
**AN INVENTORY OF GENDER-RELATED
RESEARCH AND TRAINING IN THE
CONSULTATIVE GROUP ON INTERNATIONAL
AGRICULTURAL RESEARCH (CGIAR) CENTERS
1996-1998**

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ABBREVIATIONS AND ACRONYMS

ACIAR	Australian Centre for International Agricultural Research
AFNETA	Alley Farming Training Network for Tropical Africa
ARC	Agricultural Research Center (Egypt)
AREA	Agricultural Research and Expansion Authority (Yemen)
ARTI	Hector Kotbekadiuva Agrarian Research and Training Institute (Sri Lanka)
AWLAE	African Women Leaders in Agriculture and the Environment
BMZ	Federal Ministry for Scientific Cooperation and Development (Germany)
BRAC	Bangladesh Rural Advancement Committee
BRRRI	Bangladesh Rice Research Institute
CARD	Center for Agriculture and Rural Development (Philippines)
CBC	Crossbred cows
CDI	Crop Diversity Index
CENTA	Centro Nacional de Tecnología Agropecuaria y Forestal (El Salvador)
CFPQ	Community Forestry Project Quirino (Philippines)
CGIAR	Consultative Group on International Agricultural Research
CIAL	Committees for Local Agricultural Research (CIAT)
CIAT	Centro Internacional de Agricultura Tropical*
CIFOR	Center for International Forestry Research*
CII	Cropping Intensity Index
CIMMYT	Centro Internacional de Mejoramiento de Maiz y Trigo*
CIP	Centro Internacional de la Papa *
CPR	Common Property Resources
DENR	Department of Environment and Natural Resources (Philippines)
EACP	East Africa Cereals Program
EARO	Ethiopian Agricultural Research Organization
ECAMAW	East and Central Africa Maize and Wheat Programs
EHNRI	Ethiopian Health and Nutrition Research Institute
EPHTA	Ecoregional Project for the Humid and Subhumid Tropics of sub-Saharan Africa
ESAMI	East and Southern Africa Management Institute
FAO	Food and Agricultural Organization of the United Nations
FBZM	Forest Buffer Zone Management
FLACSO	Facultad Latinoamericana de Ciencias Sociales
FMBA	Forest Margins Benchmark Area
FPR	Farmer Participatory Research
FRI	Fisheries Research Institute (Bangladesh)
G&DA	Gender and Diversity Analysis (CIFOR)
GIS	Global Information System
GTZ	German Agency for Technical Cooperation
HFM	Humid Forest Margins
HFZ	Humid Forest Zone
IAA	Integrated Aquaculture-Agriculture
IAR	Institute for Agricultural Research (Ethiopia)
ICARDA	International Center for Agricultural Research in the Dry Areas*
ICID	International Congress for Irrigation and Drainage
ICLARM	International Center for Living Aquatic Resources Management*
ICRAF	International Crops Research Institute for the Semi-Arid Tropics*
IDM	Integrated Disease Management

IFPRI	International Food Policy Research Institute*
IICA	Inter-American Institute for Cooperation in Agriculture
IIED	International Institute for Environment and Development
IIMI	International Irrigation Management Institute, now the International Water Management Institute*
IIRR	International Institute for Rural Reconstruction (Philippines)
IITA	International Institute of Tropical Agriculture*
ILRI	International Livestock Research Institute
INGA	International Network on Genetics in Aquaculture
INIAP	Institut National de Investigaciones Agropecuarias (Ecuador)
IPGRI	International Plant Genetic Resources Institute*
IPM	Integrated Pest Management
IPRA	Farmer Participatory Research Project (CIAT)
IRAD	Institut de recherche agricole pour le développement (France)
IRMU	Irrigation Research Management Unit of the Irrigation Department, Sri Lanka
IRRI	International Rice Research Institute*
ISNAR	International Service for National Agricultural Research*
ITK	Indigenous Technical Knowledge
IVITA	Veterinary Institute for Research in Tropics and Highlands (Peru)
IWMI	International Water Management Institute*
LBC	Locally bred cows
MFCF	Mixed Food Crop Field
NARS	National Agricultural Research System
NARS	National Agricultural Research System
NDUAT	Narendra Deva University and Agricultural Technology (India)
NGO	Nongovernment Organization
NRM	Natural Resource Management
NTFP	Non-timber Forest Products
PABRA	Pan Africa Bean Research Alliance
PAPA	Participant Action Plan Approach
PERC	Productivity-enhancing resource-conserving (CIMMYT)
PhilRice	Philippines Rice Research Institute
PRA	Participatory Rural Appraisal
PRM	Programa Regional de Maize (Guatemala)
PVS	Participatory Varietal Selections
R&D	Research and Development
RRA	Rapid Rural Appraisal
SADC	Southern Africa Development Community
SANREM CRSP	Sustainable Agriculture and Natural Resource Management Collaborative Research Support Project
SWP	Systemwide Program
SWP PRGA	Systemwide Program for Participatory Research and Gender Analysis
UNU	National University of Ucayali (Peru)
UPWARD	Users' Perspectives With Agricultural Research and Development (CIP)
VISCA	Visayas State College of Agriculture
WANADDIN	West Asia and North Africa Network for Durum Wheat Improvement
WARDA	West Africa Rice Development Association*
WIRFS	Women in Rice Farming Systems project (IRRI)

* - Centers of the CGIAR

ACKNOWLEDGEMENTS

Compiling a current account of gender-related research, training, and dissemination in the CGIAR was a rewarding task. Building from the 1990-1995 inventory, Centers were quick to respond with material, most of it already summarized. I am grateful to the Directors of Research and the Gender Analysis Focal Points for providing me with their information and for responding quickly to follow up questions. The initial requests and organization of responses was done with the able help of Jennifer Green, a consultant to the program. Mary Ellen Largess accepted the challenge of helping me put together the final document and has been a cheerful and flexible assistant. I would also like to thank the International Center for Research on Women who housed me in 1997 and 1998.

I would also like to thank the Systemwide Program for Participatory Research and Gender Analysis for printing and mailing, and web publishing the completed document.

While every effort was made to insure the accuracy of this document, I remain solely responsible for its final form.

This document was sponsored by the CGIAR Gender Program as part of its efforts to encourage the use of gender analysis in the research of the International Agricultural Research Centers and their partners. The CGIAR Gender Program was funded through special project funds contributed by the Australian Council for International Agricultural Research (ACIAR), the Canadian International Development Agency (CIDA), The Dutch Ministry of Foreign Affairs, the Ford Foundation, the International Development Research Centre (IDRC) in Canada, the Norwegian Royal Ministry of Foreign Affairs, the Swedish International Development Agency (SIDA), the Swiss Agency for Development and Cooperation, the Overseas Development Administration, (United Kingdom), and the United States Agency for International Development (USAID).

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INVENTORY OF GENDER-RELATED RESEARCH AND TRAINING IN THE INTERNATIONAL AGRICULTURAL RESEARCH CENTERS, 1996-1998

Introduction

In 1995, the CGIAR Gender Analysis Program published the first inventory of gender-related research, training, and information dissemination activities of the international agricultural research centers for the years 1990-1995. The objective was to provide CG scientists, Centers, and partners with a record of what was already being done within the CGIAR. Centers were doing a variety of gender-related activities including research or learning more about women, such as ICARDA's study of women's roles in West Asia North Africa agriculture; research on gender differentiated roles as part of characterizing systems; research on methods; inviting women farmers on-station to evaluate new varieties; and straightforward application of gender analysis as a regular part of socioeconomic and technical diagnostic and technology development research.

The second inventory takes us from 1996 to 1998. During this period the overall environment has improved for the recognition of the value of women's contributions to agriculture and of the usefulness of gender analysis. The 1995 World Conference for Women in Beijing drew worldwide attention to women's strength and knowledge as well as to the constraints that often limit their full participation in economic advancement and, for the CG, particularly in agriculture. Evidence mounted, much of it produced by IFPRI, to support the contention that women were highly likely to use expanded opportunities and income for the welfare of their families, particularly children. There is also evidence that as men seek better incomes away from marginal areas, women are left to farm them with fewer resources. Despite their recognized importance, poor rural women are least likely to be involved in or benefit from technology development. At Centers Week 1995, the CGIAR voiced a specific concern for the needs of poor rural women, asking that their particular needs and roles be directly addressed by the Centers in their 1996-2000 Medium Term Plans.

Parallel with the increased attention to women's roles has been a growing stream of experience by scientists of greater participation by farmers and users of new technologies in the research process. Participatory approaches brought with them the recognition that there are diverse stakeholders for technology development of which women collectively, or split by other variables such as class, are important to consider.

In 1997, the CGIAR Gender Analysis Program, formerly based at the CGIAR Secretariat, moved to a more appropriate home based in the research system—the Systemwide Program for Participatory Research and Gender Analysis for Technology Development and Institutional Innovation (PRGA Program). CIAT is the convening Center and the program is cosponsored by CIMMYT, ICARDA and IRRI. This program has moved swiftly to stimulate innovative research in plant breeding and natural resource management with Centers and their NGO and NARS partners. Such research specifically includes, measures and assesses gender-sensitive participatory research and the costs and benefits of gender or other stakeholder participation. The PRGA Program is addressing a need cited by many Centers for more specificity about the strategies, costs, benefits, and possibilities of scaling up of different approaches of gender-sensitive participatory research and how these vary for different kinds of technology development in different regions.

The evidence presented in this inventory builds on information reported in 1995. It demonstrates that Centers recognized diverse perspectives as important to the design of new technologies and that women's views, knowledge, and involvement are extremely useful. A growing number of projects

that are women-focused, directly addressing the CGIAR request that attention be paid to the needs of poor rural women.

Methodology

To gather material from the Centers for this inventory, each Director of Research and Gender Analysis Focal Point received a copy of their entries for 1991-1995 and asked for an update for 1996-1998. Centers responded with their own descriptions following the earlier model. Entries were edited for brevity or clarity. Projects from the 1995 review that are still active are included again. The summaries coming directly from the Centers means that there is more detail in some entries than others. Readers are encouraged to get in touch directly with Centers about whose program they want more information. Contact information is in Annex C.

Organization

The organization of this inventory is similar to the 1995 one. The projects and activities of the Centers have been listed according to the twelve CGIAR categories:

- I. Germplasm enhancement and breeding,
- II. Crops and cropping systems,
- III. Livestock and livestock systems,
- IV. Trees and tree systems,
- V. Fish and aquatic Systems,
- VI. Protecting the environment
- VII. Saving biodiversity,
- VIII. Improving policies,
- IX. Training,
- X. Documentation, publications and information dissemination,
- XI. Organization and management counseling, and
- XII. Networks.

As in 1995, another category has been added that includes entries describing the steps taken by each Center to improve its capacity to systematically address gender analysis in its research, training, and dissemination portfolio:

- XIII Priority setting, project proposal and review.

Within each category the entries are listed by Center alphabetically. IWMI remains IIMI in this document, though it is listed in Annex C under both titles. The entries are numbered sequentially from 1 to 212 throughout the document. Annex B1 provides a matrix showing each Center's entries according to these thirteen categories. Table 1 compares the number of entries for the CGIAR categories between 1990-95 and 1996-98.

Table 1. Comparison of number of entries in CGIAR categories:1990-1995 and 1996-1998.

CGIAR CATEGORIES	1990-1995		1996-1998	
	N	%	N	%
I. Germplasm enhancement and breeding,	15	11.0	27	13.0
II. Crops and cropping systems,	40	29.0	56	27.1
III. Livestock and livestock systems,	8	5.0	12	5.8
IV. Trees and tree systems,	13	9.0	11	5.3
V. Fish and aquatic Systems,	1	0.5	5	2.4
VI. Protecting the environment	5	3.5	12	5.8
VII. Saving biodiversity,	9	6.5	10	4.8
VIII. Improving policies,	24	16.0	32	15.5
IX. Training,	6	5.5	15	7.3
X. Documentation, publications and information dissemination,	11	8.0	10	4.8
XI. Organization and management counseling, and	2	1.5	1	0.5
XII. Networks.	2	1.5	4	1.9
XIII. Priority setting and project proposal and review	4	3.0	12	5.8
TOTALS	140	100	207	100

Annex A and B group projects by types of studies conducted. These are classified as:

- A. Methodology development,
- B. Adoption studies and impact assessment
- C. Characterization and diagnostic studies
- D. On-farm technology evaluation
- E. Postharvest processing and marketing
- F. Literature reviews and special studies
- G. Women-specific technologies or studies

A new category in this inventory classifies projects in relation to nutrition related studies.

- H. Nutrition.

Entries are included in more than one type of study. Literature reviews now also includes library collections, workshops, and seminars that address gender analysis and gender issues. Women-specific technologies or studies includes projects focused specifically on women. Table 2 compares the number of entries in each type of study for 1990-1995 and 1996-1998.

Table 2. Comparison of number of entries in cross-cutting categories: 1990-1995 and 1996-1998.

TYPES OF STUDIES FOR GENDER-RELATED RESEARCH	1990-1995	1996-1998
A. Methodology development,	12	22
B. Adoption studies and impact assessment	13	28
C. Characterization and diagnostic	38	87
D. On-farm technology evaluation	9	28
E. Postharvest processing and marketing	11	10
F. Literature reviews workshops & seminars	7	35
G. Women-specific technologies or studies	23	42
H. Nutrition.	11	12
TOTAL	124	264

Discussion: changes since 1995.

The system is making progress in terms of using gender analysis as a research tool and in understanding and focusing more on women's specific knowledge, constraints, and preferences as farmers, managers of natural resources, processors of food and other products. The comparisons

presented in the tables and this discussion are indicative, but not statistically comparable. First, because projects and activities are mixed, orders of magnitude differ. Second, some Centers are cited in 1995 for systems in place to review projects and these have not been restated for 1998. Third, some Centers may not have listed specific projects or activities where gender or diversity analysis is now routine.

Use of gender analysis is on the increase. In 1995, 140 projects or activities were listed; in 1998, 207 are listed, a 48% increase. This overall increase indicates that Centers are moving ahead in using gender analysis tools and, in some cases, proactively addressing the needs of women farmers. With two exceptions, CIP and ICRAF, the actual number of gender-related projects and activities has gone up for every Center.

There is a visible increase in gender-related training (IX) and project review mechanisms (XIII). Of the twelve CGIAR categories and the additional category of priority setting and project proposal and review, it is this last and training that have shown the largest increase in entries. Training and workshop activities that include a gender perspective have more than doubled, from 6 to 15 (representing 9 Centers). The number of Centers citing mechanisms put in place or being developed during 1996-98 to ensure better attention to gender analysis in priority setting and project proposal and review grew from 4 to 12 (representing 9 Centers). This is substantial and positive change towards using gender analysis more systematically.

Training seems to have paid off particularly with respect to IITA. Drawing on expertise from the International Institute for Environment and Development and the CGIAR Gender Analysis Program and IRRI, IITA developed a training program in gender-sensitive participatory research techniques and used them to train IITA's scientists as well as NARSs partners. While IITA does not state explicitly that it uses gender as a criterion for project review, the training of IITA scientists has resulted in a large number of projects, the most reported for any Center, that integrate gender analysis into characterization and other studies.

Building on experience. As cited below, IIMI first conducted studies to learn more about women and water before moving towards establishing questions to be addressed more regularly in its research. A small group of CIFOR scientists built up experience while trying to develop criteria and indicators for measuring the impact of forest management strategies. They have now developed a program for future gender-related research, sharing of lessons, and the development of guidelines with their colleagues. IRRI's long experience and collection of data with the Women in Rice Farming Systems (WIRFS) program has given them a solid footing with which to conduct gender audits of proposed programs.

Committees. ICARDA and IPGRI are using committees effectively to further attention to gender in their Centers and the Centers' research. ICARDA's committee includes representatives from each research program.

Gender specialists. There is a greater use of gender specialists. IN 1995, there were three, at ICRISAT, IIMI, and IRRI plus the head of the intrahousehold research at IFPRI. Two of these specialists have recently won awards for their research. Thelma Paris received the CGIAR Chairman's Excellence in Science Award as an Outstanding Local Professional for her pioneering work with the WIRFS program. Margreet Zwarteveen won the first "Dr. N. D. Gulhati Memorial International Award" for the best paper by a young researcher at the International Congress for Irrigation and Drainage (ICID) Conference in Cairo in September 1996.

CIAT (for the SWP PRGA), CIFOR, IFPRI, IIMI, and IRRI all have designated gender analysis or gender and diversity specialists. For the SWP-PRGA, the gender specialist is working with the program's grantees for innovative research and catalyzing expertise from inside and beyond the CGIAR to help in this endeavor. At CIFOR, the gender specialists are integrating gender into scientists' tool kits. The gender specialist at IRRI is conducting specific research with respect to participatory plant breeding, assisting other IRRI scientists, and leading a research effort on the effects of globalization on women and agriculture in Asia. At IFPRI and IIMI, the gender specialists

are responsible for gender-focused research to inform policy. At IFPRI, the specialist is undertaking a multi-faceted research program focused on an improved understanding of intrahousehold processes. Specific scientists at CIMMYT, ICARDA, ILRI, IPGRI, and WARDA are charged with a focus on gender as one their main areas of concern.

There is increased interest in learning about rural women and gender analysis. A number of Centers are taking steps to help their scientists learn more about gender analysis and women's roles and how this information is pertinent to their research. This is shown in the increase in the number of entries in two cross-cutting categories: 1) literature review and special studies (expanded to include workshops and library collections) which now numbers 32 entries over 7 in 1995 and 2) women-specific technologies or women focused studies, 38 in 1998 compared to 23 in 1995. Every Center has an entry in at least one of these two categories.

Workshops and seminars. A number of Centers have held internal or more broadly based workshops on gender analysis and the role of women . These include CIAT (for the SWP PRGA including a broad spectrum from Centers, NARSs and NGOs), CIFOR (internally), CIMMYT (for the East and Central Africa Maize and Wheat Network), ICARDA (for the Nile Valley and Red Sea Socioeconomics Research Network), ICRISAT (Center scientists and representatives from gender-friendly Indian NGOs and women's research institutions), IIMI (predominantly outside experts who had conducted research on women and water), IPGRI (with FAO on women's roles in the conservation of plant genetic resources, predominantly outside experts), and IRRI (regional workshop to initiate research on the extent and effects of globalization on women's roles in agriculture; predominantly NARSs' scientists). IIMI's workshop was preceded by several years of research by their first gender specialist who conducted case studies in a number of countries.

Gender-related research is found most frequently under characterization and improving policies. The CGIAR categories showing the greatest amount of gender-related research are crops and cropping systems and improving policy. Of the 54 entries in crops and cropping systems, IITA accounts for 25, primarily for work in the Humid Forest Zone and Forest Margins. There are 31 entries for improving policy led by IFPRI (17 including 2 shared projects) and IIMI (10 including one shared project). The high numbers captured in crops and cropping system are echoed in the highest category of the cross-cutting categories--characterization--which captures the information from livestock, tree, and aquatic as well as cropping systems.

Organizational and management counseling and networks still show low numbers of entries. These are two areas where the CG works explicitly with NARSs. However, the low number of entries under these categories masks a great deal of work being done in conjunction with NARS's scientists in research cited elsewhere and in training. ISNAR has developed for the SADC region, a well received comprehensive training manual on how to incorporate gender concerns into agricultural policy and management.

Addressing the needs of poor rural women. Almost every Center has at least one project directly learning about or responding to the needs of poor rural women. To address the fact that women may have different preferences for plant traits, CIAT has been encouraging NARSs in East and Central Africa to release multiple varieties of beans to meet the diverse needs of farmers. CIP worked with women farmers in Kenya in testing sweetpotato varieties that could be used for commercial snack foods as well as contributing to improved household nutrition. IITA is developing an improved cowpea variety with pods over canopy to ease the picking of pods at maturity, primarily a woman's task.

CIAT is experimenting with new sales outlets to better reach women farmers. The SWP PRGA is putting particular emphasis on reaching poor women farmers in its research on methods. IITA, in the southern Cameroon, is working on various strategies to reduce the need for weeding, an activity that is almost always women's work. They are also working to improve the production of the *afub owondo*, groundnut based mixed cropped field, which is generally farmed by women as well as

on leafy green vegetables and the problem of pops in groundnuts, both women's crops in the zones where they are working. ICARDA is examining the emergence of a female wage labor force in Syria to understand how it is organized as well as whether and how the women are differently effected by new technologies.

In some cases women are being encouraged to start small businesses: small scale bean seed enterprises in east Africa (CIAT), barley variety sale and distribution in Ecuador (ICARDA), cassava leaves hedgerows in Southern Cameroon (IITA), fish farming in Bangladesh (ICLARM).

Discussion: What are we learning?

The results of current CGIAR research is providing us with more information on women's roles in agricultural production and on some of the dilemmas of gender-related research

Women's productivity. In the Ghana cocoa farmers study conducted by IFPRI, where women own land, men's and women's productivity is the same. Similarly, in Zwarteveen's study in Burkina Faso the "productivity of both land and water was found to be higher in households where both men and women hold plots, leading to higher incomes for women while the proportion of labor contributed by women to men's plots is virtually the same." ILRI's studies of small dairying on the Kenya coast indicates that women operators were more productive than men, even where men owned cows where the woman operator received the bulk of the additional earnings.

Constraints. Center research also sheds light on the constraints to productivity experienced by many women: access to land, education, and training and competition with household responsibilities. WARDA's research shows among rice producers in Cote d'Ivoire where there is a system of men's fields, women's fields, and family fields, the gross margin is less in women's fields, especially where supervised by men, than in men's or family fields. This is partially attributed to women's smaller field size along with less access to extension services and new technologies. An IFPRI sponsored study in South Africa suggests that the decline in common property rights frequently results in the loss of niches women use for growing crops or collecting as part of meeting household needs. WARDA's study in Senegal indicates that women's production is less than men's. The regression analysis shows links between lower production and lower input use, less technical knowledge, and competition with household duties. IIRI's investigation of women's knowledge on IPM shows that despite training, women were not able to absorb as many concepts as men. A regression analysis showed that the factors most affecting farmers' scientific knowledge are education, training, sex, land size. The association between the education and knowledge score suggests that women's weaker absorption of knowledge may be due to their lesser years of school and farming experience. IIRI's detailed study in Uttar Pradesh demonstrates the increasing phenomena of the poorest, least educated women being left to handle on farm responsibilities in the most difficult environments as men leave to find non-farm employment--seasonally to permanently.

The differences between women. Two studies from India and one each from Syria and Sudan remind us that women are not all the same—their activities and benefits and the effects of new technologies will vary by social class. ICRISAT's study shows that increase in production resulting from new varieties and technologies has led to increases in household income, a small part of which is shared with wives for household provisioning, and a greater workload for wives in shelling the increased production. In landless households, the benefit has come from the increased demand for hired female labor and therefore paid employment. IIRI's study in eastern India also finds that social status determines the nature of women's and men's interaction with production: upper caste women don't provide physical labor except where men are working off farm; women from backward castes provide labor on their own farms; whereas those from scheduled castes work as hired agricultural laborers. ICARDA's study in Syria focuses on the effects on the transition of women from unpaid family labor to organized wage labor. In the Sudan, ICARDA is sponsoring research that traces the

impact of a large scale irrigation scheme on three different groups—women owner-operators, women members of household of male owner-operators, and female wage labor.

Reaching rural women. In order to reach rural women, several Centers are working closely with NGOs especially women's organizations or those with a strong focus on women constituents. ICLARM has worked with several NGOs in Bangladesh including the Bangladesh Rural Advancement Committee, to encourage and organize women as cooperators in developing seasonal pond aquaculture. IRRI worked with a local women's group in the Philippines to test a low cost rice drier for both its technical reliability and for its effects on or constraints on its use resulting from social organization. CIAT has experimented with seed dissemination through women's groups and local clinics in Uganda and Western Kenya. IITA works with the Women Farmers' Association of Nigeria to popularize improved cowpea varieties and to learn what further improvements would be useful.

Working with women separately. In some cases, working with women separately is more conducive to learning as IRRI has found in Bukidnon, Philippines where women preferred separate IPM training courses as a more comfortable environment for learning.

Treating the household as a whole family unit. Two Centers, CIAT and CIMMYT (and ICRAF in the 1995 report) have addressed the quandary of male opposition to women's separate involvement in research or training. In Bangladesh, CIMMYT has set up 'whole family training' in wheat production with positive effects in terms of training retention and application. CIAT scientists working in the Pucallpa region in Peru are taking the whole household, not just the male farmer, as the unit of research.

The 1996-98 inventory shows that Centers are making progress towards a more proactive consideration of gender in their research, training, and dissemination activities. They are paying more attention to poor rural women. Except where there has been extensive in-house training (IITA) or the long time presence of a gender specialist (IRRI), Centers are still developing their approaches to where and how gender should be addressed in their specific mandate areas. The ongoing research on the research processes being conducted through the Gender Analysis Program and the SWP PRGA will provide valuable insights furthering Centers' and scientists' understanding and use of gender-sensitive participatory research.

INVENTORY OF GENDER RELATED-RESEARCH AND TRAINING IN THE CONSULTATIVE GROUP ON THE INTERNATIONAL AGRICULTURAL RESEARCH (CGIAR) CENTERS

Increasing Productivity

I. Germplasm Enhancement and Breeding

See also No. 181 (CIAT, CIMMYT, ICARDA, IRR)

CIAT Howard Gridley (Breeder), Soniia David (Anthropologist), Louise Sperling
1. (Anthropologist).

Scientists working with CIAT's Pan-Africa Bean Research Alliance (PABRA) incorporate gender analysis at several levels of their research and training activities: diagnosis and technology development, technology dissemination and assessing the impact of new technologies. Gender sensitive data collection techniques are used to ensure that the different concerns, priorities and interests of men and women and other differentiated categories of bean producers and consumers are represented. These include: wealth ranking and survey sampling to include different wealth groups and female headed households; other participatory rural appraisal techniques such as ranking and scoring and focus group discussion. See Table 3 for an example of farmers' ranking.

Table 3. Farmers' ranking of bean production/utilization constraints, Mbale, Uganda (CIAT)

CONSTRAINT	MOSTLY MEN	WOMEN
Low yields due to climate	2	4
Low yields due to insect pests	1	1
Shortage of seed	3	5
Lack of good quality seed	6	2
Diseases	4	3
Weevils	5	6
Low market prices	7	7
High fuel use for cooking	8	8

Men consider the shortage of seed to be more important than women, reflecting male involvement in growing beans as a cash crop; they frequently buy seed of only 3 commercial varieties. Women's concern with lack of good quality seed reflects their role in seed management.

CIAT: Howard Gridley (Bean breeder), Soniia David (Anthropologist), Louise Sperling
2. (Anthropologist).

Use and development of appropriate methodologies for investigating differentiated preferences. Examples of specific studies: Participatory plant breeding in Ethiopia (to begin in 1998). Collaborators: Alamaya Agricultural University, Melkassa and Awassa Research Stations.

CIAT: Soniia David (Anthropologist).
3. Research on women's independent production of beans (S. David, 1997. "Women's autonomous bean production in Uganda: a Mbale case study.")

CIAT: Vas Der Aggarwal (Bean breeder); Soniia David (Anthropologist).
4. Gender sensitive technology testing. In this work CIAT encourages NARS to adopt a strategy of multiple variety releases: meeting the multiple and diverse needs of farmers, including the poorest, who are for the most part, women. Selection of trial farmers is by wealth, sex of household head, market orientation.

Trial design: farmer designed varietal trials to ensure better assessment of farmer acceptability on a range of characteristics, including the palatability of fresh bean pods and leaves which in some situations are important in the food security strategy of women and poor farmers households. Collaborators: Malawi Bean Improvement Program.

CIAT: Soniia David (Anthropologist), Robin Buruchara (Bean pathologist).
5. Technology dissemination. A gender component was included in action research on seed dissemination channels to address the question "do certain distribution channels and promotional methods facilitate ease of access/adoption by men vs. women"?

Women's groups and health clinics in Uganda were used as sale outlets for new bean varieties seed was sold in varying size packages (2 kg to 100 grams) to ensure access by poor farmers. For each dissemination channel, data on seed buyers was recorded in sex-disaggregated format. For example, see Table 4 for sex disaggregation of data on seed buyers in Uganda and Tanzania.

Table 4. Proportion of bean seed purchases made by men and women, by seed dissemination channels (percent) (CIAT)

	SALES FROM SHOPS*	EXTENSION SELLING IN MARKETS	WORLD VISION	WOMEN'S GROUPS	HEALTH CLINIC
MEN	86	66	33	47	42
WOMEN	14	34	67	53	58

• Note: Results are from a non-random sample of buyers.

SOURCE: S. David et al. 1997.

Women's groups in Western Kenya were used as points of distribution for seed of climbing beans and root rot resistant materials. Collaborators: World Vision International, Ministry of Agriculture (extension system), local health clinic, local women, groups, Kenyan national bean program, Kakamega. (S. David, S. Kasozi and C. Wortmann, 1997. An investigation of alternative bean seed marketing channels in Uganda. Network on bean research in Africa, Occasional paper series no. 19, CIAT, Kampala, Uganda.)

CIAT: Soniia David (Anthropologist).
6. Ensuring women's role in seed production and germplasm conservation. Research activity: study of modalities for establishing farmer seed enterprises in Uganda, 1994-1996

Individual farmers or farmer groups, including women, are encouraged to establish small-scale artesian bean seed enterprises. Benefits include: lower cost of production; timely, decentralized seed delivery; selection of varieties to be multiplied in accordance with local preferences; development of income generation and small enterprise development capacity. Collaborators: National extension system, Mission Moving Mountains (NGO) (Publication: S. David. 1997. "Designing sustainable, commercial farmer seed production systems: case studies from Uganda". Paper presented at the workshop "CIAT's experience with systems research and future directions", Cali, Colombia, December 1-2, 1997.)

CIAT: Soniia David (Anthropologist).

7. Gender sensitive impact and adoption studies. This work uses data collection approaches to capture possible gender differences with regard to changes brought about by adoption of new technology in: the sexual division of labor, intrahousehold distributional issues e.g. household/individual welfare, use of income, organization of production; disaggregation of adoption data; emphasis on social impact assessment. For example, the use of impact diagramming in Uganda alerted researchers to an important impact indicator identified by farmers: adoption of a new higher yielding bean variety is expected to decrease women's labor in looking for wild vegetables during the dry season.

On-going research includes the impact of Lyamungu 90 bean variety in Bukoba District of Tanzania (February 1998) and impact of CAL 96 and MCM 5001 in Mbale District of Uganda (May 1998). Collaborators: Tanzanian national bean program

CIAT: Bernardo Ospina Patiño (Training Coordinator), Verónica Gottret (Economist),
8. Douglas Pachico (Economist), and Carlos E. Leite Cardoso (Researcher, Centro Nacional de Pesquisa de Mandioca e Fruticultura).

A study conducted in 1997 on the introduction and impact of cassava drying plants in Cerea, in Northeast Brazil, includes a component on women as beneficiaries. Typical use of cassava in this area is the production of a flour, *farinha de mandioca*, by small scale units. Farmers are generally poor and operate at a small scale. Capital is scarce and the growing environment difficult. Most of the labor for production of this staple is by women. In 1989, the technology for the production of dry cassava chips for incorporation in animal feed concentrates was introduced in the area by the State Technical Assistance and Extension Service. This technology while suitable to small scale production is relatively complex in that its use requires collective action by farmers as well as the entry into a new market. The strategy was to set up and test production, processing and marketing technologies and channels on a small-scale semi-commercial basis. One result of this study was to demonstrate the relative effectiveness of an approach that offered considerable support to farmers versus the cassava processing plants built by political largess which were unsupported and largely did not go into operation.

