likely to work with soil conservation technologies. The difference with respect to soil conservation and agronomic practices is interesting and may reflect a greater emphasis on NRM by IARCs and on economic acceptability of technologies by non-IARCs.

7.2 Types of participation and selection of participants

7.2.1 Types of participation

IARcs and non-IARcs differ significantly[9] with respect to types of participation at certain stages of the research process. In the research stage, there are significant differences regarding who decides which solutions are available and appropriate (R4 in Table 10) and about who decides which solutions are worth testing. In both cases, there is a larger concentration of IARC cases reporting the farmer-experimentation type of participation.

In the testing stage, IARCs and non-IARCs report significantly different types of participation regarding who decides whether research should be on farm or on station (T9 in Table 10). The majority of non-IARC cases report collaborative participation while the majority of IARCs report conventional or consultative.

At the dissemination stage, IARCs and non-IARCs differ with respect to who decides when, to whom, and in what way to supply new inputs needed for adoption (D15 in Table 10). IARCs are more consultative and non-IARCs more contractual.

No clear pattern emerges from this comparison of types of participation by organization type. Further analysis of these relationships is left to Lilja, et al.

7.2.2 Participant selection

IARCs are more likely to rely on self-selection and community selection on the basis of specific skills, however these differences are not statistically significant at conventional levels (Table 10). In both cases, a large number of projects used multiple methods, and a planned future analysis is to disaggregate this category by type. What we can say now is that there is not a significant difference between IARCs and non-IARCs in the use of equity criteria in selecting participants. Non-IARC projects were twice as likely to include equity criteria--33 % of non-IARCs vs 17% of IARCs used it--but the difference is not significant.

7.3 Use of Gender Analysis

There were no significant differences between IARC and non_IARC projects with regard to gender analysis.

[9] P value in Pearson Chi square tests <.1

7.4 Benefits and Costs of Using PR and GSA

7.4.1 Benefits

In terms of the direct benefits or "process outcomes" associated with user participation in the research process, IARCs and non-IARCs only differ with regard to social capital impacts. Non-IARC projects were significantly[10] more likely than IARC projects to report strengthening internal organizational capacity in communities and reducing conflict. Eighty two percent of non-IARC projects reported strengthening organization capacity compared to 58 percent of IARCs. Thirty nine percent of non-IARC project reported conflict reduction as an impacts compared to only 11 percent of IARC projects.

With regard to indirect or "technology" impacts, IARC and non-IARC projects do not differ with respect to reported incidence of economic imapcts such as adoption, production increases, income or equity measures. They do differ significantly with respect to observed environmental impact, however. Eighty one percent of non-IARC projects report it compared to only 40 percent of IARC projects.

It should again be noted that these are projects' subjective estimates since many of the projects did not do systematic impacts assessment. Not controlling for types of methods used, non-IARC estimates of benefits may be more reliable than IARC estimates since non-IARCs were significantly more likely to have done impact assessment (Table 20). Sixty two percent of non-IARC projects did IA compared to only 21 percent of IARC projects.[11]

7.4.2 Beneficiaries

IARC projects were significant more likely to report their target group to farmers while non-IARC project reported it as the community.[12] This may be a semantic difference, however it suggests a real or mental bias towards agriculture and agricultural technologies on the part of IARC projects. There is no difference between IARC and non-IARC projects regarding their explicit targeting of women or the poor.

7.4.3 Costs of using PR and GSA

The costs associated with PR and GSA did not differ significantly between IARC and non-IARC projects.

8.0 Summary Discussion

According to the PRGA inventory, participatory NRM research projects can be found around the world, working on a variety of technologies and other innovations to improve the management of all major types of natural resources.

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[10] P value in Pearson Chi square tests <.1
[11] P value in Pearson Chi square tests <.1
[12] P value in Pearson Chi square tests =.001

Projects tend to take an integrated approach to NRM, developing several technologies for improving the management of multiple resources within a single project. The typical project works at the community scale, but the benefits are more widespread. The average project benefits 12,528 households in an area of over 56,000 kms.

