Strategies to Incorporate Gender in Irrigation Planning

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ABSTRACT

Documented experiences on gender issues in irrigation have led to an understanding of *why* incorporating gender in irrigation planning is important. That increased recognition, however, has not yet been systematically translated into *how* the planning practices of irrigation agencies and professionals have to change to become gender-sensitive, and *what* strategies are most effective. The paper argues that to incorporate gender in irrigation planning effectively, strategies are needed that address the policy, institutional, and implementation levels of irrigation planning.

Gender strategies in irrigation development are rarely documented and evaluated, and this information is often not accessible to a larger audience. Additional research and documentation are thus required, especially on cost-benefit analysis of gender-sensitive irrigation planning, and the evaluation of the impact of existing strategies to incorporate gender in irrigation planning. On the basis of constraints identified, recommendations for improvements need to be formulated.

At the same time, action is required to pilot test the recommendations, to improve tools for gender-sensitive irrigation planning and water resources management policy formulation, as well as to further develop guidelines and training material. A dialogue and link between research and action need to be established to strengthen efforts to develop successful strategies to incorporate gender in irrigation planning.

INTRODUCTION

This paper provides an analysis of strategies for including gender in irrigation projects and programs, based on a review of available literature and personal observations in various field projects of the Food and Agriculture Organization of the United Nations (FAO) and other organizations in Africa and Asia. The real challenge is the translation of socioeconomic and gender considerations into actual changes in the planning and design of irrigation schemes.

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Another challenge is to close the gap between gender experts and irrigation professionals on the one hand, and between irrigation researchers and practitioners on the other. The objective of this paper is to identify appropriate strategies to meet these challenges, in the context of both irrigation agencies and donor-assisted irrigation development.

GENDER AND IRRIGATION

Gender refers to the relations between women and men, which are revealed in a range of practices and ideas, including the division of labor, roles, and resources between women and men. Gender relations differ within and between cultures, as they are influenced by class, age, caste, ethnicity, and religion. Gender roles are dynamic; they change over time. Changes can be attributed to factors such as economic hardship, environmental crises, family instability, increasing education levels, and development activities. Because of the diversity in gender roles and their dynamic character, gender stereotypes apply to very few, if any, places in the world. The most common gender stereotype that has guided and shaped many irrigation policies and the planning and design of irrigation systems is that women are primarily housewives and mothers, while men are farmers and irrigators.

Irrigation has become an increasingly private rather than a public investment. Operation and maintenance responsibilities have been transferred from state agencies to users and private organizations. This has direct consequences for the participation of different social groups, favoring those who have access to the means to acquire irrigated land and irrigation equipment and to pay water fees. In addition, the emphasis in recent years has shifted from new irrigation development to the upgrading and improvement of under-performing irrigation schemes, combined with irrigation management transfer.

Studies have documented that where irrigation design fails not only to accommodate actual gender-based patterns of intra-household and community organization but to recognize that women are often water users and farmers in their own right, risks are high that women lose existing access to land or the products of their own labor. The failure to recognize the reality of gender relations also negatively affects agricultural productivity of irrigated crops (Zwarteveen 1994). Studies documenting these effects include those of Jones (1983, 1986), who analyzes an irrigated rice project in North-Cameroon, Blumberg (1989), who describes the impact of the Turkana Irrigation Project in Kenya, and Bernal (1988), who describes the Sudan's irrigated schemes. An impact assessment of the Mekong Irrigation Program (MIP 1991) in Laos resulted in similar findings, as those of Bruins and Heijmans (1993), who studied The Bauraha Irrigation System in Nepal. Another well-documented example is that of the Jahally Pacharr Project in The Gambia (Dey 1990; Carney 1988).

The ultimate goal of incorporating gender into irrigation planning is more equitable, effective, and efficient management of irrigation systems through:

- better tailoring services to water needs of women as well as men, and
- improving women's access to and control over water services through improved legislation and more active participation in decision making, managing, and operating water resources and irrigation systems (IIMI 1997).

Multilevel Strategies

Irrigation planning takes place at the policy, institutional, and implementation levels. To be effective, strategies to incorporate gender into irrigation development thus need to focus on these different levels simultaneously. The three levels, the areas of responsibility and the main actors at each level, as defined in this paper, are presented in table 1.