Both men and women were interviewed in focus groups as to a number of factors effecting the community decisions to adopt, level of community participation, factors which effected success or failure, effect of new alternative market. Significant for men were alternative markets for cassava in good years that provided income to families. It also provided income to landless farmers not members of the groups who sold their excess to the groups. Community organization was also considered important. Women were interviewed with respect to their participation and cited the institutional support they received, the effect of the project on their sociopolitical position in the community and the effect on overall community development and household quality of life. Women's frequency of responses was much lower than men's. A particular benefit to women was that because of the alternative market with a simpler processing, the hard labor they put into processing *farinha* was reduced. The extra cash income was seen as a benefit to the

quality of life of community households. Some women indicated that the project helped women to get better organized. Consequently the community had a better opinion of women and their participation increased on activities and decision-making. (Bernardo Ospina Patino, Maria Verónica Gottret, Douglas Pachico, and Carlos E. Leite Cardoso. CIAT's Integrated Cassava Research and Development (IRCD) Strategy: A Case study on adoption and impact in Northeast Brazil)

- CIP: Jan Low (Economist, left CIP 1996; IFPRI), Peter Kinyae, Simon Giguchi, Mary Anyango Oyunga (KARI), Vital Hagenimana, and Jackson Kabira.
- 9.** Combating Vitamin A Deficiency through Sweetpotato. 1997. Increasing recognition of the negative health effects of vitamin A deficiency has led to increased efforts to develop sustainable solutions to the vitamin A deficiency problem. The report presents initial findings from the first phase of a two-year project to combat vitamin A deficiency through the introduction and use of beta-carotene-rich (orange-and-yellow-fleshed) sweetpotato varieties in Nyanza Province in western Kenya. Secondary sources and primary data collection (dietary assessment, market, socioeconomic, and agronomic instruments) were used to determine whether enough vitamin A deficiency existed to justify intervening and if the use of beta-carotene-rich sweetpotato varieties was appropriate. The two sites selected already produce white-fleshed sweetpotato year-round. Results indicate that introduced orange-fleshed sweetpotato would be the cheapest year-round source of dietary vitamin A. Moreover, frequent feeding of young children with orange-fleshed sweetpotato could ensure that the recommended daily allowances of vitamin A are achieved.

An intervention strategy combining the introduction of beta-carotene-rich sweetpotato, nutrition education, and promotion of sweetpotato-based processed products for domestic and commercial use was implemented in twenty women's groups. Additional sweetpotato varieties were examined in researcher-managed advanced yield trials. Eleven of the 15 sweetpotato clones tested are suitable for addressing vitamin A deficiency in well-rainfed areas of East Africa. All eleven have sufficient beta-carotene content to be considered good sources of pro-vitamin A, are acceptable to consumers, and demonstrate adequate yields.

- ICARDA: Hugo Vivar (Barley breeder).
- 10.** Informal sector barley seed production by women in Ecuador. On-going since 1996. In this activity researchers work with women farm operators in Ecuador to produce high-quality seed of improved barley varieties for distribution and sale within their own communities. Collaborators: Instituto Nacional de Investigacion Agro-pecuaria (INIAP), Ecuador.

- ICARDA: Chilot Yirga (Institute of Agricultural Research, Holeta, Ethiopia) and Richard Tutwiler (Anthropologist).
- 11.** Indigenous knowledge of barley, user classifications, and consumer preferences 1995-97. Barley is a basic subsistence food in the Ethiopian highlands. This baseline study for a longer term project on genetic and agronomic improvement of barley based on local landrace material identified over 20 recognizable farmer varieties, each with specific quality and agronomic characteristics. As post-harvest processors of barley grain and straw, women identified the qualities of each variety associated with particular uses. This information has been incorporated in a participatory breeding and technology transfer program aimed at improved varieties with specific adaptation to both agro-environmental and utilization conditions. Collaborative study within Ethiopia Barley Improvement Project.

ICRISAT: David D.Rohrbach (Agricultural Economist).

12. Gender differences in the demand for alternative grain and plant traits are being considered in the evaluation of the decisions of individual farm families to grow multiple sorghum and pearl millet varieties in southern Zimbabwe. Men were generally able to identify a larger number and range of different sorghum and pearl millet varieties compared with women. These included varieties grown in the past. However, women provided substantially more information regarding the variable qualities of different varieties of sorghum or pearl millet for different end uses. Women were more concerned about processing traits while men were more concerned about marketing opportunities. Men also appeared more concerned about productivity differentials in the event of alternative rainfall scenarios. These surveys will continue with the exploration of how community status and gender influence access to seed of a wider range of varieties.

IITA: Dr. B.B. Singh (Cowpea breeder).

13. Cultivation of improved cowpea varieties. IITA Kano station is working very closely with the Women Farmers' Association of Nigeria to popularize cultivation of improved cowpea varieties as a source of nutritious food for women and children as well as in generating income by women through the sale of snack foods like "akara" and "moi-moi".

Efforts are also being made to train housewives to use cowpea leaves as a vegetable rich in protein and minerals. Since women normally harvest cowpea at maturity, efforts are being made to develop improved cowpea varieties with pods over canopy for easy picking. This innovation should considerably lessen the amount of women's labor required.

IITA: S. Weise (Weed scientist) and I. Ekanayake (Physiologist).

14. Leaf production from cassava hedgerows in southern Cameroon. 1996 – 1998. The objectives are to: 1) determine the potential differences in the quality of marketable cassava leaves of different clones; and 2) assess the type of cassava canopy architecture conducive to marketable leaf production in hedgerows.

Cassava leaf is the most frequently consumed vegetable and an important source of protein in most of Central Africa. Traditionally, young leaves are collected for home consumption from cassava planted in a mixed food crop field as a by-product of tuber production. Urbanization has created a market for this vegetable that is dominated by women in both production and marketing. However, no systems have been developed specifically for market-oriented production of cassava leaves. This study is examining the possibility of using the hedgerow technique of Asian tea plantations for the continuous production of fresh leaf material in a randomized complete block design with 4 replicates. Six varieties/clones with differing canopy architecture will be planted. Hedgerows will be pruned back regularly. Four management treatments per clone will be imposed: no-hedgerow vs. hedgerow and frequent vs. infrequent leaf harvest. Control: no leaf harvest. Both women and men taste panels evaluated the various clones for organoleptic properties. Women also evaluated the varieties in terms of preparation ease and cooking time.

IRRI: Abha Singh (Sociologist), O. Singh, S. Singh (Plant breeder, NDUAT); Thelma Paris (Plant breeder), M. Hossain (Social scientist), S. Sarkarung (Agricultural economist), R.K. Singh (Plant breeder, and IRRI Liaison Officer).

Varietal characteristics and farmers' perceptions of rice cultivars in Eastern Uttar Pradesh. June 1997- ongoing. The objectives of the study are to: a) survey rice varietal diversity b) describe farmers (males and females) perceptions and criteria for varietal

selection; c) develop methodology for farmer participatory approach and gender analysis in plant breeding. This study was conducted in two rice based rainfed villages, namely Chandpur and Mungishpur. Mungishpur is one of the sites selected for the farmer plant breeding research of the Systemwide Program in Participatory Research and Gender Analysis (SWP PRGA) project. For the survey on rice diversity, 200 households in Chandpur and 150 households in Mungishpur were surveyed. In Chandpur, 76% and in Mungishpur 89% are farming households while the remainder are landless and only rent land. Rice occupies the largest cultivated area during the Kharif season. From the total farming population, sample households representing different socioeconomic groups were selected for in-depth interviews with regards to their perceptions of the varietal characteristics of the varieties they were currently using. Respondents were asked to name the rice varieties they were growing, rank them according to landtypes, describe the positive and negative attributes of the varieties, cite the five most important traits they are looking for in selecting a variety, and rank the varieties according to traits. Other questions on seed management practices were also asked.

Preliminary analysis showed that there were slight differences in perceptions between men and women regarding positive and negative traits of specific varieties, although these findings have to be verified after harvesting the newly introduced rice varieties. Females from the lower caste preferred *Sarju 52* over *Mashurie* because of the following reasons: better yields, suitability to the landtype, better straw quality, medium duration, resistant to pest and diseases, competes with weeds, easy to thresh and has heavy and bold grains. The qualities of *Mashurie* which they liked were: better taste, commands a good price in the market, best for lowland, more straw yield, remains soft after cooking, has higher milling recovery, good grain quality suitable for special occasions, good yield.

The straw quality (palatability and preference of animals) and quantity are important varietal characteristics to women more than men due to women's major responsibility of taking care of milk animals and collecting animal fodder. It usually takes half a day to walk long distances to collect green fodder to their animals. Easiness to thresh is another important quality of rice variety which females look for because manual threshing is a labor-intensive task which is predominantly done by women. The ability of *Sarju 52* to compete with weeds is an important characteristic cited by females because weeding is exclusively done by females from land-poor families. Another varietal characteristic which is important to poor households is the grain and eating quality of rice suitable for special occasions such as weddings, religious festivals wherein relatives, special guests are invited. Collaborating Institution: Narendra Deva University and Agricultural Technology (NDUAT) in Kumarganj, Faizabad District. (Paris, T. A. Singh, O.P.Singh, V.S. Chauhan, K. Prasad, M. Vasiar, R.K. Singh and M. Hossain. IRRI-ICAR Collaborative Research on Gender Concerns in Rice-Based Farming Systems in Eastern India. Paper presented at the IRRI-India Day, September 26-29, 1996, New Delhi, India.)

WARDA: Nina Lilja (Economist).

16. Gender-differentiated analysis of farm survey data. 1997 – 1998. This study analyzes the major production factors employed by women rice farmers in Africa and compares their relative factor usage against that in plots cultivated by men in order to determine whether new seed technologies are appropriate for female production conditions, given their specific factor endowments. The constraint analysis will be integrated into a varietal preference study to determine, *ex ante*, whether strategies to increase cultivar adoption merit a particular focus on female production conditions and consumption preferences.

Production constraints are being analyzed through dedicated gender-specific factor analysis of land and labor of the existing WARDA Farm Management and Household

Survey, a three year (1993-1995) cross sectional database of production and household activities for 120 household in the three major agroecological production zones of West Africa. The database is being used to document: 1) female labor allocation in communal and private crop production activities; 2) competing labor requirement with domestic production activities; 3) land usage patterns, including quality indicators, and allocation between upland and lowland rice systems; and, 4) biochemical input usage and capital allocation. The research findings will be disseminated to NARS partners through the WARDA Rice Economics Task Force mechanism during the 1998 and 1999 annual meetings.

WARDA: Nina Lilja (Economist), Timothy J. Dalton (Production Economist), Monty P. Jones, 17. Hideo Watanabe.

Gender-differentiated participatory technology evaluation. October 1997 – Ongoing. WARDA's participatory rice varietal selection (PVS) trials have been established in collaboration with farmers in order to: 1) identify promising varieties for further evaluation, and 2) classify desirable plant and grain characteristics for continued integration into the varietal development process. These two aspects contribute to an efficient technology transfer program by identifying varietal niches and plant characteristics preferred by farmers thus allowing for improved technology targeting. WARDA's initial PVS selection trials have noted that many frequently selected varieties are jointly selected by men and women. However, particular varieties, among the top 5 most frequently selected among all participants, were selected only by women.

The objective of the gender-differentiated participatory technology evaluation research is to assess: 1) whether varietal characteristics are perceived differently by gender; 2) whether men and women select varieties because they meet different preference criterion and production opportunities; or, 3) whether more general, gender neutral, selection rules can be developed for improved targeting of breeding efforts.

WARDA's PVS research is a 3 year program. In the first year, a centralized village plot is identified with local farmers where a rice garden is established with 60 upland rice varieties. The varieties included in the trial are diverse and range from a local identified check to regional traditional *O. sativa* varieties, to improved *O. sativa* varieties, interspecific hybrids and African *O. glaberrima*. Men and women farmers are invited to visit the plot as frequently as possible but formal plant evaluations are held at three stages: (1) at maximal tillering, (2) grain filling, and (3) post harvest. In the first stage, the preferred plant architecture at the vegetative stage is derived from farmer interviews. In the second stage, panicle type, plant height, cycle length and other agronomic and morphological traits are identified. In the final visit, the focus is on grain quality attributes including size, shape, shattering and ease of threshing.

Varietal selections are recorded for each farmer during the three visits and, at the end of the season, each farmer's choices are analyzed. In the second year, each farmer receives up to 6 of the varieties he or she selected in the first year and thus a new diversity of varieties enters the locality. We have noted that there usually are 5 or 6 varieties that are very popular across the group and an additional 10-15 varieties selected only by a handful of farmers for particular niche reasons. During the second year, observers visit the field to record performance indicators and farmer appreciation of the varieties. At the end of the second year, farmers' evaluation of threshability and taste are elicited to provide a "full" view of a variety's strengths and weaknesses. At the end of the season, and in anticipation of the third and final year, farmers' willingness to pay for seed varieties is elicited in order to derive an estimate of technology demand.

Our preliminary results indicate that men's and women's varietal choices significantly differ statistically. However, men and women equally selected the interspecifics on the whole, but they selected different interspecific varieties. This phenomenon indicates that the hybridization program can serve the needs of men and women farmers equally well and that in this case, the technology development process does not favor one gender at the expense of the other.

WARDA: Nina Lilja (Economist).

- 18.** Participatory varietal selection (PVS) and gender analysis methodology development. 1997 – 1998. The purpose of this research is to provide methodological support to WARDA's rice breeding program by a) organizing available data to highlight key gender problems in technology acceptance and adoption, and underlying causes of these problems; b) clarifying what gender problems should be addressed in the varietal development; c) providing guidelines for sex-disaggregated PVS data collection and survey design; and, e) developing a method for economic analysis of the PVS data.

Because empirical evidence shows that male and female farmers vary in individual characteristics and access to productive resources, the first stage of this research involves assessing whether the technology acceptance varies by gender. The assessment of the varietal acceptance has required helping the rice breeding program to design sex-disaggregated participatory varietal selection field trials, and to develop gender-sensitive survey instruments.

In the next stage, the method of conjoint analysis will be used for the economic analysis of the PVS data. The use of conjoint analysis in the PVS study has several advantages over more traditional research designs, but the primary advantage is that farmers are forced to make trade-offs in their decisions during field trials. In reality, farmers do not typically have the option of having more of every characteristic that is desirable in a single rice plant and less of every characteristic that is undesirable. Instead, the varietal selection decision involves trading-off components of one characteristic in order to get more of another one. The results will provide priority setting recommendations to rice breeders and research managers such as physical plant characteristics, processing qualities and taste favored by women and men rice farmers or different user groups. In addition to providing information about attribute importance, this research will also offer an opportunity to conduct preference simulations and the answers to "what if" questions such as "given a set of candidate varieties, what would be the calculated preference shares by percentage of male and female farmers that would adopt each of those varieties?" This will allow the assessment of whether strategies to increase cultivar adoption require a particular focus on male or female production conditions and consumption preferences.

II. Crops and Cropping Systems

See also No. 181 (CIAT, CIMMYT, ICARDA, IRR)

CIAT: Tamsyn Murray, Ernesto Ráez-Luna, (Research fellows), Manuel Winograd
19. (Coordinator).

Development of an integrated conceptual framework for tropical agroecosystems research based on complex systems theories. The project's two main objectives are 1) developing a conceptual framework to guide agricultural research for sustainable tropical agroecosystems, using a systems approach and 2) applying the conceptual framework to a case study (Pucallpa -Ucayali region, in the Peruvian Amazon lowlands). The systems approach includes as a key condition the largest possible involvement of local

stakeholders in research. This implies the use of participatory methods and analytical approaches, such as a gender perspective, to ensure that all groups are taken into account and take part in the determination of research. This provides for the construction of an interdisciplinary, cross-scale and dynamic description of the study site (in order to provide context and prioritization criteria to the research).

As a result of a very complete literature review and interviews with local experts and stakeholders in Pucallpa, it became apparent early in the project that one of the important shortcomings of agricultural research in the region was an evident male bias when approaching the farmers. In November 1997, we discovered that the only significantly organized peasant groups were women groups. However, women faced the opposition of their husbands to activities that happen out of the household. The suggestion was made that participatory research in Pucallpa should take the household, instead of the male farmer, as the research unit. Currently, one member of the project team is developing a doctoral research proposal on participatory farming systems research with an explicit gender component, with the household/farm as the research unit.

As a result of several field trips and permanent interviewing and dialogue, the project keeps good direct relationships with most significant NARs, local GOs (Ministry of Fisheries), NGOs and grass-roots organizations in Pucallpa. Two outputs of the project will be 1) a conceptual framework, will describe practices for thorough involvement of stakeholders, including poor rural women, and 2) an analysis of issues for the Pucallpa study site. In both documents, gender issues will be explicitly treated. Collaborators: David Waltner-Toews (University of Guelph) and Gilberto Gallopín (Stockholm Environment Institute), CIAT -University of Guelph (Canada) joint project.

CIAT: Ernesto Ráez-Luna (Research fellow).

20. Doctoral research for the Pucallpa benchmark site, with a strong gender component and an explicit participatory action research approach. This initiative is a result of the monitoring of issues and stakeholders in Pucallpa that has been done within the context of the project "Integrated Conceptual Framework for Tropical Agroecosystem Research." The research will consist of a close-up survey of peasant livelihood at the household (farm) level among Pucallpa peasants. Detailed records on land-use, labor (time budgets), production (subsistence and commercial), income, redistribution, and welfare for all members of the households of a stratified sample of households in the study area. Will be collected. This will be followed by an analysis of the patterns and dynamics of gender/age-related division of labor, access to resources and decision-making; within-household constraints and opportunities to escape poverty ("develop"), and household-level adaptive responses to constraints and opportunities external to the household (market structure, credit policies, economic booms, etc.), including peasant associations. One preliminary hypothesis is that households where gender relations are more egalitarian will tend to do better. Besides direct measurements, participant observation and participatory assessment (including "espacios de reflexion") will be used.

The idea of this research was enthusiastically welcomed by women leaders in Pucallpa, who see it as a strategic necessity the recording of the contributions and hardships of peasant women in the region, and who have voiced their concern about the male bias in all the agricultural research in Pucallpa.

CIMMYT: Cheryl Doss (Economist, Visiting Scientist, Williams College).

21. Gender issues in maize farming systems in Africa. The goals of this project were to produce a literature review and concept paper on gender issues in maize farming systems in Africa, focusing on the gender constraints to increased productivity of maize in Africa;

an annotated bibliography on the same topic; and an outline of possible research topics on gender relevant for CIMMYT. The paper draws three conclusions from the literature review: 1) first and foremost, gender matters, but there is enormous complexity and heterogeneity among African smallholder households making generalizations difficult; rather the literature suggests the kind of questions that need to be asked in a given location; 2) there are no simply defined gender roles rather they are imbedded in “intricate webs” of interaction; and 3) gender roles are dynamic and respond to changes in economic circumstances, making predictions about behavior based at any one point in time difficult. Because of this dynamism, comparison of adopters and non-adopters is an inferior comparison to before and after measurements. The lessons suggested for CIMMYT include 1) better baseline surveys before new technology is introduced in order to follow changes in men’s and women’s labor and land allocation both before and after; 2) improved listening by agricultural researchers to both male and female farmers; and 3) technology innovations in processing and preparation of food, which are areas where there can be a direct benefit to women by improving their productivity. (Cheryl R. Doss. 1998. *Gender Issues and Maize Production in Africa: Implications for Agricultural Research*; and Cheryl R. Doss. 1998. *Gender Issues and the Adoption of Maize Technology in Africa: An Annotated Bibliography*.)

CIMMYT: Wilfred Mwangi, Addis Tiruneh, Hugo Verkuijl, and T. Tesfaye (Economists).

22. Gender analysis in agricultural production and decision-making process in Ada, Lume, and Gimbuchu Woredas, Ethiopia. The goals of this project are to describe the structure and patterns of production; to assess the differential access of male and female farmers to resources; to estimate production functions using conventional and non-conventional inputs; to test the heterogeneity of labor (e.g., adult male, female, child); to compare managerial efficiency between male and female farm managers; to determine the contribution of socioeconomic and infrastructural factors to the adoption of technology. Collaborator: Alemaya University of Agriculture, Ethiopia. ("Gender differentials in crop-livestock production in Ada, Lume, and Gimbuchu woredas of Ethiopia" by A. Tiruneh, H. Verkuijl, T. Tesfaye and W. Mwangi was presented at the 3rd Conference of the Agricultural Economics Society of Ethiopia, October 2-3, 1997, Addis Ababa, Ethiopia.)

CIMMYT: Wilfred Mwangi (Economist).

23. Gender analysis of agricultural production in maize-based farming systems in Iganga District of Eastern Uganda. 1997-1999. The goals of this project are to describe the structure and patterns of production; to assess the differential access of male and female farmers to resources; to estimate production functions using conventional and non-conventional inputs; to test the heterogeneity of labor (e.g., adult male, female, child); to compare managerial efficiency between male and female farm managers; to determine the contribution of socioeconomic and infrastructural factors to the adoption of technology. Collaborators: National Agricultural Research Organization Uganda, Namulonge Agriculture Research Institute, and Makerere University.

CIMMYT: Gustavo Sain (Economist) and Monika Zurek.

24. Accelerating the adoption of productivity-enhancing resource-conserving (PERC) technologies in maize based cropping systems in Central America. 1997-1999. Using two or three adoption studies, the project seeks to identify the main factors that influence farmers' decisions to utilize soil conservation technologies in maize-based cropping systems. In the first case study, that will start in March 98 in the Polochic Valley in Guatemala, the intrahousehold decision making process concerning the adoption of new technologies will be studied. As part of this, male and female perceptions of soil conservation and their impact on decision making will be investigated. This should lead

to a better understanding of technology adoption and the development of policies that enhance the use of sustainable land use systems. Collaborators: University of Kiel (Germany), PRM (Programa Regional de Maiz), Red Centroamericana de Socioeconomia, NARS.

CIMMYT: Gustavo Sain (Economist) and Mauricio Bellon (Human ecologist).

25. Impacts of Conservation Tillage: Perceptions by Gender. This is an exploratory study to incorporate a gender dimension to the work on conservation tillage that has been taking place in El Salvador. The goal of this project is to assess the perceptions that male and female members of the household have about the costs and benefits of conservation tillage. This information would be used to generate specific hypotheses of the impacts of this technology on intrahousehold organization and function. Collaborators: Centro Nacional de Tecnología Agropecuaria y Forestal (CENTA), El Salvador.

CIP: D. R. Baal.

26. Tuber crop production, processing and utilization in Dhaijan-Rastern Terai of Nepal. This report covers farmer's indigenous practices on processing and utilization, gender issues and the key problems on tuber and root crop; the complexities of production system in different communities of Dhaijan VDC in Eastern Terai, Nepal. Various long-term adapted traditional production practices followed by different communities in the area on tuber crop production were recorded using various Participatory Rural Appraisal (PRA) techniques such as resource mapping, seasonality analysis, walking transects, wealth ranking, matrix ranking, etc. and semi structured interviews with the key informants. Women's participation in various agronomic practices of tuber crops was explored. Gender role differentiation was found to vary significantly across the four ethnic communities studied. The main constraints in tuber crop production particularly on potato are known and efforts to be made for potato improvements are suggested. Results concluded the need of action program to be designed and developed by understanding gender issues and indigenous knowledge systems of farmers in the area.

CIP: B. Gayao and R. Boncodin.

27. Homegardening for sustainable rootcrops agricultural research and development: A case paper on the UPWARD Homegardening projects in the Philippines. Since its inception in 1990, the Users' Perspectives With Agricultural Research and Development (UPWARD) has focused on the study of the homegarden system as one of its major research thrusts in improving Asian rootcrops food production to answer the global problems on environmental degradation and food security. At present, two homegarden projects are being implemented by UPWARD in the Philippines, a sweetpotato-based urban homegarden project in Baguio City, Mountain Province and a multi-crop rural homegarden project in Lantapan, Bukidnon. The homegarden system is a production system that provides vital contributions to household level food and income security especially for the poor and marginalized families in the developing world. Women and children have a vital role in the homegarden and are given importance as a separate category of technology users and decision makers.

This case paper will be a self-critique of the two homegarden projects in order to assess the soundness of this UPWARD research thrust. Considerable knowledge has been gained from these studies yet most of the documentation done was focused on the participatory research processes, how the projects started as diagnostic studies that evolved into action researches and into locally managed R&D initiatives. No conscious effort has been made to look into the comparability of these projects and what have been their contribution to the realization of UPWARD's goal and to the homegarden system R&D as a whole.

CIP: Esther C. Velasco (Human Ecologist, University of the Philippines, Laguna).
28. Gender-role differentiation in sweetpotato production system in Quezon, Philippines. The study analyses the division of labor and time allocation in productive and reproductive activities of men and women in sweetpotato farming households, and identifies what resources men and women in sweetpotato farming can mobilize to carry out their activities and the benefits derived from such activities. It also identifies factors which bring about such gender-based division of labor and gender-related access and control over resources and benefits.

Gender-specific analysis on the time spent on activities relating to sweetpotato farming showed that men spent longer hours in sweetpotato production activities than women. Farm-based activities such as land preparation, crop maintenance and harvesting are almost entirely done by men. Hauling is the only postharvest task performed solely by men while the rest - washing, sorting, packing and weighing - were shared with women. Comparative analysis of the gender based division and time allocation among households belonging to different stages of the family life cycle-showed an increasing participation of women in productive activities as their mobility increases with the growth of the family.

Gender-specific analysis on access and control over resources and benefits showed a relatively equitable distribution of access and control over resources and benefits among men and women. This can be attributed to the following interrelated factors: 1) the relatively higher level of literacy of women compared to men; 2) women's traditional role as controller of the cash among the household; and 3) women's relatively high organizational and training exposure.

ICARDA: Muhammad Hamdan (University of Jordan) and Richard Tutwiler (Anthropologist).
29. Agricultural resource management, productivity, and rural poverty in Jordan. 1997-98. This is one of several studies sponsored by ICARDA in support of its research strategy and activities addressed to poverty alleviation. Within two selected sites in Jordan, the study identifies current trends among poor farming households in terms of agricultural productivity, technology use, natural resource management endowments and management, and linkages between poor producers and consumers of agricultural products. The research will identify examples of successful contributions to poverty alleviation, disaggregated by gender and resource endowment, from new technologies and improved resource management practices. The research seeks to identify any constraints to the achievement of poverty alleviation that are gender related.

ICARDA: Rajaa Hassan Mustafa (University of Gezira, Sudan), Richard Tutwiler
30. (Anthropologist).
Role of women in agriculture: case study of Rahad Irrigation Scheme in Sudan. 1996-97. Rahad, Sudan, is a relatively recent, large-scale irrigation scheme that seeks to encourage the use of modern agricultural technology by local farmers. This study examined the differential impact of new technology on three groups of women farmers: owner-operators, household members of male farm operators, and female wage-laborers in Rahad. The study included labor time allocations for the three groups of women, as well as the distribution of benefits from the new technology. (Rajaa Hassan. 1997 "Role of women in agriculture: Case study of Rahad irrigation scheme in Sudan." M.Sc. Thesis)

ICARDA: Malika Martini (Socioeconomist), and Richard Tutwiler (Anthropologist).
13. Agricultural intensification and the emergence of a female wage labor force in Syria. 1995-99. This study traces the impact on rural women of the process of agricultural intensification within several distinct dryland farming systems in Syria. The essential

focus is the transformation taking place in the organization of women's labor from unpaid family labor to wage labor, and the new organizational structures that have emerged to facilitate this change, especially the activities of professional labor contractors, many of whom are women, who organize and manage labor groups hired by commercial farmers for particular production activities. Within this context, the study examines the new specializations of female labor and their economic impact on individuals and families.

ICARDA: Aliaa Rafea (Visiting Scientist, University of Ain Shams, Syria) and Malika
32. Martini (Socioeconomist).

Resource management: perceptions and strategies of smallholder farmers in Bershaya village, El-Bab district, Syria, 1996-98. This study examines the responses of farmers participating in ICARDA's work introducing improved technologies for resource management in rainfed crop-livestock systems. The assessments and perceptions of both men and women in participating and non-participating households were elicited. The results are being utilized to improve ICARDA's technology development and participatory research and transfer methods.

ICRISAT: Rama Devi Kolli (Agricultural Economist).

33. This study is an analysis of gender considerations in the adoption of groundnut varietal and management technology. A component of this work evaluated differences in the priorities men and women attach to alternative grain and plant traits. The research indicated that women in two survey villages in Maharashtra State prefer varieties which are easy to uproot and shell and varieties offering high grain yields and good taste. Men seem to prefer varieties with better fodder yield, and larger seeds attracting better market prices. By inference, the distinct needs of both men and women need to be considered when setting varietal selection priorities. These differences may also affect varietal adoption patterns and seed marketing strategies.

Research on the adoption of a wider range of groundnut crop management technologies suggests the complexity of efforts to measure impacts of technological change on gender and family welfare. Literature suggests that technologies targeted toward the needs of women will have a greater likelihood of improving family food security broadly and child nutrition in particular. But we also need to account for a wide range of impact interactions. For example, the adoption of a package of groundnut technologies (including new land preparation and planting methods, seed treatment, fertilizer use and irrigation) recommended for farmers in Maharashtra has led to aggregate increases in female labor demands, but most of the gain is in hiring of female wage labor. Survey evidence suggests aggregate production and income gains which seem to improve the welfare of both men and women. While some of the additional grain production is used for household consumption, a major share is sold with the cash income controlled by men. The ultimate distribution of benefits is difficult to measure. (Kolli, R.D. 1996. Gender Analysis of resources and benefits - an ex poste study of groundnut crop production technology in the semi-arid tropics of India. Kolli, R.D. and Padmaja, R. 1996. Effects of the Introduction of Crop Technologies in India's Semi-Arid Tropics: A Gender Analysis Approach. Kolli, R.D. and Bantilan, M.C.S. "Gender-related Impacts of Improved Agricultural Technologies: Identification of Indicators from a Case Study", accepted for publication in Gender, Technology and Development, Volume 1, Number 3.)

ICRISAT: Cynthia Bantilan (Agricultural Economist) and Rama Devi Kolli (Agricultural
34. Economist).

Gender modules have been added to the socioeconomic assessment of on-farm trials conducted for integrated pest management (IPM) and integrated disease management

(IDM) technologies. They were expanded to include gender-related inquiries for the focus group meetings intended to assess factors influencing adoption and to consider the potential affect of gender specific variation in access to and control over resources on the adoption of alternative IPM and IDM technologies. The gender module collects data on the perceptions of men and women of the major constraints to groundnut production and measures taken to overcome these problems, the evaluation of the relative importance of alternative pests and diseases, gender differentiation in activities to manage these pests and diseases and the perceptions of on-farm trials. Inquiries include:

- 1) Who takes decision on groundnut cultivation; if women is not involved in the decision, why?
- 2) Operations performed by men and women in groundnut cultivation.
- 3) Problems encountered by men and women.
- 4) Measures taken to overcome problems or constraints by gender
- 5) Access and control of resources by gender.

ICRISAT: R. Padmaja (Agricultural Economist).

35. In 1997 a report on Women in Semi-Arid Tropics (SAT) Agriculture was prepared as a background paper for a brainstorming meeting to develop a concept note for a new project tentatively titled "Women in Marginal Areas: Reaping Benefits from SAT Technologies." The background paper documents women's roles in agriculture and highlights opportunities to improve the welfare of rural women.