IARCs are responsible for 37 percent of the projects, followed by NGOs (16%), universities (12%) and NARs (9%). The fact that the data collection was done by a CGIAR program may have biased the response rate in favor of IARCs. Nonetheless, the relatively small number of NARs project is disappointing given their important role in adaptive research.

Projects tend to use consultative or collaborative participation, although there is a great deal of variation within a single project in the type of participation used at different stages of the research process. The implications of this variation for project outcomes and impacts are currently being analyzed.

According to project estimates, participatory NRM research is generating both direct human and social capital benefits for participants and indirect benefits to users and the environment via the adoption of project technologies. Incidence of benefits appears to be high, however there may be cause for concern about about how these benefits are being distributed. Only twenty six percent of projects claimed women as specific targets of their projects, and only 18 percent were targeted towards the poor. This is worrying since the inclusion of marginalized groups and their unique perspectives is one of the underlying principles of participatory research.

Of particular concern is the use of gender analysis in participatory NRM projects. Nearly two thirds of projects claim to use gender analysis, however the most common form is “ transfer-oriented” which focuses on how to disseminate already-developed technologies to women. This approach is likely to overcome barriers to adoption such as availability or lack of information, however it does not address fundamental issues of appropriateness of a technology for women.

Data on methods of participant selection also suggest a lack of direct participation by women and other marginalized groups in the research process. Most projects rely on self selection or community selection on the basis of “efficiency” criteria such as education, skills, or status, methods that are likely to bias the process towards the favored groups in a society. Only 27 percent of project included equity as a criterion in the selection of participants.

Thus women and marginalized groups would not appear to be capturing the direct benefits of PR, and their ability to obtain indirect benefits depends critically on the extent to which they can adopt technologies generated by research processes in which they are not involved. Empirical evidence about whether women and the poor must participate in order to benefit from participatory research on NRM is needed.

Finally, this study documents several significant differences between IARC and non IARC projects in certain aspects of their methods and outcomes. Given the differences in their roles in the research system, specifically the IARC focus on strategic research, it is likely that some differences are to be expected. More work is needed on defining the appropriate roles of IARCs and other types of research organizations in participatory NRM research. These data can serve as a basis for identifying areas for future analysis and for benchmarking the current situation.

IDRC. Conflict management.

Lilja, N and JA Ashby. 1999. Types of PR based on locus of decision-making. PRGSA Working Paper no. 6.

Lilja, N, N Johnson, J. Ashby and J. Garcia, 2000, The empirical validity and implications of the PRGA participation typology , PRGA working paper (in progress)

Lilja, Nina, Nancy Johnson, James Garcia and Jacqueline Ashby, Empirical validation of a typology of user participation, (work in progress)

Pretty. Regenerating agriculture.

APPENDIX - TABLES

Table 1. Scale of projects

Project Scale	Number of projects
Sub-community	3
Community	18
Watershed	9
Regional/national	8
Other/multi-scale	15
All projects	59

Table 2. Size of project

Geographical area in which project worked (sq. kms) (n=24)		Number of households involved as participants or direct beneficiaries (n=32)	
Mean	Median	Mean	Median
56,971	677	12,528	1000

Number of observations varies since not all projects reported each measure

Table 3. Number of projects working on the resource, by region

Resource	ASIA	AFRICA	LAC	Middle East	World	Percent of all projects
Soil	7	12	6	2	27	47
Water	6	7	2	3	18	31
Bio-diversity	2	4	7	1	14	24
Forest	4	7	6	0	17	29
Irrigation	4	1	1	0	6	10
Fisheries	1	0	1	0	2	3
Coastal Resources	1	1	1	0	3	5
Rangelands	0	1	0	2	3	5
Human capital	3	0	0	0	3	7
Land/systems	1	6	2	0	9	15
Other*	6	1	2	1	9	17

