1 THE WORK OF THE REVIEW PANEL AND ITS REPORT

The Review Panel for the Participatory Research and Gender Analysis Systemwide Initiative included a plant breeder, a social scientist, and an agricultural economist. The CVs of the Panel members and the Terms of Reference are given in Appendices I and II. In October 2006, the Review panel participated in a one-week meeting of the Advisory Board (AB) of the PRGA in Entebbe, Uganda, and subsequently visited field sites and NARS in Kenya (KARI) and Rwanda (ISAR) to see the progress of the work on mainstreaming gender analysis and participatory research in ASARECA. During the first week of the AB meeting, the panel interviewed all of the board members and PRGA staff who attended the meeting (Annex 3). One Board member was absent from the meeting. Panel members participated in most of the AB's sessions, particularly those that focused on the review. The Panel also interacted with seven NARS participants who were active in the mainstreaming gender analysis and participatory research project. The following week, accompanied by the PRGA coordinator, the Panel met with NARS scientists and visited two sites where the gender analysis and participatory research focal points practiced their training from the project. The site in Kenya was a farmer field school that focused on the cultivation and processing of newly introduced orange-fleshed sweet potato. The site in Rwanda centered around the testing and dissemination of improved bean technologies.

This two-week visit was complemented by e-mail and telephone interviews with key informants to generate information for the Panel's report. A literature review, carried out by James Stevenson, of the ex-post impact of participatory research as documented by the PRGA and its partners was an integral part of this review to both inform the Program and to identify generic issues about the impact assessment of participatory research. Complementarily to this review, the Review Panel leader, Thomas Walker, wrote a background paper on participatory plant breeding for the *World Bank Development Report*, which focuses on Agriculture in 2008.

The Panel wanted to visit participatory plant breeding activities in Syria and Nepal, but the timing of the review was not opportune to allow us to see crops in the field. A planned visit to the Himalayan Consortium in Nepal did not materialize because of scheduling conflicts. An attempt to visit PRGA sites in Vietnam proved unfeasible because of the absence of a key researcher. A prospective inquiry of CGIAR Centers on their views of and participation in the PRGA was not carried out because recent surveys by the PGRA attempting to quantify the amount and character of participatory research in the CGIAR Centers covered much of the same ground. Unfortunately, the quality of these data has deteriorated over time as the Centers seem to be suffering from survey fatigue.

The PRGA is characterized by a broad, inclusive stakeholder constituency comprised of the CGIAR Centers, NARS, NGOS, and universities, among other interest groups. The Panel's report is oriented mainly towards the CGIAR Centers and the NARS. At the AB meeting, the prevailing view was that the PRGA was doing an adequate job of reaching some of its stakeholder groups particularly the NGOS. However several staff and board members agreed that interactions within the CGIAR were more problematic and that demonstrable progress had not been made on several fronts. Therefore, we focus on the CGIAR not only because it is the locus for this systemwide initiative and looms large in the terms of reference, but also because performance seems to be below expectations in this key stakeholder group.

2 THE PRGA PROGRAM

The PRGA was the fifth Systemwide Program (SWI) approved by TAC in the 1990s. The PRGA Program traces its origin to a six-day international seminar and planning workshop in 1996 with stakeholders from more than 50 institutions (IARCS, NARS, and NGOs). A proposal for the establishment of what was to become the PRGA was approved by TAC in October 1996. CIAT was designated as the Convening Center and the proposal was co-sponsored by CIMMYT, ICARDA, and IRRI. The Program began to implement its work plan in April 1997.

Lobbying by donors, who were keenly interested in seeing the development of capacity in participatory research and gender analysis within the CGIAR system, played an important role in the establishment of the PRGA Program. The goal and purpose in the 1996 proposal (Systemwide Program Proposal 1996:2) still conveys the mission of the PRGA Program.

The Program Goal: To improve the ability of the CGIAR system and other collaborating institutions to develop technology which alleviates poverty, improves food security, and protects the environment with greater equity.

The Program Purpose: To assess and develop methodologies and organizational innovations for gender sensitive participatory research, and operationalize their use in plant breeding, crop and natural resource management.

The period of analysis for this review is roughly ten years from the inception of the Program in 1997 to the present. In the Program's documentation, these ten years are divided into Phase I (1997-2002) and Phase II (2003-2007). The transition from Phase I to Phase II was marked by a change in the Program Coordinator.

During Phase I, participatory plant breeding at about 40 percent and participatory natural resource management at 30 percent received the bulk of the budget. Capacity building and coordination accounted for about 15 percent and 10 percent of expenditures, respectively. In Phase II, impact assessment that began in Phase I and gender mainstreaming in NARS received emphasis in a more diversified expenditure pattern. Participatory plant breeding was able to maintain its momentum in spite of the relative decline in research-resource allocation. However, activity in participatory natural resource management declined significantly in Phase II.

Similar to most of the other systemwide and eco-regional programs that were approved by TAC in the 1990s, the budget for the PRGA has fluctuated between 0.5 and 2.0 million annually in U.S. dollars. In Phase I, expenditures peaked at US$ 1.7M in 1999 and averaged US$ 1.25M annually. In Phase II, average annual expenditure has declined to about 0.95 dollars annually. In real terms, the decline in expenditure between the earlier and later years has been substantial. In income, the difference between the two Phases is not that notable, but income in Phase II declined in real terms relative to Phase I. In 2006, financial stress in the Convening Center affected the Program's performance.

More than most other systemwide and eco-regional programs, the PRGA Program has benefited from unrestricted core funding that has given it stability and has allowed it to hold regular Advisory Board meetings and stakeholder workshops. Unrestricted funding accounted for about 45 percent of total income in both phases. Ten donors have contributed at least

US$ 100,000 to the Program since its start in 1997. With a total approaching US$ 2M, the government of Norway is the largest donor. Although definitive data are not available, a large share of restricted and unrestricted funds has passed through CIAT to fund multiple partners of the Program.

With one or two notable exceptions, the PRGA has been staffed by social scientists. Eight international Ph.D. scientists have worked in the PRGA since 1997. Most worked full time in the Program. An important exception is the Phase I Coordinator who spent the bulk of her time managing a large research program in CIAT. Scientific staffing did not reach its full complement until 1999-2000 when five Ph.D. scientists were employed in the program. After 2000, staffing averaged about three international scientist years during the rest of Phase I. In Phase II that average has fallen to about two Ph.D. scientists per year. Several scientists have worked in the program four or more years, which has imparted continuity, endowing the Program with institutional memory.

Based on the aforementioned budgetary and human resource information, the size of investment made in the program amounts to about US$ 10.6M and about 30 international scientist years. This level of investment is typical of the amount spent in a small CGIAR Center in one year. That is the size of the program that this Panel is reviewing. Our experience with External Program Reviews in the CGIAR is that such reviews tend to err on the side of recommending too much additional investment relative to the amount that is targeted for divestment and relative to prospects for donor funding. Returning to the size of the PRGA program, it seems realistic to assume that the negative trend in budgetary expenditure can be reversed to return to the level of funding in Phase I. Likewise, it seems unrealistic to assume that doubling or tripling the Phase I funding level can be attained in the current donor environment. Therefore, we base our recommendations on the Phase I level of activity.

A comprehensive internally commissioned external review of the PRGA was carried out in 2000, three years after the start of the Program (Prain et al. 2000). That review was chaired by Gordon Prain of CIP, and the five-person panel included two scientific staff from ISNAR and WARDA and two donor representatives from IDRC. (Gordon Prain currently occupies the position of the CGIAR representative on the PRGA Advisory Board). Additionally, in 2003, Nadine Saad, a program staff member, published a comprehensive overview of the activities of Phase I. She observed that after five years of operation, the PRGA methods were delivering broad impacts by producing technologies and resource management systems well suited to the needs of end users (Saad, 2003:2). Taken together, the 2000 evaluation and the 2003 overview provide benchmark data for an evaluation of progress that has been made during the life of the Program.

In general, the earlier review was highly supportive, stating that "the Program has made rapid and excellent progress towards accomplishing its goals and purposes (Prain et al.:4)." The 40-page report contained 59 detailed recommendations addressing the research program, management and organization, small grants, methodology development and capacity building, partners and networking, and program impact. Many of these recommendations were acted on and incorporated into the Program. Others that identified and addressed the difficulties encountered in finding focus in natural resource management research and in integrating gender analysis into the program continue to be problematic.

Before we turn to a discussion of the achievements of the Program, a word is warranted about the operational style of the PRGA. Since the beginning of the Program, work has been organized

around plant breeding and natural resource management working groups. Working-group membership comes from different types of organizations including CGIAR Centers, NARS, AROs, and NGOs. On average, CGIAR scientists have represented about 40 percent of participants. Gender analysis has been viewed as a cross-cutting theme across the two working groups. For several years, the coordinator of the Natural Resource Management Working Group was also given the responsibility of leading the work on gender analysis in the PRGA.