The planned objectives of the study are to:

- 1) Understand the roles and responsibilities of women in SAT agriculture in order to effectively incorporate the gender perspective in research agenda for the SAT.
- 2) Identify gender-related factors for technology adoption.
- 3) Quantify the impact of SAT technologies on the welfare of women.
- 4) To provide feedback to incorporate gender perspective in research and development process

The activities planned to achieve these objectives include a review on the roles, responsibilities, need and opportunities of farm labor in SAT agriculture; identification of technologies where gender perspectives are critical; diagnostic studies to understand the role of women in germplasm biodiversity, IPM and natural resource management (NRM); case studies to identify and measure adoption and gender related impact indicators; and gender related policy implications.

The report calls for greater efforts to investigate the impact of technologies on women's welfare. This includes the consideration of technology impacts on drudgery, women's employment status and family nutrition. Further research can also usefully consider the role of women in conserving biodiversity, seed production and natural resource management. The concept note proposes a set of exploratory studies on gender impacts in the SAT.

ICRISAT: Rama Devi Kolli (Agricultural Economist).

36. Two studies on IPM and IDM revealed that men and women had different perceptions regarding the crop protection strategies and that the constraints to groundnut production identified by women were more related to production practices and workability. Men identified the constraints related to economic gains. Women showed a positive approach towards the trials and were enthusiastic to take up new approaches together with the existing ones. Women had indigenous knowledge regarding crop production which is useful in future planning of activities. Rapid rural appraisals and questionnaires were the

tools used to get the above information. Men and women farmers were interviewed jointly.

- IITA:
37. Yoong Woon Jeon (Agricultural Engineer, Head of Cassava Processing Unit) and Leonides Halos-Kim (Food and Agricultural Engineer).
Under this Ford Foundation supported project, different types of post-production technology packages were developed and introduced to villages in West Africa. Case studies conducted throughout the project showed that gender roles and status in crop and food production in Africa is clearly differentiated even within a family unit. The holistic approach to technology development led to the proper targeting of the technology user. Impact assessment in terms of farmer's reaction to the given intervention, and the effect on the quality of life of the users are discussed. (Report: Y.W. Jeon and L. Halos-Kim, "Gender Implications For Post-Production Technology Development in West Africa [Case studies in Nigeria]." presented at the Developing Gender Sensitizing Training Programmes for Policy Makers, Research and Extension Workers. International Workshop on Women, Agricultural Intensification and Household Food Security. University of Cape Coast, Ghana, June 1996.)
- IITA:
38. Victor Manyong (Agricultural Economist), Akin Adesina (Economist), R. J. Carsky (Agronomist), and Doyle Baker (Agricultural Economist).
Longitudinal village household surveys at the benchmark areas in the Guinea Savanna, Nigeria. 1997-98. The objective of this activity is to generate long term input-output systems in the benchmark sites of the Guinea savanna of Nigeria. The activity has gathered sex-disaggregated data on labor allocation, demographics, agricultural practices, off farm employment, intensification of agriculture, and systems diversification. The data will be used to assess the gaps in systems efficiency and to examine equity and welfare effects that are occurring in the process of technical change.
- IITA:
39. Stephan Weise (Weed Scientist), Nicodeme Tchamou (Research Assistant), Akin Adesina (Agricultural Economist).
Weed communities and pest and disease incidence of mixed food crop fields along an intensification gradient in Southern Cameroon. 1994-1998. As slash-and-burn bush-fallow systems are intensified, changes in management practices and soil fertility status affect the composition and competitiveness of the weed community during the cropping cycle. It is therefore important to identify what weed community changes are to be expected with intensification, how this is related to site properties, and what impact these changes have on weed management decisions by the farmers. This study is being conducted on the mixed groundnut field which is the main food crop system in the forest margins of southern Cameroon. The field is nearly exclusively managed by women. The study is focused on sixteen of these fields in each of the six villages across the benchmark site. In addition to the analysis of the weed community in these fields, a questionnaire was administered to the women managers to acquire information on the specific field practices. Specific information was gathered on the factors that affect the timing frequency and method of their weed management. Their subjective evaluations of the ease of weeding a range of commonly found weed species was also elicited. Collaborator: Cameroon NARS.
- IITA:
40. I. Rivière (Crop Ecologist), S. Weise (Weed Scientist), J. Gockowski (Agricultural Economist).
Management of simplified crop associations and altered crop sequences in areas of intensified production systems. The objectives of this study were to : 1) link the changes (crop sequences and associations, cropping pattern and management) in the traditional cropping systems with the environmental and socioeconomic circumstances in the center

region of Cameroon (Lekie); 2) identify a farmer's strategy as an adaptation to circumstances; and 3) identify constraints and opportunities in the new cropping systems.

Food crop association is a traditional agricultural practice in the Humid Forest Zone (HFZ). As with spontaneous vegetation where plant association is common, most of the small farmers' fields contain 15 different food crops. These cropping systems are usually managed by women for home consumption.

However, there appears to be an evolution in cropping systems, especially in areas of intensified production systems. This evolution has a gender component as it seems to concern men who are traditionally interested in cash crops. While some crop associations tend to become simplified, as the traditional *afub owondo* (groundnut based food crop field), other crop associations and crop sequences are appearing. Simplification and diversification find expression in new cropping systems. These are adaptation responses to the evolution of environmental and socioeconomic conditions. Their characterization (functioning, management, circumstances) is needed to understand agriculture evolution and to identify new opportunities in the HFZ. As part of this study a household level survey was conducted in 1995 with accompanying field inventory with a description of composition and number of food crops and the size and gender of labor force involved.

IITA: Sue Ellen Johnson (Agroecologist).

41. Sustainable intensification of staple crop production in the Humid Forest Margin: cropping sequences of commercial staple crops in the Humid Forest Zone. 1997 – 2000. The objectives of this research are: 1) determine dominant and emergent cropping sequences across intensification gradients. 2) determine rationale behind those sequences; and 3) determine production advantages and disadvantages of particular farmer and researcher crop sequences in field trials.

Most of the staple food crop production in the forest margins benchmark is the domain of women farmers concentrating on the mixed groundnut/cassava-based field. Agricultural intensification of cropping systems is associated with a transition from a complex multi-year cropping cycles to an annual-biennial cycle. Both systems still involve mixtures of multiple cropped species. However, concomitant commercialization and specialization have tended to simplify the composition of the annual-biennial cropping system.

Efforts have frequently focused on improving the short (3-5 year) fallow fertility regeneration systems, usually through the introduction of leguminous fallow species. This study will expose the consequences of changing the traditional cropping sequence and crop associations for productivity and resource conservation in both simplified commercial and complex subsistence systems. Optimal modifications of contemporary emergent cropping systems in terms of crop sequencing or rotations will be investigated. While land scarcity can cause shortening of the cropping cycle and the shift towards specialization, reduced productivity can influence land shortages, and consequently labor constraints particularly for women.

IITA: Sue Ellen Johnson (Agroecologist).

42. Canopy dynamics and resource capture in four different cropping systems types. 1997 – 1998. The objectives of this research activity are: 1) To characterize the canopy dynamics of four dominant forms of food crop association in terms of resource capture and utilization; 2) To clarify differences in the above ground resource dynamics of the four forms of food crop association; 3) To associate the cover dynamics with soil responses of the four forms of crop association. The four associations to be examined are:

- 1) Short season annual-biennial associations
 - 1a. complex (traditional) associations
 - 1b. simple (emerging) associations
 - 2) Long season annual-biennial-perennial associations
 - 3) Short season annual associations (including monocultures)
- Of these, 1a and 1b are largely managed by women, while 2 and 3 tend to be mainly the domain of men.

Variations on these four forms of associations typify the primary patterns of food crop production systems in the Humid Forest Margins (HFM) benchmark. The canopy, cover and rooting characteristics of these four dominant forms of associations differ due to their botanical composition, number and types of species, and in their duration or canopy cover. They may differ in other aspects: inputs, labor, typical field history, fertility requirements as well as their commercial or subsistence orientation. However, from the perspective of resource management, resource capture and utilization efficiencies are closely associated with the canopy development and characteristics of each group. By studying the number of canopy layers, species layers, and light dynamics of cropping phases in relation to above ground biomass production, we will get fundamental information on the structuring and composition of effective canopies in the HFM environment. Comparative knowledge of canopy relations and dynamics (and soil consequences) will give clues for development of new resource efficient cropping systems interventions.

IITA: **43.** Akin Adesina (Agricultural economist), C. Barrett (Agricultural economist, Cornell University), M. Carter, O. Coulibaly (Agricultural economist), V. Manyong (Agricultural economist), D. Baker (Agricultural economist).
 Impacts of modern maize technology in West Africa. 1996-2000. Among the objectives of this study are to document the spread of improved maize varieties and production systems across West Africa and to determine how the introduction of modern maize technology has affected women's access to (and control of) land for maize production and share of benefits.

IITA: **44.** C. Nolte (Soil fertility specialist), S. Hauser (Soil physicist), S. Weise (Weed scientist), N. Tchamou (Research assistant).
 Evaluation of farmers' objectives for fallowing land. 1998. The objectives of this research activity include obtaining: 1) detailed information on fallow management of farmers; 2) farmers' indicators for onset of fallows, end of fallows, and fallow quality; 3) better knowledge base for designing improved fallow systems with regard to density, spatial pattern, pruning regime, fallow length.

Fallowing land is the major and one of a few management practices that farmers implement in cropping systems of the HFZ. Besides restoration of soil fertility it serves complex purposes such as reduction of weed and pest/disease pressure. Both women and men take part in the decision making process that leads to conversion from crop fields into fallow fields and vice-versa. With increasing population across the HFZ fallows are shortened and it is widely perceived that fallows need to be improved in order to be able to sustain the system. To increase chances of adoption of these technologies, this research will involve farmers early by exploring farmers' specific objectives of fallowing land for specific crops or crop mixtures. Among the observations of this field survey conducted in the forest margins benchmark will be the perspectives of different groups (men/women farmers, young/old, poor/wealthy), reasons to start a fallow period, and reasons for ending a fallow period (role of labor requirement for clearing). The purpose of fallows (including comparison with other options for goal achievement (e.g., burning, soil tillage)

and problems along with indigenous knowledge to improve fallows will be elicited. Men and women farmers' ideas for biomass management; in-situ production or cut-and-carry advantages and disadvantages and specific fallows for specific crop associations will also be determined.

- IITA:
45. A. Adesina (Agricultural economist), O. Ndoye (Economist, CIFOR), C. Diaw (Anthropologist), C. Nolte (Soil fertility specialist), S. Weise (Weed scientist), J. Gockowski (Agricultural economist) and R. Carsky (Agronomist).
Panel data development for farm households in benchmark area villages of the Humid Forest Zone and Savanna Zone. 1998 – 2002. The objective of this activity is to understand household and intrahousehold patterns of decision making, resource use, productivity, poverty, exploitation and management of research for IITA's two main agroecological zones. A household panel data set will be developed over three years. Across both agroecological zones gender data collected will include: baseline socio-demographic profiles, and sex disaggregated labor use for both cropping and non-cropping activities and sex disaggregated cash and non cash incomes .
- IITA:
46. S. Weise (Weed scientist), S.E. Johnson (Agroecologist), S. Hauser (Soil physicist).
Introduction of herbaceous and shrub legumes into a groundnut-based mixed food crop field. 1996 – 1999. This activity falls within the short fallow stabilisation project of IITA and addresses resource management interventions targeting the mixed groundnut/cassava-based field which is the dominant food crop system in the forest margins benchmark and is largely managed by women for both subsistence and commercial purposes. Among the objectives are to: 1) identify herbaceous and shrub-type fallow species best suited for introduction into a cassava stand after groundnut and maize have been harvested; 2) determine the vigour, biomass production and nutrient accumulation, including apparent nitrogen fixation of these species; 3) determine effect of fallow species on soil physical, chemical, and biological properties and on the performance of crops (groundnut, maize and cassava) after the fallow cycle; 4) determine changes in the weed community and pest population dynamics during the fallow and cropping phases; and 5) determine the availability and quality of dry season fodder for livestock.

Most households in the Forest Margins Benchmark Area (FMBA) establish mixed food crop fields as the basic field unit that provides them with the bulk of their dietary needs. Groundnut, maize and cassava are the primary components in these fields. After the groundnut and maize are harvested leaving a near sole crop of cassava, the bush fallow species, predominantly *Chromolaena odorata*, invade the fields. The cassava is harvested over a 6 month period as the field gradually reverts back to a bush fallow dominated by *C. odorata*. To supplant *odorata*, selected herbaceous and shrub fallow species will be introduced into this food crop system after the groundnut and maize harvest. Such species could provide groundcover, allow the soil to rejuvenate rapidly during the fallow, outcompete weeds without becoming a weed problem themselves, and possibly provide nutritious fodder for livestock at critical times during the year.

- IITA:
47. S. Hauser (Soil physicist), S. Weise (Weed scientist), F. Gauhl (Plant pathologist), C. Pasberg-Gauhl (Plant pathologist, IITA), Lindsay Norgrove (Resource management, University of London).
Effectiveness of intensification and conservation measures in improving the sustainability of a mixed food crop field in a short fallow system. Long-term experiment started in 1994 and this activity falls within the short fallow stabilisation project of IITA and addresses resource management interventions targeting the mixed groundnut/cassava-based field which is the dominant food crop system in the FMBA and is largely managed by women for both subsistence and commercial purposes. Among the objectives of this

experiment are to: 1) compare three fallow types in their capability to maintain crop yields and the bio-physico-chemical resource base; 2) monitor water and nutrient dynamics in different fallow systems; 3) observe changes in the weed seedbank, weed community composition, and weed pressure in the various cropping systems; 4) monitor pest and disease incidence and severity on crops and weeds; 5) monitor labor requirements for clearing, land preparation and weeding. 6) determine the performance of these systems at different levels of the bio-physico-chemical resource base. This on-station experiment is the first long term approach on sustainable production systems development for the groundnut/cassava-based mixed food crop field.

IITA:
48. N. Tchamou (Research assistant), S. Weise (Weed scientist), D. Baker (Agricultural economist).

Effect of time of slashing of a bush fallow on weed pressure in mixed food crop fields under farmer conditions. 1996 – 1998. Among the objectives of this research are to: 1) determine how the early slashing of a bush fallow will impact on weed pressure, women's labor time needed for weeding, and crop yields (facultative) of a mixed food crop field; 2) assess whether the response is different between first season and second season plantings (facultative); and 3) evaluate gender perception of this weed management technique.

Short fallow rotations are becoming more common in the slash-and-burn cropping systems of the HFZ. Slashing of the bush fallow is mainly a man's task. Initial weed pressure in crops planted after slashing and burning of short fallows is very high. The field has to be weeded by hand-pulling 4 to 6 weeks after planting if major yield losses are to be avoided. This task is very tedious and time-consuming, and is generally left for the women and children to tackle. Observations in some farmers fields indicate that early slashing followed by a period of several weeks where the slashed vegetation is allowed to lie in the field will permit the first flush of weeds to manifest itself. The slashed material is then burned just before planting. The tillage associated with the planting of groundnuts gets rid of this weed flush, thus reducing weed pressure in the short cycle crop phase.

Farmers' fields dominated by *Chromolaena odorata* bush fallows will be selected in 2-3 villages, 10 fields per village. For one or two seasons, each field will be split into an area managed traditionally by the farmer, an area with early slashing, and one with late slashing of the bush fallow. A questionnaire will be administered to acquire information on the specific management practice of the field (planting densities and dates, varieties used, and time of weeding). The women will be queried on the factors that affect the timing, frequency and method of their weed management and asked to identify problem weeds. The men will be queried on the factors that affect the time of clearing.

IITA:
49. N. Tchamou (Research assistant), S. Weise (Weed scientist), and D. Baker (Agricultural economist).

Effect of weed management measures in the cassava-phase of a mixed food crop field on cassava harvestability and yield under farmer conditions. 1997 – 1998. Among the objectives of this activity are to : 1) determine what labor input is required for the slashing of weeds in the cassava-phase of a mixed food crop field and how cassava yield and ease of harvest are affected; and 2) assess whether the planting of a herbaceous/shrub legume or a cooking cassava variety after groundnut harvest are feasible alternatives.

A traditional mixed food crop field is weeded by hand-pulling 4 to 6 weeks after planting, and at the time of groundnut and maize harvest (3 months after planting). A thick brush, often dominated by *Chromolaena odorata*, develops during the cassava phase of the

mixed food crop field and makes the harvesting of tubers tedious, and probably reducing the tuber yield.

Twenty mixed food crop fields in two villages have been selected for this on-farm trial. Each field is split into an area managed traditionally by the farmer, an area where the weeds were slashed 9 months after planting, an area without slashing, an area underseeded with a herbaceous/shrub legume after groundnut harvest, and an area relay cropped with a cooking cassava variety after groundnut harvest. Women have been queried on the factors that affect the timing, frequency and method of their weed management and asked to identify problem weeds.

IITA: S. Hauser (Soil physicist), and C. Nolte (Soil fertility specialist).

50. Village demonstration of mulching effect of *Senna spectabilis*, *Indigofera zollingeriana* and *Calliandra calothyrsus* on maize/cassava and the *afub owondo* or maize/cassava/groundnut fields. 1995 – 1998. The mixed groundnut fields are the main subsistence crop for Southern Cameroon and are exclusively managed by women. Marketed surpluses are also a source of “soap” money for the household. Included among the objectives are to : 1) demonstrate the effect of applied or retained mulches of managed fallow species on maize-cassava-groundnut yield and weeding requirements; 2) create incentives to plant improved fallows and selected species to produce mulch *in situ*; and 3) generate feedback information from farmers on technologies in order to improve design.

On-station experiments have demonstrated the superiority of mulch retention of *Senna spectabilis* and *Calliandra calothyrsus* in maize production and increased maize grain yields. As a first attempt to get men and women farmers' feedback on the option, demonstration plots were established in three sites in the second season 1995.

Farmers' responses to this activity were very positive and a number of suggestions were made on how to continue. Several have been incorporated into subsequent trials. For the 1997 first season planting, a number of villages outside the Mbalmayo reserve area have requested IITA's collaboration and help in establishing trials and the supply of improved varieties. Among the important observations are the weed infestation and labor requirements of these systems.

IITA: J. Wendt (Soil chemist).

51. Groundnut yield improvement. 1997 – 1998. The objective of this activity is to evaluate methods for improving groundnut yields which are chiefly the responsibility of women farmers in the HFZ. Groundnuts, with an average protein content of 25%, play a major role in HFZ diets. Average groundnut harvest throughout the forest margins benchmark is extremely low. Considering groundnuts have a yield potential in excess of 3000 kg ha⁻¹, the current yield level of 330 kg ha⁻¹ has considerable leeway for improvement. Poor groundnut pod filling known as “pops” is a common problem throughout the forest margins. This condition is usually the result of calcium (Ca) deficiency. Likely soil deficiencies contributing to low yields are calcium (Ca), potassium (K), magnesium (Mg) and phosphorus (P). If fertility conditions can be ameliorated, improved varieties may also give higher yields. Kitchen wood ash is a common underutilized resource with potential for contributing Ca < Mg, K, and P to the mixed groundnut systems of the zone. The average household in the HFZ of Cameroon is estimated to burn over 5 tons of wood for cooking stoves annually. Research is to be conducted on-farm with at least 40 farmer groundnut fields to be selected for investigation. Soil and plant samples will be taken simultaneously to assess nutrient deficiencies. Based on this information, soil amendments primarily ash from household firewood will be selected for trial. Ash

samples will be collected and analyzed so that appropriate rates of ash can be deduced. Collaborator: Institut de recherche agricole pour le developpement, Cameroon.

IITA:
52. C. Nolte (Soil fertility specialist), S. Weise (Weed scientist), S. Hauser (Soil physicist), A. Adesina (Economist), T. Tiki-Manga (IRAD).
Testing and evaluating different spatial management systems of *Calliandra calothyrsus* for planted fallows. 1996 – 2002. Among the objectives of this trial are to: 1) determine farmer-based selection of different planting patterns for managing planted fallows with trees; 2) test biophysical hypotheses and farmer reactions; 3) determine labor requirements for managing these species.

Planted fallow systems need to be developed in order to sustain production levels and reduce land requirements of traditional food crop fields including the mixed groundnut fields managed by women in the humid forest zone. Most research in the past has been done on continuous cropping systems which intercalated food crops with trees in alley cropping systems. These systems turned out to be highly labor demanding and difficult to manage, the main factors that lead to low adoption rates in the forest zone. Many more different spatial patterns for continuous or rotational cropping of food crops with trees can be conceived. An approach that combines men and women farmers' perception and management practices with biophysical features of these systems should increase from the onset chances of adoption. *Calliandra calothyrsus* constitutes one of the 'best bet' species tested so far in the humid forest zone of Cameroon. The trial is being conducted on-farm in 6 benchmark villages

IITA:
53. S. Hauser (Soil physicist), C. Nolte (Soil fertility specialist), S. Weise (Weed scientist).
Establishment, growth and effect of *Calliandra calothyrsus* on crop yield. 1996 – 2000. Among the objectives of this research activity are to: 1) determine optimal density of introduced species; 2) demonstrate the effect of retained mulches of managed planted fallow species on maize/cassava and groundnut yields; 3) determine labor requirements for establishing, pruning of *C. calothyrsus*; tilling, planting and weeding of the crops.

On station maize grain yield was increased fourfold by retaining *C. calothyrsus* mulch. The on-station experiments have two problems in common:

- The material has to be brought from other fields thus the treatment requires unacceptable amounts of labor.
- The side-effects of an *in-situ* production of the mulch material such as competition, nutrient contribution from litter fall and below ground biomass, and the labor requirement to manage the species as well as the crops cannot be assessed.

Establishing planted fallows requires labor and to a lesser extent capital. Thus the smallest number of trees still capable of restoring fertility and suppressing weeds needs to be determined to reduce initial investment and later labor for land preparation. The trial will be conducted on-farm. Six treatments per field will compare a plot remaining in fallow, four plots of *C. calothyrsus* planted at different densities after an intercrop of maize, cassava, and groundnut, and a plot returning to natural growth after the intercrop.

IITA:
54. J. Gockowski (Agricultural economist) and M. Ndoumbé (IRAD scientist).
Horticultural production and marketing systems in the urban perimeter of Yaounde. 1996-97. Among the objectives of this activity were to: 1) document the degree of specialization and commercialization in horticultural production as a function of socioeconomic, infrastructural, and institutional factors at the household and village level; 2) determine the gender and distributional ramifications of increasing horticultural

production; 3) determine farmers' major constraints in specialized horticultural production (diseases, pests, inputs, prices, labor availability etc.)

Sixty-five percent of the households had adopted a monocropping system of production for one or both of their two most commercially important horticultural crops, representing a major structural change in the cropping systems of households in the humid forest zone. One of the driving forces behind this change is an increasing proportion of younger household heads in recent years. The most significant factor explaining the adoption of horticultural monocropped systems in a Probit adoption model was the age of the household head, with younger heads more likely to adopt. Other significant factors in explaining the adoption of monocropping systems included the gender of the decision maker--there was a lower (higher) probability of adoption when the production decisions were exclusively made by women (men). Among the most important commercial crops, women were more likely to manage leafy green production; for all other categories of commercial horticultural production (tomatoes, fruit trees, dessert bananas, citrus) men tended to be in control of production management. With regards to marketing, nearly 90 percent of households transported their produce to the Yaounde market for sale. Marketing activity was chiefly in the responsibility of women.

A follow-up study examined the importance of marketing indigenous vegetables. The study estimated average earnings of less than USD \$1 a day and found that the operating capital for indigenous vegetables was significantly lower than exotics such as tomatoes or cabbages. Over 1000 market women were estimated to be regularly employed in the sale of these vegetables. The selling and production of indigenous vegetables is one of the more important economic activities for women.

IITA:
55. J. Gockowski (Agricultural economist), J. Berinyuy (University of Dschang), Rudy Schippers (NRI), M. Ndoumbé (IRAD scientist).
Economic and biophysical evaluation of indigenous leafy green vegetable production systems. 1998. Among the objectives of this activity are to: 1) determine the profitability and returns to women's labor of growing 3 species of leafy green vegetables; and 2) determine farmers' major agronomic constraints for these production systems.

In 1996 an area-based random survey of households was conducted in 16 villages of the Yaounde block. The objective of the survey was to uncover the relative importance of horticultural production and to determine possible areas of intervention for research. The survey uncovered 40 sundry horticultural products which were ranked according to their economic importance as indicated by the household. For women the most important category of crops was indigenous leafy green vegetables. Little research has been conducted to date on these important crops which are the major source of micronutrients and vitamins in both rural and urban diets. A study to be conducted by the Asian Vegetable Research and Development Center and the University of Dschang on varietal improvements will serve to further quantify the economic importance of these crops and provide input on the major production constraints that varietal improvements might address.

IITA:
56. V.M. Manyong (Agricultural economist), R. Asiedu (Breeder), and G.O. Olaniyan (Geneticist).
Gender implications for the development of resource management technologies for yam production in West Africa." West Africa produces about 90% of the total world output of yams, with Nigeria as the leading producer. Yam production is labor-intensive and the

crop responds well to soil fertility and crop management practices. It is considered a "man's crop" with high market values. However, the farmer's continuous search for fertile or virgin land and staking materials in many areas could have negative impact on the environment. Much research on propagation to address the labor constraint successfully led to the development of the miniset techniques; however, the adoption of the technology has been far below expectations.

To incorporate farmers' indigenous knowledge in the development of new, acceptable resource management options to sustain yam production, a survey was conducted with about 600 farmers in a major yam-growing area in the southern Guinea savanna of southwestern Nigeria. The results indicate that, contrary to many conventional views, women are widely involved in yam production. The major constraints in yam production for both sexes were pests and diseases in the field and storage. Other constraints were of less importance such as weeds, declining soil fertility, lack of staking materials, and labor constraint. There was no significant gender difference in the strategies applied against the perceived problems. The only difference was on the strategy to reduce the labor constraint for land preparation. In addition, men were found to have more farm resources and were more efficient in field work while women were more efficient in the marketing of yam products. These gender similarities or differences will be taken into account in the development of acceptable resource management technologies for sustainable yam production.

IITA: Olivier Girardin (Yam scientist).

57. Yam post-harvest system constraints. A survey in Niger state (Bida area) on storage constraints was conducted in January, 1998. One hundred fifty farmers were interviewed of which one third were women. A participatory trial on improve storage techniques was developed with 24 farmers and around one quarter were women. During April a participatory rural appraisal in 2 or 3 major yam growing areas to investigate the storage problems will be conducted and will include the interviews with both men and women.

IITA: Felix Nweke (Agricultural economist).

58. Gender roles in food production in Africa: focus on cassava growing areas. The Collaborative Study of Cassava in Africa (COSCA) collected sex-disaggregated data in its household surveys across cassava zones in Africa. The analyses of that data is nearing completion.

IITA: John Wendt (Soil chemist), G. Tian (Soil fertility specialist), A. Dixon (Breeder/Geneticist), J. Ngeve (IRAD).

59. Soil fertility indices for sustainable cassava production. Among the objectives of this on-farm trial are to: 1) identify soil fertility parameters that are indices of sustainability of cassava-based cropping systems; 2) apply these indices to determine relative system sustainability; and 3) develop fertility and soil management practices to insure sustainability.

Though cassava can be grown on many low fertility soils, its nutrient demand is high. Fertility depletion by cassava has been shown to negatively impact subsequent crops. Development of sustainable cassava-based cropping systems requires an understanding of the quantities of soil nutrients that cassava is able to exploit, how cropping affects those nutrient pools, and how management practices including fertilization, rotation, and fallow affect fertility. Once critical nutrient pools are identified, effects of cassava on soil properties can be determined, and sustainable systems can be developed to address long-term sustainability.

Farmers may choose to incorporate the high-yielding varieties into their mixed food crop fields (MFCFs) or to grow them as a sole crop. In MFCFs, the planting densities will usually be less than 1/3 of sole crop densities. Therefore, a comparison between a sole crop and a MFCF is absolutely essential for evaluating nutrient depletion.

In the HFZ, on-farm trials involve both a high-yielding variety and a local control variety with trials being conducted in 60 women's mixed groundnut/cassava-based fields throughout the 6 benchmark villages. The trial is combined with a missing nutrients trial to evaluate cassava nutrient demands. Initial observations will focus on root yield and number, stem girth, leaf retention, quantities of nutrients removed during harvest, and changes in soil fertility parameters.

- IITA: **60.** Mercy Obot Ekop (Soil microbiologist) and Victor Manyoong (Agricultural economist).
Gender sensitivity on traditional agricultural systems management/production of plantations in Nigeria. A six-month study of gender sensitivity in traditional plantation management is being conducted in 1998.
- IITA: **61.** Dr. Chimere Diaw (Anthropologist) and Rene Oyono.
A research activity conducted by at the Humid Forest Station of IITA has developed an inventory and a typology of organizational types and forms bearing a potential for collective action in the HFZ benchmark of southern Cameroon. These include community based organisations, NGOs, local credit associations (i.e. tontines), and farmer organisations. The activities, gender composition, and orientation of over of these 2,000 organisations operating in southern Cameroon have been characterised.
- IRRI: **62.** Catalina Diaz (Sociologist), Severino Merca, Mahabub Hossain (Agricultural economist), Tom Mew (Plant pathologist).
Constraints to higher rice yield: findings from a farmer participatory experiment in Central Luzon, Philippines. 1995 to 1998. This study was undertaken to: a) identify the socioeconomic and biophysical constraints to increase rice productivity; b) examine the effects of seeds as well as the differences in farmers' perceptions and traditional practices on rice yield; and c) to help the government formulate appropriate support program to increasing rice productivity. A farmer participatory experiment was conducted in Tampac, Guimba, Nueva Ecija, Central Luzon, Philippines. Thirty selected farmers conducted an experiment using clean and healthy seeds from IRRI in one parcel and using their own seeds in another parcel. These farmers used their own management practices which were monitored by the researchers during the experiment. Another thirty farmers were selected to serve as control in the experiment.

Results of the farmer-managed experiments showed that the use of clean and healthy seeds alone accounts for about 23 percent difference in yield among farmers who participated in the experiment. The factors through which the quality seed contributed to higher yields are fewer weeds, reduced pest pressure and large number of panicles. Regression analysis shows that biophysical factors are more serious constraints to increasing rice yield than socioeconomic factors.

The socioeconomic factors which are important determinants of variations in rice yield are the contribution of non-farm occupation to household income and the participation of women in rice farming. When the effect of other factors was controlled households with

women members heavily involved in rice farming had significantly higher yields compared to others. Thus, more farmer (including women farmer) participatory methods must be used to improve farmer's knowledge and perceptions on seed cleaning techniques. (Diaz, C, S. Merca, M. Hossain, and T. Mew, 1997. Constraints to higher rice yield: Findings from a farmer participatory experiment in Central Luzon, Philippines. IRRI)

IRRI: Truong Thi Ngoc Chi (Entomologist), Lisa Price (Anthropologist), and Joyce Luis
63. (Agricultural Economist). May 1997-August 1998

A village study on the effect of IPM-FFS (Integrated Pest Management- Farmer Field School) on the male and female rice farmers' entomological knowledge, perception and pest control behavior in Can Tho Province, Vietnam. This project is a M.S. thesis of a former Women in Rice Farming Systems (WIRFS) collaborator from Cu Ulong Rice Research Institute in South Vietnam.

The objectives of this study were to: 1) describe the insect pest control practice of IPM-trained and non-IPM trained farmers; 2) compare the knowledge and perception of IPM-trained and non-IPM trained; 3) compare the gender differences in knowledge among IPM-trained and non-trained farmers; 4) determine whether women's access to entomological knowledge will enhance gender equity in farming and in the household; and 5) identify relationships of acquisition of new knowledge, i.e. IPM technology, with selected socioeconomic variables (age, sex, education and land resources).