Table 1. Policy, institutional, and implementation level.

Level	Responsibility	Main actors
Policy	Formulate policies, plan, consult stakeholders, establish necessary conditions, e.g., legal framework	International, national, and regional planning and governing institutions
Institutional	Link policy level to the implementation level, execute policies, provide feedback to policy level, resources mobilization	Institutions and service entities, such as district irrigation and extension services, water user associations
Implementation	Ensure livelihood, efficient and sustainable use of natural resources	Households, farmers, local groups, communities, field staff, and engineers

At the policy level, gender issues must be recognized as a legitimate political concern, and objectives and goals for their inclusion in irrigation policies and planning need to be formulated. The scope for integrating gender issues into irrigation and water policies depends to a great extent on the national policy objectives with respect to water and agriculture. For example, gender issues might be more easily incorporated in an agricultural policy environment that advocates national and household food security, than one focusing predominantly on water conservation. Policy support creates the pressure to actually make changes and determines the direction of those changes.

At the implementation level, practical strategies need to be developed that involve both women and men farmers in the planning and implementation of irrigation activities, to satisfy their gender-specific needs. In between, to link the policy level to the implementation level, specific institutional strategies are needed that strive toward the building of capacities to implement gender-sensitive programs, enhance management capacities and facilitate communication and interaction between farmers and policy makers.

Gender-sensitive strategies toward irrigation planning at the policy and institutional level have only recently started to develop. There is more experience with practical strategies at the implementation level. Unfortunately, these are only occasionally documented, hardly ever evaluated and are often not accessible to a large audience.

The following sections discuss required gender strategies at the three levels, analyze existing strategies, and identify gaps that need to be filled by additional information or action. This leads to recommendations for a research agenda and a plan of action, as well as interaction between research and action. The discussion is based on the assumption that strategies need to be simple and integrated into existing planning procedures.

POLICY LEVEL

At the policy level four specific strategies are called for:

- define a gender strategy for irrigation planning
- incorporate gender issues into water resources management policies
- analyze costs and benefits of gender-sensitive policies
- promote stakeholder participation in planning

Gender Strategy Definition

Many countries have policy directives about women in development, but few have linked these to the process of irrigation planning. Thus, there is a need for irrigation agencies and donor-assisted irrigation projects to formulate a gender strategy for the planning and implementation of irrigation programs and projects.

An analysis of strategies toward gender and irrigation reveals that the first attempts by irrigation planners have often isolated women and have focused only on specific women's spheres, domains, or activities. These attempts can be categorized as a *Women in Development* (WID) approach. The women's components initiated in the WID approach are separate from the mainstream activities. Often, the focus is on women's role as domestic caretakers and not on their role as farmers. For example, vegetable gardens for women on small plots outside the irrigated areas, crop processing activities, and new income-generating activities have been added to irrigation development activities.

The advantage of the WID approach has been that it made women visible, and funds were allocated to activities to involve them. However, the weakness of this approach is that women's components are often marginal and small-scale compared to the mainstream project, and very often not sustainable. The main irrigation activities tend to ignore women when these women's components exist.

More recently, in a number of irrigation development activities, a *gender mainstreaming* approach has been implemented, which means that women are recognized as farmers and are involved in core irrigation activities side by side with men. The approach makes use of the analysis of the different roles and resources of women and men, and the relations between them. Gender-specific barriers women face are identified and strategies to address these barriers implemented.

Involvement of women in on-farm irrigation development, increased access of women farmers to irrigation technology, and activities that increase women's participation in water user associations are examples of mainstreaming activities. The following case illustrates how a mainstreaming strategy can be implemented.

The Cidurian Upgrading and Water Management Project in Tangerang, West Java, Indonesia, conducted a pilot program for the inclusion of women farmers in planning the project after it became apparent that they were not participating. Separate meetings and four special training sessions for women farmers were organized with the following objectives:

- to provide women with basic information on the program
- to overcome women's initial reluctance or shyness
- to make an inventory of women's interest in participation that would result in concrete plans
- to identify potential leaders and representatives for water user associations

Field staff, other officials, and men farmers were involved in special training and discussion sessions on the need for women's involvement (Dok, Putri, and Zulaicha 1992).

A gender strategy is not static, but may evolve over time, as the following case illustrates.