* Other includes wildlife, habitats, medicinal plants, feed, and livestock

Table 4. Number of projects using a technology, by geographic location and use of gender analysis

Technology	Asia	Africa	LAC	Middle East	World	Percent of All Projects (n=56)
Agronomic practice	5	9	6	3	23	40.4
Agroforestry	6	5	8	1	23	36
Fertilizer	0	4	1	1	6	10.7
In situ conservation	2	4	5	1	12	21.4
Institutional/ Organizational	11	14	8	2	34	60
IPM	3	2	1	0	7	13
Mechanical cropping	4	1	0	1	6	10.9
Mechanical-irrigation	1	0	0	0	1	1.8
Pesticides	0	1	1	0	2	3.6
Crop or plant varieties	2	4	3	3	12	21.4
Soil conservation practices	0	2	1	1	4	7
Other*	2	4	3	1	14	18

*Other includes communications packages, tree domestication and *circa situ* conservation, culture, management training, flora inventory, livestock technologies, beekeeping, carpentry and artesania.

Table 5. Average number of resources and technologies per project, by project scale

Project Scale	Average number of resources per project (sd)	Average number of technologies per project* (sd)
Sub-community (n=3)	1.3 (.58)	1.7 (1.15)
Community (n=18)	2.17 (1.41)	2.4 (2.44)
Watershed (n=9)	2.3 (1.41)	3.1 (1.83)
Regional/national (n=8)	1.8 (.89)	2.0 (1.85)
Other/multi-scale (n=15)	1.9 (.83)	2.5 (1.55)
All projects (n=59)	1.9 (1.13)	(2.4) (1.88)

* Differences in number of technologies by scale are statistically significant (p value<.1 in Pearson Chi square)

Table 6: Percent of projects by type of research organization in charge

Type of Organization	Percent of All Projects
IARCs (n=21)	36.8
Non-IARC (n=36)	63.2
NARS (n=5)	8.8
NGO (n=9)	15.8
University (n=7)	12.3
Other (n=9)	15.8
Multi-institutional partnerships (n=6)	10.5

Table 7. Project initiation years, by region

	Asia	Africa	LAC	Middle East	All
	Number of Projects				
1988	0	1	0	0	1
1990	1	0	0	0	1
1991	0	0	1	0	1
1992	2	1	0	0	3
1993	0	0	1	0	1
1994	1	3	0	0	4
1995	3	1	1	1	6
1996	2	3	1	0	6
1997	2	3	1	0	6
1998	4	4	4	1	13
1999	4	4	2	0	11*
2000	0	1	2	1	4

*Contains one project that worked in multiple regions

Table 8. Types of participation by stage of innovation process at which they are used

Activity and stage	Conventional	Consultative	Collaborative	Collegial	Farmer Experimentation
Design	Number of projects using this type X participation in activity Y*				
R1 Who decides what is the target group or clientele at the research initiation stage?	10	20	13	4	2
R2 Who decides what are the topics, opportunities or the problems at the diagnosis stage?	2	17	22	4	3
R3 Who decides what is the most important problem or opportunity that has been identified for research?	4	11	23	7	2
R4 Who decides what are the available solutions and relevant information about the problem or opportunity?	4	13	21	5	0
R5 Who decides that the available solutions are not adequate and more information needs to be sought or generated to reach a potential solution?	6	14	18	7	0
R6 Who decides what is the relative importance of solutions that have been identified?	2	10	23	6	3
R7 Who decides which solutions are worth testing?	1	10	25	5	2
Testing					
T8 Who decides what is the target group or clientele for evaluating the potential innovations or technology options?	4	12	17	5	3
T9 Who decides whether to do the testing on farm or on station or both?	7	12	14	1	2
T10 Who decides what aspects of innovation or technology option are important to evaluate?	4	13	18	5	2
T11 Who decides what is the yardstick for measuring what is an acceptable solution or not?	2	14	20	4	3