Ninety-nine respondents were interviewed for this study. Of these respondents, 61 (30 males and 31 females) were untrained. The 38 trained respondents went through IPM Field School. This training is based on informal learning where the "classroom" is farmer's own field, and the "content" to be learned are the interrelated components of that field. This aims to help farmers in the identification of and an understanding of the relationship of beneficial insects and other animals with harmful insects in their field and the optimal spraying to conserve the natural beneficial insects.

Preliminary results of the analysis revealed that there were gender differences among IPM trained farmers. Trained males showed higher scores than trained females on knowledge on insect, insecticides and practices. Trained males had a better knowledge about the roles of predators as agents of natural control than females though fifty percent or more of trained females answered most questions correctly. Despite the training received by women, they were not able to fully absorb the IPM concepts through the field school. This strongly indicates that other approaches such as "learning by doing" or by enabling women to participate on IPM related experiments may be a more effective method for women farmers to absorb the IPM concepts. In terms of decision making among trained farmers, husbands were found to be more dominant than wives in making decisions related to pest management. All of the trained and untrained women respondents were custodians of household cash; however, husband and wife jointly decided on disbursements of funds.

Regression analysis showed that the factors which affect farmers' scientific knowledge are education, training, sex, land size and consultation with extension. The positive association between education and knowledge score indicates that education motivates absorption and learning of technical knowledge; education is also highly correlated to acceptance of innovation or new knowledge by farmers. Males greater tendency to absorb scientific knowledge than females can be attributed to the lower years in school, lesser years of farming experience and less self-confidence of women respondents.

Collaborating Institutions: Cu Ulong Rice Research Institute (CLRRI) and Cantho University, South Vietnam. (Chi, Truong Thi Ngoc, 1997. A village level study on the effects of IPM-FFS [Integrated Pest Management-Farmer Field School] on male and female rice farmers' entomological knowledge, perception and pest control behavior in Can Tho Province, Vietnam)

- IRRI:
64. L. Meenakanit (Entomologist), P. Meenakanit (Entomologist), M.M. Escalada (Communication specialist), K.L. Heong (entomologist).
Farmer participatory research in pest management for women rice farmers in Thailand. 1995-1996. This study is a follow-up of the study "Changing role of women in rice pest management in Central Thailand" conducted by the same authors. The results of that study showed that the unavailability of farm labor has forced women farmers in Central Thailand to apply pesticides on rice. Women generally have poor knowledge and lack basic skills in pest and disease diagnosis, pesticides, application methods and concepts of natural control. They are also unaware of chronic effects of pesticides. Where women recognize the toxic effects of pesticides, they employ labor for spraying. However with further male migration, labor costs may rise and more women may have to do their own spraying. Since pest management is a recent responsibility of women, this presents an opportunity to teach the right concepts and beliefs in pest management and unnecessary spraying prevented.

Perceptions, beliefs and attitudes that affect farmer practices are more effectively changed through training methods that are participatory. To prove this hypothesis an experiment was conducted to explore the potential of using farming participatory research (FPR) as an approach for improving pest management decision making and practices among women farmers.

FPR was done through a baseline survey, weekly discussion sessions, use of insect zoos, defoliation experiments, field days, knowledge assessment using ballot boxes, and post-training interviews. After participating in the experiments, none of the women participants used insecticides in the first 40 days after sowing but some applied herbicides. Insecticide applications were reduced to one per season. There was also a marked decline in the percentage of farmers who believed that pesticide application would increase yield and a further reduction of participant women farmers who thought that pesticide application would increase rice yield. All participants believed that spraying insecticides could kill natural enemies. There was also a substantial rise in the percentage of women farmers who believed that leaf-feeding insects could cause yield loss. Collaborating Partners: Department of Agricultural Extension, Thailand and Visayas State College of Agriculture (VISCA), Philippines under the IRRI IPM Network. (Meenakanit, L. P. Meenakanit, M.M. Escalada, K.L. Heong, 1995. Farmer participatory research in pest management for women rice farmers in Thailand. In Rice IPM Network Workshop Report. Reducing Early Season Insecticide Use for Leafhopper Control in Rice: Impact, Economics and Risks. Sept 4-7, 1995. Escalada, MM. L. Meenakanit, P. Dulyapach, A. Lazaro, and K.L. Heong. 1992. Changing role of women in rice pest management in Central Thailand. Paper presented at the International Workshop on Gender Concerns in Rice Farming. Held in Chiang Mai, Thailand.)

- IRRI:
65. Irene Tanzo, Victor Gapud (Entomologist), Thelma Paris (Social scientist), Sarah Hamilton.
Gender roles and intrahousehold decision making in relation to rice-onion pest management. Feb 1997 - on going. The objectives of this study are: a) to assess the labor participation of male and female household members of farming households; b) to assess

whether there are gender differences in pest management decisions and access to and control of household income and expenditures. This study includes 5 villages in Nueva Ecija, Central Luzon where on-farm experiments on IPM rice-vegetables are being conducted. One hundred thirty one respondents (85 males and 46 females) were interviewed and case studies are being developed about specific women involved in pest management decision making. Collaborating institutions: IRRI, Philippine Rice Research Institute (PhilRice), and the Integrated Pest Management Collaborative Research Support Project (IPM-CRSP), Virginia Polytechnic Institute and State University, USA.

IRRI:
66. Hu Raifa (Agricultural economist), Cheng Jiaan (Entomologist), Dong Shouzhen, and Sun Yinjin (Communication specialist, Zhejiang Agricultural University, Hangzhou, China); K. L Heong (Entomologist) and M. Escalada (Communication specialist, VISCA).

The role of women in rice pest management in Zhejiang, China. 1996 - Feb 1997. With current changes in the rural socioeconomic situation in China, women's participation in decision-making is observed to be changing. Women not only provide labor in most of the rice activities but they also contribute to decision making. Very few studies have examined their participation in pest related management decisions. The main objective of this study was to analyze the role of women in rice production and in rice pest management decisions. In four hundred thirty (430) households women and men farmers in 16 counties of Zhejiang Province in 1996 were surveyed. Results of the study showed that female participation in pesticide spraying varied from 5.3% to 50% in these counties. The participation of women in pest related decisions was less than their male counterparts. More than half of the male respondents and nearly half of the women get information on pest control from pest management service organizations. Less than half of men and women base pest control methods on their own experience. A probit model was used to analyze the factors which affect women's role in decision making. Results showed that household size, women's age and men's off-farm employment has negative effects on women's participation in pest management decision-making. In large families, women have fewer chances to make pest management decisions. In small families, men often work in other industries in off-peak seasons, thus women have to make more decisions, including pest management decisions, during this period. Older women participate less in pest management decisions than younger women do. Collaborating Partners: Zhejiang Agricultural University, China, and VISCA Philippines. This project is under the IRRI IPM Network. (Hu Ruifa, Cheng Jiaan, Dong Shouzhen and Sun Yinjin. The role of women in rice pest management in Zhejiang, China. In Pest Management of Rice Farmers in Asia, edited by K. L. Heong and M. M. Escalada.)

IRRI:
67. Lisa Price (Anthropologist), Joyce Luis (Agricultural economist), and Girlie Abrigo (PhilRice).

Gender differences in entomological knowledge in rice: A case in an irrigated rice village in Central Luzon, Philippines. Ongoing. The objectives of this study are: 1) to develop a methodology for eliciting farmers' knowledge on insects in rice; 2) to develop a methodology for assessing the pre- and post-IPM Farmer Field School knowledge and measuring individual and group knowledge competencies and changes to those competencies. A random sample of 30 farming families was selected from 97 households in the village. Three methods for eliciting information were tested. They were 1) free listing; 2) triad test and 3) farm and IPM questionnaire. In the free listing method, farmers were given 10 minutes to identify all insects they see in the field and to use their own dialect in the identification. The insects identified and labeled by the respondents were verified by an entomologist. This list of insects was included in the triad test. The triad

test explores the differences in cognition among individuals. Three things or concepts are presented to the respondents. They were then asked to identify two similar insects or one dissimilar insect in a row. Respondents were then further asked what are their criteria for similarities and differences. In the farm and IPM questionnaire, respondents were asked regarding their knowledge about pest control. The set of questions includes perceptions and entomological knowledge. The respondents' answers were matched with the scientifically correct answer.

Results showed that in the free listing done by male respondents, the plant hopper came out as the frequently identified and first to be mentioned. Females identified the green leafhopper as the most frequently identified and first to be mentioned insect. Thirty percent of the female respondents were not able to identify insects in the free listing method. The results of the triad test showed differences in the way male and females classify insects. In the clustering of each partition by the principal males, the choice of dissimilar insects can be grouped as plant hoppers, less dangerous insects and worms. On the other hand, principal females classified the brown plant hopper, white backed plant hopper, green leafhopper, stemborer, armyworm and ricebug together and grasshopper and white-butterfly together. Insects were clustered according to the manner of movement, the first cluster is flying insects while the second clusters are insects that perch or crawl on rice plants. Collaborating institutions: PhilRice

IRRI: Abha Singh, T.Paris, M.Hossain, Joyce Luis (Agricultural economists).

68. Socioeconomic assessment of rice household economy in rainfed villages: A case in Faizabad district, eastern Uttar Pradesh. 1995 – 1998. The objectives of this study are: 1) to describe the interrelationship between the biophysical, social, economic circumstances of farming households of different caste and class; 2) to describe gender roles and gender relations within a farming systems context; 3) to identify whether there are gender differences in access to resources; and 4) identify farmer participatory research approaches for the effective incorporating of women in each stage of the technology development process

This study was conducted in rainfed villages in Uttar Pradesh and Madhya Pradesh. Two villages in Uttar Pradesh, namely Chandpur and Mungishpur will be reported. Chandpur is near the market, Faizabad City, while Mungishpur is far. In Chandpur and Mungishpur, 200 and 150 households, respectively, were surveyed. In both villages lower castes are more numerous – 90.5% in Chandpur and 92% in Mungishpur. However, despite being the minority in both villages, the upper caste have greater access to resources (land, water, education) than the lower caste. The disparity in access to resources is not only between social groups but also between males and females, particularly in terms of education. In Chandpur, 36% and 45% of the total adult males among the backward and lower caste, respectively are illiterate, while illiteracy among adult females is higher at 74% and 89%, among the backward and lower caste, respectively. In this and in most findings described below, the pattern is similar but worse in Mungishpur.

In both villages, rice is the dominant crop during the Kharif season on lowland areas. Rice is followed by mixed wheat with mustard during the Rabi season. Several other crops such as pigeon pea, sweetpotato and sugarcane are grown depending on the landtype, access to irrigation, crop duration and end use of crop. Animals constitute an integral part of mixed farming systems and farmers grow green fodder within their cropping systems. Cropping intensity index (CII) is inversely related to social status; for example 170 upper caste, 181 backward caste and 195 for scheduled caste in Chandpur.

This indicates that to spread risks within a year those from the lower social and income status grow more crops per unit of land than do the upper castes.

Family members, especially the female members, provide the bulk of the labor inputs in the farming systems. However, the participation of family members in farming is determined by the social status of the household. In general, women from the upper caste don't provide physical labor in the fields. Women from the backward castes work mostly on their own farms unless the male members are engaged in non-farm employment and, the scheduled castes work as hired agricultural laborers in other farms. The contribution of female labor in rice production is higher than men in both villages, especially in Chandpur (84%) where there is higher participation of male members in non-farm employment activities.

In Chandpur, non-farm employment, remittances, pensions, etc. comprise the main source of household income, 43% among the upper caste-farming households and 68% among the lower caste. This indicates that farming in Chandpur is no longer a full-time activity. Women substitute for their husbands who go for non-farm employment, for some or all of the year. After land preparation, female members are left to manage the farms.

The goal of increasing rice productivity will be difficult to achieve if management, particularly under stressed environments which require new knowledge and skills, is left to female family members, the majority of whom are illiterate and without access to training and extension service. They will face competing demands on their time between households duties and agricultural responsibilities unless their male counterparts or children share in those activities. Women's expertise in the early evaluation of new technologies such as new seeds, and the development of technologies that will reduce their drudgery and relieve their time constraints are essential to enable poor women to fulfill their multiple roles. Collaborating institutions: NDUAT, IRRI. (Paris, T, and A. Singh. 1997 Changes in the rice-based economy: A case in two rainfed rice farming villages in Faizabad district, Eastern Uttar Pradesh. Discussion notes presented in a workshop "Economic Aspects of Changes in Rice Production Systems in Eastern India" held in New Delhi, 2-4 April, 1997.)

IRRI:
69. Paterno Borlagan (Agricultural engineer), Mark Bell (Agricultural engineer), Catalina Diaz (Social scientist), and the Women Farmers' Association in Guimba, Nueva Ecija. Field testing of low cost dryer in the rice villages in the Philippines. 1997 – Ongoing. With the introduction of short-maturing rice varieties, farmers have to reduce the turn around time especially in postharvest activities. Drying rice during the rainy season is one of the major problems faced in Vietnam and the Philippines. Both men and women sun dry newly threshed rice on cement roads before milling, a practice with which a considerable amount of grains is lost and damaged. A low cost dryer with an added feature of variable heat control has been developed by agricultural engineers in IRRI. Realizing the need to get the feedback from farmers, agricultural engineers demonstrated the dryer to the Women Farmers' Association in Guimba, Nueva Ecija, Central Luzon, Philippines.

Initial testing of the dryer showed that the women find the dryer affordable, simple, low in electrical energy requirements, and most useful during the rainy season when sun drying is not possible. They can use the dryer to skin dry and store their paddy so that they can wait for a better price. There is a potential for the adoption of low cost dryer. However, the success of the adoption will depend on the proven technical performance and on management of the dryer as a group and not on an individual basis. Further testing and evaluation of the dryer will be continued with farmers participation including groups

of women farmers. (Borlagan, P. Performance optimization of the low cost dryer. Terminal report submitted to the IRRI-GTZ project. 1997.)

WARDA: Binata Fofana Namizata (Socioeconomist), and Akin Adesina (Agricultural
70. economist).

This doctoral study examines the impact of intensification on women's productivity in rice production in Cote d'Ivoire using a linear programming model, and identifies the major constraints to intensification for women farmers. 1992 – 1996.

The field work was conducted between December 1992 and January 1994 using 128 rice farmers : 65 farmers near Gagnoa in the humid forest zone and 68 near Korhogo in the Savannah area. Three types of rice fields were identified: 1) individual male field, 2) individual female field, and 3) family field.

The results provide evidence that women, who are the major rice producers in all ecosystems, earn positive returns in all systems whether in man-owned fields or in their own fields. The financial analysis of crop budgets show higher gross margins for intensified cultivation compared to traditional systems. However, the ratios of gross margin per unit of variable cost and per unit of labor exhibit higher returns for upland rice production than for irrigated lowland even in women's own fields.

The linear programming model for the intensified production system showed that: 1) gross margin is higher for both individual male field and communal field than for women's own fields when every field owner manages autonomously his or her production inputs. The returns for women's fields are even lower when the women are under the supervision of a male head of household; and 2) women's rice fields are smaller than those for men or the family, which helps to explain the differences in returns. A sensitivity analysis showed that when women's rice fields are increased the result is higher gross margins due to a more efficient combination of resources.

From the results, one may hypothesize that women can yield better results when they are given the opportunity to cultivate in intensified irrigated perimeter systems. It is therefore recommended that women be given their fair share of land in irrigated perimeters. Women's access to upland rice fields – where it seems they also have acceptable returns – could be improved through better access to extension services and women organizations through which they could be informed of modern production techniques and new technologies.

WARDA: Abdourahmane Diallo, (Cheikh Anta Diop University, Senegal) and Thomas Fitz
71. Randolph (Anthropologist). 1994 – 1997.

During the 1994-1995 crop season, an intensive survey was conducted with a sample of rice producers in irrigated schemes in northeastern Senegal, one of the few areas in the Sahel where rice producers include women in significant numbers. The survey used a dual approach of anthropological methods (focus groups, large group interviews) and agricultural economics methods (farm household survey of randomly selected sample of 135 producers).

The objective of the study was to confirm whether a differential in productivity exists between men and women rice producers, and if so, what factors would explain the differential. Based on the results of the 1994-1995 survey, rice paddy yields for men producers (2.8 tons ha⁻¹ average) are significantly higher (p<0.01) than those for women producers (2.1 tons ha⁻¹). Regression analysis with a rich set of agronomic, managerial, and social explanatory variables indicates that women's yields are lower due to lower

input use, less technical knowledge about rice production, and social constraints (competition with household duties as a function of household structure). These results highlight the role that poor access to factors of production--including land, labor, credit for inputs, and extension advice--combined with constraints related to competing household activities plays in reducing women's productivity in irrigated rice production systems in Senegal. The analytical results suggest a number of policy implications with respect to reducing the various constraints faced by women.

WARDA: Deirdre M. Birmingham (Agronomist) and K. L. Sahrawat. 1993 – 1998.

72. This research is on the soil typologies and land management practices of the Bete in the equatorial forest and the Senufo in the guinea-savanna zones of Cote d'Ivoire. From this research are presented: 1) a cognitive model of soil typologies in each agroecosystem; 2) similarities and differences in the conceptual foundations and characteristics of these soil typologies; 3) intra- and inter-cultural variations in soils knowledge, and the maintenance of land-related knowledge; 4) how knowledge content and knowledge processes are influenced by their cultural and physical environments; and 5) implications of these findings for improving extension theory and practice in Cote d'Ivoire.

The Bete readily conceptualize soils as a discrete entity whereas the Senufo interchange terms for soil types, land types, and locations. Each typology reflects its physical environment. The Senufo claimed three soil types, in contrast to the Bete who distinguished 10 to 12 mutually exclusive soil types. Both cultures used criteria of gravel, texture, and color, but employed them differently. Soils were not classified by production potential in either culture. While the Bete did classify soils, hierarchically structured classifications based on taxonomic principles were not elucidated as in 'folk' taxonomies of flora and fauna. The Senufo typology does appear to fulfill practical and social needs, yet does not reflect their intimate knowledge of soil variation. Conceptually 'soil fertility' included properties of soil depth, structure and biology as well as soil nutritive elements affecting vegetation.

Older adults were more knowledgeable and interested in soils. Fewer educational and employment opportunities for Senufo youth, combined with greater Senufo esteem for agriculture, yielded consistently stronger knowledge of soils among Senufo youth than Bete youth. Men and women generally had similar rather than dissimilar knowledge of soils in each society. Women had more detailed knowledge of soils they particularly use. Depth and expression of land-related knowledge is affected spatially through land tenure and access, and inter-personal relationships. Learning comes through acting in the environment, the experience, both direct and indirect, that action brings, and social processes starting in childhood. Extension practice needs to be rooted with these dynamic, experiential, and socialized learning processes.

III. Livestock and livestock systems

CIAT:

73. The Farmer Participatory Research Project (IPRA) will start working in November 1998 with the University of Merida in Yucatan, Mexico (Participatory Diagnosis [DIP] Project) to apply the methodology of Committees for Local Agricultural Research (CIAL) to livestock (small animals) in the MILPA Production System, with special attention to gender issues as women play key roles in that type of agriculture.

ILRI: P. N. Echessa (Research technologist, Kenya Trypanosomiasis Research Institute)

74. [KTRI]), B.M. Swallow (Agricultural economist), D.M. Kamara (KTRI), J.J. Curry (Anthropologist).

A household survey was conducted in six villages of Busia District, Kenya to assess people's willingness to contribute labor and money to control the tsetse flies that transmit trypanosomiasis. This *ex-ante* study on informants likelihood to adopt different strategies for disease control reveals differences in adoption behavior between male and female-heads of households. A Heckman's two step model was estimated to identify factors affecting the probability that a respondent was willing to contribute labor or money and the factors affecting the amounts of labor or money he or she was willing to contribute. Everything else held equal, households willing to contribute the most money were those whose heads were female and well educated, while those willing to contribute the most labor were headed by men, had high cash income and had participated in an educational event. This contingent adoption study by Echessa et al on investment of money and labor in trypanosomosis control indicates clearly that the characteristics of men and women (in this case male heads and female heads of household) willing to adopt are different. Their motivations and what they are willing to invest also differs. Such insights could be useful to NARSs' strategies for extending useful technologies. This is an example of where methodology development and specific information of use to NARSs coincide. (Protase N. Echessah, Brent M. Swallow, Damaris W. Kamara, and John J. Curry. 1997. Willingness to contribute labor and money to tsetse control: Application of contingent valuation in Busia District, Kenya. World Development, Vol. 25, No. 2, pp. 239-253.)

ILRI and IFPRI: Charles F. Nicholson (Social scientist, ILRI), Getachew Gebru (ILRI),

75. Simeon K. Ehui (Economist, ILRI), Barry Shapiro (Agricultural economist, ILRI) and Christopher Delgado (Economist, IFPRI).

Crossbred cows and the use of improved milk production technologies have spread in Ethiopia. Small scale milk groups have formed made up of farm households who did not have access to markets for fluid milk and focused on the production of milk products such as butter. A joint IFPRI/ILRI study of the importance of these groups was undertaken to better understand whether milk marketing is a constraint to production and what the impact is on household members. Initial focus group interviews informed researchers that men considered it rude to speak of their wives' views; consequently, the researchers expanded the team to include both male and female enumerators and made explicit the interviewing of both husbands and wives in each household.

Changes in production and benefits as a consequence of greater commercialization of fluid milk, associated with a change to crossbred cows, for higher yields of fluid milk, from traditional cows appear to have gender implications. Adult women predominate in caring for cattle and the home processing and marketing of dairy products which provide rural households with an important source of income. The initial findings of this study provide little evidence that the groups have large impacts on who provides labor for cattle care or for processing and marketing dairy products. There is some indication that additional time is required for daily marketing of fluid milk, that there is a reallocation of some milk from home processing to fluid sales, and a shift in dairy income from women to men. It has been suggested by one scientist that one reason for the shift from dairy products to fluid milk sales is that the fat content of the milk from crossbred cows is less than that provided by traditional animals. Milk processing depended on higher fat content of the milk. (C. F. Nicholson, Getachew Gebru, Ehui, S. K., Shapiro, B. I., and C. Delgado, 1998. "Producer Milk Groups in Ethiopia: Impacts On Women's Role in Dairy Production and Marketing." Invited Plenary Paper, Sixth National Conference of the Ethiopian Society of Animal Production, Addis Ababa, 14-15 May 1998.)

ILRI: Mirjam Steglich (Nutritionist).

76. An earlier study of the effects of improved technologies based on the crossbred cow and associated practices (CBC) versus local animals and practices (LBC) had shown an increased food availability in the CBC households and an increase in leisure time, almost entirely that of children. However, availability and consumption do not always coincide. This study undertakes to look specifically at consumption, i.e. the intrahousehold impact in nutrition and health of improved dairy technologies (crossbred dairy cows and complementary feed production and feeding strategies) and associated increases in milk production and household income. The focus is on the nutrition and health effects of increased milk production, especially on women and children. Data is being collected on the food intake through food expenditure and food recall surveys of individual household members for the same households of the earlier study. The use of the two methods, with both men and women informants, will focus specifically on measuring those factors that might give divergent patterns of food consumption. The study seeks also to determine the nutritional consequences, including health and anthropometry, the effects of new technologies on off-farm activities, as well as the effects on the incomes and household and childcare activities of women, and what happens to the increased leisure time of children. Collaborators: Institute of Agricultural Research (Ethiopia), Ethiopian Health and Nutrition Research Institute (EHNRI), Humboldt University.

ILRI: Carol Cabal (Agricultural economist).

77. The subject of this doctoral study is the differing constraints to livestock access among males and females and the effects of male and female incomes on household food consumption and food security. Data is being collected for 709 households in three study areas in Debre Berhan area including male and female incomes and expenditure and responsibilities in the household production with specific attention to decision-making in household labor allocation. Both quantitative and qualitative data will be collected.

ILRI: Joan Kagwanja (post-doctoral scientist).

78. The Ghibe district in Ethiopia is one site of a multicountry and multidisciplinary study of the impact of trypanosomiasis control through pour on treatments. Effects to be studied include migration, crop production practices and output, household income, intrahousehold labor allocation, food consumption and health of all household members, and natural resource use and management.

ILRI: G. Mullins (Agricultural economist), L. Waborne, P. Tsangari, and L. Maarse.

79. For over eight years, ILRI and the Kenya Agricultural Research Institute (KARI) jointly carried out studies on the Kenya coast related to improved smallholder dairying, based primarily on a cut and carry system. The studies focused on integrating dairy development with the introduction of forages and fodder legumes, ECF vaccination, utilization of crossbred cows, and policy issues such as credit. The complete package proved to have limited acceptance. To better understand the dynamics of dairy production, a joint study was undertaken to look specifically at women's roles and workloads. The study showed increased workloads for women as the predominant dairy operators. It also showed that women managers were more likely than men to adopt more of the package. Milk yields per lactating cow were higher for women contact farmers (11.5 liters/day) than for male contact farmers (6.8 liters/day). Though informants stated that workloads were considerably increased, they also perceived that household welfare had increased. Women's small increments of income went for school fees and books and increased food purchases. These purchases provide immediate benefit and contribute to long term developmental benefits for family members. (G. Mullins, L. Waborne, P. Tsangari and L. Maarse. 1996. Impacts of intensive dairy production on small holder farm women in coastal Kenya. *Human Ecology*, Vol. 24, no. 2, pp 231-253.)

- ILRI:** W. Thorpe (Animal scientist), S. Staal (Agricultural economist), and J. Tanner (Animal nutritionist).
- 80.** The promising results from the Kenya Coast have led to an extension of the methods of characterization survey and cluster analysis to identify small dairy managers and owners and to a production-to-consumption systems approach in order to identify the range of constraints that reduce the efficiency of dairy in mixed cash-crop dairy systems. The research being undertaken by ILRI researchers and NARSs partners is a four stage process: 1) rural appraisal of a 'milkshed' with a wide variety of stakeholders including men and women managers and owners; 2) research characterization of a subsystem in detail at the household level including intrahousehold arrangements, 3) research to relieve the identified constraints, and 4) cross-site comparisons and synthesis of information. This is being carried out at a cluster of sites with different characteristics.
- ILRI and IFPRI:** Brent Swallow (Agricultural economist).
- 81.** Property rights, risk and livestock development. This is a joint project of ILRI and IFPRI in collaboration with the University of Gottingen in Germany. The central focus is institutions: property rights institutions in particular. The study is primarily concerned with: 1) the effects of risk on resource allocation under alternative property rights institutions; and 2) the relationships between risk and the evolution of land-use and property rights systems. The project involves literature review, development of conceptual models, dynamic simulation, and field studies in the Borana Plateau of Ethiopia and western Niger. The field studies focus on areas where mixed crop-livestock and extensive livestock are competing land uses. Gender is also a component of the project: a student from the University of Namur is investigating gender differences in attitudes toward risk in Niger. There is a minor focus on equity: we are concerned with how the heterogeneity of livestock holdings affects the ability of communities to effectively manage their land resources.
- ILRI:** B.I. Shapiro (Agricultural economist), Jemal Haider (Medical nutritionist, EHNRI), and Alemu Gebre Wold (Animal scientist, Ethiopian Agricultural Research Organization [EARO]).
- 82.** In a joint study undertaken by ILRI and EARO and a collaborative study undertaken by EHNRI, scientists estimated the intrahousehold consequences of market-oriented dairy production. Members of households with crossbred cows (CBC) showed improved consumption (17% more calories, 24% more fat and 13% more protein) than households with no crossbred cows (LBC households). The CBC households also spent more on food purchases and allocated more land to growing high protein pulses. These improvements in human health were shown by the EHNRI study to be evident in that stunting was found to be less than half as prevalent in CBC households as in LBC households (20% versus 43%). Contrary to a number of other studies, women in CBC households maintained control over income allocated for food purchases. Men in the CBC households spend 28% more on food than men in households with no crossbred cows. (Shapiro, B.I., Jemal Haider, and Alemu Gebre Wold "Crossbred cows and human nutrition and health in the Highland ecoregion: evidence from Ethiopia." Invited Plenary Paper, Heifer Project International Symposium on Livestock and Human Nutrition, Little Rock, Arkansas, October 14-16, 1998.)
- ILRI:** Emily Awour Ouma (Agricultural economist), Steve Staal (Agricultural economist).
- 83.** Earlier studies of dairy systems in Kenya had shown that women provided much of the labor for dairying, but did not have much decision-making authority nor benefited from income. Ouma undertook a study of 28 households in Kiambu to look specifically at the impact of women's roles in farm and household decision-making on the productivity of

the small holder dairy enterprise. The study found that in both male-headed and female-headed households, women are the main dairy operators though they are usually less advantaged with respect to education and access to extension advice. The study recommends improved attention to women dairy operators for extension advice structured for their education levels, and availability of low interest loans to female-head of households in order to improve their production.

IV. Trees and tree systems

- CIFOR: Ravi Prabhu (Forester), Carol Colfer (Anthropologist), and Cynthia McDougall
84. (Social scientist).
Testing social criteria and indicators for sustainable forest management. This study, which involves assessing social well-being, has intentionally taken a gender sensitive approach. The project is planning a phase on developing tools to better access women in this research, and on methods to involve women in co-management processes. Duration 1994 – 2001. (Difficulties in Accessing Women's conditions, needs, knowledge etc., described in C. Colfer, R. Wadley, J. Woelfel, and E. Harwell "Heartwood to Bark: Gender Issues in Sustainable Forest Management.")
- CIFOR: Manuel Ruiz Peres (Ecologist).
85. A study of bamboo in China looks at men's and women's roles related to bamboo.
Collaborator: Chinese Academy of Forestry
- CIFOR: Manuel Ruiz Peres (Ecologist) and Ousseynou Ndoye (Non-timber forest products
86. specialist).
Marketing of Non-timber Forest Products (NTFP) in Cameroon. As a part of looking at the socioeconomic and development potential of NTFPs, Dr. Ruiz Peres and Dr. Ndoye are studying women's and men's roles related to marketing of specific NTFPs.
- CIFOR: Ester Katz (Anthropologist).
87. As part of the study of perceptions in the exploitation and trade of NTFPs in Indonesia, Dr. Katz is examining gender differentiation of roles. NGO partners include LAIDIN (Bogor), Yayasan Sejahtera Bersana (North Sumatra), and Yayasan Punan (East Kalimantan). The project is running from roughly 1996 to 2000.
- CIFOR: Godwin Kowero (Forestry Economist).
88. Management of the Miombo Woodlands (Tanzania, Malawi, Mozambique and Zimbabwe). This study examines, albeit lightly, the roles of women, men, children and youth specifically in trade in forest products. It will also examine the changing roles of women and men in income generating activities especially those which are forest based and as they are affected by various policies. There are 10 national institutions and two NGOs represented in the steering committee of the project. Collaboration with NGOs will increase to disseminate and/or use results in their activities.
- CIFOR: David Edmunds (Social Scientist) and Lini Wollenberg (Local Forest Management
89. Specialist).
As part of their planned research on devolution of forestry management to local levels, they will be investigating the impacts on gender and diversity-specific groups, and looking at the different roles different social groups play in local management.

ICRAF: Angus Brodie.

90. Tree germplasm management and use on-farm in the Peruvian Amazon. This study separated out women with regard to tree use preference, showing that since the women's responsibility is for cooking, they consider firewood to be a more important tree use than men. In some cases, in indigenous communities, the women gave higher preference 1) to medicinal plants to substitute for lack of health clinics and costs that are beyond most farmer's income and 2) to the tree's ability to provide house building poles because having a house is regarded as vital for living in a village.