3 ACHIEVEMENTS

Over the past decade, the PRGA Program has registered an impressive list of achievements. The Program has contributed to the development of participatory plant breeding that was in its infancy in 1997. In its most complete form, PPB is characterized by eliciting and incorporating information from farmers into decisions on the choice of parents for crossing and by including farmers in the early stages of selection. As we describe in the next section, progress in participatory plant breeding is seen in a small but increasingly visible and vibrant conceptual and empirical literature, and in emerging success stories of cultivar adoption. The role of the PRGA program has ranged from informal and, in some cases decisive, interactions with plant breeders in the CGIAR, to the funding of PPB in NARS, to the convening of PPB thematic workshops, to the elaboration of state of the art reviews. The Program is also to be commended for its responsiveness to stakeholder demands to appoint a plant breeder as coordinator of the PPB working group. With the selection and active participation of one of the most respected plant breeders in the CGIAR system, the Program is poised to continue to make progress in this area that holds promise to improve the prospects for varietal change for poor people in marginal production regions. PPB was officially endorsed for consideration by all CGIAR crop improvement programs as an organic part of plant breeding by the 2000 Stripe Review of Plant Breeding.

The inclusive nature of the program, resulting in a multiplicity of partners, is one of the hallmarks of the PRGA. Carefully documented inventories described 48 partnership projects in Phase I and 30 in Phase II (PRGA Program 2006a and 2006b). Many partnerships in Phase I were funded via a small grants program that operated from 1999-2001. This proved to be an effective way of engaging colleagues from the CGIAR: 15 different Centers, Eco-regional Programs, and Systemwide Programs from the CGIAR participated in the small grant program. More than 20 NARS and NGO partners also took part. Since the first workshop in September 1996, periodic stakeholder workshops have figured prominently in priority setting. This seems efficient and is one of the sources of strength of the PRGA. A listing of all workshops and conferences is presented in Table 1.

The PRGA Program has always had a strong interest in research use and, arguably, has carried out more work on impact assessment than other systemwide and eco-regional programs. More than 30 impact assessment papers in the form of journal articles, book chapters, edited proceedings, monographs, technical reports, working papers, and conference presentations have been written over the past six years. Research on impact assessment has benefited from strong collaboration with an economist at CIAT and with an ex-CGIAR economist now posted at an agricultural university in an industrialized country. Both CIAT and the PRGA Program have gained considerably from these interactions that have impacted favorably the quantity and quality of this work.

The Program has produced a substantial volume of work on gender analysis and gender mainstreaming. During Phase I, Program output included many publications on GA methodologies, typologies and case studies that demonstrated the importance of including gender analysis in agricultural research. During Phase II, attention has turned to institutional change and the introduction of gender mainstreaming into agricultural research institutions, especially in the NARS. This work has progressed smoothly in Eastern and Central Africa through the ASARECA program and in the Eastern Himalayan region, through women's

networks and government organizations. The emphasis has been on gender and social analysis capacity building, gender mainstreaming, and organizational analysis.

A regularly convened Advisory Board with wide institutional representation is another strong point of the Program. It has broadly supported the Program and been especially useful as a sounding board for ideas and initiatives. The AB has helped keep a scientific focus foremost on the radar screen of the Program, ensuring that participatory research and gender analysis are regarded as scientific tools. For example, the Advisory Board supported the programmatic decision taken late in Phase I not to invest in a women-in-development initiative that was under consideration.

The PRGA publication list is impressive for its sheer volume. The 14-page list includes a brief description of each of 122 entries and averages about 12 publications per year. This number of publications seems more than adequate for a program the size of the PRGA. Moreover, the publication list is highly selective in that it does not include graduate theses that were funded by the program. The publications that are included directly related to the work of the PRGA and its Convening Center-appointed staff. Almost all publications are co-authored by a scientist employed in the Program. The publication list could be expanded to include work such as the results of small grant funding where a PRGA staff member did not figure as a co-author. In particular, several funded thesis projects and some co-funded partner research do not appear on the list.

The PRGA appears to be well managed with respect to regular reporting and budgetary accounting to donors. All information requested by the Panel was made available to us in a timely manner. The website appears to be broadly effective, and documentation seems to be one of the administrative strengths of the program.

The volume of proposal writing also demonstrates an adequate level of activity. Since implementation of the PRGA in 1997, 26 proposals have been authored and 22 have been approved for funding. Half of the 22 have been approved for a level exceeding US$ 100,000. Although IDRC has received and approved the most requests (six) for funding, the portfolio of special project funding over the past 10 years has been quite diverse. Details of submitted proposals are contained in Table 2.

Capacity building was carried out in Phase I primarily through the small grants programs and in Phase II through intensive work with NARS, aimed at organizational change. Concurrently with the small grants program, the PRGA organized a number of 'learning workshops' aimed at promoting participatory research and gender and stakeholder analysis. Training has not been a major focus of the PRGA, but over the years a number of students have completed theses with support from the Program. The Program also organized 14 international meetings and workshops between 1996 and 2005, involving almost 900 participants (Table 1).

4 PARTICIPATORY PLANT BREEDING

Participatory plant breeding (PPB) has been the most active area of the PRGA. PPB has benefited from the presence of two dynamic coordinators. The first coordinator was a respected social scientist who excelled in advocacy and also did a good job in research. The second coordinator is a respected plant breeder who is an excellent evangelist for and researcher on PPB. In the CGIAR, very strong partnerships have been developed with the ICARDA barley program and the ICRISAT-Mali sorghum breeding program. Indeed, in some areas, it is difficult to separate the work of these two plant breeding programs from the work of the PRGA. The plant breeder who, until recently, led the ICARDA barley program is now the coordinator of the PRGA working group on plant breeding. Before assessing the performance of the PRGA in PPB, we briefly describe the rationale for and definitions of PPB below.

4.1 Rationale for and definitions of Participatory Plant Breeding

Plant breeders generally evaluate segregating populations and make selections of 'finished' products (experimental cultivars) in favorable environments. Farmers' field trials are also conducted but only on a limited scale. Favorable environments are used for evaluation to maximize genetic differences, minimize uncontrolled variation, and thereby, enhance progress through selection.

This use of favorable environments and unrealistic selection criteria are generally considered to be responsible for the low adoption of improved varieties by poor farmers in marginal production regions. Evaluation in farmer fields under conditions of severe abiotic stress has been limited. Moreover, desirable genes for performance in such environments are often selected against and lost early in the breeding process.

A participatory approach to plant breeding has been suggested as a possible remedy to increase varietal change in unfavorable environments. This approach can be categorized as either participatory varietal selection (PVS) or as participatory plant breeding (PPB). PVS enlists farmer participation in evaluation and selection among the 'finished products' of plant breeding. Commercial and experimental cultivars from diverse sources are assembled and evaluated using collaborative participatory methods in the farmers' fields for traits important to farmers. PPB has a wider array of definitions than PVS. These can be summarized as (1) involving farmers in choosing parents for hybridization; (2) conducting experiments on non-finished products (segregating populations); and (3) selecting cultivars in farmers' fields. PVS is in fact a component of PPB; the difference between PVS and PPB depends on the degree and timing of farmer involvement.

PVS is a quicker and more cost-effective way of identifying farmer-preferred cultivars if suitable diversity is available. Otherwise, more resource-consuming PPB is required.

In general, PPB has focused on crops cultivated in marginal areas, crops with diverse end-uses, crops of minor importance, and those grown in marginal areas in risk prone (rainfed) and complex (intercropping) systems with low input use. These types of areas are not only stressed but also heterogeneous, and it is difficult to recreate all such conditions at research stations.

PPB is expected to enhance the response to selection in marginal areas because selection is conducted in the target environment for farmer-preferred traits (accounting for gender

differences in trait selection), to speed up varietal development, to improve the likelihood of adoption and the speed of diffusion, to increase the availability of seed at an affordable price, and to increase on-farm diversity.

PPB is also expected to improve priority setting in plant breeding, help in the development of the researcher–extension worker–farmer linkages, and to result in increased farmer's social empowerment. However, like conventional breeding, the realization of these favorable outcomes depends on the quality of partnerships and stable resources over time.

4.2 The PRGA Program in PPB

Many of the achievements on the PPB axis of the PRGA program were described in the previous section. About half of the 48 project partnerships in Phase I focused on PPB. In Phase II this number declined considerably as gender mainstreaming received relatively more attention. Nonetheless, PPB retained its momentum in Phase II, and the number of publications did not decline. Recently, the appointment of a new coordinator has helped reinvigorate the program.