The Grameen Krishi (Agricultural) Foundation (GKF) was established in 1991 by the Grameen Bank in Bangladesh. GKF supports agricultural development through irrigation, credit, and services. The Foundation's gender strategy has evolved over time. At first only men were included in GKF's crop production activities, while women were supported in their traditional homestead-based activities, such as rice processing and small husbandry. Gradually, GKF recognized women's actual important roles in crop production. This recognition, combined with a serious commitment to women, led GKF to shift its gender strategy to one that involves women farmers in its irrigation and agricultural activities. Agricultural production became more accessible and productive for women, who gained access to land, irrigation water, credit, seeds, fertilizers, and marketing facilities. Women were also able to earn more from the agricultural activities than in the traditional activities. The recognition and acceptance of women as farmers and as irrigators are a crucial first step in addressing gender issues in irrigation programs (Jordans and Zwarteveen 1997).

More recently, there has been growing support for the inclusion of other socioeconomic patterns, in addition to gender differences. In some cases, class differences exclude some groups from irrigation development, just as gender differences do. This strategy is called *socioeconomic and gender analysis (SEAGA)*. As a strategy, the analysis of gender differences together

with other socioeconomic differences, such as class, age, ethnicity, and religion, corresponds more to reality and may prove more effective and sustainable.

Gender and Water Resources Management Policy

Water resources management policies usually accommodate the needs of different sectors, such as urban water uses, industry, environment, and agriculture at the national level or for a river basin. The challenge is to incorporate identified needs of individuals, women and men, who are spread among the different sectors.

This could start with an assessment of women's and men's concerns related to water in each sector.

> *In Bangladesh it is important to recognize that women, who are responsible for the provision of water for drinking, horticulture, and other domestic purposes, do have different perceptions and concerns about water than men, who use water predominantly for irrigation of rice. However, women's views on water issues are profoundly affected by their socioeconomic status. Women from wealthier segments of society generally have access to private hand tube wells, while poor women may depend on public surface water bodies* (Duyne 1997). *Field observations indicate that in some areas of Bangladesh, conflict arises among groups of users of water during the dry season. Irrigation may consume all available surface water and cause a lowering of the groundwater table, resulting in limited availability of water for drinking, as well as for gardening and other domestic purposes.*

Much more information is needed on linkages between gender and water resources management policies, to be able to develop strategies that incorporate gender issues. The underlying premises and assumptions regarding socioeconomic and gender differences on which existing water resources management policies are based need to be unearthed. Water resources management policies need to be redefined to depict realistic gender relations and all women's and men's water needs. Efforts to formulate new water resources management policies should incorporate socioeconomic and gender issues from the start.

Cost-Benefit Analysis

To establish the legitimacy of women's claims to water and irrigation services, cost-benefit information needs to be collected that justifies the inclusion of gender in irrigation planning with any additional costs involved. Social and economic benefits of women's participation may be quantified, e.g., effect on water management and water use efficiency, on yields, on labor productivity, or on family health. Studies that document the impact of gender-sensitive planning, such as the following example, are needed.

The Dakiri irrigation system is one of the few systems in Burkina Faso where women have obtained irrigated plots on an individual basis: 60 women (or 9 percent of the total number of plot-holders) have an individual plot. Most of their husbands also have plots. A recent case study found that the productivity of both irrigated land and labor is higher in households where both men and women have plots, in comparison with households in which only men have plots. The study further shows that women are equal to or better than men in irrigated farming, and their motivation to invest labor in irrigated production significantly increases when they have individual plots (Zwarteveen 1997).

Furthermore, cost-benefit analysis should disaggregate costs and benefits in terms of gender and class. This will yield information that helps to choose between different investment options; for example, a smaller, targeted investment may produce proportionally larger and more equitable benefits.

Stakeholder Participation

The planning of new irrigation development or upgrading of existing systems is increasingly based on the process of stakeholder participation. A stakeholder is anyone who has a direct or indirect interest in, or is affected by, or can affect the outcome of, irrigation development. A stakeholder approach to irrigation development requires an understanding of priority problems and recognition of the stake of all participants in achieving success.