ICRAF: Julio C. Alegre (Soil scientist) and Arnoud Braun (Soil scientist).

91. Farmer participatory research on approved fallows. At three watersheds in the Aguaytia Watershed (Peru) a study is being conducted on constraints to adoption of improved fallow technologies. Fifty families were identified and trials initiated. The division of family labor will be considered for each family member, both on-farm and off-farm.

ICRAF: John C. Weber (Forest geneticist), Jeremy Haggard (Agroforester/tropical ecologist) and Maurico Sosa (agricultural economist).

92. In southern Mexico, an evaluation of economic potential of 23 priority tree species is being undertaken. Gender analysis will be considered with regard to species preference in relation to tree products and market dynamics.

ICRAF: John C. Weber (Forest geneticist).

93. Indigenous knowledge study on use and management of tree resources, where the women's knowledge and descriptions of use and silvocultural practices will be documented.

V. Fish and Aquatic Systems

ICLARM: Satyendra D. Tripathi (Aquaculturist), M.A. Mazid (Fishery biologist), Gulam Hussain (Geneticist).

94. Research for development of sustainable aquaculture practices, 1996-1999. Simple aquaculture technologies have been developed through on-farm participatory research conducted by Bangladesh Fisheries Research Institute (FRI) with technical assistance from ICLARM. Of the fishers participating in on farm trials, 60 percent are women. The technologies comprise management of medium carp nurseries, weed-based carp polyculture, GIFT tilapia culture, management of Macrobrachium nurseries and carp-prawn polyculture. The technology needs of the poor rural folk, including women, have been kept in mind while developing these systems. The technologies are not exclusive for women but easily adoptable by them. However, to fit some specific practices requests of women in the trials are planned to be developed soon. These are being disseminated through training and demonstrations in collaboration with the NGOs. The research findings from this project revealed that women in Bangladesh, who engaged in seasonal pond aquaculture, benefited from the activity. From the fish harvested, they were able to supplement the protein requirements of their families and obtained additional cash income from selling the fish. No local gender experts are involved except the NGOs who have some background. Some of the NGO workers are women and found greatly helpful in organizing and dissemination. Collaborators: Bangladesh Rural Advancement Committee (BRAC), Proshika, Banche Shekha, Jagorani Chakra, Thengamara Mohila Samabaya Samiti. (See Marlene Bedford and David Mowbray. 1998. *Networth: Research with the Rural Women of Bangladesh*. Washington, D.C.: Consultative Group on International Agricultural Research, CGIAR Gender Program.)

ICLARM: Mark Prein (Aquaculturist) and Madan Dey (Economist).

95. Research program on increasing and sustaining the productivity of fish and rice in the flood-prone ecosystems in South and Southeast Asia, 1997-2000. The overall objective of the Program is to develop sustainable resource management systems in the deepwater rice ecosystem, through action research. The aim is to integrate indigenous resource management techniques with semi-intensive rice-fish culture and management technologies that promise to increase the income of rice farmers.

One of the program components is the assessment of impact of alternative resource use patterns. The evaluation of trade-offs among alternative resource uses and consideration of the needs of different user-groups are key factors to ensuring the sustainable development of flood-prone ecosystems. Following detailed baseline surveys of existing traditional integrated deepwater rice-fish culture production systems, a socioeconomic study will be undertaken to evaluate the impact of improved semi-intensive rice-fish culture on household food and nutrition security, household income, labor and employment opportunities, equity, fish production and aquatic biodiversity.

The socioeconomic impact of improved rice-fish culture would be analyzed in comparison with areas where former deepwater areas have been transformed into rainfed irrigated zones growing HYVs. A detailed comparison of the two resource management strategies would be undertaken with reference to a set of clearly defined technical parameters. Farming systems analysis of a range of households would model input/output flows over the whole year for both systems. In addition to the monetary value approach, the systems would be analyzed to determine energy, nutrition and labor flows, thus providing better understanding of the important role of women in the household economy. Collaborators: Fisheries Research Institute (FRI), Bangladesh Rice Research Institute (BRRI), Proshika, Research Institute of Aquaculture (Viet Nam) and International Rice Research Institute (IRRI)

ICLARM: Rex Dunham (Fish geneticist), Modadugu Gupta (Aquaculturist), Madan Dey (Economist).

96. Genetic improvement of carp species in Asia, 1997-1999. This study will establish a systematic approach to genetic improvement of carp linking biodiversity and the development of national fish breeding programs. The study will: 1) assess the current status of carp genetic resources in Asia, including their systematic documentation and evaluation; 2) gather the existing technologies and experiences on carp culture and breeding in Asia; 3) establish strategic research partnerships and networking arrangements; 4) develop criteria for prioritizing carp genetic research; 5) identify research priorities and approaches, including species, farming systems and breeding strategies; and 6) initiate and conduct location-specific strategic research and training based on identified research priorities in carp genetics improvement leading to the development of high-yielding carp strains.

Research will begin after an extensive, objective, and pragmatic research priorities exercise, which will consider regional supply and demand. ICLARM and the six participating national research institutes will: 1) assess how and to what extent existing carp species/strains are valued by different groups including women; 2) estimate future demand by income groups; 3) analyze the present and future importance of various carp-based farming systems; 4) assess the relative economic importance of various traits (including growth, disease resistance, resistance to abiotic stresses such as low dissolved oxygen, and averse soil and water conditions).

Collaborators: Members of the International Network on Genetics in Aquaculture (INGA); Bangladesh Agricultural University, Fisheries Research Institute (Bangladesh); Shanghai Fisheries University, Freshwater Fisheries Research Center (People's Republic of China); Central Institute of Freshwater Aquaculture, University of Agricultural Sciences (India); Hasanuddin University, Research Institute for Freshwater Fisheries (Indonesia); Fisheries Economic Division of the Department of Fisheries, National Aquaculture Genetics Research Institute (Thailand); and Research Institute for Aquaculture No. 1, Research Institute for Aquaculture No. 2 (Vietnam)

ICLARM:

97. Gender and Integrated Aquaculture-Agriculture within the Context of Forest Buffer Zone Management, 1998-2001. ICLARM's Integrated Aquaculture-Agriculture (IAA) Systems Program has an existing BMZ/GTZ project in Quirino Province, Philippines, on "Upland IAA systems in forest buffer zone management (FBZM)". The objective of this study is to assess the usefulness of farm ponds for aquaculture and the potential for integration of ponds and rice fields into existing farming systems within the context of FBZM efforts of Community Forest Project Quirino (CPFQ). Another research component under this project is the study of the integration of a gender perspective into the introduction of fish culture in ponds and ricefields.

The general objectives of the proposed study are: to examine how gender and IAA (individually) relate to the farm households and communities actions of FBZM within the upland agroecosystem, and how gender roles and issues in IAA systems affect FBZM.

It is hypothesized that incorporating gender concerns within a production intervention such as an IAA system can enhance sustainable resource utilization in FBZM. Moreover, women play an important role in the adoption of IAA systems, and removing gender inequity and discrimination would enhance efforts in sustainable resource development. This study has the following specific hypotheses: 1) farm productivity of IAA systems is enhanced if women are given equal access and control over the use of resources; 2) household food and income security of IAA systems is enhanced if the distribution of benefits of farm production are equal for men and women; 3) women provide the bulk of labor needed in IAA systems and their labor is a significant factor in the adoption of such systems. Thus, households with ponds located near the homestead (near which women's work usually revolves) have greater chances of adopting integrated aquaculture-agriculture; and 4) when women shoulder the full burden of the reproductive and productive functions in the family, the productivity gap between effective and potential production is much wider for women than men.

Methods: The study population of the proposed gender research will be the whole barangay. A complete enumeration of all households will be done. Cross-section analysis of two major groups will be conducted, i.e., households practicing IAA (i.e., households with ponds) and households not practicing IAA (i.e., households without ponds). For households practicing IAA, time series analysis will also be employed to examine the income and conditions of the households before and after the fish culture intervention. Primary data will be obtained through an interview questionnaire on household demographic profile and production activities; informal interviews with key persons in the community; and participatory rural appraisal (PRA) techniques to construct historical time trends, historical maps, resource maps, resource transects and seasonal calendars. Workshops will be convened to validate the data and present the findings to the community.

Results from this gender study will reveal the impact of ICLARM's intervention (i.e., the introduction of pond culture technology) on both women and men in terms of household food security, increased income and improved natural resource management.

Other anticipated results include: 1) insights and field experiences for methodological improvements on how to combine gender analysis and participatory rural appraisal in natural resources management in the context of sustainable development; 2) increase gender awareness and competence among ICLARM Scientists (see No. 185); 3) increase the community's awareness on socioeconomic equity issues and environmental values; 4) empowerment the community in the study site through conscientizing them of the values of people participation and stewardship of the natural resources to the betterment of the local community and the country; and 5) strengthening of the institutional linkages of people, government and non-governmental organizations towards sustainable resources management.

Collaborators: CFPQ: joint collaboration of the German Federal Ministry for Scientific Cooperation and Development (BMZ), the German Agency for Technical Cooperation (GTZ) and the Philippine Department of Environment and Natural Resources (DENR).

- IITA.
98. Chimere Diaw (Anthropologist), Sue Ellen Johnson (Agroecologist), S. Francis, N. Tchamou (Research assistant).
Fisheries management, common property resources and access rights in the forest margins of Southern Cameroon. 1995 – 1997. Among the objectives of this research activity are to: 1) establish the relative importance of fishing in the production systems of the forest margins and the way it enters into the agricultural and forest economy; 2) evaluate systemic (anthropological, bioecological, economic) factors affecting the exploitation and management of forest inland fisheries at the household and community levels; 3) identify forms and rationality of the tenure systems pertaining to aquatic resources and related land use systems in the Cameroonian forest; 4) identify key factors affecting the willingness or capacity of fishermen to manage local fisheries; and 5) assess organizational options for an optimal use of inland fisheries.

In the context of increasing human pressure on Africa's rain forest and biodiversity through slash and burn agriculture, fishing is an important economic asset for rural households and could make a substantial contribution to small-scale farmers' diversification strategies, human welfare, and resource base preservation. Inland fisheries are, however, a largely understudied component of the forest production systems, though the lucrative freshwater shrimp fishery along the Lobe River that is largely managed by women fisherfolk has been intensively investigated.

Little is known of the role fishing plays in the agricultural and forest economy of other areas, of production patterns, fishing types and techniques, decision making and gender roles in the various fishing practices, the sharing of benefits among patterns and family members, markets or tenure systems. Constraints related to the agricultural calendar, resource use patterns and their management impact will be documented. As an integral part of the forest agroecosystem, fishing needs to be looked at not only from the standpoint of its intrinsic characteristics and dynamics but also through its interface with agriculture and other landscape uses (with regard to mutual systemic influences as well as potential competition in households, resource allocation) and within the whole system of access and property rights pertaining to common property resources.

Protecting the Environment

VI. Protecting the environment

CIFOR: Lini Wollenberg (Social scientist).

99. As part of a collaborative study by CIFOR and others, project staff is looking at income generation and incentives for forest conservation. Roles of men and women in income generation and forest management; impact of income generation differentiated by gender will be incorporated into the study. Collaborators: the University of Indonesia and the World Wildlife Fund - Indonesia Kayan Mentarang

CIFOR: Neil Byron (Economist).

100. Dr. Byron and social scientists from the Chinese Academy of Social Sciences are studying the social, institutional and economic aspects of the rehabilitation of degraded lands in China. The study includes a detailed examination of intrahousehold roles. The project involves the well-being and interests of rural women in the research sites, and a large number of women, including researchers and farmers, have been involved.

CIFOR: Louise Buck (Senior associate).

101. With NARS partners in Madagascar, CIFOR is studying protected and peripheral area management systems. An examination of gender differences related to governance, knowledge systems and support for community-based protected area management will be included in the study.

ICARDA: Mostafa Bedier (Statistician) and Richard Tutwiler (Anthropologist).

102. Long-term monitoring of natural resource management on farms in five agroecological situations across Egypt. Collaborative study. This long term research, on-going since 1966, is designed to monitor management of soil and water resources at the farm level in five different locations in Egypt, each with its own particular resource quality and quantity issues. Measurements are taken periodically of soil and water quality, as well as crop productivity, as indicators of sustainability of resource use. The research is participatory in nature, with 15-20 farmers involved at each site. Women farm operators are participants as members of the multidisciplinary team of researchers at two sites where, along with male-operated farms, their own farms and farming practices are being studied. Collaborator: Agricultural Research Center, Egypt.

ICARDA: Muhammad al-Hebshi (University of Sanaa, Yemen) and Aden Aw-Hassan (Coordinator, Dryland Resource Research Management Project).

103. Female labor allocation and natural resource management in Kohlan Afar, Yemen. Collaborative study within Yemen Mountain Terraces Project, 1996-97. This study is part of a larger project concerned with the sustainability of Yemen's mountain terrace farming system. Recognizing that agricultural labor in Yemen is more than 50% female, the study looks at women's labor allocation, differentiated by household type and socioeconomic status, to identify relationships between women's labor and the maintenance of mountainside terraces. Collaborators: Agricultural Research and Extension Authority, Yemen, and Sanaa University

IITA: 104. James Gockowski (Agricultural economist), Jean Tonye (Agronomist, IRAD), Doyle Baker (Agricultural economist), Michel Ndoumbé (Biometrician, IRAD) and A. Fouguegue (Agricultural economist, (IRAD).
 Characterization and diagnosis of agricultural systems in the Alternatives to Slash and Burn (ASB) in the FMBA of Southern Cameroon. Ongoing. The overall objective of the ASB program is the development of technology interventions and policy options able to mitigate the impact of agriculture on deforestation in the world's tropical forests. In Central Africa, research efforts are focused on the Congo basin and the six countries — Congo-Brazzaville, Congo-Kinshasa, Gabon, Central African Republic, Equatorial Guinea and Cameroon — whose borders encompass what is the world's second largest contiguous rainforest. Most of the deforestation in the Congo basin is attributed to smallholder agriculturalists using extensive slash and burn techniques. Research to develop technological interventions and policy recommendations for the Congo basin is conducted in the FMBA of southern Cameroon which spans across several gradients including population density, market access, soils and climate. A characterisation survey of 225 households in 15 villages spread across the benchmark was conducted in 1994.

The most important food cropping system is the groundnut-cassava-based mixed food field which largely guarantees household food security and in areas with market access generates marketable surpluses. This system is managed by women farmers. The next most important system and the largest source of agricultural revenues are cocoa plantations, which are mainly managed by men although in certain instances, widowed female heads of house also manage such systems. The third most frequently encountered field system (70 % of survey households) was the plantain/banana field. In the southern portion of the benchmark where population pressures are low the melon-based (*Cucumeropsis manii*) field is frequently encountered. Input intensive, monocrop fields of horticultural crops and maize are another frequently encountered cropping system in particular in areas with good access to the Yaounde urban market. This system has developed rapidly within the last 20 years. The plantain, *Cucumeropsis* spp and horticultural field systems are chiefly managed by men with significant labor input from women in the latter two.

Farms in the FMBA are generally small consisting of numerous small fields. The average number of fields cropped annually was slightly over 7. One of the processes associated with increasing resource use intensification is a greater differentiation of field types. The survey examined the frequency of participation of men and women in various agricultural tasks and is presented in Table 5. In all labor tasks there were significant gender differences in reported participation. A greater proportion of women vis-a-vis men participated in all agricultural labor tasks with the exception of clearing fallow fields.

Table 5. Proportion of households indicating participation of men and women by task, FMBA, 1994. (IITA)

task	women participate	men participate	Student's t-test
	proportion of households		
clearing	0.5733	0.9867	***
tillage	0.8667	0.7333	*
planting	0.9333	0.6800	***
weeding	0.9333	0.6133	***
harvesting	0.9067	0.6000	***
processing	0.8933	0.1733	***
marketing	0.8667	0.1867	***

* probability < 0.10, *** probability < 0.001

IITA: Sue Ellen Johnson (Agroecologist) and Chimere Diaw (Anthropologist).
105. Village natural resource management strategies: land use maps and resource flows. 1997 – 1998. Among the objectives of this activity are to develop baselines on natural resource land use and resource flows, management perceptions, resource control, access by clans, families and gender, and allocation within and between villages in the benchmark villages.

For an understanding of basic village objectives and perceptions of the natural resource base along the intensification gradient can serve as a research tool informing research decisions as well as a baseline of resource status. By comparing resource and landscape management strategies of different benchmark blocks we will also have a sense of how resource perceptions and strategies change with population and natural resource gradients, and where are the best opportunities as well as needs for technology intervention. Methodologies for rapid quantification of village resource perceptions need further development.

IRRI: Lisa Price (Anthropologist) and Ricardo Guino.
106. Development of sustainable production systems for different landscape positions in the Pulangi River Watershed, Bukidnon, Philippines: soil and water resource management and conservation. 1995-1997. A study was conducted to describe farmer-based practices and constraints in natural resource (soil) management and farmer's classification into natural resource domains. The sample of 48 farmer households selected out of the 259 households, were selected because they represented farmers farming multiple parcels throughout various locations in the landscape. Six focus discussion groups were formed according to different criteria relative to the information in individual interviews.

Rice, corn, vegetables, sugarcane and coffee are all grown in the watershed. Adult men are responsible for working in 80 to 100 percent of the farming tasks. Women's contribution ranged from 15 to 40 percent of the operations. Women were not responsible for any particular tasks as gender exclusive work. Men's lists of their actual contribution to soil erosion control measures ranged from 60 to 100 percent responsibility for each measure and they engaged in all listed activities. Women listed tree planting, planting vegetation, constructing ditches, and hedgerows. Children engaged in some of the measures conducted by mothers, including tree planting and hedgerows.

Women consider themselves as full partners in work and decision making with their spouses. Many felt that they did not know enough about conservation farming and that out-reach education was needed. For example, one group of Cebuana women farmers said that they heard of contour farming but did not know how to do it. Most courses are filled with male farmers even though women attend from time to time. Only very few women attend farming courses with men. Women say that courses for women only on the same conservation-farming subjects taught to the men would be more comfortable and desirable.

The study concluded that an opportunity for improving soil management was to train women in soil erosion measures in areas where they currently work (tree planting and maintenance, hedgerow planting and maintenance and beneficial vegetation for parcel boundaries). The training of women is deemed of high value since children work with their mothers and it is probable that intergenerational sustainability of the measures will be enhanced. Collaborating institution: Sustainable Agriculture and Natural Resource Management Collaborative Research Support Project (SANREM CRSP) in Lantapan, Bukidnon. (Price, L. and R. Guino, 1997. Farmer-based practices and constraints in

natural resource (soil) management and farmers classification into natural resource management domains. Project report submitted to IRRI-SANREM CRSP Collaborative Project, Lantapan, Bukidnon, Philippines.)

ISNAR: Michael Loevinsohn (Agricultural economist), Gerdien Meijerink(Agricultural economist), and Beatrice Salasya (Agricultural economist, Kenyan Agricultural Research Institute).

107.

Gender and participation in natural resource management (NRM)-oriented research and development (R&D). Within the project "Institutional challenges In NRM research", a number of case studies are being carried out of farmer participatory research (FPR) approaches in NRM within southern institutions. These cases are selected to represent particular classes of FPR, differentiated by R&D objective, the scale of resource management, and the approach selected to moving research outcomes beyond the site level. The objective of the project, which links with the System Wide Program on Participatory Research and Gender Analysis, is to provide decision makers in the NARSs with evaluated experience on the costs, benefits and institutional implications of taking on FPR. The success of the efforts examined in reaching and benefiting men and women resource users is a central concern of the studies.

For example, in an evaluation just completed of a participatory integrated crop and pest management project in Kenya, investigations focused on the extent to which men and women adopt, adapt, recombine or abandon technological options, and their propensity to diffuse both concepts and practices within and beyond the village. Individual and group interviews considered how innovation by husband or wife within a household affects decision making in which both are involved, though probably unequally. These interviews also examined the involvement of women in group processes in which innovations are discussed and collective action planned. Finally, the study considers how gender-differentiated user concerns have fed into the planning and priority setting of partner organizations, and how this function might be improved.

Saving Biodiversity

VII. Saving biodiversity

CIFOR: Tim Boyle (Forest geneticist).

108. Research on *in situ* conservation of biodiversity and genetic resources of tropical forests and on developing new methods for assessing components of biodiversity. The research has included analyses of the respective roles of men and women in multiple uses of forests, including non-timber forest product collection, timber harvesting, and cattle grazing, in India and Thailand.

CIMMYT: Melinda Smale (Economist) and Mauricio R. Bellon (Human ecologist).

109. Maize diversity management and utilization: A farmer-scientist collaborative approach 1997-2000. The goal of this project is to assess whether through collaborative breeding, farmer welfare can be increased while genetic diversity is maintained or enhanced. In terms of gender, all data is collected in a sex-disaggregated way. Female as well as male farmers have been invited to evaluate collections of landraces, and their preferences and priorities are being elicited. This information would be used to identify social organizations to support the flow of germplasm, skills, and information, and thereby

sustain the flow of private and public benefits over time. Collaborators: CIMMYT and the Instituto Nacional de Investigaciones Forestales y Agropecuarias, Mexico.

CIP: Helen F. Dayo, Jacelyn D. Labios, Amparo M. Wagan.

110. Documentation and assessment of rootcrop production systems, their sustainability and the gender roles in the conservation of plant genetic resources. The project began in January 1995. The main focus then was to define the differentiated roles of men and women in sweetpotato production system in various economic categories as defined by Francisco (1991) and Mula (1992) in their respective study areas.

Our interdisciplinary team with expertise in social and agricultural sciences conducted a rapid rural appraisal (RRA) in the Bataan Island, Province of Batanes. The purpose of the activity was to assess the existing farming systems and define gender roles in sweetpotato production as well as to identify a suitable study site for the project. After an initial assessment, the project was refocused towards documentation of the existing rootcrop farming systems. The major rootcrops being referred here include sweetpotato and two species of yam, *tugui* and *ube*. The project documents and assesses current practices in terms of sustainability and conservation of genetic resources. The other concern of the project is to determine the potential role of women in the conservation of resources.

IPGRI: Pablo Eyzaguirre (Anthropologist).

111. An IPGRI project, 'Gender issues and the role of women in plant genetic resource (PGR) conservation and use' focuses on the use of gender sensitive approaches to PGR conservation and use, and involves the development of a joint FAO-IPGRI program for the gender sensitive implementation of the Global Plan of Action for the Conservation and Sustainable Use of Plant Genetic Resources for Food and Agriculture.

A joint IPGRI/FAO working group meeting was held in Rome from 1-4 October 1997. The objective of the meeting was to build on practical methods to enable institutions in developing countries to include gender sensitive approaches in the development and implementation of plant genetic resources programmes. IPGRI is in the process of making some of the workshop reports available through the World Wide Web in order to increase their impact and circulation. These reports include a state-of-the-art review of the gender sensitive approaches to plant genetic resources research and conservation by Virginia Nazarea and Sunita George, a literature review for the development of a conceptual framework and guidelines for incorporating gender-sensitive approaches into plant genetic resources conservation and use by Consejo Quiroz, and a selected bibliography with the same focus by B. Landon Myer.

Another major output of this project will be the publication by IPGRI and FAO of a series of case studies illustrating the importance of considering gender roles in the conservation and use of plant genetic resources. The first case study, which will be published in both Spanish and English, is entitled *La Mujer Campesina y las Semillas Andinas*. The series will contribute to the development of a body of technical evidence demonstrating the importance of mainstreaming gender-sensitive approaches in research and conservation programs.

IPGRI: Pablo Eyzaguirre (Anthropologist).

112. IPGRI is supporting research to obtain a better understanding of women's and men's differential knowledge and relationship to agricultural biodiversity, particularly within the context of its work on the human and policy aspects of plant genetic resources conservation and use. One example is an ongoing study of the diversity of African leafy green vegetables. These are crops for which indigenous knowledge and gender roles are

important factors shaping conservation and use systems. The participatory approaches for collection, documentation and conservation that are developed in this project will have broad applicability to other crops and regions.

IPGRI: Pablo Eyzaguirre (Anthropologist).

113. The contribution of home gardens to *in situ* conservation of agrobiodiversity. A methodology for this activity is being developed which will analyse gender roles in home gardening systems, with special attention paid to the relationships between gender, biodiversity and food security. One component of the activity has already been completed in Vietnam with initial empirical findings that compared gender with other social and economic variables affecting the level of genetic diversity maintained within home gardens. These findings will be published and compared with results from other project sites.

IPGRI: Pablo Eyzaguirre (Anthropologist).

114. A case study is being planned to follow up on research done in Mali in 1993 by the Centre for International Environment and Development Studies at the Agricultural University of Norway, and the Programme Integre de Développement de Bafoulabé (PIDEB), a project run by the Norwegian NGO, Fondation Commémorative de Strømme. The project focuses on the gender differentiated management of local crop genetic resources in the Kayes region of Mali. The proposed study will further examine the local diversity and management of PGR, taking into account the role of local knowledge in conservation and use of these resources. It will build upon the previous research, which indicated that women and men have different knowledge about different species, as well as different and specialised knowledge about the same local variety, and will explore possible sustainable interventions to maintain diversity and improve the productivity and stability of local production systems.

IPGRI: George Ayad (Regional Director, West Asia and North Africa).

115. An IPGRI project to locate and monitor genetic diversity has initiated an activity in Cochabamba, Bolivia in collaboration with the non-profit organisation Biodiversidad, Sostenibilidad, y Medio Ambiente, entitled, "Locating and maintaining crop genetic diversity - the impact of gender and local knowledge, Pocoata, Arani". This project combines a focus on scientific aspects of genetic resource conservation with greater attention to social and gender issues in order to increase its effectiveness and relevance to project partners. This involves a case study of the impact of gender on the extent and distribution of genetic diversity within three crops: local maize; native potatoes; and tarhui, that are important for the development and food security of communities in this region. The project outcomes will be used to inform the development of methods and guidelines that incorporate gender-sensitive approaches for locating genetic diversity in crops under traditional community management.

IRRI: Lisa Price (Anthropologist), Joyce Luis (Agricultural economist), Girlie Abrigo

116. (PhilRice).

IPM – No early spray – farmer practice: Farmer attitudes toward natural resources and exploitation of rice field flora and fauna in the Philippines. 1995-1996. Farmers in intensive rice cultivation systems utilize fauna and flora that are commensals to these systems. Their use, however, is curtailed by the intensive, over-application of insecticides and possibly other pest control chemicals. In the villages where IPM and No Early Spray are being practiced, some farmers note an increase in these foods and the sample of farmers overwhelmingly agree that these flora and fauna provide food and lessen household expenses. The control villages, to a lesser extent, also deemed these resources as important sources of food that lessen household expenses. However, the control

village farmers, appear to be caught in a negative feedback loop where they deem almost all paddy life as dead and thus give importance only to the rice.

Women, men and children of both sexes are involved in the collection of useful flora and fauna from rice fields. Women's gathering activities were concentrated in the collection of plants and small protein items such as snails, crabs and frogs for human consumption. Men's gathering (fishing/hunting) activities focus on fish and birds for human consumption and flora for animal fodder. Women are market sellers of all rice field foods except birds, which men sell at the roadside.

Women are responsible for preparing food for the family's consumption and for selecting food items to be consumed based on their finances, food availability, and family preference. Women are also responsible for child care and child welfare. The work of pesticide and other pest control chemical application is men's work. In general, work traditionally considered women's work, such as handweeding, is now managed through the use of herbicide application.

Women's roles as marketers and as gatekeepers of family nutrition are severely hampered by the reduced availability or destruction of these foods. Cash crops should not directly compete with food crops, and in this case, farmers welcome the return of the rice field foods. Collaborating institutions: Philippine Rice Research Institute. (Price, L 1995. IPM – No early spray – farmer practice: Farmer attitudes toward natural resources and exploitation of rice field flora and fauna in the Philippines. Paper presented at the workshop on Reducing Early Season Insecticide Use for Leafroller Control in Rice: Impact, Economics and Risks. International Rice Research Institute, Philippines, 4-7 September 1995.)

IRRI: Stephen Morin (Social anthropologist) (IRRI), Jean-Louis Pham (ORSTOM),
117. Leocadio Sebastian (Breeder, PhilRice), Girlie Abrigo (Agricultural economist, PhilRice), Dennis Erasga (Research assistant, IRRI), Mauricio Bellon (Human ecologist, CIMMYT), Marlon Calibo (Assistant for field operations, IRRI), and Paul Sanchez (Genebank manager, PhilRice).

Integrating indigenous technical knowledge (ITK) and on-farm conservation: collaborative research in the Cagayan Valley, Philippines. This study was conducted at three sites: in the Philippines, in central Vietnam and in Eastern India. In the Philippines, gender, environmental conditions, and ITK relative to variety performance, are relevant to on-farm conservation in a number of ways. Of the 180 households surveyed in Cagayan, only in 45 (25%) of them was there complete agreement between the male and female household heads regarding varieties they had planted in the past wet and dry season. The type of disagreement varied. In some cases, the number and names of the varieties grown conflicted. In other cases, there was only a semantic difference.

The difference in view affected the number of varieties that were reported to be grown, and hence the presumed biodiversity present in the region. For example, according to women, there were 42 occurrences of "Wagwag" and 35 of "Wagwag pino," with a combined land area of 64.5 ha in the 1995 wet season. Men, on the other hand, said there were 48 "Wagwag" and 40 "Wagwag pino" with a combined land area of 93.7 ha. These were men and women from the same households, nearly always spouses to each other, discussing the same growing season. For the seven most popular varieties there is strong correlation between the number of occurrences mentioned by men and women.

With respect to the allocation of rice production activities there was some agreement between men and women that choosing varieties is primarily a male activity, i.e., 53% of the women who were asked, and 69.8% of the men asked. According to both men and women for each of 16 specified tasks, from seed selection to harvesting and drying, all were considered primarily male activities. The exception is marketing, in which an equal number of men and women said it was a man's or a woman's job. The division of labor also affects the judgment individuals may have in regard to varieties. Many more women than men said that glutinous variety *Imelda* was planted in the previous wet season. This is not surprising because women are more likely to plant glutinous varieties than men to use for household consumption or to be processed and sold as sweets or snacks at local markets.

The implication of this divergence in judgement between men and women for on-farm conservation is that information is not uniformly distributed among members of even the most localized cultures. At this point it is not clear whose information is more accurate but clearly there is a degree of divergence that should be taken into account. It is plausible that the distinction between men and women is not the most important one relative to the accuracy of these data. It is equally likely that some men are more knowledgeable than some women and some women are more knowledgeable than some men. So while gender is important, it is not predictive in this case. The important consideration is that for on-farm conservation, accurate information is crucial to a proper understanding of the technical knowledge basis of the rice farming system.

Improving policies

VIII. Improving policies

ICARDA: Ahmed Mazid (Agricultural economist) and Richard Tutwiler (Anthropologist).

118. Sustainability and socioeconomic implication of changes in farm resource management practices in Syria. 1997-2000. Building upon previous longitudinal studies of agricultural change in Syria, this nationwide study looks at the sustainability of recent agricultural development trends and their implications for the traditional household organization of agricultural production. The present and future role of women in maintaining agricultural production within households under different agro-ecological and socioeconomic situations is a particular concern of the study. Collaborators: Ministry of Agriculture and Agrarian Reform (Syria), Aleppo University, Damascus University, al-Baath University, Tehrane University, and Faculty of Agriculture, Deir Ez-Zor.

ICLARM: Paul Thompson (Socioeconomist).