One of the PRGA's most important outputs occurred in 2003 when a comprehensive monograph was published on emerging experience in participatory plant breeding (Weltzien et al. 2003). This state of the art review is still one of the best references to PPB in the literature and is based on an inventory of 40 developing-country 'cases' that were active in the 1990s. Formal-led participatory plant breeding was the population of interest. (Initiatives led by NGOs and by the private sector were not included as the bulk of cases addressed public-sector funded research). Fifteen different aspects of each case were described in the Weltzien et al. appendix that is a rich source of material to determine how participatory varietal selection and participatory plant breeding were evolving. The majority of the cases focused on participatory varietal selection or on establishing objectives for a specific plant-breeding program. Eleven of the cases were studied in detail. This inventory of experience was also the basis for a summarizing journal article by Sperling et al. (2001).

The PRGA publications have contributed to a rapidly expanding peer-reviewed literature in PPB. The most prolific authors in this literature are not the PRGA staff themselves but plant breeders who have interacted with the PRGA. From the listing of recent PPB literature presented in Annex 4, one can see a growing interest over time.

Through the plant breeding worker group, the PRGA has also indirectly contributed to the development and transfer of plant breeding methods in PPB. For example, the ICARDA barley breeding program has developed a stylized approach in PPB. The approach is basically a bulk-pedigree method featuring four cycles of farmers' selection to develop pure-line cultivars in self-pollinated crops. Responses to biotic stress and biochemical/quality traits are recorded at research stations. Selection is based on breeders' measurement of traits and farmers' preferences. Now that the facilitator of the plant breeding working group is a plant breeder more direct contributions in the area of plant breeding methodology development are expected in the future.

4.3 Responding to challenges: Real and otherwise

The Program has tackled several of the most important real and perceived challenges confronting PPB. In response to the widespread perception that PPB-derived data are difficult to analyze, the PRGA organized a workshop on "Quantitative Analysis of Data from Participatory

Methods in Plant Breeding" where the Program played an active role in educating plant breeders about the development of quantitative analysis of large data sets obtained in PPB experiments. Proceedings of the workshop were published by CIMMYT in 2002.

Public sector plant breeders in the developing world have not yet come fully to terms with IPRs on plant cultivars. In PPB, farmer stakeholders will also be involved in cultivar development, and the number of farmers may not necessarily be low. This will complicate apportionment of IPRs. In view of the importance of this matter, a workshop was organized at ICARDA in 2005 to discuss "Recognition, Access and Benefit Sharing in PPB" for both scientists and farmers.

It is generally felt that PPB, because of its decentralized approach, needs more resources in terms of infrastructure, scientific personnel, and mobility. A PRGA-inspired study of ICARDA's barley breeding program, however, showed that although the total cost was slightly higher for PPB than for a conventional approach, there were no significant differences. Furthermore, PPB generated markedly higher benefits compared to its cost than an assumed conventional program, and benefits to farmers were realized sooner. Nonetheless, plant breeders are unlikely to be persuaded by studies of expected cost effectiveness until they see more success in the field.

The Program has also had to combat the perception that PPB is not scientific or that it does not require good science. The PRGA Program has been active in capacity building by organizing five PPB-related symposia, seminars, and workshops at different places in Africa, Asia, and Latin America. There is no new genetic element in PPB. It is primarily management of decentralized plant breeding and of large data sets generated by the farmers. Thus, those working in PPB/PVS need to be proficient in experimental design and data analysis and be fieldwork-oriented. This could be a cause of concern as new graduates, because of urbanization and industrial development, have no background in and a poor knowledge of agriculture. PPB requires good breeders who can come up with workable designs on farmers' fields and who have good interpersonal skills. A significant positive development is the inclusion of PPB in the curriculum of many learning institutions. The present coordinator of the PPB Working Group has played a prominent role in the university institutionalization of PPB.

4.4 Geographic and commodity focus

The geographic distribution of the PRGA's programmatic effort has focused on some of the poorer regions of the developing world. In PVS, the geographic emphasis has been on Sub-Saharan Africa followed by South Asia and Latin America. In PPB, the two principal CGIAR collaborators with the PRGA have worked on areas known for limited varietal change in highly stressed production environments: dryland farming regions of the Middle East and North Africa and the Semi-Arid Tropics of West Africa.

Priority setting has been done with respect to crops and types of cultivars. The emphasis has been mainly on improved cultivars in self-pollinated crops where production can be retained as seed. These are crops for which the production of hybrids is not feasible commercially or the gains from hybridization are small. In other words, these are commodities that are of limited interest to private sector seed companies because the prospects for selling hybrid seed are bleak.

4.5 Enhancing of adoption of PPB/PVS in NARS and in the CGIAR

Application of PPB in the strict sense of that practiced by the leading practitioners is a fairly recent development with the first applications only starting in the mid-1990s. In contrast, PVS has been going on for several decades although its popularity in the literature mushroomed in 1991 with a publication on farmer selection of bean varieties on a research station in Rwanda from the first PPB coordinator (Sperling et al. 1993).

Table 3 summarizes the application of PPB/PVS in different crops and countries based on publications in peer-reviewed journals and some other sources. It shows that PPB/PVS has been adopted in a number of crop improvement programs in the developing world. ICARDA has been effective in setting up PPB programs in NARS in the Middle East and North Africa, and the Andes of Latin America is another region where a critical mass in PPB is developing. Once a methodology demonstrates its effectiveness on such a large scale, it is bound to be adopted by other NARS, particularly by plant breeders working on the improvement of crops of minor importance that are cultivated in marginal areas to which adequate resources are not allocated in formal plant breeding programs.

Participatory varietal selection has been a staple methodology of several CGIAR Centers, and its use sometimes predates the establishment of the PRGA. A non-exhaustive list of success stories includes CIAT's improved bean varieties in East Africa, WARDA's NERICA rice varieties in West Africa, ICRISAT's early-maturing pearl millet variety Okashana 1 in Namibia, CIMMYT's improved maize varieties in Ghana, and CIP's late blight resistant potato varieties in Peru. All of these selections have featured close partnerships with NARS working with farmers. Although more research is warranted on PVS to improve the quality and cost-effectiveness in its applications, the benefits of PVS seem so transparent that they do not point to a substantial additional investment in research.

In contrast, with notable exceptions of the ICARDA Barley Program in Syria and the ICRISAT Sorghum Program in Mali, PPB is still not widely practiced in the CGIAR. Various reasons can be given for the seemingly slow progress in the adoption of PPB in the CGIAR:

- CG centers cannot take up PPB by themselves. They need collaboration with NARS;
- The earlier approach of centralized development of breeding material is still paying dividends in important crops like wheat and irrigated rice;
- Most CG centers still produce 'unfinished' or 'semi-finished' products;
- PPB at least initially may require more resources for infrastructure, operations, and monitoring of program activities.

On the whole, much remains to be done to mainstream PPB in CGIAR institutes.

Breeders in NARS and in the CGIAR may question the knowledge of farmers about germplasm, or the utility of growing a segregating population in the farmers' field under their management, as this may enhance non-genetic variation due to poor management and non-uniform effects of various stresses under natural conditions. Also in question is the efficiency of farmers to conduct selection. Decentralized work is difficult to operate and monitor, but no plant breeder can argue about the utility of evaluating the material and conducting selection in a target environment and basing the selection criteria on farmer-preferred traits. Further, a plant breeder would like to go

to a farmer's field (target environment) with as much material and as early as possible in the breeding process, subject to the availability of resources. So given the resources, some form of PPB may be adopted by all the breeders working to improve crops in marginal areas particularly in weak NARS; and PVS, particularly, should face no opposition.

4.6 Evaluating the early impact of PPB

The impact of improved varieties generated via PPB is beginning to be felt in farmers' fields in marginal production regions. Of the two CGIAR programs with which the PRGA is most closely associated, the ICARDA barley program is the oldest and the adoption of its PPB-selected varieties now extends to several thousand hectares in Syria. The ICRISAT Sorghum Program in Mali is significantly younger, and it is too early to expect results until the anticipated next phase of the PRGA program.

Researchers working in CAZS-NR at the University of Wales, Bangor, U.K., have also been very active and successful in PPB/PVS particularly in South Asia. They have partnered mainly with NGOs and NARS and have interacted frequently with the PRGA. They have published five success stories in the peer-reviewed literature on the adoption of PPB-selected cultivars. Their work underpins several of the conclusions of a review of the impact of participatory research that is described in Chapter 7 of this report. They have also found that niche varieties derived from PPB may be more widely adapted than previously thought. All the CAZS-NR work is carried out on-farm and they have developed a flexible protocol for the use of PPB. They estimate that PPB-generated varieties by them in collaboration with their partners are now on about 100,000 hectares in South Asia, mainly in Nepal. (J.R. Witcombe, personal communication, 2006).

PRGA-related research has also brought out some differences between the selection criteria used by plant breeders and farmers, and differences between types of farmers. This indirect benefit of PPB and PVS is likely to become pronounced as more crop improvement programs engage in marker-assisted selection. Knowing the demand for traits by farmers is a necessary condition for effective marker-assisted selection.