A key stakeholder in many irrigation programs is the government, as a primary decision maker and implementor of policies. Many individuals or institutions may be indirectly involved or affected, or may be involved through linkages to those who are directly affected. Such stakeholders may include NGOs, various intermediary or representative organizations and private sector businesses. Those directly affected by a proposed irrigation intervention, farmers and tenants, are clearly among the key stakeholders. They are the ones that stand to benefit or lose from irrigation programs (World Bank 1994). In most irrigation systems, few women have official rights to land and water, which is why they are seldom identified as key stakeholders.

Different groups of stakeholders have similar, but also conflicting, interests. Power relations, both between local, regional, and national level, between rich and poor people, and between women and men, strongly influence final decisions made. In cases of a very hierarchical social structure and inequitable distribution of assets, women and poor people will generally lose out in the planning process, unless special efforts are made.

In the rehabilitation of Bauraha Irrigation System in the district of Dang in Nepal, women farmers were not identified as stakeholders and consequently not involved in the planning and the design of the rehabilitation activities. The result was a male-dominated problem identification, i.e., the high labor requirement for maintenance and repair. The constraint faced by women, i.e., water-shortage that resulted in

> *competition for water with male farmers, was not considered. Consequently the project replaced the brushwood intake structure by a solid trashrack-intake, that would require less maintenance in future. Although the intake could easily have been expanded to increase the water flow, it was built with exactly the same dimensions* (Bruins and Heijmans 1993).

In addition, specific restrictions often prevent women farmers and marginal groups from voicing their opinion in stakeholder consultations. These need to be recognized and strategies developed to tackle them in order to facilitate their active participation from the early stages of planning through implementation (Wilde 1997).

Stakeholder groups at policy, institutional, and local-level need to participate actively in the planning process. However, linkages between participatory appraisal and planning at the community level and irrigation planning at system, district, and national level, need to be strengthened, which include the development of appropriate tools. Stakeholder participation and participatory irrigation planning efforts need to be evaluated and documented with special emphasis on the participation of women farmers and marginal groups. Their participation in the planning process, as well as the actual reflection of their needs in the final design and implementation, need to be documented.

INSTITUTIONAL LEVEL

To link the policy level to the practical level of implementation calls for specific institutional strategies, including:

- changes in the institutional framework of irrigation institutions
- preparation of guidelines on gender and irrigation
- increasing the capacity of the various actors to integrate these concepts into their work
- involvement of women in water user associations

Institutional Framework

In order to formulate and implement a gender strategy in irrigation development, existing institutional frameworks may need to be changed. Issues to be addressed include alternative organizational arrangements and gender expertise.

The various organizations involved in irrigation development include national governments, national irrigation organizations, multilateral organizations, international research institutions, donor agencies, and lending institutions. Often, separate institutions are responsible for gender issues and rural women, e.g., a Ministry of Women's Affairs. A strategy to bridge the gap between irrigation and gender institutions can be the installation of gender focal points or gender units within irrigation institutions or sections.

In Tanzania in 1995, a Women and Irrigation Unit was formed within the Irrigation Department of the Ministry of Agriculture and Cooperatives, with the mandate to advise the department on policy issues relating to gender and irrigation. It oversees the integration of gender issues into all aspects of irrigation project preparation, implementation, and monitoring, and provides training, supervision, and monitoring for all projects and irrigation-related personnel. The unit serves as a center of knowledge and experience on gender issues in irrigation in Tanzania, participates actively in ongoing programs, and collaborates daily with staff of the Irrigation Department. Although understaffed and faced with a serious lack of funds, the unit manages to sensitize the Irrigation Department staff on gender issues, and to initiate a gender strategy, especially in the field of water user associations.

The change in the institutional framework can only be complete if the gender policy and strategy are included in the budget of the institution. There needs to be a separate budget for a gender program, or funds should be earmarked for clearly defined gender activities. There is some indication that gender units tend to get marginalized and do not lead to real changes in the institutions' policies and programs. Greater access to funds, and more control over these funds, especially in times of budget cuts, would increase the effectiveness of these units.

Ultimately, all staff members of irrigation institutions need to become gender-sensitive in their work, making special gender units superfluous. This aim needs to be supported by strong management commitment to gender issues. Changing an institutional framework is a difficult task, especially in the current environment in which most irrigation agencies have to economize, decrease staff, and drastically cut irrigation investments and expenditure for operation and maintenance. On the other hand, the shifting roles of public irrigation agencies from implementation to coordination, advice, and supervision may also provide the opportunity to incorporate gender.