119. Policy research on user-based management: the case of inland openwater fisheries of Bangladesh, and community-based fisheries management, 1995-1998. Women traditionally in Bangladesh have very low involvement in actual fishing in openwaters, but have an important role in processing fish and in maintaining and making fishing gear. Most project activities focus on those who depend on catching fish, households as a whole, and more particularly fishers who are mainly men. However, all of the partner NGOs have formed groups of women, mainly wives of fishers and poor women from the same fishing communities, to target these women for empowerment through education,

training and credit for additional livelihoods. In particular Proshika works with groups of women to improve access to credit and technology in fish drying and processing.

One of the NGOs, Banchte Shekha, works only with destitute women, and so in this seasonal floodplain site the emphasis is on management led by groups of women who in this location are directly involved, with their menfolk, in catching fish for household consumption. In addition, as part of the baseline survey a separate module was administered to the senior woman as well as senior man of each household to reduce gender biases in understanding fish related activities and incomes according to gender and opinions regarding fishery management issues. Analysis of this survey is ongoing. Collaborators: Department of Fisheries, Government of Bangladesh, BRAC, Caritas, Proshika, Banchte Shekha and CRED (NGOs)

IFPRI: Agnes Quisimbing (Economist and team leader).

120. Gender and Intrahousehold Aspects of Food Security (MP 17). This multicountry project attempts to address when and how food and agricultural policies can be improved through a better understanding of intrahousehold processes. It tests the assertion that a better understanding of interhousehold resource allocation is essential to accurately predict the outcome and consequences of policies, regardless of whether the policy is targeted at the household or individual level. The project aims to generate information that will assist in the development of policies, programs, and projects that are high-performing precisely because they take intrahousehold allocation processes into account. The project consists of four high concentration studies. The Bangladesh and Ghana/Sumatra studies are discussed below. In addition, seven supplemental studies were completed.

ICRAF and IFPRI: Thomas P. Tomich (Anthropologist, ICRAF) and Suyanto

121. (Anthropologist, ICRAF), Agnes Quisimbing (Economist, IFPRI), Kejiro Otsuka (Economist, IFPRI).

Gender differences in inheritance and property rights, Sumatra. 1996-1998. This study is undertaken jointly by ICRAF, IFPRI, and Jambi University and makes up part of larger research on 'Gender and forest resource management: A comparative study of selected areas of Asia and Africa' focusing on gender differences in property rights, the evolution of inheritance, and consequences of female control of assets for consumption and expenditure. The study has been undertaken with ethnic groups of West Sumatra who descended from the matrilineal Minangkabau where descent and inheritance are traced from grandmothers to mothers to daughters. This matrilineal society provides a unique and interesting counterpoint to most studies on gender difference in property rights.

Inheritance is being analyzed by examining intergenerational transfers of land, assets and education in a lineage in terms of the descendants from a single grandmother. Further, assets are disaggregated and their present value estimated. Disaggregation is being applied to land, draft animals, other assets, and residential house and lot. Information generated from the assets and inheritance module help to arrive at an estimate of male and female inherited assets, which in turn are key to estimating the effect of women's and men's control of income, because they are exogenous to labor supply and to decisions taken within marriage.

Efficiency of cinnamon production in Sumatra. In two typical cinnamon-growing villages in Western Sumatra, the traditional matrilineal inheritance system in paddy rice has almost completely given way to inheritance by daughters and sons alike, in both joint-family and single-family ownership systems. In contrast, land tenure institutions of cinnamon fields were much more individualized. Consistent with findings in customary land areas of some Sub-Saharan African countries, prevailing land tenure institutions do

not affect farm management efficiency in either paddy rice or cinnamon. Thus, we conclude that customary land tenure institutions have been sufficiently individualized to ensure tenure security and that factor markets work well in customary land areas.

Efficiency of rubber production in Sumatra. In our study site, a typical rubber-growing region in Western Sumatra, the matrilineal system of inheritance, which is still followed in lowland paddy and upland food crop fields, has been replaced by a patrilineal system of inheritance for rubber fields. Sales of upland fields have also become common. Strong land rights are also conferred upon newly-cleared forestland, even though the land rights may decline if the cleared land is used for food production and then left fallow under traditional shifting cultivation. Because customary land tenure institutions have evolved to more individualized single-family ownership, there is no significant difference in management efficiency of rubber production in newly emerging private ownership and single-family ownership systems.

Gender-differentiated inheritance in Sumatra. A retrospective survey on inheritance in the same sites as the rubber and cinnamon studies shows that the inheritance system is evolving from a strictly matrilineal system to a more egalitarian system in which sons and daughters inherit the type of land related to their own work effort. Different inheritance patterns of paddy land, agroforest, and bush-fallow land by gender are consistent with work differentiation between men and women in the cultivation of different fields, which suggests that land inheritance institutions have evolved so as to provide proper work incentives to men and women. That is, men inherit areas planted to crops which are intensive in male labor, such as rubber, while women continue inherit paddy land, which uses women's labor more intensively. Cinnamon, which uses approximately equal amounts of male and female labor, is inherited by both daughters and sons. The availability of uncultivated land reduces parents' investment in schooling, which implies that schooling substitutes for bequest of land. However, while gender bias is either non-existent or small in overall land inheritance, daughters are clearly disadvantaged with respect to schooling. Finally, the study tests the hypothesis whether the food consumption share is larger in households where women control a greater share of agricultural land. Intensive surveys were conducted in October 1996 and December 1996-March 1997. Analysis is currently ongoing. Finally, the study tests the hypothesis whether the food consumption share is larger in households where women control a greater share of agricultural land. Intensive surveys were conducted in October 1996 and December 1996-March 1997. Analysis is currently ongoing.

(Quisumbing, A. R. and K. Otsuka. 1998. "Individualization of Land Rights and Gender-Differentiated Inheritance in Matrilineal Sumatra: Efficiency and Equity Implications," Washington, D.C.: IFPRI (Mimeo). Otsuka, K. and A. R. Quisumbing. 1998. Gender and Forest Resource Management: A Comparative Study of Selected Areas of Asia and Africa. Report submitted to the United Kingdom Department for International Development, October 1998. Suyanto, S., Thomas P. Tomich, and Keijiro Otsuka. 1998a. Land Tenure and Farm Management Efficiency: The Case of Paddy and Cinnamon Production in Customary Land Areas of Sumatra. International Center for Agroforestry, Indonesia, and Tokyo Metropolitan University, Processed. Suyanto, S., Thomas Tomich and Keijiro Otsuka. 1998b. "Land Tenure and Farm Management Efficiency: The Case of Smallholder Rubber Production in Customary Land Areas of Sumatra," International Center for Agroforestry, Indonesia, and Tokyo Metropolitan University.)

IFPRI: Agnes Quisumbing, Keijiro Otsuka, Ellen Payongayong (Economists) and J. B.
122. Aidoo (Economist, University of Science and Technology, Ghana).

Ghana Property Rights and Gender Study. Evolution of women's land rights in Ghana. A study on impact of evolutionary changes in customary land tenure institutions in Western Ghana found that customary land tenure institutions have evolved toward individualized systems to provide incentives to invest in tree planting. However, contrary to the common belief that individualization of land tenure weakens women's land rights, these have been strengthened through inter-vivos gifts. Investment in tree planting is affected not simply by the level of land tenure security, but also by its expected changes, as tree planting strengthens land tenure security. Cocoa yields are lower on allocated family land and rented land under share tenancy, due to distorted work incentives. While men and women are equally likely to plant trees, women obtain lower yields on their cocoa plots, suggesting the presence of gender-specific constraints.

Land rights and production efficiency. Traditional land tenure institutions in Western Ghana are generally not inefficient with respect to the decision to plant trees. Land tenure institutions also do not significantly affect net revenue and labor use in food crop fields and young and mature cocoa fields. These results support the hypothesis that management intensity of cocoa fields tends to be equalized due to the establishment of secure land tenure after tree planting, regardless of the manner of land acquisition. Consistent with other evidence from Sub-Saharan Africa, when net revenues and input use are considered, women parcel managers are equally efficient as male cocoa farmers. Given the almost complete individualization of land rights under some land tenure categories, our results indicate that traditional land tenure institutions in customary areas of Western Ghana have been sufficiently individualized to achieve farm management efficiency comparable to private ownership. (Quisumbing A. R., E. Payongayong J. B. Aidoo, K. Otsuka "Women's Land Rights in the Transition to Individualized Ownership: Implications for Tree Resource Management in Western Ghana," IFPRI; University of Science and Technology, Kumasi Ghana; and Tokyo Metropolitan University, Japan, June 1998.)

IFPRI: Agnes Quisumbing and Benedicte de la Briare (Economists).

123. Bangladesh High Concentration Country Study. There is considerable interest in "food-based" strategies to alleviate micronutrient malnutrition, which can complement supplementation and fortification programs and seek directly to improve dietary quality. Promotion of polyculture fish and vegetable production, two foods relatively rich in micronutrients, holds potential for improving micronutrient status in Bangladesh 1) by increasing the supply of micronutrients to the general population and so lowering prices or maintaining constant prices in the face of rising demand due to population and income growth and 2) by directly improving household incomes and intakes of fish and vegetables of producing households. The present study examined three NGO programs promoting the production of polyculture fish and commercial vegetables through provision of credit and training programs directed at women. The evaluation methodology involved comparing groups of adopters to comparable nonadopters, as well as a random sample from the rest of the population. Selected findings are presented below.

Profitability of the new agricultural technologies. While vegetable production is much more profitable than rice production, both adopting and nonadopting households devote much more land to rice production than to the more risky vegetable production. Taking fallow time for rice production into consideration, polyculture fishpond production as practiced by adopting pond owners in Mymensingh is clearly much more profitable than rice cultivation. In Jessore, of nine group ponds surveyed only five were operated as intended. Inadequate excavation and intra-group disagreements led to non-operation of ponds in the remaining four cases. Thus, while programs which make productive assets

available to groups of poor women can in theory be an effective way to raise the incomes of the poor, such programs can be fraught with institutional constraints related both to ensuring actual control over the productive assets and to intra-group disagreements once access is secured. Such problems can be minimized by the active participation in group activities of highly motivated extension officers who are employees of the NGO administering such programs.

Women's assets and the distribution of household expenditures. To examine whether providing assets to poor women has an effect on intrahousehold distribution, the study examined the effect of differences in the bargaining power of husband and wife on the distribution of consumption expenditures. Parent's landholdings are a consistent determinant of both assets at marriage and current assets. Contrary to the unitary model, husband's and wife's assets have different effects on the allocation of expenditures within the household. Wife's assets have a positive and significant effect on the share of expenditures on children's clothing and education. After endogeneity of assets is accounted for, husband's assets have a positive and significant effect on the food expenditure share. Neglecting the endogeneity of asset measures to individual and parental characteristics underestimates the impact of men's and women's assets on expenditure shares.

Intrahousehold food distribution. Preschoolers appear to be favored in the intrahousehold distribution of food, particularly preschool boys who receive a disproportionate share of animal and fish products, which are the most expensive sources of energy and account for a high percentage of foods purchased at the margin as income increases. Adult women tend to receive disproportionately lower shares of preferred foods.

Effects of technology adoption on nutritional outcomes. Adoption of the two technologies under study has not significantly improved the micronutrient status of members of adopting households through better dietary quality. Adopting households do not consume disproportionately high proportions of their production of fish and vegetables. Impacts on overall household income, are positive, but not strong. From a short-run perspective, such production strategies can only start to meet recommended daily allowances of minerals improve the nutritional situation at the margin. Producing sufficient quantities of non-staple foods for consumers is very much a medium-to-long-run objective for the agricultural sector in Bangladesh.

Iron-deficiency anemia. Rates of anemia among adult women and preschool children in all three sites were high. Prevalence rates were 50-60% for adult women and 40-50% for preschoolers. For these groups animal and fish intakes (but no other food groups) were found to be statistically significant determinants of hemoglobin status through the magnitude of the measured effect was small. To achieve a 10% increase in the percent of total energy derived from animal and fish products, and a reduction of anemia prevalence by 12-13%, total energy intakes would have to increase substantially: about 110 calories per capita per day for preschoolers and 220 calories per capita per day for adult women - from an observed base of 40-60 calories per capita per day. This suggests that substantial reductions in anemia can only be achieved in the short-to- medium term through supplementation and fortification.

Effectiveness of iron supplementation for women. Since 1978, iron and folic acid pills have been distributed to women in Matlab subdistrict, Bangladesh through fortnightly visits of community health workers. In 1986 the iron dose was set at 198 mg of iron daily during pregnancy and 132 mg daily for 6 months post-partum. Hemoglobin concentrations were determined in a representative sample of 218 women who gave birth

from June through August 1994 and who were followed prospectively from 0.5 to 9 months post-partum. The prevalence of anemia declined from 36% at 0.5 months to 9% at 9 months post-partum, with an overall average prevalence of 23% in this period. To estimate the impact of the program, these results were compared to anemia results from representative samples of non-pregnant women in Matlab in 1975 and 1976 and in the three communities surveyed in the IFPRI study in 1996. The estimated reduction in the prevalence of anemia resulting from the program ranged from 48% to 70%, and the estimated increase in hemoglobin concentration ranged from 0.9 to 2.1 g/dl. This evidence suggests that the Matlab program has been highly effective in controlling anemia

(IFPRI, Bangladesh Institute of Development Studies, Institute of Nutrition and Food Science. 1998. "Commercial Vegetable and Polyculture Fish Production in Bangladesh: Their Impacts on Income, Household Resource Allocation and Nutrition – Final Report." November 1998. Quisumbing, A.R. and B. de la Brière. 1998. "Women's Assets and Intrahousehold Allocation in Rural Bangladesh: Testing Measures of Bargaining Power," Paper for presentation at the Northeast Universities Development Conference, October 16-17, 1998, Yale University, New Haven CT. Stoltzfus, R.J., J. Chakraborty, A. Rice, B. de la Brière and A. de Francisco. 1998. Plausible Evidence of Effectiveness of an Iron Supplementation Program for Pregnant and Post-partum Women in Rural Bangladesh. Food and Nutrition Bulletin 19 (3) pp.197-205.)

IFPRI: Under Multicountry Project 17, small grants were made for the following studies.

124. Brazil and Peru: Marianne Schminck, University of Florida; AVECITA Chicchón, Conservation International, Peru. "Gender and Intrahousehold Impacts of Community-Based Conservation and Development Initiatives in Peru and Brazil."

Ecuador: Elizabeth Katz, Barnard College, Columbia University. "Gender and Rural-Urban Migration in the Ecuadorian Sierra".

Ethiopia, South Africa, Guatemala and Bangladesh: Susana Lastarria-Cornhiel and John Bruce, Land Tenure Center, University of Wisconsin. "Women's Legal Rights to Property in Ethiopia, South Africa, Guatemala and Bangladesh".

Ghana: Christopher Udry, Northwestern University. "Agricultural Innovation and Resource Management in Ghana."

Indonesia: Elizabeth Frankenberg, RAND; Gust Ngurah Agung, Sri Moertiningsih Adioetomo, Wayan Suriastini of Lambaga Demografi. "Collecting Data on Household Decision-Making in the Indonesian Family Life Survey."

Nepal: Priscilla Cooke, Department of Economics, Kenyon College. "The Long-Term Impact of Environmental Degradation on Women in Nepal." (See also Agriculture and Environment for other projects.)

Zimbabwe: Bill Kinsey, Free University Amsterdam and University of Zimbabwe; John Hoddinott, IFPRI. "The Determinants of Divorce in Zimbabwe and Its Consequences for Women Who Return to their Natal Homes."

IFPRI: **125.** Agnes Quisumbing, Lynn R. Brown, Lawrence Haddad (Economists) and Ruth Meinzen-Dick (Sociologist).

Gender and food security interventions. Women in developing countries play a crucial role in meeting the food and nutrition needs of their families through the "three pillars" of food security—food production, economic access to food, and nutrition security. A review of recent empirical evidence shows that income increases controlled by women have a greater impact on household food security, child health, and schooling. Despite women's importance, they are constrained by lower access to land, credit, and extension advice, as well as domestic responsibilities. These constraints have consequences for productivity, efficiency, and environmental sustainability. To address these, different approaches can be employed for the gender-sensitive design of agricultural projects. (Quisumbing, A., L. R. Brown, L. Haddad, and R. Meinzen-Dick. 1998. "Gender Issues for Food Security in Developing Countries: Implications for Project Design and Implementation" *Canadian Journal of Development Studies*, Special Issue on Food Security, October 1998.)

IFPRI: Lawrence Haddad (Economist).

126. Impacts of women's income on welfare outcomes. This paper provides an updated review of the empirical evidence on income pooling across household members. Income pooling is one of the main predictions of the unitary model of the household. Despite the wide range of estimation techniques used, the studies demonstrate a pattern of rejection of the hypothesis that male and female income (or credit or assets) have equal marginal effects on a range of household and individual welfare outcomes. The conclusion of the new studies – rejection of income pooling and the unitary model – is consistent with previous work. The paper also explores some of the issues that arise. First, what is the progress in testing the restrictions imposed by nonunitary models of the household? Second, what are the implications of rejection of the unitary model for policy and program design? Finally, what are some of the challenges faced by programs and policies that internalize the rejection of income pooling in terms of impact evaluation? (Haddad, L. 1998. "The incomes earned by women: Impacts on welfare outcomes" *Agricultural Economics*, forthcoming.)

IFPRI and IIMI: Ruth Meinzen-Dick (Sociologist, IFPRI) and Margreet Zwarteveen (Irrigation engineer).

127. Gender and water management. The widespread trend to decentralize natural resource management responsibility from the state to "communities" has too often ignored intra-community power differences, especially those based on gender. Despite the rhetoric on women's participation, a review of evidence from South Asia shows that female participation is minimal in water users' organizations. Formal and informal membership criteria exclude women, and women's costs of participation are often higher than for men. More formal participation of women can strengthen women's bargaining position as resource users and strengthen the effectiveness of the organization by improving women's compliance with rules and maintenance contributions (Meinzen-Dick, R. S. and M. Zwarteveen. Forthcoming. *Gendered Participation in Water Management: Issues and Illustrations from Water Users' Associations in South Asia*. *Agriculture and Human Values*.)

IFPRI: Agnes Quisumbing (Economist) and M. Fafchamps (Economist, Stanford University).

128. Social roles and the division of labor in Pakistan. Using detailed data from rural Pakistan, this paper investigates whether human capital, learning by doing, gender, and one's status within the family (or family status) affect the division of labor within households. Results suggest the presence of returns to individual specialization in all farm, non-farm, and home based activities. The intrahousehold division of labor is influenced by comparative advantage based on human capital and by long-lasting returns to learning by doing, but we also find evidence of a separate effect of gender and family status. Households seem to operate as hierarchies with sexually segregated spheres of activity. The head of

household and his or her spouse provide most of the labor within their respective spheres of influence; other members work less. When present in the household, daughters-in-law work systematically harder than daughters of comparable age, build, and education. Other findings of interest are that there are increasing returns to scale in most household chores, that larger households work more off farm, and that better educated individuals enjoy more leisure. (Fafchamps, M. and A. R. Quisumbing, "Social Roles, Human Capital, and Intrahousehold Division of Labor: Evidence from Pakistan," Stanford University and International Food Policy Research Institute, October 1998.)

IFPRI: Shubh K. Kumar Range (Economist), Ruchira Naved (Economist), and Saroj Bhattarai
129. (Economist).

A study of child care and nutritional outcomes undertaken in Bangladesh. Children are the most vulnerable among the malnourished population. Child and maternal care practices are now being considered as important complements to increasing household income or targeted food interventions to address child growth needs. In Bangladesh, as elsewhere, many children, even in poor households, do well nutritionally, whereas others do not. This study attempts to identify characteristics of the existing child and maternal care environment that could be used as a basis for designing policies and programs to improve the nutritional status of children. (S. K. K. Range, R. Naved, and S Bhattarai. "Child Care Practices Associated with Positive and Negative Nutritional Outcomes for Children in Bangladesh: A Descriptive Analysis." Feb. 1997.)

IFPRI: Bina Agarwal (Visiting scientist, Economist).

130. This paper spells out the nature of the complexities of bargaining and gender relations and their importance in determining the outcomes of intrahousehold dynamics. It also extends the bargaining approach beyond household to the interlinked arenas in the market, community, and the state. Highlighting the problems posed by a "unitary" conceptualization of the household, a number of economists have in recent years proposed alternative models. These models, especially those embodying the bargaining approach, provide a useful framework for analyzing gender relations and throw some light on how gender asymmetries are constructed and contested. At the same time, the models have paid inadequate or no attention to some critical aspects of intrahousehold gender dynamics, such as: what factors (especially qualitative ones) affect bargaining power? What is the role of social norms and social perceptions in the bargaining process and how might these factors themselves be bargained over? Are women less motivated than men by self-interest and might this affect bargaining outcomes? Most discussions on bargaining also say little about gender relations beyond the household, and about the links between extrahousehold and intrahousehold bargaining power. (Agarwal, Bina. "Bargaining' and Gender Relations: Within and Beyond the Households." March 1997.)

IFPRI: Ruth Meinzen-Dick (Economist), Lynn R. Brown (Economist), Hilary Sims Feldstein
131. (Anthropologist) and Agnes R. Quisumbing (Economist).

Attention to gender differences in property rights can improve the outcomes of natural resource management policies and projects in terms of efficiency, environmental sustainability, equity, and empowerment of resource users. Although it is impossible to generalize across cultures and resources, it is important to identify the nature of rights to land, trees, and water held by women and men, and how they are acquired and transmitted from one user to another. This paper particularly examines how the shift from customary tenure systems to private property - in land, trees, and water - has affected women, the effect of gender differences in property on collective action, and the implication for policy formulation and implementation. This paper and the articles accompanying it were part of an e-mail conference on gender and property rights run by IFPRI's gender – nongender e-mail network. (R. Meinzen-Dick, L. R. Brown, H. S. Feldstein, and A. R.

Quisimbing. 1997. "Gender and Property Rights: Overview" and "Gender, Property Rights, and Natural Resources." *World Development* Vol. 25, No. 8, pp 1299-1302.)

IFPRI: Hanan Jacoby (Economist, Visiting scientist).

132. This paper studies the impact of a school feeding program on child caloric intake in the Philippines. Are public transfers targeted toward children largely neutralized by the household, as the theory of altruism implies, or is there an intrahousehold "flypaper" effect whereby such transfers "stick" to the child? Because children are interviewed on school days and nonschool days, and because some schools offer a feeding program and others do not, the dietary impact of the program is identified under mild restrictions. The empirical results confirm an intrahousehold flypaper effect; indeed, they indicate virtually no intrahousehold reallocation of calories in response to the feeding program. In poor households, however, children's gains from the program appear to be "taxed" more heavily. (Hanan Jacoby. "Is There an Intrahousehold 'Flypaper Effect'? Evidence from a School Feeding Program." August 1997.)

IFPRI: Howarth E. Bouis and Mary Jane G. Novenario-Reese (Economists).

133. Micronutrient deficiencies are particularly severe in Bangladesh. This paper attempts to examine how understanding household income, food prices, parental education, and nutritional knowledge, and culturally-based customs and food preferences interact to determine food consumption patterns (particularly for nonstaple foods), and micronutrient intake. In order to provide information for designing policies and intervention programs to improve human nutrition. (Howarth E. Bouis and Mary Jane G. Novenario-Reese. "The Determinants of Demand for Micronutrients: An Analysis of Rural Households in Bangladesh." August 1997.)

IFPRI: Philip Maggs and John Hoddinott (Economists).

134. In developing countries, common property resources (CPRs) can be an important source of income for certain individuals and households. This paper demonstrates that if a change in the management of CPRs imposes costs on these individuals, or causes a decline in the prices or productivities associated with goods produced by CPRs, the intrahousehold allocation of resources may alter in a manner detrimental to those individuals. The paper also shows that the assumption of a unitary household model causes the detrimental effects of certain CPR policy intervention to be overlooked. (Philip Maggs and John Hoddinott. "The Impact of Changes in Common Property Resource Management on Intrahousehold Allocation." September 1997.)

IFPRI: Benedicte de la Briere (Economist), Alain de Janvry (Economist, UC Berkeley),

135. Sylvie Lambert (Economist, Institut National de Recherche Agronomique [France]), and Elisabeth Sadoulet (Economist, UC Berkeley).

Two contrasting hypotheses about what motivates Dominican migrants to send remittances to their rural parents in Sierra are tested: 1) an investment in potential bequests and 2) an insurance contract between parents and migrant children. Remittances from young migrants, males, and migrants who want to return to the Sierra follow a pattern consistent with investment. In contrast, female migrants with no intention of returning to the Sierra play the role of insurers. The gender composition of the migrant siblings affects this remittance task-sharing, since women with no remitting brothers show interest in inheritance, while men with no sisters offer insurance. (B. de la Briere, A. de Janvry, S. Lambert, and E. Sadoulet. "Why Do Migrants Remit? An Analysis for the Dominican Sierra." October 1997.)

IFPRI: The Systemwide Program on Property (SWP) Rights and Collective Action.

- 136.** This SWP has identified feminization of agriculture and demographic change as a priority theme for research although it has not yet initiated new research on this. However, gender issues come up in many of the studies under another priority theme: Accommodating multiple uses and users of resources.
- IIMI: Eva Jordans (Visiting scientist) and Margreet Zwarteveen (Irrigation engineer).
- 137.** Bangladesh. Research was carried out on the evolving gender strategy of the Grameen Krishi Foundation (GKF), established by the Grameen Bank. As GKF came to recognize the importance of women's roles in irrigated agriculture, and affirmed its commitment to women, GKF changed its strategy to provide more direct assistance to women, including enabling them to acquire their own wells (Jordans, Eva, and Margreet Zwarteveen. 1997. *A Well of One's Own. Gender Analysis of an Irrigation Program in Bangladesh.* IIMI Country Paper, Bangladesh, No. 1. Colombo: IIMI and Grameen Krishi Foundation).
- IIMI: Margreet Zwarteveen (Irrigation engineer).
- 138.** Burkina Faso. A case study was carried out in 1996 of the Dakiri irrigation system, which compared households in which only men were plot-holders, to households where both men and women were plot-holders. The productivity of both land and water was found to be higher in households where both men and women hold plots, leading to higher incomes for women while the proportion of labor contributed by women to men's plots is virtually the same. The implication is that allocation of smaller plots separately to men and women would have positive production and social benefits. An early version of this paper won the first "Dr. N. D. Gulhati Memorial International Award" for the best paper by a young researcher at the International Congress for Irrigation and Drainage (ICID) Conference in Cairo in September 1996. (Zwarteveen, Margreet. 1997. *A Plot of One's Own: Gender Relations and Irrigated Land Allocation Policies in Burkina Faso.* Colombo: IIMI Research Report no. 11. See also Margreet Zwarteveen. 1996. *A Plot of One's Own: Gender Relations and Irrigated Land Policies in Burkina Faso.* Washington, D.C.: Consultative Group on International Agricultural Research, CGIAR Gender Program.)
- IIMI: Margreet Zwarteveen (Irrigation engineer) and N. Neupane.
- 139.** Nepal. A study of the Chhattis Mauja farmer-managed system in 1995 shows that in the head end of the system, women are the principle water managers, but are excluded from membership in the management organization. This exclusion allows them to take more water than their entitlement, and to contribute less labor to maintenance than they should -- they are "free riders." (Zwarteveen, Margreet, and N. Neupane. 1996. *Free-Riders or Victims: Women's Nonparticipation in Irrigation Management in Nepal's Chhattis Mauja Scheme.* Colombo: IIMI Research Report no. 7. Colombo: IIMI.)
- IIMI: Margreet Zwarteveen (Irrigation engineer, Coordinator of research described here).
- 140.** Sri Lanka. In Sri Lanka, a number of different research activities have been carried out, including detailed household level monitoring in 3 systems over 3 seasons (30 households/season/system), and a variety of shorter studies. While these have not been published, the reports have been useful for IIMI and for the Irrigation Department which has collaborated in some of the work, and have provided an opportunity to give young researchers experience in gender research. One report made recommendations for integrating gender considerations more effectively in a watershed action research program implemented by IIMI (See Winther and Ahlers below). Some research shows an apparent breakdown in the traditional gender-based division of labor, with women playing very significant roles in irrigated agriculture, even doing irrigation (IRMU et al. 1997). However, a more recent report, part of a research program by a Dutch Ph.D. student, suggests the division of labor has not changed much in the communities where she

worked. But her study confirms other research that women's workloads are increasing as women engage in more agricultural work, which is not compensated by men doing more domestic work. Women's participation in farmer organizations is minimal, but there are important internal family mechanisms through which women's views are considered seriously. There are no legal impediments to women's access to land and water rights, but in practice, most land is in men's names. Again, women seem to have access to sufficient financial resources that they do not feel victimized. Development projects related to water and agriculture rarely include a significant gender perspective, but because divisions in Sri Lanka are less extreme than elsewhere, this does not lead to obvious inequities or strong dissatisfaction. (van der Molen, Irna. 1997. *Gender and the Flow of Water: Gender Considerations in Water Management Practices, 2 Case Studies*. Unpublished report. December. Colombo: IIMI; Winther, Sidsel, and Ahlers Rhodante,. 1996. *Challenging the Conventional Development Approach; Challenging Conventional Gender Ideas? Gender and Participation in Natural Resource Management: A Case Study in Sri Lanka*. Unpublished report. August. Colombo: IIMI; IRMU et al. [Irrigation Research Management Unit of the Irrigation Department, Colombo; IIMI, and Wageningen Agricultural University]. 1997. *Gender and Irrigation Management Transfer in Sri Lanka: First Component*. Unpublished report.)

IIMI:
141. Margreet Zwarteveen (Irrigation engineer. Coordinator of research described here). Sri Lanka. A topic of special interest has been the involvement of women in the farmer organizations being promoted under the government's participatory management policy. An early paper had noted that by confining membership in these organizations to men, the flow of information and other services is mediated by men, even though women play very important roles in irrigated agriculture. That paper suggested women may be marginalized from decision making processes if active efforts are not made to promote women's participation in farmer organizations (See Athukorala and Zwarteveen). IRMU et al. (1997) document the role of government officials' attitudes in reinforcing the bias against women's participation in farmer organizations. A larger survey by IIMI of the effectiveness of these farmer organizations in Sri Lanka documented that overall about 12% of the members of farmer organizations in irrigation schemes are women. The incidence of women as farmer representatives is very low -- 1.5% of the total representatives (IIMI and ARTI 1997). IRMU et al. (1997) report similar figures in the systems they studied -- about 15% of the members were women. (Athukorale, Kusum, and Margreet Zwarteveen, 1994. *Participatory Management: Who Participates? Economic Review* (People's Bank, Sri Lanka) 20 (6):22-24; IIMI and ARTI [Hector Kobbekaduwa Agrarian Research and Training Institute] 1997. *Monitoring and Evaluation of the Participatory Irrigation System Management Policy*. Asian Development Bank TA 1705 SRI. Final Report (3 volumes). [Volume 1, Annex C]; IRMU et al. [Irrigation Research Management Unit of the Irrigation Department, Colombo; IIMI, and Wageningen Agricultural University]. 1997. *Gender and Irrigation Management Transfer in Sri Lanka: First Component*. Unpublished report.)

IIMI
142. Mexico. In 1997, research was initiated by a Dutch Associate Expert, an American Ph.D. student, and Margreet Zwarteveen, a former Dutch Associate Expert. Each of the three researchers are working in three sites covering four irrigation districts, representing three contrasting environments. These irrigation districts are: Camarca Lagunera (North Central Mexico); Bajo Rio San Juan, Rio Bravo (North East border); and Alto Rio Lerma (Central Mexico). All four districts are large, ranging from 100,000 to 2,000 ha and all are affected by migration and industrialization. IIMI is examining the gender dimensions of the radical policy and institutional changes implemented in Mexico in the past few

years. Specifically, we are examining the management transfer policy and process, privatization of property rights, development of water markets, and the changing role and importance of irrigated agriculture for farming families, all from a gender perspective. This work addresses directly the questions found on Table 6 (See No. 188), which are central to IIMI's current program. This research program is scheduled to run through mid-1999.