Important differences have been seen in evaluating the relative importance of various end-uses in dual purpose crops like barley, e.g., grain for human/industrial use and straw to feed animals. Crops with multiple uses seem to be particularly attractive for PPB, as plant breeders tend to focus more on the dominant use and do not fully appreciate the relative importance of traits associated with various end-uses. Further, dual uses, such as food and feed, may not be farm-size neutral. In pearl millet in India, poor farmers in marginal areas select for high tillering and small panicle size, whereas better-off farmers in good-growing conditions prefer low tillering and larger panicle size. The demand for traits and the elicitation of preferences is one of the core areas of strength of the PRGA but more training materials could focus on this area.

PPB also offers a mechanism by which the PRGA can influence policy through technological change. PPB is affected by and can affect policy on several fronts: public sector varietal testing systems, cultivar release procedures, and seed production systems. Relevant guidelines and legislation have been developed keeping in view formal plant breeding. The success of PPB has been instrumental in bringing a change in policy in Nepal where the cultivar release and registration procedure has been made more flexible to better account for the needs of clients.

The Nepal Government endorsed this procedure in 2005 and varieties have been released through joint (NARS, CAZS-NR, NGOs) proposals.

A notable instance of PVS success that may influence policy has been in barley in Syria. Barley 'Zanbaka' was submitted in the early 1980s to the official system of varietal release, but was rejected at that time. It has since been identified through PVS and is becoming a popular cultivar.

4.7 Assessing prospects and making recommendations

PRGA emphasis in PPB has the correct geographic and commodity orientation. This approach has a focus on marginal areas that have been by-passed by advances made through improved cultivars. PPB also appears to have relevance to favorable environments wherein yields may have peaked at a high level, and exploiting specific adaptation is an avenue to effect further progress. Pure-line cultivar development in self-pollinated crops is rightly receiving top priority.

The PRGA needs to keep addressing the challenges confronting PPB, because being a decentralized program it may not be easy to manage. Further, there are policy issues like varietal release, seed production, and IPRs that still need attention. Moreover, the cultivars developed through PPB are expected to have small-scale impact as these generally have specific adaptation to various niches in marginal environments. This specific-adaptation hypothesis needs to be rigorously tested as is done in the case of Nepal, where PPB-selected cultivars are submitted to regional and national trials for wider testing and subsequent release.

Instead of projecting PPB as an alternative to conventional plant breeding, efforts need to be made to integrate both. On the whole, the Program needs to document more success stories, describe thoroughly the protocols followed in those studies, and publish more manuals, bulletins, and guidelines. There should be more in-service training and workshops and a select group of scientists should be regularly brought together. This is important in part to remove misconceptions about the role and ability of plant breeders. Above all documentation needs to focus on what PPB can accomplish that does not happen in conventional plant breeding. Small grant projects have played a very useful role in promoting PPB, but their coverage is still small. Grant awards with a longer duration are desirable.

The lack of adoption research and absence of data on seed production in self-pollinated crops limits the assessment of the impact of varieties developed through PPB. A high priority is attached to adoption research on the early acceptance and subsequent diffusion of PPB selected varieties.

PPB is a good entry point for participatory research and gender analysis, and should be used as a vehicle for social change and poverty alleviation. To attain that goal the PRGA program needs to be strengthened and the collaborative activities expanded in the next phase.

5 PARTICIPATORY NATURAL RESOURCE MANAGEMENT

Compared with PPB, Natural Resource Management has had a checkered history in the PRGA program. The NRM component of the Program started later, staff turnover has been higher, focus has been difficult to achieve, and relatively little research and capacity building has been carried out on NRM in Phase II.

5.1 Describing the level of activity

PRGA's investment in NRM began with a listserv that was established in 1997, but this was insufficient to satisfy the needs of the Program's clientele. In 1998, a Ph.D. level coordinator was hired to address both the gender and NRM areas of the Program. She left the program in 2000, her major achievement having been the organization of an 'NRM Scientists Group' (Prain et al. 2000). In 2000, a crop ecologist was contracted as a part-time consultant to stimulate networking among NRM practitioners interested in PRGA. She facilitated the NRM working group until 2004. Other PRGA scientific staffers also have worked on NRM for short periods of time.

NRM featured prominently in the small grants initiative that was described in the achievements section. BMZ, the Ford Foundation, and unrestricted core funding supported the NRM component of the small grants program. In Phase I, ten NRM-related project partnerships were developed, the majority supported through the small grants program. Substantively, these ten projects all addressed different areas of NRM ranging from a very specific focus on the effects of stakeholder participation on the adoption of improved land management on Vertisols in Ethiopia to the generalized treatment of the impact of farmer participatory research in natural resource management in Zimbabwe. Other substantive NRM areas included community forestry, nutrient management, pest management, and disease management. Several projects shared the same objective: an evaluation of participatory research approaches on project outcomes, which seems central to the mandate of the PRGA.

A major NRM-related work was published in Phase II: *Managing Natural Resources for Sustainable Livelihoods: Uniting Science and Participation* (Pound et al. 2003), but this 252-page book was the result of a 1999 workshop, "Participatory Research for Natural Resource Management: Continuing to Learn Together." Attending scientists were nominated by their peers for their involvement in innovative Participatory Natural Research Management in order to strengthen interchange with the Program's international working group.

Despite the paucity of NRM research in Phase II, the NRM working group seems to have remained active. The Program maintains a PNRM Resource Center as part of its website. The Resource Center presently contains downloadable lists of 100 recommended websites, 19 reflections, 10 collaborative products, 11 recommended articles and books, 946 resources developed by PNRM members, and 47 recommended tools and methods.

5.2 Identifying the problem of focus

The problem of focusing integrated natural resource management research was foreseen and eloquently expressed in the founding proposal: "A comparable disquiet is evident over the difficulty of achieving impact for this research in heterogeneous, fragile environments, with diverse client groups" (pg. 8). Even during Phase I, when NRM research was being carried out, there was a lack of focus. The internal review of the PRGA was commissioned while the small

grants program was active and the review concluded that: "The diversity of subject interests (soils, IPM, forestry etc), levels of focus (micro, meso and macro) and philosophy (technology and management tools or developmental process) in both the NRM Scientists Group and the small grants makes it very difficult to arrive at a coherent program component. In practice, NRM is too broad a focus for the Program to deal with, especially given the fact that currently the part-time Coordinator of the PRGA Program is also in overall charge of the NRM small grants activities" (Prain et al., p. 19).

To improve focus, the authors of the review suggested three options for consideration by the PRGA leadership: (1) Limit NRM projects to those which include PPB.; (2) Identify one or two focal themes for NRM; and (3) 'Piggy back' a PRGA component on existing, funded NRM activities which lack this aspect.

Although these options may have been seriously pursued by the Program, none have come to fruition in Phase II. Consequently, NRM has a low profile in both project partnerships and in publications. Eighteen partnerships are listed under the title of "Mainstreaming of Participatory Research and Gender Analysis in Agricultural and Natural-Resource Management Research" but the partnership descriptions suggest that only a few of these are linked directly to NRM. Some of the impact assessment research carried out in Phase II did focus on NRM, with three studies on the impact of PR and soil management technologies.

5.3 Considering options to improve focus

Each of the three options posed by the internally commissioned review panel has positive and negative aspects. In the short-term, the 'piggy back' option is the most easily achieved, especially if a strong partner can be found. That partner or someone working with him/her could also assume the role of coordination of the NRM scientists' group. Experience suggests that the coordinator/facilitator should have strong academic and research credentials and already be engaged in a well-defined area of natural resource management. It would be ideal to find someone with a profile comparable to that of the current PPB facilitator.

The option of locating PRGA-related NRM research in the same areas of PPB research supports a move towards a much tighter focusing of the Program and could reinforce the linkages that exist conceptually between NRM and PPB. But, it begs the question of how the site-specific NRM research is to be funded. Moreover, researchable NRM-related problems may not be that relevant or important in the PPB sites.

In the medium term, a greater focus on specific factor-oriented research (Option 2) would seem to be the best way to attain a coherent program for the NRM component. A thematic focus also needs to find strong partners for interdisciplinary research to be successful. The strong research areas of CIAT would seem to be logical initial starting points for developing longer-term partnership with the PRGA. A thematic focus has several advantages. It would open up the potential for historical studies of farmer innovation and farmers' interactions with science in the generation and adaptation of technology. It would provide the basis for 'strategic' research over space and time. Working for several years with specialist scientists on a specific area, e.g., soil management or IPM, would also enhance the agricultural background of social scientists in the PRGA. A deeper understanding of what technologies work, when, where, and why is highly complementary to research on PR and GA.