T12 Who decides what is recommended to other farmers?	1	8	21	7	4
Diffusion					
D13 Who decides what is the target group or clientele for awareness building, validation and dissemination of tested innovation or technology options?	1	14	12	10	3
D14 Who decides when, to whom, and in what way to promote awareness of solutions and publicize information about it?	2	15	15	5	4
D15 Who decides when, to whom, and in what way to supply new inputs needed for adoption?	1	16	14	4	3
D16 Who decides when, to whom, and in what way to teach new skills needed for adoption?	2	12	21	4	1

*Row do not all sum to the same number because some projects reported using more than one type at a single stage while others did not do all stages

Table 9: Kendall's tau-b coefficients / Prob > |R| under Ho: Rho=0 / N=25

	R2	R3	R4	R5	R6	R7	T8	T9	T10	T11	T12	D13	D14	D15	D16
R1	0.600 0.001	0.490 0.008	0.335 0.072	0.547 0.003	0.317 0.088		0.569 0.002	0.518 0.006		0.382 0.038	0.466 0.012	0.582 0.002			
R2		0.686 0.000	0.433 0.019	0.338 0.068	0.449 0.015		0.452 0.014	0.503 0.007			0.322 0.079				
R3			0.679 0.000	0.505 0.006	0.750 0.000	0.417 0.025	0.593 0.001	0.517 0.006	0.479 0.010	0.394 0.032	0.508 0.006			0.353 0.055	0.363 0.049
R4				0.513 0.006	0.794 0.000	0.596 0.001	0.407 0.028	0.494 0.008	0.518 0.005	0.347 0.060	0.505 0.006			0.356 0.054	0.331 0.073
R5					0.612 0.001	0.310 0.096	0.665 0.000	0.566 0.003	0.577 0.002	0.445 0.016	0.431 0.020	0.480 0.009			0.333 0.072
R6						0.525 0.005	0.434 0.019	0.501 0.007	0.569 0.002		0.382 0.038			0.562 0.002	
R7							0.347 0.061	0.4109600 0.028	0.684 0.000	0.441 0.017	0.574 0.002	0.457 0.019	0.349 0.059	0.562 0.002	0.515 0.005
T8								0.645 0.001	0.365 0.048	0.536 0.003	0.524 0.004	0.644 0.000	0.517 0.005	0.452 0.014	0.442 0.016
T9									0.422 0.023	0.549 0.003	0.620 0.001	0.625 0.001	0.540 0.004	0.634 0.001	0.451 0.016
T10										0.645 0.000	0.467 0.011	0.431 0.019	0.451 0.014	0.456 0.013	0.557 0.003
T11											0.602 0.001	0.568 0.002	0.772 0.000	0.640 0.001	0.730 0.000
T12												0.547 0.003	0.494 0.007	0.705 0.000	0.665 0.000
D13													0.730 0.000	0.678 0.000	0.570 0.002
D14														0.761 0.000	0.761 0.000
D15															0.809 0.000

>0.8 >0.7-0.8 >0.6-0.7

Table 10. Methods of participant selection by type of lead research organization.

Type of Organization	Self-Selection	Researcher-Skill Based	Research-Equity Based	Community-Skill Based	Other	>1 Method
	% of projects using the method					
All projects (n=48)	17	6	2	29	2	44
IARCs (n=20)	30	5	0	35	0	30
Non-IARC (n=28)	5	5	2.5	17.5	2.5	37.5

Table 11. Number of projects and use of GSA by region.

Region	No. of Projects	% Using GSA[2]
Asia	20	68
Africa	22	82
Latin America & the Caribbean	13	60
Middle East	3	67
Total	58[1]	72

[1] Several projects either didn't report region or worked in multiple regions.
[2] Of those reporting use of GSA.

Table 12 Percent projects working on a natural resource topic that use GSA.