IIMI:

143. Pakistan. During 1997, as part of a larger study of the multiple use of irrigation water, IIMI collected gender-disaggregated data from several hundred households. These data will document the extent to which men and women have significantly different perceptions of water issues in an area where domestic water supply is dependent on irrigation canals. In addition, IIMI is supporting the work of several Pakistani M.Sc. students who are documenting gender differences in perceptions of water issues and uses of water, and participation in new farmer associations, in the context of a pilot effort to organize farmers on secondary canals. Finally, IIMI will be preparing a proposal for a longer research program on gender and poverty issues related to irrigation in Pakistan in the context of planned reforms to decentralize and transfer irrigation management responsibilities.

IIMI:

144. Doug Merrey (Anthropologist), and Margreet Zwarteveen (Irrigation engineer). International Workshop. During the week of 15-19 September 1997, IIMI hosted an international workshop in Sri Lanka that brought together some of the best known researchers on gender and water, key IIMI staff, and a number of practitioners, to try to clarify the major research questions of importance to IIMI's work, and how they could be addressed more effectively. The workshop was built around thirteen research papers specially written for the workshop, which together provide a useful picture of the 'state-of-the-art' for both research and implementation guidelines. Discussion of the papers was combined with organized exchanges of ideas with IIMI staff to explore how gender issues can be more effectively addressed by the larger research program, and field visits to sites in Sri Lanka.

The workshop focused particularly on gender analysis of rights to land and water, the implications of privatization and water markets for women's access to resources, how women as well as men can participate fully in collective action projects, and the relationships between problems like water scarcity, pollution and multiple uses of water in irrigation systems, and gender. Important observations underlined by the workshop are: the paucity of reliable gendered quantitative and qualitative data at both the micro and macro levels; and the need for a clearer understanding of the linkages among policies, project implementation strategies and the diversity of social, cultural and economic contexts of irrigation.

The workshop participants produced a set of useful research questions and issues and recommendations for research methodologies which largely confirmed the direction IIMI is taking. The interactions with other senior staff at IIMI led to important insights into how gender questions can be more effectively integrated into a variety of other projects at IIMI. And the nucleus of an international research network on Gender and Water was established. (Douglas Merrey and Shirish Baviskar, editors. 1998. *Gender Analysis and Reform of Irrigation Management: Concepts, Cases and Gaps in Knowledge: Proceedings of the Workshop on Gender and Water, 15-19 September 1997*, Habarana, Sri Lanka. International Water Management Institute.)

IITA: James Gockowski (Agricultural economist) and C. Diaw (Anthropologist).
145. Assessing institutional and infrastructural impediments to agricultural technical change and rural development in the Humid Forest Zone of Cameroon. 1997-98. Among the objectives of this study are to : 1) identify and characterize major institutional constraints preventing technical progress in agriculture in the humid forest zone of West and Central Africa. 2) Measure the impact of infrastructural development on agricultural intensification, marketing costs, and institutional development.

In the humid forest zone of Africa a lack of agricultural productivity growth attributable to institutional and infrastructural failures has contributed to higher rates of deforestation among households that are still mostly subsistence oriented. Chief among these are the inadequacy of institutions for improved seed multiplication and distribution (whether private or public), farm chemical distribution, credit, land tenure and extension services. Even when the necessary institutions exist, the access of the relatively poorer households to their services is often restricted. Infrastructural impediments include poor communication routes (lack of roads and telecommunications) that greatly raise the cost of production and marketing and it is our hypothesis that they inhibit the development of effective rural institutions.

The ecoregional benchmark approach requires characterization of the major institutional characteristics as well as the biophysical and household socioeconomic parameters. As institutional development in the humid forest zone has been strongly tied to governmental efforts, the sampling approach of the proposed study begins at the local (arrondissement) level of government. For each of the 31 arrondissements in the benchmark, key informant interviews will be conducted with prefectural officials, and other officials and suppliers active in agricultural production.

From the key informant interviews a number of measures will be collected including the number and types of seed multiplication and distribution institutions functioning; number and sex of extension personnel and their distribution; number of officially recognized farmer organizations and their level and sex composition of membership; number and extent of registered rural land titles; number of farm chemical suppliers and volume of sales; incidence of government supported rural credit; kilometers of paved roads and kilometers of primary rural feeder roads will be made. From the village surveys data to be collected includes levels of farmer awareness of major varietal innovations; farmer use of improved varieties or purchased seeds; frequency of extension visits; formal credit access and uses; informal credit access and uses; farmer transaction costs of food marketing network (transport cost, opportunity cost of time spent marketing); farmer transaction costs of input supply; seasonal variations in transport costs; land tenure systems (customary tenure, communal tenure, titled tenure, and inheritance).

IIMI, IFPRI, and ICLARM: Flemming Konradsen (Environmental health biologist), Wim
146. Van der Hoek (Medical doctor, epidemiologist), Randolph Barker (Agricultural economist), Waqar Jehangir (Agricultural economist), Peter Jennings (Environmental engineer), Yutaka Matsuno (Irrigation engineer), David Molden (Civil engineer), Ruth Meinzen-Dick (Development sociologist, IFPRI), Rekha Mehra (Economist, ICRW), Margaretha Bakker (Development economist, IIMI), Mark Prein (Aquaculture scientist, ICLARM).

The Systemwide Initiative on Water Management. Multiple uses of water at the local level. Government agencies and donors involved in the construction, modification, and rehabilitation of irrigation systems need to be more sensitive to the multiple demands placed upon irrigation water in light of growing scarcity. A study, has been launched to

identify and value the multiple uses of irrigation water at the local level. This work, being undertaken by IIMI, IFPRI, ICLARM and the International Center for Research on Women (ICRW), will attempt to identify the gender differentiated multiple demands for and uses of irrigation water and the productivity and equity impacts of alternative use. The hypothesis is that the value of irrigation water for purposes other than crop production is much greater than normally recognized. Withdrawal of irrigation water for competing uses could have serious impacts in addition to reduced crop production. Pilot research was initiated at a site in Sri Lanka with a meeting of collaborators from IIMI, ICRW, IFPRI, and ICLARM in February. A parallel study funded by IIMI was initiated in Pakistan in April.

A concept paper based on this study was presented at the European Meetings of the International Commission on Irrigation and Drainage in Oxford in September 1997. Reports on the pilot phases of this work were discussed at a workshop in Pakistan in February 1998. This research will lay the conceptual framework for more in-depth analysis and application of methodology to evaluate the different uses of water.

- IRRI: Mahabub Hossain (Agricultural Economist), and Catalina Diaz (Sociologist).
147. Reaching the poor with effective microcredit: evaluation of a Grameen Bank Replication in the Philippines 1997. The Grameen Bank in Bangladesh has developed a successful model of reaching credit to resource poor households that are generally bypassed by government financial institutions. This study evaluated the experience of the replication of the model in the Philippines by the Center for Agriculture and Rural Development (CARD), an NGO which has disbursed P82 million to 8000 borrowers since 1990, and has succeeded in recovering the entire amount. The respondents in this study included 133 female borrowers (70% of which are landless; the rest have small landholdings) from CARD. Loans were used by female borrowers on a number of enterprises. Among these, the highest net household income came from fish drying and trading, followed by trading agricultural produce, bakery, variety store, food vending, dressmaking, transport, fishing, and hog raising. Hog raising showed the highest labor productivity with a return to capital of 113%. These economic activities helped increase employment of women borrowers as well as their spouses and contributed to a 25% increase to household incomes. However, the institution is not yet financially viable, as the cost of operation is about 54 percent of the amount of outstanding loan while it collects 44% as service charges from the borrowers. Without high rates of interest or continued subsidies from funding agencies the microcredit program will not be able to expand their operations on a large enough scale to have a significant impact on poverty alleviation. Collaborating institution: CARD an NGO. (Hossain M and C. Diaz, 1997. Reaching the poor with effective microcredit: evaluation of a Grameen bank replication in the Philippines. Paper presented during the Evaluation Dialogue on Grameen Bank Replication of the Center for Agriculture and Rural Development (CARD). Inc, held at the International Rice Research Institute (IRRI), Los Banos, Laguna, 12-15 June 1997.)

- ISNAR: Ann Gordon (Visiting scientist), Zenete Franca (Senior research officer and Head
148. of training), and Helen Hambley Odame (Associate research officer).
Women and Agribusiness. A series of comparative case studies are being planned in Mali and Kenya on women and marketing structures in agriculture and natural resource management.

ISNAR: Carlos Valverde (Senior research officer) and Helen Hambly (Associate research officer).
149. Institutionalizing Gender Policy. An article in preparation for external publication examines the achievements and obstacles experienced by national agricultural research organizations in institutionalizing gender policy. The article reflects on the issue of "resistance to change" in organizations and on gender as an integrated organizational objective. Examples from Africa and Latin America are discussed.

Strengthening National Research

IX. Training

CIAT: Cary Farley.
150. Gender is considered as an important dimension of differentiation in training workshops for collaborators (NARS in Ethiopia, Kenya, Madagascar) involved with the Participatory Research for Agroecosystems Management Project.

CIAT: Soniia David (Anthropologist).
151. The manual for doing research on local seed systems specifies asking questions and involving both men and women farmers. (S. David, 1998 A guide for documenting farmers' acquisition, diffusion and management of bean seed).

CIAT: Ann Braun (Entomologist).
152. We included gender analysis in two courses on the local agricultural research committee (CIAL) methodology. One in Ecuador with FLACSO and the IIRR, where Susan Poats developed the topics and the other one in CIAT in a course for the GTZ. The course covers descriptions of dissemination and information activities which give attention to different gender roles or to the technology needs of poor rural women.

CIFOR: Carol Pierce Colfer (Anthropologist).
153. Social criteria and indicators project. Training/preparatory seminars for partner researchers who undertake field testing of the criteria and indicators, included gender issues e.g., by urging them to get female assistants as well as male, by getting them to access equal numbers of male and female respondents, by including methods that collect information on sex role stereotypes and roles, etc. A draft toolbox for criteria and indicators has been developed. (See C. Colfer, A.M. Tiani, M.A. Brocklesby, P. Etuge, M.A. Sardjono, R. Prabhu, C. McDougall, R. Wadley, E. Harwell, J. Woelfel, C. Diaw, B. Tchikangwa, and M. Guenter. 1998. The BAG [Basic assessment guide for human well-being: The criteria and indicators toolbox])

CIMMYT: Craig Meisner (Agronomist).
154. Proven innovative approaches for accelerated adoption of wheat production practices in Bangladesh. 1994-1995. The 'Whole Family Training Program' was developed based on research that showed that wheat production in Bangladesh is a whole family activity because all immediate family members generally participate in the production cycle, and all family members are affected by production decisions and results. Additionally, it was revealed that families had different systems for determining intrahousehold labor allocation. Based on this, it was decided to train families as wheat producing units, rather than to categorically divide training into gender-specific and/or task-specific segments, and thereby demonstrate respect for the family's internal operations. A participatory

approach to the training was utilized to have maximum interaction among the trainers and families. Though conventional wisdom would dictate that in a conservative country like Bangladesh such a 'family approach' would not work, participation was close to 100%. Evaluation of data suggests that families have adopted significant changes in many wheat producing practices when compared with the baseline data before the training. Collaborator: The Bangladesh Agriculture Research Institute Wheat Research Centre.

CIMMYT: Joel Ransom and Douglas Tanner.

155. The Eastern Africa Cereals Program (EACP) Phase IV. Ongoing until June 2001. All short term training activities of the EACP Phase IV have a two or more day component of gender sensitization. This is conducted by consultants from the region. Last year a statistics course (with two days of gender training) and a training course/workshop on incorporating gender analysis into the research process for regional wheat agronomist were held in Ethiopia. There is a plan for a seed production course in Kenya in 1998 (with 2 days of gender training). The Steering Committee of the Maize and Wheat Network will also be trained for 2 days in February 1998.

ICARDA: Richard Tutwiler (Anthropologist).

156. "Methodologies for Impact Assessment and Gender Analysis" Training course, June 1996 (Cairo) and February 1998 (Aleppo). Participants were from Egypt, Ethiopia, Sudan and Yemen as members of the Nile Valley and Red Sea Socioeconomics Research Network. The network requested a training course for network members that included a basic introduction to the objectives and methods of gender analysis. This was conducted in 1996 and again in 1998.

ICARDA: Malika Martini (Socioeconomist).

157. "Women in Agricultural Development" Course offered March 1998 (Aleppo). Participants are women in development subject matter specialists from Egypt. At the request of the Agricultural Research Center (ARC), ICARDA will conduct an orientation and training course for 20-25 Women in Development specialists working in the Agricultural Intensification Project for Upper Egypt. The course will include lectures and practica on gender analysis and its application in agricultural research, including technology transfer and impact assessment. The course will include fieldwork in Syria at sites where agricultural intensification has had an important impact on women.

IIMI

158. IIMI does very little formal training. But through support for young professionals, on-the-job training for researchers, and occasional short courses on specific skills required, IIMI does contribute significantly to the professional development of its partners. The workshop to sensitize senior IIMI staff to gender issues is mentioned below. (See No. 188 under Priority setting and project proposal and review.) IIMI has also provided training in data collection, data management software, word processing, and data analysis to the national research staff involved in gender research. Further, it has supported M.Sc. and Ph.D. students (as well as Associate Experts, who are young professionals) to carry out gender research. During 1997-1998 for example, IIMI is supporting two Ph.D. students in Mexico and one in Sri Lanka; and three M.Sc. students in Pakistan. The proposed program in South Asia described in the next entry is explicitly designed as a professional development and capacity-building program.

IIMI: Barbara van Koppen.

159. South Asia (India, Nepal, Sri Lanka). IIMI is undertaking collaborative research with NARS on gender and poverty issues, with special reference to studying the effectiveness of projects promoting water and land rights for women (largely by NGOs). A major

objective will be professional development: assisting students in learning to use and apply gender analysis in their research. IIMI will arrange for international, regional and national consultants to hold workshops in gender analysis methodologies, support the development of a network of researchers on poverty and gender in the region, and provide substantial support to post-graduate students.

IITA: J. L. Gulley (Training program leader), Rainer Zachman (Head, training materials), and I. R. Obubo (Research training specialist).

160.

IITA efforts to incorporate gender issues in training and research. In keeping with its affirmative action program in training women, IITA has undertaken several activities to increase the number of women participants at all levels of training.

Gender awareness is not limited to the encouragement of women's participation and representation in programs and activities. IITA has also taken specific steps to sensitize research and training course participants to gender analysis and sought the inclusion of gender perspectives in these activities. In 1993, IITA, Training Program hosted Hilary Sims Feldstein from the CG Gender Program and Annie Frio a colleague from IRRI to conduct a workshop on sensitizing researchers to gender issues.

In encouraging user perspectives in its research agenda, IITA's Training Program collaborated with the Alley Farming Network for Tropical Africa (AFNETA) to invite the International Institute for Environment and Development (IIED) to incorporate farmer participatory techniques in research diagnosis and design. IITA and AFNETA conducted several training courses in Ibadan and AFNETA regional bases in Kenya, Ghana and Benin during the period 1993 - 95 to incorporate farmers perspectives into the research process. Within the farmer participatory research framework, gender analysis issues such as "who does what?" featured prominently. For instance, after constructing a seasonal calendar, a specific sex-disaggregated calendar was constructed to see the gender implications. In March 1994, the Training Program consolidated developments in participatory rapid appraisal and gender analysis training by extending the net of participants to a range of scientists and research associates within the Institute. A 3-day workshop was held in Ogun State of Nigeria with a total of 22 IITA staff. The principal objective was to use farmer participatory research techniques to analyse selected themes including gender roles in the production system.

IITA: Lin Buckland and Joyce Halegoah.

161.

IITA research guide 58 Training Document was completed in December 1996. "Gender analysis in agricultural production." This research guide provides information and guidance to researchers, technicians, extension specialists, educators and students involved in gender research and training. The guide is intended to explain the objectives of gender analysis, identify gender roles, needs and constraints faced by men and women under different situations, and analyse research for gender sensitivity

IRRI: Thelma Paris (Social scientist) and Catalina Diaz (Social scientist).

162.

The course "Problem-based technology generation for Rainfed Lowland environments" has been given twice: in Indira Gandhi Agricultural University, Raipur, Madhya Pradesh, India from July and August, 1997; and in Bangladesh Rice Institute, Bangladesh, October, 1997. Thelma Paris in India and Catalina Diaz in Bangladesh gave lectures on gender issues in rice-based farming and the methodologies for incorporating gender variable in farming systems research and extension. In both training programs, the participants are researchers from agricultural universities involved in the Rainfed Lowland Rice Consortium.

IRRI: Dr. Sushil Pandey (Social Sciences Division).
163. A non-degree training course on “New paradigms and tools for socioeconomic analysis of rice production systems in Asia” was held at the IRRI headquarters in Los Banos, Laguna, Philippines on 9 February to 4 April, 1998. This was organized in cooperation with the Australian Centre for International Agricultural Research (ACIAR). This 8-week program was designed to enhance the capacity of NARSs in areas on research concepts, issues, methods and analysis in agricultural research within the spectrum of perspectives in economics, natural resource management, anthropology, and geographic information systems. Gender issues was one of the topics in this training course. Gender analysis was also included as one of the analytical tools in farming systems research.

ISNAR: Zenete Franca (Training specialist), Helen Hambly Odame and Anna Wuyts
164. (ISNAR); Louise Seshwelo (ESAMI Tanzania); and Regina Gata (Department of Research and Specialist Services, Zimbabwe).
A Gender Training Module was produced under the Agricultural Research Management Training Program of Southern Africa Development Community (SADC), Eastern and Southern Africa Management Institute (ESAMI) and ISNAR in collaboration with resource persons from the Southern Africa region. Research leaders and scientists from countries of the region participated in the revision of the materials and their adaptation to regional needs. The module comprises three sections: gender policy, institutionalization of gender concerns (e.g. gender staffing, recruitment, and promotion), and gender analysis in research management. In November 1996, the module was tested in a four-day training of trainers workshop on gender analysis for management of research in agriculture and natural resources. The dynamic of the workshop was ideal, with 6 men and 6 women. One of the participants, who had attended other gender analysis training events, remarked that the current module was more progressive and innovative than others available in the region.

The effectiveness of the training has been assessed through the Participant Action Plan Approach (PAPA). Graduates have used the training in the following areas: sensitization of scientists and research managers to gender concerns; identification of programs which harbor important gender issues; and incorporation of gender perspective in projects and policies.

Three such workshops have now been held in the SADC region and have developed a capacity for further gender training and for follow-up consultations on gender analysis and gender staffing. Thus, when ISNAR has been requested to provide direct assistance to NARS on such issues, we have referred NARS leaders to the resource persons in the region and have, as a means of encouragement of the use of regional resources, offered to help finance the use of these project-trained associates.

An article is being prepared on the impact of the three gender training workshops held in SADC, using data from the PAPA and workshop evaluations. The article relates ISNAR's work to some of the wider thinking on gender training and its variants: such as training for sensitization, and training for transformation.

X. Documentation, Publications and Information Dissemination

CIAT:

165. In 1998/99 we plan to document several women's CIALS that have recently emerged. Information Services is initiating a collection of literature on gender and participation as part of the SWP PRGA.

CIFOR:

166. Gender focal point, Dr. Carol Colfer, maintains a small gender library in her office and circulates gender-related materials via email and document sharing, as appropriate. She also provides materials to visiting Indonesian scientists and collaborators on the topic.

ICARDA:

167. Publication of articles in general audience magazine Caravan:

"Livestock: the women are the experts" by Andrea Pape-Christiansen, Caravan No.3, 1996

"More food from barley: How Ecuadorean women are helping develop barley foods" by Mike Robbins, Caravan No. 3, 1996

"Women: making their mark in the garden of Egypt" by Mostafa Bedier, Richard Tutwiler and Christine Kalume, Caravan No. 6, 1997

"Not for gold, or fine clothes: women agricultural workers in Syria" by Malika A. Martini, Richard Tutwiler and Christine Kalume, Caravan, No. 7, 1998

ICLARM:

168. Story/Video on Women in Fisheries and Aquaculture in Bangladesh. David Mowbray (President, Baobab Productions, Inc) and Marlene Bedford were commissioned to work with ICLARM Bangladesh Project staff on this story and video which describes the work of ICLARM and the Bangladesh Fisheries Research Institute in developing seasonal pond agriculture with women fishers.

IIMI:

169. IIMI has one of the best water management libraries in the world. During the past few years, we have significantly strengthened our holdings on gender analysis, gender and development, gender and natural resources management generally, and gender and water specifically. We are linked to several gender networks, including GEN NET, the Newsletter of the Water and Sanitation Collaborative Council's Gender Network, and the CGIAR Gender Network.

ILRI:

170. ILRI has one of the largest collections of literature on livestock world wide including a microfiche collection of grey or non-conventional literature. With a grant from the CGIAR Gender Analysis Program, a compilation and review will be conducted of the literature that addresses gender issues and/or the roles of women in livestock and two case studies for training purposes will be written.

IPGRI. Ruth Raymond (Public Awareness Officer).

171. As the relationship between gender and plant genetic resources management receives greater attention on international and national agendas, researchers and policy-makers require systematic information on the key issues. To fill this need, IPGRI uses diverse media to brief key participants in international and national conferences, meetings and workshops. For example, two draft brochures were prepared and distributed at the December 1996 meeting of the FAO Commission: Feminizing Farmers' Rights: The

Means to Ensure an Equitable Recognition of the Contributions of All Farmers to the Conservation and Use of Plant Genetic Resources and Women's Work: The Role of Rural Women in the Implementation of the Global Plan of Action for the Conservation and Sustainable Utilization of Plant Genetic Resources for Food and Agriculture. The brochures, which are being revised to reflect recent important developments in the policy arena, will be distributed to delegates at regional meetings to develop strategies for the implementation of the Global Plan in 1998.

IRRI: Thelma Paris (Social scientist) and C. de Leon (Publications services).
172. Bringing a better life for poor rural women in Asian farming. This is a 10 minute video reflecting the research on gender and technology development at IRRI. The script was written by T.Paris and the video was produced by C. de Leon of Communications and Publications Services at IRRI.

IRRI: Thelma Paris (Social scientist).
173. Women in rice farming in Eastern Uttar Pradesh. This is a documentation of the daily activities throughout the production cycle of poor women in rice villages in Eastern Uttar Pradesh.

IRRI:
174. Thelma Paris, Co-ordinator of the Gender Research at IRRI was given the CGIAR Chairman's Excellence in Science Award as an Outstanding Local Professional. This award recognizes IRRI's efforts in addressing gender concerns in rice farming.

XI. Organization and management counseling

ISNAR: Marleen Cremers and Gerdien Meijerink (Research analysts).
175. Gender staffing and agricultural research. An article is being prepared for "Out of the Margin 2: Feminist Perspectives on Economic Theory", a conference being organized by the International Association for Feminist Economics in Amsterdam in June 1998. The paper, "Facts and feelings about women in the science labor market: the case of agricultural research in developing countries", makes the point that, globally, women are a minority in agricultural research, as they are in other science sectors. The paper discusses why this is cause for concern. Equity considerations (the starting point of much feminist economics) are supplemented with efficiency and effectiveness concerns, putting the issue very much on the agenda of economists.

The paper synthesizes available empirical evidence from different continents, concentrating on the South. It tries to understand the mechanisms and causes behind gender imbalances in agricultural research institutions. In doing so, the authors borrow insights from sociological studies - even though these often focus on rich countries - and incorporate them into a basic economic framework. Economic tools and concepts are applied, such as supply and demand of labor, price and non-price effects, opportunity costs and perceived opportunity costs, in order to understand the dynamics behind the gender balance of researchers in agricultural research.

XII. Networks

See also 1 (CIAT) under germplasm; 155 (CIMMYT) 156 (ICARDA), 160 (IITA), 164 (ISNAR) under training; and 184 (ICARDA) under priority setting and project proposal and review.

CIMMYT: Wilfred Mwangi (Economist).

176. Regional Networking Workshop on Gender Analysis in Agricultural Production. Socioeconomists from Ethiopia, Kenya, Uganda and Tanzania working on gender research themes were invited to discuss and share their experiences. Special attention was given to methodological, conceptual and analytical issues, through the introduction of the Gender Analytical Framework. Emphasis was given to increase awareness and knowledge of gender and how to apply gender as a unit of analysis in agricultural research. Collaborators: Socioeconomists from Ethiopia, Kenya, Uganda and Tanzania. (For example, Bisanda and W. Mwangi (1996) "Adoption of Recommended Maize Technologies in Mbeya Region of the Southern Highlands of Tanzania". Ministry of Agriculture of the United Republic of Tanzania and CIMMYT. This paper presents sex-disaggregated data and analysis.)

CIMMYT: Joel Ransom (Agricultural economist), Douglas Tanner (Agronomist), and Scientists from NARSs of Ethiopia, Kenya, Rwanda, Tanzania, Uganda.

177. Meeting of the Gender Working Group of the East Africa Maize and Wheat Network (ECAMAW). All of the research proposals funded by ECAMAW must include a paragraph on how gender analysis will be incorporated into the research process. These are not gender studies, but research that will use gender analysis in the research process. A Gender Working Group, made up of 22 technical and social scientists from East Africa, held its first meeting in January 1998.

The objectives of the Working Group meeting were 1) to bring together maize and wheat researchers (including biological scientists and socioeconomists) from the region to discuss the role of gender in the research process, 2) to identify aspects of the agricultural production process in which gender issues are important, and 3) to make recommendations to the Steering Committee of ECAMAW on issues related to gender analysis in the research process.

Findings and Recommendations: There was relatively good qualitative data on the role of gender for all countries. However, there was little quantitative data available except for that presented from Ethiopia. Important gaps identified in the database were: 1) lack of quantitative baseline data in most countries. 2) lack of data classified on the basis of household economic status, agroecological zones and/or cultural differences. 3) the majority of the maize and wheat production systems in each country not captured by the data and characterizations in the presentations. 4) no clear distinction between *de jure* and *de facto* female headed households in the reports. In addition, the role of females in male headed households is not clearly stated. 5) no indication of consumer preferences in the maize and wheat production systems. 6) lack of information on post harvest and marketing. 7) no clear distinction made between commercial and subsistence maize and wheat production in the region. 8) no indication of time trends in the roles of men and women on crop production in the data presented.

The workshop made recommendations on correcting the gaps in the database through a review of existing information available in most countries from FSR reports, surveys and

other secondary data sources. Recommended studies included: 1) gender analysis studies in maize and wheat production systems in other countries in the region similar to those studies already conducted in Ethiopia and Uganda, 2) studies on household economic status and its effect on labor division. 3) studies on the relationship between decision-making and household resource utilization. 4) impact studies on existing wheat and maize technologies disaggregated by gender.

Research issues of special concern to women were identified. Technical research should be directed to women-specific bottlenecks in weeding and postharvest processing, storage and pest control, and processing characteristics. Issues to be addressed by social science research include, for example, access to and benefits of existing credit systems; land tenure; how institutional constraints, such as women's lack of access to resources such as land and credit affects farm productivity; and using identified case studies, estimate additional costs of including a gender perspective in biological research projects, and track the actual costs and benefits of this approach.

There were a number of recommendations on the incorporation of gender analysis in the research process such as providing gender training to researchers and policy makers, requiring a gender component in proposals submitted to the steering committee for funding, monitoring such projects, and linkage with SWP PRGA. The workshop also suggested guidelines for the submission of proposals to the Steering Committee.

ICARDA: Asmaa Bilassi (Agricultural Research Center, Egypt) and Richard Tutwiler
178. (Anthropologist).

Role of women in faba bean production and utilization of improved technology in Egypt. Collaborative study under Nile Valley and Red Sea Regional Socioeconomics Research Network, 1996-97. This is one of a number of gender-related studies being undertaken each year by the ICARDA-supported Nile Valley and Red Sea Regional Socioeconomics Research Network. In this study, based upon a formal survey, the labor time allocations for faba bean production were disaggregated by gender and age to reveal the relative participation of men, women, and children. Implications of differential participation for the transfer of improved faba bean technology were assessed.

ICARDA: Abderrazak Belaid (Socioeconomist).

179. Algeria, Morocco, Syria, Tunisia, and Turkey: Farm and community-level post-harvest processing of durum wheat. Collaborative study within the WANADDIN Network for Durum Wheat Improvement, 1996-98. This research within the WANADDIN Network focuses on post-harvest processing and consumption of durum wheat products, primarily undertaken by women in producing households and village communities. The research includes attention to indigenous knowledge of quality indicators for specific products, technology of processing, and marketing arrangements. The objective is to incorporate quality and value added concerns in national and international durum improvement efforts. Collaborators: NARSs of the participating countries.

Improving Centers' attention to gender

XIII. Priority setting and project proposal and review

See also No. 160 (IITA) under Training.

CIAT:

- 180.** Gender integration in research programming. The need for gender analysis will be assessed in project design, impact assessment or training. Specific tools such as collection of sex disaggregated data, gender analysis or needs assessment, participatory planning, and evaluation or consultation with men and women participants and beneficiaries may be considered in project design, to ensure validity of the results when gender-differentiated effects are anticipated. In situations where reliability of data and the impact of research is likely to be affected by gender, researchers should be provided with the necessary level of training or support in gender analysis, to enable gender-differentiated results to be obtained.

CIAT, CIMMYT, ICARDA, and IRRI:

- 181.** Jacqueline Ashby (Sociologist), Louise Sperling (Sociologist; plant breeding group), Maria Fernandez (Rural sociologist; natural resource management group and leader of gender analysis program).
Systemwide Program on Participatory Research and Gender Analysis for Technology Development and Institutional Innovation. This program began in late 1996 with the goal of improving “the ability of the CGIAR System and other collaborating institutions to develop technology that alleviates poverty, improves food security and protects the environment with greater equity.” Its purpose is to “assess and develop methodologies and organizational innovations for gender-sensitive participatory research and operationalize their use in plant breeding and crop and natural resource management.” At its inaugural international seminar in September 1996, three working groups were formed: participatory plant breeding (PPB), natural resource management (NRM), and the Gender Working Group (GWG). Members of the GWG were also members of the PPB and NRM groups and worked to integrate gender into those groups working plans. (For specific grants and studies sponsored by the program see No. **192**.)

CIFOR: Carol Colfer (Anthropologist) and Cynthia McDougall (Social scientist).

- 182.** CIFOR has taken some major steps towards of making research and priority setting systematically include gender issues. This began in June 1997 with a participatory seminar for CIFOR scientists on ‘gender in research’. This led to a draft plan for a gender and diversity analysis program. The plan, excerpted below, was proposed by Cynthia McDougall.

Background: CIFOR scientists and other leading NRM researchers recognize the contribution of gender and diversity perspectives to high quality research. The CIFOR seminar on gender (June 1997), revealed that there remain many uncertainties regarding determining when gender perspectives are needed, and the most efficient means of implementing gender analysis. Reflecting this, Phase II Social Criteria and Indicators research revealed that project scientists were in need of new tools for accessing local women in their research. Scientists developed a research proposal to meet this specific need, but it became apparent that creating a single research initiative around gender would compartmentalize it, thereby missing the opportunity to address broader CIFOR needs. Furthermore, the original initiative was oriented towards gender issues *only* because that had been the challenge in the particular project; clearly, however, gender is only one of the factors which distinguish and cross-cut participant groups. Thus, the parameters of the initiative were expanded to include other factors such as ethnicity, age, class, wealth, etc., in other words - diversity.