Regardless of whether the program opts to adopt one of the options discussed above, it is clear that the NRM component of the PRGA urgently needs to be reconceptualized and revitalized to address natural resource management issues from the perspective of participatory research and gender analysis. During the past few years, natural resource management has received increased attention from donors and there is an opportunity for PRGA to select appropriate entry points that will bring added value to work that is already underway. There is interest in pulling together inventories and overviews of what 'works.' For example, DFID is putting approximately US$ 70M into a global view on 'research in use' with a big focus on NRM. Moreover, an overarching theme for much of the current donor interest in NRM is the UN Millennium Development Goals, which highlight environmental sustainability, the eradication of poverty and hunger, and the promotion of gender equality and empowerment of women. These themes are consistent with the overall mission and objectives of PRGA and provide entry points for work in NRM.

While it is not the role of the Review Panel to identify areas of concentration for the NRM work of the PRGA, a few areas that might warrant further consideration because they build on the interdisciplinary approach of the program, include the development of new institutions for resource governance that give greater voice to poor local users, ecosystem health, and multi-stakeholder collaboration. The decentralization of agricultural research with an accompanying impetus to organize farmers into associations opens up avenues for the PRGA to conduct research and advocacy on the effective role of stakeholder groups in priority setting in both crop improvement and natural resource management.

At the same time, the Program has the potential to bring a participatory research/gender analysis approach to emerging areas like Climate Change, for example, building on work already being done in the CGIAR on climate resilient crops. There are also opportunities for collaboration with on-going Challenge programs such as Water, Generation, and HarvestPlus.

Finding an effective alternative in the broad research agenda described above seems doable. In Phase I the program raised about US$ 3M in special project funding (see Table 2). The donor supply of funds appears to be significantly more constrained for participatory plant breeding than for participatory natural resource management.

In the case of NRM in the PRGA, the time may be ripe to redraft the mission statement and focus on those areas that the PRGA is good at or is making reasonable progress on: participatory plant breeding, impact assessment, and gender mainstreaming. If the expected level of interdisciplinary-research activity in NRM in an anticipated Phase III only rivals that of Phase II, there is no reason to keep up the pretense that substantive work is being conducted in this area. The leadership of the Program may want to establish a deadline for the successful implementation of one of the options described above. If the deadline comes due without successful implementation, then the program's mandate should be re-fashioned accordingly. It is better to address this programmatic area of weakness directly and systematically, than to have it lingering on for another Phase.

6 GENDER ANALYSIS

6.1 Background

The original Gender and Diversity program of the CGIAR system, established in 1991, had two components, one related to gender staffing in the CGIAR and the other to the use of gender analysis in research. In the mid-1990s this program was dissolved, and in 1997 the gender analysis component was absorbed into the PRGA. The staffing component retained the Gender and Diversity (G&D) title and was relocated to ICRAF in Nairobi.

The Gender Analysis component of the PRGA was seen as a cross-cutting issue that would be integrated into the two substantive program areas: participatory plant breeding and natural resource management. This was consistent with thinking in the gender and development research and advocacy community at that time. The Platform for Action that emerged from the Fourth International Conference for Women in Beijing in 1995, urged the mainstreaming of gender into all development institutions and projects. Probably for this reason, the component did not have a dedicated facilitator.

At some level, the consolidation of participatory research and gender analysis into one program area seems to have created uneasiness. At the first meeting of the PRGA's Gender Working Group in 1996, before the Program was officially launched, gender analysis was identified as a field of methodological expertise but not necessarily as a central component of participatory research (Fernandez 2001). Given this ambiguity, even among PRGA core staff, about the natural fit of gender analysis and participatory methods, it is not surprising that the Internal Review of 2000 noted that "[gender analysis] integration into the participatory research focus of the program is not consistent" (Prain et al 2000:20).

The 1996 proposal for the PRGA expressed expectations that the program would develop gender sensitive technologies that would become widely used within the CGIAR system and by NARS and NGOs. Two specific areas that were to be addressed included gender mainstreaming and gender analysis capacity building, and the intention was to develop "More efficient, cost-effective diagnostic methods which will serve as initial probes to determine the gender-specificity of a prototype technology. Researchers need sharper methods to understand when differentiating users by gender will be of critical importance; and farmers need tools to help them choose appropriate participants in a joint research effort" (Systemwide Program Proposal 1996:2-3).

The program made some early progress towards fulfilling these objectives. For example, a project entitled "Assessing the Benefits of Rural Women's Participation in Natural Resource Management Research and Capacity Building" tried to mainstream gender sensitive participatory research through small grants projects that were added on to larger CGIAR projects. GA- related research output in terms of publications and presentations was high during Phase I. The intention was to build a body of evidence to demonstrate that the adoption of participatory research and gender analysis methods could contribute to the 'technical' goals of agricultural research.

6.2 Staffing

As noted, the gender component did not have a dedicated facilitator during Phase I. Consultants were used on an as-needed basis and all core PRGA staff were expected to promote the use of gender analysis where possible and appropriate. In 1998, presumably in an effort to better promote mainstreaming of gender into all of the Program's research, the gender component was combined with the NRM component and put under the management of a single coordinator. Unfortunately the net effect seems to have been a reduction of time and energy given to the gender component. The 2000 evaluation noted that "the gender component of the PRGA has not been well-defined, nor has it sufficiently evolved with the rapidly changing thinking around social analysis" (Prain et al. 2000:20). The program supported gender-related work after 2000, but it was only in October 2004 that a gender coordinator was appointed on a part-time consultancy basis (until the end of 2005). She was hired to facilitate improved interaction between the Program and the CGIAR centers but as the ASARECA project developed, there was a considerable need for training activities and most of her time was deflected into this area.

6.3 Gender mainstreaming

During Phase II, the Program's attention shifted from small grants projects and gender training to gender mainstreaming and organizational change. The goal of the second phase was "to mainstream gender analysis and equitable participatory research to promote learning and change through partnerships with CG Centers, national agricultural research systems (NARS) and civil society groups, so that they can better target the demands of beneficiary groups, particularly poor rural women" (Gurung 2006).

A systematic approach has been followed. It recognizes that gender mainstreaming requires policy change, the identification and implementation of accountability mechanisms, the development of appropriate capacity, and institutional change within prevailing organizational cultures. Gender analysis methods have been defined as encompassing diagnosis, implementation, and tracking of impact. At the same time, efforts have been made to introduce institutional capacity building, using institutional analysis methods, such as organizational development concepts and framework analysis. With this approach, the PRGA has given attention to building skills in change agents in the area of leadership (especially among women), negotiation, and facilitation. Recognizing that commitment is required from institutional managers, the program has organized strategic planning meetings that have led to creating action plans.

Despite the advocacy function that is also implied in the Program's gender mainstreaming goal, the focus has been primarily on research and on monitoring change within organizations. Building a constituency of gender researchers and practitioners inside the CGIAR beyond those who are directly receiving support from the Program seems to have been neglected. For example, although there have been active listservs discussing participatory plant breeding and participatory natural resource management, there has never been one focused on gender analysis. This probably reflects the staffing decision to not have a full time gender facilitator/coordinator, except for a relatively short period.

There are different views about the advocacy function among PRGA staff and AB members. Some argue that advocacy and training can be better handled by the CGIAR G&D program and that the PRGA should focus on training technical people who can take forward gender analysis

within different institutions both inside the CGIAR system and in the NARs. This position seems to have been the prevailing one over the past few years. It also is worth noting that Saad warned in 2003 that the use of gender analysis methods may be too fragmented within the CGIAR system to enable them to be mainstreamed (Saad 2003: 14).

6.4 PRGA gender focus

In examining the language used in the PRGA program documentation, there is a clear emphasis on 'gender,' 'gender analysis,' and 'gender mainstreaming' but many of the program's activities continue to fall into the women in development perspective, i.e., providing women with opportunities to participate in technology development, giving them access to resources, soliciting their input, etc., without examining the social context of the power relations between men and women. Efforts are being made to move beyond this perspective and some of the organizational change work that has been done during Phase II begins to address the issue of gender equity. Recently published work on the gender dimension in social capital also begins to address the different social, economic, and political contexts within which women and men work (Westerman, Ashby, and Pretty 2005). Given the lack of a dedicated gender research coordinator, it is not surprising that the Program has made slow progress in addressing the conceptual and methodological aspects of this problem (which poses equal difficulties for other research-supporting organizations). This does appear to have been a 'missed opportunity' for the PRGA and an area where an important conceptual contribution could be made.

6.5 What has been the influence on the CG system?

By the late 1990s, gender analysis was becoming somewhat more prominent in research undertaken within the CGIAR system. According to inventories of gender-related research and training done in the IARCs for 1990-1995 and 1996-1998, gender-related work increased substantially within that period. One hundred and forty activities were listed in 1995, whereas in 1998, 207 were listed, representing an increase of 48 percent. Although the two datasets were not methodologically identical, they suggest that that during this period, which coincided with the establishment of the PRGA program, the use of gender analysis tools and methods was growing overall (Feldstein 1998). This suggests that the late 1990s may have been an opportune time to influence research within the CGIAR system.