Resource	Total No. Projects	% of All Projects	% Projects Using GSA
Soil	27	47	74
Water	18	31	81
Biodiversity	14	24	85
Forest	17	29	79
Irrigation	6	10	40[1]
Fisheries	2	3	100
Coastal resources	3	5	50
Rangelands	3	5	100
Human capital	3	7	100
Land/systems	9	15	71
Other[1]	9	17	78

1 Includes wildlife, habitats, medicinal plants, feed and livestock.

Table 13. Number of projects using a technology and GSA.

Technology	Total No.	% of All Projects (n=56)	% Projects Using GSA
Agronomic practice	23	40.4	78
Agroforestry	23	36	78
Fertilizer	6	10.7	80
In situ conservation	12	21.4	90
Institutional/organizational	34	60	64
IPM	7	13	80
Mechanized cropping	6	10.9	50
Mechanized irrigation	1	1.8	100
Pesticides	2	3.6	100
Crop or plant varieties	12	21.4	80
Soil conservation practices	4	7	50
Other[1]	14	18	100

[1]Includes communications packages, tree domestication and *circa situ* conservation, culture, management training, flora inventory, livestock technologies, beekeeping, carpentry and handicrafts.

Table 14 Gender Analysis by Scale

Scale	Percent Using GA (n=50)
Sub-community (n=3)	67
Community (n=6)	78
Micro-watershed (n=4)	50
Watershed (n=4)	50
Regional (n=6)	100
National (n=1)	100
Other (n=4)	71
Multi-Scale (n=7)	43

Table 15. Type of GSA used by projects.

GSA	All Projects (n=33)	Projects Using Only One Type of GSA (n=29)
Diagnostic	33	28
Design-oriented	33	28
Transfer-oriented	58	45

Table 16 Target groups by type of research organization, percent

	Communit y*	Farmers *	Women	Poor
	Percent of projects reporting beneficiary category**			
IARC (n=20)	25	75	20	15
Non-IARC (n=34)	23.5	67.6	29	19
All (n=54)	52	43	26	18

- The difference between IARC and non-IARC projects with respect to targeting farmers or the
  community is significant, p. =.001

Table 17. Number of resources and technologies per project, by organizational type.

	Avg. No./Project	SD	Maximum
Resources[1]			
IARCs (n=21)	1.38	0.50	2
Non-IARCs (n=36)	2.22	1.29	5
NARS (n=5)	1.80	0.84	3
NGOs (n=9)	1.67	1.12	4
Universities (n=7)	3.14	1.57	5
Other (n=9)	2.00	1.12	4
>1 type (n=6)	2.67	1.37	5
Technologies			
IARCs (n=20)	1.95	1.43	5
Non-IARCs (n=36)	2.64	2.07	9
NARS (n=5)	2.8	1.79	5
NGOs (n=9)	1.89	1.27	5
Universities (n=7)	3.29	2.29	6
Other (n=9)	2.00	2.00	6
>1 type (n=6)	3.83	2.86	9

[1] Difference between IARC and non-IARC projects in terms of no. of resources is statistically significant at level <.05

Table 18. Percent projects working on a resource, by organizational type.

Resource	IARCs (n=21)	Non-IARCs (n=38)	NARS (n=5)	NGO (n-9)	Universities (n=7)	Other (n=9)	Multi-institutional (n=6)
Soils	38	50	40	44	57	33	83
Water	10	42	40	22	43	44	67
Biodiversity	14	29	20	33	57	22	17
Forest	14	37	20	33	71	22	50
Irrigation	10	11	0	0	14	0	50
Fisheries	0	<1	20	11	0	0	0
Coastal resources	0	<1	0	11	0	11	0
Rangelands	0	<1	0	0	29	11	0
Human capital	19	0	0	0	0	0	0
Land	14	16	20	0	14	33	0
Other	19	16	20	11	29	44	0

Table 19. Percent projects working on technology type, by organizational type.