Goal: The gender strategy is the creation of a program which will further enhance the high quality of CIFOR research by supporting CIFOR scientists and associated researchers in their efforts to be sensitive to, and to incorporate, gender and diversity perspectives and analysis in their research.

Although CIFOR research is strategic, whereas gender and diversity changes from location to location, making the effort to be aware of, and adjusting research to address diversity is important. It not only creates a more whole and representative picture of forest peoples and management realities, but also, both the research *outputs* and the *process* of sensitization may be transferred to policy and management. CIFOR can play a leadership role here.

Who will benefit? Improved quality and utility of research will result in enhanced satisfaction for CIFOR and other scientists, but the most important benefits would include improved policy, better management, and impacts on other researchers, all of which lead to benefits for the ultimate beneficiaries: forest peoples. Also, some research concludes that the process of inclusion increases the confidence and status of beneficiaries directly.

Why Gender and Diversity Analysis?

In terms of CIFOR's mission to improve well-being through strategic research and the promotion of the transfer of appropriate technologies, and the adoption of new methods of social organization, CIFOR will have the greatest positive impact on policy and forestry management when it most accurately addresses the present situation and future trends in forests, forest peoples and management. Gender and Diversity Analysis (G&DA) fits here because of several (merging) situations/trends:

- 1) The *different roles, knowledge, perceptions, and conditions* of men and women, and peoples of different age, class, ethnicity, etc. People both contribute differently to forest management, and are affected differently by changes in forests, forest management, and in policy. Contributions to and *impacts* of changes to forests, to management systems, or in policies, *vis-à-vis* the different roles/relationships among groups may require special attention. Such attention is easily overlooked if it is not built into research from the beginning.
- 2) *Equity* and disempowered user groups. Despite advancements made in some areas, numbers of poor rural women, and their percentage of the world's poor are increasing. They form a large, and still growing, yet (generally speaking) historically disempowered, user/beneficiary group. The same situation of disempowerment very often applies to minority groups and indigenous peoples. There may be times when it is appropriate to prioritize or allocate special research attention or resources to certain groups.
- 3) *Accessing* "marginalized", or "relatively marginalized" groups. Certain groups of people may be *harder to access in research*.

To ensure that CIFOR research generates the greatest impacts, among the main objectives pertaining to G&DA are: 1) G&DA needs to be made easier and more accessible to implement; 2) this includes a need for relatively simple means of identifying when it is relevant; how to build it into projects from the planning stages; tools for accessing women and other groups, and for analyzing research from gender and diversity perspectives; 3) a means to assess if and when G&DA is needed; 4) a way to deal with the need to sometimes allocate research resources unequally amongst groups of people, i.e. more for the less accessible groups. This last involves 1) a way to gain recognition of the problem, and 2) a means of addressing it.

ICARDA:

- 183.** ICARDA has undertaken several steps to encourage scientists to use gender analysis in their research. 1) Establishment of functional "Gender Research and Analysis Committee" at ICARDA. The terms of reference of this committee include promoting the use of gender analysis within the Center The committee includes members from each of ICARDA's research programs and covers a range of disciplines. 2) promotion with

national program partners, through sponsorship and technical support to individual research projects, training and information provision, and assistance in planning and priority setting. 3) ICARDA senior staff seminars on gender research and analysis. Gender analysis and the gender dimension of research is presented to ICARDA staff through periodic staff seminars, either as a topic on its own or as part of another subject. 4) Among the five criteria used in ICARDA's priority assessment to formulate its Medium Term Plan 1998-2000 and Research Project Portfolio was relevance of the proposed research for the rural poor, explicitly including "expected impact on vulnerable groups, particularly women and children, including nutritional improvements."

ICARDA:

184. The Nile Valley and Red Sea Socioeconomics Research Network was established in 1995 to facilitate research by member national programs in agricultural technology development, adoption, and impact. It was decided in 1996 to include gender analysis as part of the network research agenda. As a result of a training course offered by ICARDA in 1998, several basic guidelines and approaches to gender analysis were adopted for use by researchers in Egypt, Ethiopia, Sudan, and Yemen.

ICLARM:

185. ICLARM has included gender as one of the guiding principles (the others being sustainability, equity, participation, systems approach and anticipatory research) in setting its research priorities. Program activities should consider gender issues and ensure that women and men's needs are met. At present, however, ICLARM's institutional capacity in understanding and analyzing gender issues in research is still being developed.

ICLARM has done research that concerned women, e.g., the Agricultural Research Project II funded by USAID in the early 1990s. Findings from the research on seasonal pond agriculture (see No. 94) indicated substantial benefits to women engaged in that activity. The study cited as No. 97 provides an opportunity to understand the full gender concerns and issues in integrated aquaculture-agriculture systems. Of particular concern to ICLARM's research practice is that the study will 1) provide insights of field experiences for methodological improvements on how to combine gender analysis and participatory rural appraisal in NRM and 2) increase gender awareness and competence among ICLARM scientists so they can devise systematic and analytical procedures wherein gender issues and concerns are incorporated in setting research priorities in the Center.

ICRISAT:

186. ICRISAT Workshop on Gender Research Methodologies for Agricultural Research in India. ICRISAT sponsored a two day informal workshop on methodologies for gender research in India. This was held on May 27 and 28, 1996 at ICRISAT Asia Center. The primary objective of the workshop was to refine our gender research methodologies and also to initiate the development of a strategy for main-streaming gender analysis in technology development at ICRISAT. Specifically the workshop was intended to: identify gender related differences in preferences for varieties and other technologies which may constrain technology adoption; identify a set of key indicators to measure the intrahousehold distribution of welfare gains from the adoption of given technologies, and identify simple, accurate and quick methods for collection of data. The workshop was attended by participants from research and training institutions and non-governmental organizations in addition to ICRISAT scientists. A synthesis of discussions and the abstracts of presentations made by participants has been published. Specific recommendations made by the workshop for ICRISAT to consider in developing a strategy for main-streaming gender are included in the synthesis. (Rohrbach, D.D.,

Kolavalli S. and Kolli, Rama Devi (eds). 1997. Gender research methodologies for agricultural research in India: summary and recommendations of a workshop, 27-28 May 1996, ICRISAT Asia Center, Patancheru, India: ICRISAT.)

ICRISAT:

187. ICRISAT's Medium Term Plan - 1998-2000. ICRISAT has once again considered gender in setting its priorities across the range of research considered for inclusion in the Medium Term Plan. In the first instance, ICRISAT seeks to avoid developing technologies which worsen the welfare of women. Where possible, technological change is promoted which improves women's welfare. Gender research was prioritized in the 1998-2000 Medium Term Plan and gender was used as a factor influencing the priority attached to alternative research thrusts.

During this period, ICRISAT also aims to participate in the new SWP PRGA. In this context, we view gender differences as a key issue in sampling, varietal trait ranking and impact assessment in our participatory breeding and participatory crop management research program. Through collaboration with other Centers and NGOs we seek to strengthen our techniques for such work. Emphasis will be on methods development.

IIMI:

188. Integrating a "gender component" into IIMI's larger research program has been an important goal of the Gender and Water Program. Because most of IIMI's research is at the level of irrigation systems or river basins -- for example applications of remote sensing and geographic information systems to understanding macro-level water supply and consumption patterns -- IIMI carries out relatively few detailed household surveys. With only a few exceptions, its work does not involve or lend itself to intrahousehold analysis. The exceptions are largely in the Health and Environment Program which is carrying out detailed household-level and often sex-disaggregated research related to multiple uses of water, the impacts of water quality, the impacts of high pesticide uses on human health, and the patterns and impacts of vector-borne diseases which are related to water management (primarily malaria). To integrate gender into the larger research program, IIMI has taken a number of steps: 1) case studies and literature reviews; 2) workshop for IIMI scientists, and 3) an international workshop of women and water experts.

1) Case studies and literature reviews. The Gender and Water Program at IIMI began in 1993. In its early years the program followed two tracks: case studies to obtain a better understanding of what is happening "on the ground;" and literature reviews including comparative assessments to develop a conceptual basis for the program. The literature reviews clearly showed how little is actually known -- and how much is assumed with little real factual basis -- about gender issues in relation to irrigation. Thus, the papers prepared by IIMI (almost entirely by Margreet Zwarteveen) draw attention to possibly serious problems, and call for field research to test hypotheses regarding the gender aspects of irrigation. This first set of studies provided the foundation for IIMI's Program on Gender and Water as articulated in its Medium Term Plan (IIMI 1997). (Examples of these comparative review papers Zwarteveen, Margreet. 1994. Gender Issues, Water Issues: A Gender Perspective to Irrigation Management. IIMI Working Paper no. 32. Colombo: IIMI. Zwarteveen, Margreet. 1995a. Gender Aspects of Irrigation Management Transfer: Rethinking Efficiency and Equity. In Irrigation Management Transfer: Selected papers from the International Conference on Irrigation Management Transfer, Wuhan, China, 20-24 September 1994, ed. S. H. Johnson, D. L. Vermillion, and J. A. Sagardoy. Rome: IIMI and FAO. Zwarteveen, Margreet. 1995b. Linking Women to the Main Canal: Gender and Irrigation Management. IIED Gatekeeper Series no. 54.

International Institute for Environment and Development, Sustainable Agriculture Programme. Zwarteveen, Margreet. 1997a. Water: From Basic Need to Commodity. A Discussion on Gender and Water Rights in the Context of Irrigation. World Development 25 (8):1335-1349. Zwarteveen, Margreet. 1997b. Identifying Gender Aspects of New Irrigation Management Policies. Paper presented at Workshop on Gender and Water Management in Irrigated Areas, IIMI, 15-19 September 1997, Sri Lanka.).

2) A workshop on gender analysis was held to inform and sensitize senior IIMI staff in April 1996. A senior gender specialist from the International Center for Research on Women (ICRW) interviewed staff and facilitated a workshop. This resulted in enhanced awareness of how gender issues could be integrated into the research program, and some specific ideas on how this could be done. In 1996-1997, two major research projects included an important gender dimension. These are a project which has developed and applied a methodology for systematically documenting and comparing the impacts of the transfer of irrigation management to local organizations (a gender component was included in the Sri Lanka cases); and a project in Sri Lanka and Pakistan aimed at documenting, quantifying, and valuing the multiple uses of water in irrigation systems (the Pakistan component is referred to above).

3) The International Workshop on Gender and Water held in 1997 is discussed under No. 144 in the Improving Policies Section. The workshop again confirmed the need for field research.

Basically, the current recognition of the growing seriousness of water scarcity, and the current reforms in many countries in the irrigation sector involving transfer of management responsibility to local community-based organizations provide the context of the work IIMI proposes to do over the next several years. Table 6 summarize the research questions on gender impacts and implications that need to be addressed.

Table 6. Overview of research questions and thematic areas of interest (IIMI).

	Property rights Access and control over resources	Collective Action Access and control over organ- izations and decision making	Long Term Objectives
Irrigation Management Transfer	<ol style="list-style-type: none"> 1. What are the implications of changes in water rights structures, as brought about by IMT, on men's and women's access to and control over water? 2. How does this in turn influence the performance of irrigation water management? 	<ol style="list-style-type: none"> 1. What is the nature and degree of men's and women's participation in formal water users' organizations? 2. What are the implications of (1) in terms of men's and women's access to and control over irrigation-related decision making and irrigation services? 3. What is the effect of (1) on accountability and effectiveness of irrigation water management? 	<ol style="list-style-type: none"> 1. To contribute to formally and legally secure and institutionally enforced, female resource users' rights. 2. To contribute to development of efficient and effective water resource management organizations and institutions. 3. To increase women's control over water and irrigation infrastructure by enhancing female participation in users' organizations.
Water Scarcity	<ol style="list-style-type: none"> 1. What are men's and women's different uses of water and how are these legally protected? 2. Do men and women use different sources of water? 3. What are the hydrological 	<ol style="list-style-type: none"> 1. In what ways and to what extent are men's and women's water needs institutionally recognized? 2. What are the costs (in terms of labor, health, capital) for men and women to obtain the quantity and 	<ol style="list-style-type: none"> 1. To estimate benefits and full income returns of different uses of water for individuals and households, and optimize water use efficiency. 2. To ensure increased competition of water does not unnecessarily worsen health, incomes and social

	and social linkages between users, uses and sources of water?	quality of water they need?	(including gender) equity.
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IPGRI: The IPGRI Gender Committee.

189. The IPGRI Gender Committee was established in 1996 as a mechanism for assessing opportunities for the integration of gender variables into IPGRI projects where appropriate. The Committee's role is to determine whether the concerns of women as well as men have been taken into account in project development. Other responsibilities of the Committee are to provide an annual assessment of project activities with regard to IPGRI's strategic objective to promote and support the role of women in plant genetic resources conservation and use. The Gender Committee also serves as a focal point for the development of proposals for funding gender-related research, training and collaboration relative to the conservation and use of plant genetic resources.

IRRI:
190. A major accomplishment of IRRI's Gender Research is that biological scientists, agricultural engineers and social scientists worked together to address gender issues and to incorporate gender concerns into their respective research projects/networks and training courses within IRRI and in collaboration with NARS. In 1997, TAC endorsed the inclusion of gender concerns in IRRI's MTP for 1998-2000 and the Board of Trustees approved the creation of a gender specialist position to provide leadership for Gender Research. Gender analysis and gender audit in research are now incorporated in IRRI's Medium Term Plan 1998-2000.

Gender Audit of MTP: In 1997, a Gender Audit Committee was formed in IRRI composed of M. Hossain (Agricultural economist), Lisa Price (anthropologist), Thelma Paris (Social scientist), and B. Cortois (plant breeder) and Osmat Azzam (plant pathologist). All of IRRI projects by program (Irrigated, Rainfed Lowland, Upland, Flood prone, Cross ecosystems, Rice genetic resources; Conservation, safe delivery and use; Accelerating the impact of rice research) include the gender audit aspect of the MTP entitled: Sustaining Food Security Beyond the Year 2000: A Global Partnership for Rice Research.

IRRI:
191 An international workshop on "Strategic research on gender issues in rice-based household economy" was organized by IRRI and funded by ACIAR in conjunction with the Systemwide PRGA Program. This was held in IRRI from August 24 to 28, 1998. The objectives of this workshop were: 1) assess the emerging patterns of changes in rice economy in SE and South Asia and their implications on household and gender relations; 2) review past and current research on gender issues in rice farming in SE and South Asian Regions; 3) identify and prioritize research on gender issues of relevance to rice-based household economy; 4) develop a project proposal based on the major outputs of the workshop; 5) identify and develop appropriate international and national research linkages on gender concerns in agriculture. Around 32 participants representing international and national research institutions and agricultural universities dealing with gender issues attended the workshop. The countries and organizations represented were: Australia, Bangladesh, China, India, Indonesia, Laos, Nepal, Philippines, USA, Vietnam, ACIAR, CIAT, CIMMYT and IRRI. A project proposal was submitted for ACIAR's consideration on a common issue – male migration and its implications on rice productivity, gender roles and gender relations as indicated by the representatives from NARS from Southeast and South Asia.

CGIAR Program on Participatory Research and Gender Analysis for Technology Development and Institutional Innovation: The Plant Breeding Small Grants Fund of the CGIAR Program on Participatory Research and Gender Analysis for Technology Development and Institutional Innovation, convened by CIAT, has approved the following small grants:

- 192 ICARDA (PB-01). This grant will finance the activities of the project “Village-based participatory breeding in the terraced mountain slopes of Yemen”. The project will take place in Kuhlán-Affar district in the Haija province of Yemen, Syria from 1st January, 1999 - 31 December, 2000. The objective of the project is to develop and implement a novel breeding approach for crop improvement in Yemen.
- 193 INIAP (PB-03). This grant will finance the activities of the project “Incorporation of User Channels in Participatory Plant Breeding in Ecuador (Incorporación de cadenas de usuarios en PPB en Ecuador)” The project will take place in Carchi, Pichincha, Cotopaxi, Tungurahua, Chimborazo, Cañar - Ecuador, from 1st February, 1999 - 31 January, 2001. The objective of the project is to develop a methodology that allows selection factors and criteria of different users to be quickly incorporated into the Participatory Breeding Program (PBP) for potato.
- 194 IPGRI (PB-07). This grant will finance the activities of the project “Farmers practice of domestication and their contribution to improvement of Yam in West Africa”. The project will take place in selected districts of Benin, Cameroon, Cote D'Ivoire, Ghana, Guinea-Conakry, Nigeria and Togo, from 1st March, 1999 - 28 February, 2001. The objective of the project is a better understanding of farmers' domestication of yam and the contribution of the process to yam improvement and production.
- 195 EMBRAPA/CNPMF (PB-13). This grant will finance the activities of the project “Amplification and use of the concepts of participatory research in cassava improvement”. The Project will take place in Cruz das Almas-BA, Brasília-DF, Araripina-PE, Caetitê-BA, Aquidabã-SE, Simão Dias-SE and Ribeirópolis-SE, from 1st January, 1999 - 31 December, 2001. The project has as general objectives the implementation of a methodology complementary to the conventional breeding process with the participation of farmers, extension agents and researchers, both in preliminary and advanced stages of clonal evaluation, aiming to speed up the process of adoption and diffusion of new cassava genotypes.
- 196 LI-BIRD (PB-16). This grant will finance the activities of the project “Farmer-led Participatory Maize Breeding in Middle Hills of Nepal”. The Project will take place in Gulmi and Argakhanchi districts from 1st January, 1999 - 31 December, 2000.
- 197 PROINPA (PB-22). This grant will finance the activities of the project “Participatory Plant Breeding of Potato Cultivars for Resistance to Late Blight (*Phytophthora infestans*) and Nematodes (*Nacobbus aberrans*) and Frost”. The project will take place in Piusilla Community and Compania Pampa of the Morochata region, from 1st January, 1999 - 31 December, 2000. The objective of this project is the development and adjustment of PPB methodologies to obtain advanced clones with genetic resistance to biotic factors, such as late blight (*Phytophthora infestans*) and nematodes (*Nacobbus aberrans*), by closely working with farmers and technicians.

- 198 University of Arizona (PB-24). This grant will finance the activities of the project “Development of new methodologies useful to participatory plant breeding”. The project will take place in Oaxaca, Mexico from 1st January, 1999 - 31 December, 2000. In this project we will continue ongoing work to develop methods that facilitate collaboration between farmer and formal breeders through improved understanding about farmer-managed crop populations and approaches to obtaining that information at the community level.
- 199 EAP / Zamorano (PB-28). This grant will finance the activities of the project “Participatory methodologies for the genetic improvement of common bean (*Phaseolus vulgaris*”. The project will take place in Zamorano, Santa Barbara and Yorito. The objective of this project is to determine the diversity and genetic vulnerability of bean cultivars used by farmers.
- 200 FIDAR (PB-29). This grant will finance the activities of the project “Participatory development of low-cost simplified rustic tissue culture for cassava (micropropagación artesanal)”. The project will take place in a rural community near Santander de Quilichao, Dept. of Cauca, Colombia, from 1st January, 1999 - 31 December, 2000.
- 201 CORPOICA (PB-30). This grant will finance the activities of the project “Incorporating farmer's knowledge and formal models of their decision making in participatory improvement of cassava-maize intercropping”. The Project will take place in the Colombian Caribbean Region from 1st May, 1999 - 30 April, 2002. The objective of this project is to establish a knowledge-based systems approach to decision support in planning participatory plant breeding, integrated pest management and maintenance and enhancement of soil fertility; to develop a model using farmers’ knowledge and how farmers make decision about their practices, focusing on genetic variability conservation (cassava and maize), integrated pest management and management of soil fertility; and to establish guidelines for participatory cassava-maize breeding, and natural resources management program with embracing a systems approach.

The Natural Resource Management-Gender Analysis Small Grants Fund of the CGIAR Program on Participatory Research and Gender Analysis for Technology Development and Institutional Innovation convened by CIAT, has approved the following small grants:

- 202 CIMMYT (NRM-01). This grant will finance the activities of the project “Development and dissemination of integrated Striga control practices (IPM) that are adapted to the small-scale farmers of Western Kenya”. The project will take place in Western Kenya from 1st Jan, 1999 - 31 Dec, 2001. The overall objective of the project is to develop and extend to farmers sustainable cropping systems adapted to western Kenya that control *Striga hermonthica* and improve farm productivity.
- 203 ICRAF (NRM-02). This agreement will contribute to the activities of the project “Impact of using participatory methods to solve natural resource management issues in the East African Highlands”. This collaboration will take place between 1st Jan, 1999 - 31 Dec, 2000. The aim is to conduct research work in a more participatory and consistent way with the residents or stakeholders, moving the process from where it is towards a more collegial type of relationship.
- 204 ILRI (NRM-03). This grant will finance the activities of the project “Assessment of the impacts of stakeholder participation in the diffusion of a vertisol management technology package in highland Ethiopia”. The project will take place in Ethiopia and Kenya from 1st

Jan, 1999 - 31 Dec, 2001. The overall objective is to undertake within the ongoing vertisol management project a more systematic approach to stakeholder/gender differentiation and their participation in the process of technology diffusion, and assess their impacts.

- 205 IES (NRM-04). This grant will finance the activities of the project "Evaluating the Impact of Farmer Participatory Research and Extension in Natural Resource Management in Zimbabwe". The project will take place in Zimbabwe from 1st Jan, 1999 - 31 Dec, 2001. The two main aims of the proposed impact assessment component to be added to the ongoing farmer participatory research project of the Institute of Environmental Studies are:
- an analysis of the impacts of the different approaches and to allocate them to core factors for success and failure and based on these results,
 - improved capacity of the IES project and its partners in monitoring and evaluating impact through development and testing of new methodological components
- 206 CIP (NRM-05). This grant will finance the activities of the project "Impact evaluation of participatory development of integrated insect and disease management (IPM) for the potato crop in San Miguel, Peru". The project will take place in San Miguel, Cajamarca, Perú, from 1st Jan, 1999 - 31 Dec, 2001. To evaluate the intermediate impact of the modified version of the FFS approach used in Peru on technology development related to insect and disease control on crops and livestock, using a users' differentiation approach.
- 207 CIFOR (NRM-06). This grant will finance the activities of the project "Local People, Devolution and Adaptive Co-Management of Forests". The project will take place in Long Loreh, East Kalimantan, Indonesia, from 1st Jan, 1999 - 31 Dec, 2001. The reform of management practices and institutional arrangements in order to promote sustainable forest management systems and practices.

The PRGA Program's Working Documents are the following:

S. McGuire, G. Manicad, L. Sperling, 1999. Working Document No. 2, Technical and Institutional Issues in Participatory Plant Breeding - Done from a Perspective of Farmer Plant Breeding. PRGA Program: Cali, Colombia.

Smith, M., E. Weltzein, L. Meitzner & L. Sperling. Working Document No. 3, Technical and Institutional Issues in Participatory Plant Breeding - Done from a Perspective of Formal Plant Breeding. A Global Analysis of Issues, Results, and Current Experience. PRGA Program: Cali, Colombia.

Thro, A.M & C. Spillane, Biotechnology-Assisted Participatory Plant Breeding. Complement or contradiction? (draft).

Hecht, S. Client-Orientation in the Management of Participatory Plant Breeding.

PRGA. Proceedings of the 2nd International Seminar on Participatory Research and Gender Analysis for Technology Development ref. held in Quito, Ecuador. Cali Colombia. (in press).

ANNEX A

Types of Studies

- A. Methodology development**
2, 19, 67, 81, 84 108, 133, 136, 146 181, 192, 193, 194, 195, 196, 197, 198, 199, 201, 203, 207
- B. Adoption and impact assessment**
7, 8, 25, 27, 30, 33, 84, 89, 94, 97, 123, 125, 133, 181, 192, 194, 203, 204, 205, 206
- C. Characterization and diagnostic**
1, 15, 20, 22, 23, 24, 26, 28, 29, 31, 32, 36, 38, 39, 40, 41, 42, 44, 45, 46, 47, 48, 51, 54, 56, 63, 66, 68, 71, 72, 74, 80, 81, 83, 85, 86, 87, 89, 92, 93, 95, 96, 98, 99, 100, 101, 102, 103, 104, 105, 106, 108, 109, 110, 111, 113, 114, 115, 116, 117, 118, 119, 120, 121, 122, 127, 135, 137, 138, 139, 140, 141, 142, 143, 145, 146, 165, 178192, 194, 199, 201, 202, 203, 204, 206, 207
- D. On-farm technology evaluation**
4, 10, 11, 12, 14, 17, 18, 34, 46, 49, 50, 52, 53, 59, 62, 64, 65, 73, 90, 91, 102,192, 194, 195, 196, 198, 200, 202
- E. Postharvest processing and marketing**
5, 6, 13, 14, 37, 54, 57, 69, 148, 179
- F. Literature reviews workshops and seminars**
13, 16, 21, 35, 54, 58, 60, 61, 64, 66, 70, 112, 124, 126, 128, 129 130, 134, 136, 144, 149, 165, 166, 169, 170, 171, 174, 175, 176, 177, 182, 186, 188, 191
- G. Women-specific technologies or studies**
3, 6, 9, 13, 16, 30, 31, 35, 39, 47, 48, 49, 50, 51, 54, 55, 59, 64, 66, 70, 84, 94, 103, 112, 123, 125, 126, 135, 137, 148, 167, 165, 168, 170, 171, 172, 173 174, 175
- H. Nutrition**
9, 13, 14, 76, 77, 82, 94, 123, 124, 128, 131, 132,

ANNEX B-1

Matrix of Center Entries and CGIAR Categories

CENTER	1	2	3	4	5	6
CIAT	1, 2, 3, 4, 5, 6, 7, 8, 192, 193, 194, 195, 196, 197, 199, 200, 201,	19, 20, 198, 203	73, 204	207		202, 205, 206
CIFOR				84, 85, 86, 87, 88, 89, (207)		99, 100, 101
CIMMYT		21, 22, 23, 24, 25				(202)
CIP	9	26, 27, 28				(206)
ICARDA	10, 11, (192)	29, 30, 31, 32, 33				102, 103
ICLARM					94, 95, 96, 97	
ICRAF		(203)		90, 91, 92, 93		
ICRISAT	12	34, 35, 36				
IFPRI			(81)			
IIMI						
IITA	13, 14	37, 38, 39, 40, 41, 42, 43, 44, 45, 46, 47, 48, 49, 50, 51, 52, 53, 54, 55, 56, 57, 58, 59, 60, 61			98	104, 105
ILRI			74, 75, 76, 77, 78, 79, 80, 81, 82, 83, (204)			
IPGRI						
IRRI	15	62, 63, 64, 65, 66, 67, 68, 69				106
ISNAR						107
WARDA	16, 17, 18	70, 71, 72				

CGIAR Categories of Activities

- | | |
|---|--|
| 1. Germplasm Enhancement | 8. Improving Policies |
| 2. Crops and Cropping Systems | 9. Training |
| 3. Livestock and Livestock Systems | 10. Documentation Publications Information |
| 4. Trees and Tree Systems | 11. Organization and Management Counseling |
| 5. Fish and Aquatic Systems | 12. Networks |
| 6. Protecting the Environment Dissemination | 13. Priority Setting and Project Proposals |
| 7. Saving Biodiversity | |

* Addition to CGIAR list.

ANNEX B-1

CENTER	7	8	9	10	11	12	13
CIAT			150, 151, 152	165			180, 181
CIFOR	108		153	166			181, 182
CIMMYT	109		154			176, 177	
CIP	110,		155				
ICARDA		118	156, 157	167		178, 179	181, 183, 184
ICLARM		119 (146)		168			185
ICRAF		(121)					
ICRISAT							186, 187
IFPRI		120, 121, 122, 123, 124, 125, 126, 127, 128, 129, 130, 131, 132, 133, 134, 135, 136, (146)					
IIMI		(126), 137, 138, 139, 140, 141, 142, 143, 144, 146	158, 159	169			188
IITA		145	160, 161				
ILRI				170			
IPGRI	111, 113, 113, 114, 115			171			189
IRRI	116, 117	147	162, 163	172, 173, 174			181, 190
ISNAR		148, 149	164		175		191
WARDA							

NOTE:

Numbers in parentheses are the second or more listing of a project shared by several centers.

ANNEX B-2

Matrix of Center Entries and Types of Studies

CENTER	A	B	C	D
CIAT	2, 19, 181, 192, 193, 194, 195, 196, 197, 198, 199, 200, 201, 203, 207	7, 8, 181, 192, 194, 204, 206	1, 20, 165, 192, 194, 199, 201, 203, 204, 205, 206, 207	4, 73, 192, 194, 195, 196, 198, 200, 202
CIFOR	84, 108, (207)	84, 89	85, 86, 87, 89, 99, 100, 101, 108	
CIMMYT		25	22, 23, 24, 109	(202)
CIP		27, (206)	26, 28, 110, (206)	
ICARDA	(192)	30, (192)	29, 31, 32, 102, 103, 118, 178, (192)	10, 11, 102
ICLARM		94, 97	95, 96, 119	
ICRAF	(203)		92, 93, 121	90, 91
ICRISAT		33	36	12, 34
IFPRI	120, 134	123, 126, 134	121, 122, 128, 136	
IIMI	146		137, 138, 139, 140, 141, 142, 143, 146	
IITA		43	38, 39, 40, 41, 42, 44, 45, 46, 47, 48, 51, 54, 56, 98, 104, 105, 145	14, 46, 49, 50, 52, 53, 59
ILRI	81	75, 76, 77, 78, 79, 82, (204)	74, 80, 81, 83, (204)	
IPGRI	(194)	(194)	112, 113, 114, 115 (194)	(194)
IRRI	67	147	15, 63, 66, 68, 106, 116, 117	62, 64, 65
ISNAR		107		
WARDA		18	71, 72	17, 18

Types of Studies

- A. Methodology development
- B. Adoption and Impact
- C. Characterization and diagnostic
- D. On-farm technology evaluation

Annex B.2

CENTER	E	F	G	H
CIAT	5, 6	165	3, 6, 165	
CIFOR		166, 182	84	
CIMMYT		21, 176, 177		
CIP			9	9
ICARDA	179	13	13, 30, 31, 103, 167	
ICLARM			94, 168	94
ICRAF				
ICRISAT		35, 186	35	
IFPRI		120, 124, 125, 129, 130, 131, 135	123, 124, 126, 127, 136	123, 125, 129, 132, 133
IIMI		127, 144, 169, 188	127, 137	
IITA	13, 14, 37, 54, 57	54, 58, 60, 61	13, 39, 47, 48, 49, 50, 51, 54, 55, 59	13, 14
ILRI		170	170	76, 77, 82
IPGRI		111, 171	111, 171	
IRRI	69	64, 66, 174, 191	64, 66, 172, 173, 174	
ISNAR	148	149, 175	148, 175	
WARDA		16, 70	16, 70	

Types of Studies, cont.

- E. Postharvest processing and marketing
- F. Literature reviews, workshops and seminars
- G. Women-specific technologies or studies
- H. Nutrition

CGIAR Centers

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Tel (57 2) 4450000 ext. 3131
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CIMMYT

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Fax: (52-595) 54425
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CIP

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ICARDA

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ICLARM

International Center for Living Aquatic
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MC P.O. Box 2631 Makati Central Post Office
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Fax: (63-2) 816-3183
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ICRAF

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Agroforestry
United Nations Avenue
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ICRISAT

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E-mail: ilri-ethiopia@cgiar.org

IPGRI

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00145 Rome, Italy
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E-mail: ipgri@cgiar.org
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IRRI

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Fax: (63-2) 891-1292
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