An obvious starting point for collaboration within the CGIAR system should be the Gender and Diversity Program. Over the past decade, the G&D program has achieved high visibility both inside and outside the CGIAR system. This has been done through a number of strategic partnerships with high profile individuals and through collaboration with outside organizations including donors and others that promote women in science. Currently the G&D program has identified more than 200 focal points or champions in the CGIAR system.

Collaboration between PRGA and G&D has been sporadic. Although the primary interest of the G&D program is to ensure that women scientists are given appropriate career opportunities within the CG system rather than to promote research, there is some overlap between the objectives of the two programs. PRGA documentation notes that "[its] less emphasized strategy has sought to empower women in R&D positions within the CG family but also in partner organizations and selected women's organizations with a strong R&D component activity, . . ." (Framework for Assessing PRGA Program Activities, n.d.). At the same time, one of the three current objectives of the G&D program is to "Integrate gender and diversity practices into the

core work of the CGIAR Centers through closer collaboration with scientists, research teams and other global initiatives and Systems Office units of the CGIAR." (http://www.genderdiversity.cgiar.org/about/default.asp). It is clear that there is some overlap in the mandates of the two programs.

The PRGA project staff has met with the leadership of the G&D program on several occasions, but there has not been follow-up. Given the difficulty in introducing gender concepts into the CGIAR system, the formation of a closer, mutually-supportive link between the two programs would appear to be highly strategic.

Strategies for institutionalizing gender in the CGIAR system were discussed during a session at an Impact Assessment Workshop at CIMMYT in October 2005. Many good ideas were proposed but there was no concrete follow-up. In fact, a number of CG centers are actively involved in gender-related research. Probably the most progress has been made at IRRI in both substantive research on gender and on gender mainstreaming. IRRI has a senior internationally recruited scientist on staff with the responsibility to institutionalize participatory research and gender analysis in problem oriented research, in collaboration with NARES. Her team has made advances in participatory varietal selection (using mother-baby trials and including women as consultants, evaluators and farmer cooperators) but they are still struggling with NRM, except for seed health management. Almost all on-farm experiments on rice varietal improvement now use the mother and baby trials (researcher-managed and farmer-managed) approach and women are well represented. IRRI has also invested time and resources in a training course on Participatory Approaches to Research and Extension. The course, which is aimed at participants from NARES involved in collaborative research in South Asia and Southeast Asia, includes lectures on gender analysis and the importance of including women as users of technologies. Most of the scientists in the teams are non-social scientists and the course provides biological scientists with a social science perspective. Finally, IRRI has produced simple guidelines for mainstreaming gender in rice varietal improvement and crop management. These and other tools are used in their training courses and have been posted in IRRI's Knowledge Bank, which can be accessed through the internet (http://www.knowledgebank.irri.org/). ICRISAT and ICARDA also have taken initiatives in promoting work on gender analysis and are actively seeking to incorporate gender into many of their projects. ILRI undertook an internal audit on gender-related activity in some of their partner institutions, which led to a regional workshop and provides an example to other centers of a way to move forward. Given this level of interest and expertise scattered throughout the CGIAR system, the PRGA has a rich base from which to work towards institutionalization of gender into the CGIAR research and management.

6.6 Influence on the NARs/NGOs

The gender mainstreaming work, which concluded at the end of 2006, was undertaken in collaboration with ASARECA in eight countries in central, eastern, and southern Africa. Both male and female professionals with degrees in science, social science, and agriculture were identified as gender focal points in agricultural institutions in the region. Research and capacity building activities focused on gender analysis, organizational change within NARs, training of trainers, institutional assessment of the level of gender awareness within the different NARs, and some field research. To a lesser degree, there was also emphasis on gender lobbying and negotiation.

Each country pursued these objectives in slightly different ways and progress was uneven. For example, in Kenya there has been considerable achievement and the program received a strong endorsement from the Director of the Kenya Agricultural Research Institute (KARI), but in Rwanda progress was much more modest and the Institut des Sciences Agronomiques du Rwanda (ISAR) did not have the same level of institutional commitment nor expertise. Even in Kenya, there have been considerable obstacles to the widespread incorporation of gender analysis into the work of KARI, including limited gender analysis expertise; a low level of integration of gender analysis into KARI projects; financial limitations, etc. However, KARI has developed innovative ways of coping with these problems, for example, by presenting an award at their annual conference for the most gender sensitive paper. Other countries are at different stages but for the most part not as advanced as Kenya. For example, in Ethiopia a gender action plan is currently being developed. It is also worth mentioning that the countries started from different points in terms of stock of available gender expertise and earlier exposure to gender analysis.

During Phase II, work was also carried out with women's networks in the Eastern Himalayan region, in a project that focused on providing training in social and gender analysis to help local organizations to understand the differential impacts of resource degradation and NRM practices on different segments of the population. Working in Bangladesh, Bhutan, China, India and Nepal, the project produced a set of 'good practices' for mainstreaming gender sensitive participatory research and development approaches within selected organizations. Best practices emerged through capacity building, including training and mentoring/ coaching and through research on organizations. The project helped to bring about new levels of awareness of social and gender issues among professional men and women in agriculture and NRM organizations in the eastern Himalayas and Laos.

These two large projects seem to have had a positive influence on NARS and NGOs in the regions where they were organized. They were organized in such a way to ensure ongoing impact even after the end of PRGA involvement.

6.7 Achievements and continuing challenges

During Phase II, the Program made good progress with mainstreaming gender through ASARECA and the Himalayan Consortium. There was also some earlier success with the Andean Consortium. Based on what the Review Panel observed in East Africa, however, it is not likely that gender mainstreaming has been sufficiently institutionalized in most of the participating NARS (with the possible exception of Kenya) for it to continue as a prominent activity after the completion of the PRSA financial support.

Over the years, and especially during Phase I, the Program developed a rich literature of guides, typologies, empowerment indices, and checklists aimed at helping NRM researchers to use gender analysis in their work, e.g. Fernandez, Assessing Impacts of Participation: Stakeholders, Gender and Difference (2000); Lambrou, A Typology: Participatory Research and Gender Analysis in Natural Resource Management (2001) and Lilja and Ashby, Types of Gender Analysis in Natural Resource Management and Plant Breeding (1999). These are useful publications that give sound advice on how research can be made more gender-sensitive. None of them was intended to be prescriptive, and most conclude that both PR and GA must be adapted to suit the needs of each specific situation. Unfortunately, there is no evidence that the publications have been used (or even promoted) in a systematic way. While the focus of the

program has moved towards impact assessment in recent years, it is unclear if the use of gender analysis in PRGA or PRGA-linked projects has been evaluated from an impact perspective. However, a 2001 study by Johnson, Lilja, and Ashby that looked at the use of participatory research and gender analysis in natural resource management research concluded that a large proportion of projects that did include some aspect of gender analysis did so at the technology transfer stage where efforts were made to ensure the technology could/would be used by women. Gender concerns were less likely to be taken into account at the technology design stage.

Research by Kaaria and Ashby in 2000 (PRGA Working Document 13) concluded that scientists and development agencies must make proactive efforts to ensure that women will participate in and benefit from technical change. They also developed a strategy that international agricultural research centers could use to ensure women's interests and perspectives were integrated into their work. The strategy included the identification of priority geographical areas of the world where feminization of agriculture is hypothesized to be under way; participatory diagnosis of poor rural women's technology needs; constraints and opportunities; partnerships with CGIAR and NARS applied research programs with a capacity for developing technologies for women; designing technologies that address both pre- and post harvest needs; establishing a long-term panel of rural women's focus groups to identify and analyze women's changing demand for agricultural technology; and establishing rural women's focus groups in the panel as a network for regular CG and NARS consultation on the diagnosis of needs and the evaluation of technologies (Kaaria and Ashby 2000). These ideas were never implemented by the PRGA. If they had done so, it is quite possible that this would have led to more systematic inclusion of gender analysis in the work of the CGIAR scientists. Instead of trying to test this and other strategies and methodologies that were developed in Phase I, attention in Phase II turned to other issues.