Technology	IARCs (n=20)	Non-IARC (n=37)	NARS (n=5)	NGOs (n=9)	Univ. (n=7)	Other (n=9)	Multi-institutional (n=6)
Agronomic practice*	25	49	60	22	57	33	83
Soil-conservation technology*	15	<1	0	0	0	0	17
Fertilizer	15	<1	0	0	14	11	17
Agroforestry	35	36	60	44	43	22	17
Varieties	20	22	20	11	29	22	33
In situ conservation	20	22	0	22	57	11	17
Institutional/ Organizational**	38	73	80	67	86	78	50
IPM	15	11	20	0	14	0	33
Mechanized cultivation	10	11	20	0	14	0	33
Mechanized irrigation	0	<1	0	0	0	0	17
Pesticides	0	<1	0	0	14	0	17
Other	5	24	20	22	0	22	50

* = p value < .1 and ** = p value < .01

Table 20. Use of impact assessment, monitoring and evaluation (M&E).

	Impact Assessment Done?[1]	M&E Done?	M&E Participatory?	M&E Resulted in Changes?
	% Projects Answering Yes to Questions			
IARCs (n=19)	21	74	93	75
Non-IARCs (n=29)	62	66	89	69
NARS (n=5)	22	40	100	0
NGO (n=7)	57	71	80	60
University (n=5)	60	100	100	100
Other (n=8)	88	38	67	100
>1 (n=4)	75	100	100	75
All (n=48)	46	69	91	71

[1] Difference among all types of projects and among IARC and non-IARC projects was significant at level $p < .05$.

Future Harvest is a non-profit organization that builds awareness and support for food and environmental research for a world with less poverty, a healthier human family, well-nourished children, and a better environment. Future Harvest supports research, promotes partnerships, and sponsors projects that bring the results of research to rural communities, farmers, and families in Africa, Latin America, and Asia. It is an initiative of the 16 food and environmental research centers that are primarily funded through the Consultative Group on International Agricultural Research.

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The Consultative Group on International Agricultural Research (CGIAR) works to promote food security, poverty eradication, and sound management of natural resources throughout the developing world.

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In recent years the CGIAR has embarked on a series of Systemwide Programs, each of which channels the energies of international centers and national agencies (including research institutes, non-government organizations, universities, and the private sector) into a global research endeavor on a particular theme that is central to sustainable agriculture, fisheries, and forestry.

The purpose of the CGIAR Program on Participatory Research and Gender Analysis for Technology Development and Institutional Innovation (PRGA Program) is to assess and develop methodologies and organizational innovations for gender-sensitive participatory research and to apply these in plant breeding, and crop and natural resource management.

The PRGA Program is cosponsored by 4 of the 16 centers that make up the CGIAR: the International Center for Tropical Agriculture (CIAT), which serves as the convening center; the International Maize and Wheat Improvement Center (CIMMYT); the International Center for Agricultural Research in the Dry Areas (ICARDA); and the International Rice Research Institute (IRRI).

PRGA Program activities are funded by Canada's International Development Research Centre (IDRC), the Ford Foundation, the Rockefeller Foundation, and the governments of Germany, Italy, the Netherlands, New Zealand, Norway, and Switzerland.

CIAT's mission is to reduce hunger and poverty in the tropics through collaborative research that improves agricultural productivity and natural resource management. Headquarters in Cali, Colombia.

CIMMYT is a nonprofit scientific research and training organization engaged in a worldwide research program for sustainable maize and wheat systems, with emphasis on helping the poor while protecting natural resources in developing countries. Headquarters in Mexico City, Mexico.

ICARDA's mission is to improve the welfare of people through agricultural research and training in the dry areas in poorer regions of the developing world. The Center meets this challenge by increasing the production, productivity and nutritional quality of food to higher sustainable levels, while preserving or improving the resource base. Headquarters in Aleppo, Syria.

IRRI is a nonprofit agricultural research and training center established to improve the well-being of present and future generations of rice farmers and consumers, particularly those with low incomes. It is dedicated to helping farmers in developing countries produce more food on limited land using less water, less labor, and fewer chemical inputs, without harming the environment. Headquarters in Los Baños, The Philippines.

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