Gender analysis was not included in all PRGA work. For example, much of the participatory plant breeding studies, while innovative in their own right, did not include gender analysis (e.g., Fukuda and Saad 2001). Researchers were not required to disaggregate the term 'farmer' so there is no way of knowing whether male and female farmers participated and, if they did participate, whether their perspectives and opinions were the same. This is an important point because it goes against the overall mandate of the PRGA program. Moreover, the inclusion of sex-disaggregated data would have allowed for later analysis by other researchers with particular interest and skills in gender analysis. Similarly, a conceptual model for participatory research for sustainable agriculture developed by the PRGA did not include gender analysis as a basic component (van de Fliert and Braun 2001). At best, the use of gender analysis has been inconsistent in PRGA projects. A paper also published in 2000 on characterizing and measuring the effects of incorporating stakeholder participation in natural resource management (Johnson et al. 2001b) included gender analysis. Similarly, Sanginga, Lilja and Tumwine incorporated gender analysis into their assessment of the quality of participation in farmer's research groups in the Kabale Highlands in Uganda (2001). This gives the impression that gender analysis was included if the subject was of interest to the research team. For a program that was intended to promote the use of PR and GA, a more proactive approach might be expected.

Overall, it could be concluded that the PRGA research work on gender has focused more on the development of conceptual models and tools and less on systematic testing and utilization of these models and tools. If the Program is to continue into a third phase, attention should be given to the testing, fine-tuning and use of the approaches that were developed during the early years. More work should also be done on the power issues and differential control over

resources that are embedded in 'gender' analysis as compared to a 'women in development' approach. The Program has started to do some valuable work in this respect through its focus on organizational change but care will have to be taken to ensure that the focus does not move away from 'gender' and more squarely into organization theory. A recent paper published in World Development (Westerman, Ashby, and Pretty 2005) also begins to unpack the nature of male and female group activities and collaboration in the context of natural resource management.

7 IMPACT ASSESSMENT

In this section, we evaluate impact assessment in the PRGA program and later summarize the results of a desk study, A Literature Review of the Documentation of Ex-Post Impact of Participatory Research with a focus on work by the PRGA Program and its Partners that is an integral part of this review.

7.1 Impact Assessment in the PRGA

Impact assessment has been and continues to be one of the most active areas in the PRGA. An economist with expertise in impact assessment and gender research joined the Program in 1999. In 2000, the internally commissioned external review recommended that "The PRGA should continue to conduct systematic impact assessment to generate convincing evidence about the usefulness of participatory methods for improving research efficiency, targeting specific beneficiary groups and meeting CGIAR goals of poverty alleviation and protecting the environment (Prain et al., p.33)." The authors of the review further stated that "The PRGA's efforts to strengthen its capacity to monitor and assess impacts are highly commendable. PRGA is encouraged to maximize use of internal and external resources through collaboration."

The PGRA has implemented these recommendations in a consistent fashion. Impact assessment has figured prominently in both phases of the Program. A gamut of work has been carried out. The expected impact of participatory plant breeding has been quantified and compared to the expected impact of conventional breeding. Case studies of innovative PR-using projects have been synthesized with regard to the impact of participatory research on diverse outcomes. State-of-the-art conventional ex-post impact assessment focusing on the consequences of PR has been conducted on one of the more important success stories of the Convening Center. Resources have been mobilized within and outside the Convening Center in undertaking this research, which is increasingly visible in the CGIAR. CIMMYT, CIP, and ICARDA have been among the most active partners with the PRGA in the assessment of the impact of participatory research in the CGIAR.

The Program has also invested in capacity building and the dissemination of information on impact assessment mainly through the workshop organized with CIMMYT in 2005. The goal of that workshop was to share experience and learn more about the measurement and impact of participatory research and gender analysis. Several lessons were teased out of the 25 case studies that now appear on the PRGA Website.

Impact assessment on the effects of methodological approaches and institutional programs, such as PR and GA and the PRGA, is a daunting task. Outside of agriculture, costly experimental research in a with-the-program and without-the-program setting is an important way to assess programmatic consequences. In the 1996 'founding' proposal for the PRGA, controlled comparisons of different strategies, i.e., the same breeding populations are managed with and without farmer participation, were proposed as part of the empirical studies that were to be the basis for impact assessment (p. 17).

We only know of one case (on potato breeding in Bolivia) where an experimental programmatic approach has been carried out in PPB, and, while interesting and of potential importance, we do not recommend research in this experimental vein be implemented at this time until PPB matures into a more well-established methodological approach. Presently, investing in highly

focused experimental studies that pit the most relevant components of emerging PPB models against each other would seem to have a higher priority than wider experimental comparisons of PPB vis-a-vis conventional breeding.

The 'founding' proposal was optimistic that "through empirical studies and comparative data, it will be possible to assess the payoff to participatory methods and gender analysis in different stages of research (p. 3)." The PRGA has been successful in designing a comprehensive and thought-provoking model for assessing the impact of PR and GA. The model is fully described in the 2001 Working Document 17: *Characterizing and measuring the effects of incorporating stakeholder participation in Natural Resource Management Research: Analysis of research benefits and costs in three case studies.* The PRGA model was one of the bases for the literature review. We expect that it will be increasingly used to assess the impact of participatory research particularly in adaptive research projects.

Working Document 17 compares outcomes from participatory research in three innovative projects: (1) one of the first uses of a Farmer Field School as a research and extension tool on a non-rice crop by CIP and its partners on sweetpotato improvement in Indonesia, (2) the use of a 'new' on-farm research method of mother-baby trials by ICRISAT and its partners to promote the incorporation of legumes in the soil fertility management of maize production in Malawi, and (3) the well-known ACORDE-World Neighbors (WN) integrated development project that promoted the use of improved soil management and conservation practices in Honduras.

The authors of the report formulated 22 hypotheses for testing that cut across 5 impact outcomes, 3 stages of technology generation and transfer, and 4 levels of intensity in farmer participation (See Annex 5). Focus was on the economic impact of technologies, social and human capital impacts among beneficiaries, feedback to formal research, and cost of research in technology design, testing, and diffusion. The results were summarized by six key questions that were synthesized from the original PRGA proposal to TAC to arrive at a judgment on whether or not participatory research makes a difference (See Annex 6). This innovative, comparative research fits squarely within the mandate of the Program and provides a valuable background for the Panel to identify areas of improvement for PRGA research on impact assessment.

7.2 Use of on-farm experimental data

In this comparative evaluation and in several of its other studies, PRGA impact assessment research rarely exploits the results of on-farm experimental data. Instead of using on-farm trial data complemented with early acceptance studies of the most important novel technology components, the preferred method seems to be to focus on with-and-without comparisons of participant and non-participant groups. Such comparisons are necessary for the evaluation of early adoption and methods are now available to correct for selectivity bias and 'match' non-participants to participants, but inter-group comparisons are usually an inferior basis for benefit calculation if reliable on-farm experimental trial data are available.

The first case study on improved crop management in sweetpotato is an apt example of where reliable on-farm experimental data could have shed light on the economic value of conducting adaptive research on a minor crop in a weak NARS setting with a farmer field school approach. The comparison between participants and non-participants indicated a small mean yield advantage of participants of about 5%. Yet analysis of an earlier baseline survey showed that both participants and non-participants had not purchased the single-nutrient fertilizer potassium

chloride prior to the start of the multi-year farmer field school. Almost certainly, the use of potassium could be attributed to the project and the use by participants had spilled over to non-participants, but the estimated yield advantage from the participant and non-participant comparison was almost too small to justify the farmers' investment in potassium. On-farm trials with plus and minus potassium would have provided data to validate the worth of the project and farmers' adoption behavior. If the productivity effects of potassium were large in the on-farm trials, then the analyst could investigate the effects of expanding the extension message on potassium by estimating the representativeness of the soil series on which sweetpotato was grown to determine the regional extent of potassium deficiency.

One of the main messages in this case study should have been that the use of a farmer field school as an adaptive research tool needs to be complemented by simple on-farm trials featuring single components as treatments and the farmers' technology as a control. Without reliable on-farm trial data, it is difficult if not impossible to piece together and subsequently tell a persuasive story of impact. Comparisons that are aimed at separating yield and crop income differences between participants and non-participants often become a black box generating estimates that defy common sense even when multivariate analysis is well-conducted.

In the second case study, the participatory research project on the incorporation of legumes in sole-crop maize systems was characterized by negligible economic impact, but the mother-baby experimental trial approach has rapidly diffused to NARS in southern and eastern Africa mainly via the CIMMYT maize breeding program. The small Rockefeller-funded ICRISAT Program on soil fertility management in Malawi has been the most important source of change in mainstreaming participatory research in SSA during the life of the PRGA. The mother-baby trial approach has most likely been readily adopted because it is a simple recipe for on-farm research. Outside the PRGA, mother-baby trials have also been effectively incorporated into participatory plant breeding. Although the mother-baby trials did not receive high marks on several of the important participatory dimensions in the case study, it is important that the PRGA in general and that impact assessment research in particular keep up to date with and work on new methods of PR and GA that are rising in popularity with NARS.

At the Entebbe meeting, almost all the NARS representatives complained about the quality of participatory research. On-farm experimentation is one of the key areas that is most severely affected by low quality work. Yet, aside from this one case study, one workshop, and some recent work in the Plant Breeding working group, the admittedly difficult issue of improving the quality of on-farm experimentation particularly when such experimentation is viewed as participatory has not received much attention in the Program.

7.3 Emphasis on research-related benefits and on adoption

The PRGA model describes five types of benefits. The comparative study of the three projects concluded that participatory research in and of itself did not engender an increase in group action; therefore, benefits to social capital accumulation were negligible. Benefits to human capital in the form of improved ability to experiment and to better manage farms were reported to vary from project to project. The costs of participatory research were also detailed and compared to 'conventional' on-farm research where it was assumed that researchers merely contract land from farmers.

Although research on the impact of human capital effects, social capital benefits, and cost effectiveness is interesting, these aspects are not nearly as important as the effects of participatory research on the generation of technologies that result in farmer adoption and in the changing of research priorities about problems and opportunities. Did PR and GA result in technological change and, if it did, what were the consequences of such change on different groups in society and did PR and GA result in a change in research priorities? These are the two questions that should command the lion's share of attention in the impact assessment of participatory research, unless the goal is the permanent establishment of a group of farmer cooperators, such as a local farmers' research committee (CIAL), that have been extensively promoted by CIAT, the convening center, in Latin America.

In the context of the CGIAR, adoption should be the focus of impact assessment on PR and GA: adoption of PR-related technologies by farmers and PR-related information by researchers. Studies on the returns to agricultural research conclusively show that the size of net benefits from technological change is heavily influenced by the level of adoption. If adoption exceeds a negligible level, the size of benefits is almost never sensitive to research costs.

This focus reflects the spirit of the 1996 Systemwide Proposal that 'sold' the program on the value of 'upstream' or 'pre-adaptive' PR and GA. "Pre-adaptive participatory R&D brings users into the early stages of technology development as researchers and decision makers who help set priorities, define criteria for success, and determine when an innovation is 'ready' for release to farmers (:1)." In pre-adaptive participatory R&D, attention should center on the design and testing stages of technology development.

7.4 Emphasis on PPB

In a prospective next phase of the Program, impact assessment work needs to focus more heavily on the consequences of PPB. Thus far only one or two ex ante studies have been carried out on PPB. Impact assessment should continue to rigorously document some of the emerging success stories and also try to tease out lessons from an inventory of 'dry holes.' The 2003 state-of-art monograph on PPB needs to be updated in the next phase.

Conducting impact assessment on PPB is as close as it will get, in the foreseeable future, to quantitatively documenting the impact of the PRGA program. Although the PRGA is a relatively minor player in several important PPB projects, its history of research and advocacy in this area makes for a persuasive story for its inclusion among many partners in the attribution of success.

One of the thorny issues in impact assessment on PR and GA is the question of did PR and GA actually result in new or modified technologies or are the technologies that were tested and diffused only the researchers' unmodified technologies. This seemingly simple issue has not been definitively answered in some case studies that purport to show the effects of PR and GA. In PPB, as now practiced by leading practitioners, that issue is no longer an issue. The varieties would not have been forthcoming if farmers were not involved in their selection. Moreover, the impact assessment analyst in PPB does not have to spend a lot of intellectual energy in constructing a refined and textured counterfactual on what would have happened if PPB had not been implemented. As long as PPB focuses on regions with limited varietal change in the commodity of interest, the counterfactual that nothing would have happened is a good base from which to start the analysis. The analyst only needs to show that average varietal age in the

target farmer population is 'old', i.e., greater than 20-25 years for most important field crops, and document that the prospect for future varietal change is limited without PPB.

Impact assessment in PPB is a natural niche for PRGA support, because plant breeders usually do not have the means to carry out a rigorous assessment. The PRGA has developed excellent capacity in this area that can be marshaled cost-effectively to carry out interdisciplinary applications with interested plant breeders and to train both biological and social scientists in more specialized methods of impact assessment in PPB.

7.5 Addressing smaller questions and deeper thinking

Another line of inquiry to take on assessing impact of PR and GA is to focus on specific thematic issues of farmer involvement in the innovation process. For example, almost all IPM adaptive research and development projects teach farmers about the life cycle of the pest. By the end of the project, many reports show that farmers become significantly more knowledgeable about pest management. One of the critical questions for PR and GA is: Did this knowledge translate into technological adaptation and modification that spread to other farmers? In other agricultural fields, one can find comparable questions that could be used to guide a more incisive approach to impact assessment.

Many technologies are highly adapted and modified by farmers. The role of researchers is to get the adaptation process started by introducing principles or options to farmers. Soil conservation and minimum tillage practices are often used as examples of farmer-driven technology adaptation. In these areas of heavy farmer involvement, the appropriate types and duration of research depend on context but there are probably important lessons to be learned. A scientist in the Rural Innovation Institute at the Convening Center has carried out important conceptual work in this area based on a long-term experience in the adaptation of agricultural machinery. Collaboration between the PRGA and such scientists could result in a better definition of impact assessment pathways and provide a firmer conceptual basis for generating hypotheses on impact assessment.

7.6 Impact assessment of PR on plant breeding and natural resource management: The literature review

The 1996 Systemwide Proposal for the PRGA initiative referred to a 1995 review that concluded that the empirical evidence on the impact of participatory research was scanty (Okali, Sumberg, and Farrington 1994). The Science Council recommended that a study be linked to this review to determine whether the profile of impact assessment of participatory research had changed appreciably during the past ten years. Specifically, the terms of reference for the study were to review the literature on impact assessment of participatory research that has been produced by the Program and its partners and others, assess the extent to which impacts from using PR approaches have been rigorously evaluated by the PRGA Program and its partners, and specify methodological issues to be taken into consideration in assessing the impact of PR research.

The first stage of the review involved the assembly of impact assessment documents from the PRGA program, other sources in the CGIAR, and sources external to the CGIAR. The PRGA program supplied a listing of 124 references that were perceived to be of potential importance to the study. Of these, 104 documents were omitted because of problems related to availability and because they did not have substantive impact assessment information on participatory research.

Of the 20 remaining documents, only ten satisfied minimal levels of the criteria that the Science Council's Standing Panel on Impact Assessment (SPIA) have used to evaluate the quality of ex-post impact assessment in the CGIAR in its own assessment reports. The criteria used in the literature review included (1) the research is original and well described, (2) the counterfactual is realistic and well- stated, (3) attribution and assumptions are realistic and well-stated, and (4) distance down the impact pathway is as far as reasonable.

In a second round of elicitation, studies were canvassed from the other 14 CGIAR Centers. (Contributions from CIAT were included under the PRGA review). References to 110 documents were posted. Some of these were duplicates of studies already considered in the PRGA review because they were written in partnership with PRGA scientists. The screening of the other CGIAR center contributions was less selective than for the PRGA review, but only nine of the 110 studies were kept for detailed appraisal mainly because many Centers had taken a very liberal interpretation of what constituted empirical impact assessment on participatory research.

These 19 studies were complemented by studies that were external to the CGIAR. These were taken directly from literature searches and included only a handful of studies in addition to three that surveyed the effects of participation in fields outside of agricultural research in the broader developmental literature.

The PRGA impact assessment model described in Working Document 17 (Johnson et al. 2001b) was used as an organizing construct for the implementation of the review. Each of the selected studies was described and evaluated with regards to what it implied for the impact of participatory research. Methodological strengths and weaknesses of each study were noted.

The literature review concluded that the evidence for the impact of PR in PPB was more persuasive than the evidence for the impact of PR in PNRM. With regards to the work of the PRGA, the major contributions of the program have come in providing the conceptual basis for carrying out impact assessments, rather than in the actual implementation of impact assessment studies. The papers describing the types of participation (Lilja and Ashby, 1999) and impact hypotheses (Johnson et al. 2001b) gave great clarity to the issue of how to assess the impact of participation at all the different stages in research.

Additionally, the review underscored the importance of planning for impact assessment from the design stage of a research project. Several of the selected studies were constrained by a lack of baseline information. Others, particularly those in PNRM, were restricted by a lack sufficient technical expertise to address wider social and environmental benefits.

We broadly agree with the main finding of the review that the body of evidence pointing to the impact of participatory research is expanding slowly from a small base. The limited number of works selected for appraisal is perhaps the most surprising aspect of this study. It gives the impression that PR is not being used or that there is not that much activity in this research area. The latter seems to be true, but the review does not imply the former. Impact assessment research is usually results-oriented and not process-oriented. For example, farmer participation features prominently in several CGIAR-related success stories of technological change, but farmers' involvement is not well described or plays only a minor part of a narrative centering on the documentation of results.

Although the objective of this work was not to carry out a comprehensive search of all the literature on the impact of participatory research in agricultural research, PRGA-related research represents a significant share of the selected empirical studies. In the future, work in this field will attain a significantly higher profile if PPB fulfills its potential in the next 5-10 years.