Guidelines on Gender and Irrigation

Guidelines on Gender and irrigation assist irrigation professionals and agencies in integrating gender issues into their work. Guidelines come in different formats—from one-half page "do's and don'ts" to extensive documents that spell out every step in detail.

An example of a set of general guidelines is the "Sector Guide: Irrigation," developed under the Socioeconomic and Gender Analysis program of FAO/ILO. The document gives specific suggestions for the inclusion of socioeconomic and gender issues in various stages of the project cycle, lists key questions for analysis, illustrates the issues with case studies and recommends appropriate tools (Jordans 1997).

Guidelines cannot spell out every activity and design choice beforehand. Specific activities will largely depend on the interest and needs among the stakeholders, women and men

farmers, based on their constraints and opportunities. On the other hand, it will also depend upon the willingness, motivation, and creativity of the irrigation planner and designer.

In addition, strategies will differ because of diverse and dynamic gender roles and differences in field situations, regions, and countries. Different irrigation systems require different strategies. For example, the issues that have important gender implications in a large canal irrigation system are very different from the issues in a small-scale pump irrigation program. Guidelines can be developed to integrate gender issues into specific situations or programs.

> *The "Guidelines on addressing gender issues in the Traditional Irrigation Improvement Program (TIIP)" in Tanzania describe the gender strategy of the TIIP program, and step by step tools for the integration of gender. The document further offers suggestions to address gender issues in daily fieldwork activities, as well as in office work. The document provides practical ideas on how such things as the cultural taboo for women to see the irrigation intake or open the water gate, which obstructs women's access to irrigation water, can be overcome* (Grift, van der 1995).

The impact of existing gender guidelines, such as the ones mentioned above, needs to be evaluated. They also should be adapted to today's irrigation context, that is influenced by growing water scarcity and irrigation management transfer to the private sector.

The lack of wide dissemination of gender guidelines and the additional time and effort that irrigation professionals take to apply these separate guidelines indicate that in the long run this strategy may not be effective. What is needed is to incorporate socioeconomic and gender issues into the general irrigation guidelines and manuals. Until now, these technical publications have been almost always gender-oblivious. In fact, most irrigation manuals and guidelines are predominantly technical and hardly focus on people, let alone recognize differences between groups of people and between women and men.

Capacity Building

Strategies and efforts to integrate gender into irrigation planning will only be effective if proper capacity building activities accompany them. Capacity building aims at the development and enhancement of the skills of people to incorporate gender issues into their irrigation activities. Training activities can also raise awareness, initiate discussion and feedback, and be instrumental in the participatory planning of activities and monitoring of progress. Participants in the training activities could be staff of irrigation agencies, irrigation engineers and designers, water user associations, or farmers. While general participatory gender training programs have been developed and conducted by various agencies and groups, only a few examples exist of these training programs or materials that specifically focus on the irrigation reality and practitioners.

Under the Special Program for Food Security (SPFS) in Zambia, implemented with technical assistance from FAO, a number of low-cost irrigation pumps were introduced. Both women and men are involved in the irrigated production. They pump and distribute the water on the field alternately. Participatory training sessions are organized for technical staff, extension workers, and farmers throughout the growing season in order to support and closely monitor the program. Special training sessions are organized on the socioeconomic and gender issues related to the introduction of the various technologies. The different roles and resource-bases of women and men farmers and the implications for the irrigation program are discussed, in order to raise awareness among the staff. In action plans prepared during the training, the extension staff defines specific activities that ensure both women's and men's involvement in the program and an adequate response to their needs and constraints.

Very few capacity building activities, such as the training program mentioned above, have been evaluated for their usefulness and impact on the irrigation development. Findings of these evaluations could lead to further improvements of the training programs.

Water User Associations

In the context of privatization processes and decentralization, irrigation management transfer entails the turning over of operation and management responsibilities from government agencies to the private sector; in practice, transfer is very often to water user associations (WUAs) or water companies. Mechanisms are needed to ensure that women are included in the membership, decision-making committees, and among irrigation professionals of the WUAs.

Specifically, WUAs can:

- Abolish the one member per household rule, and allow dual or multiple membership within a single household.
- Reserve positions for women farmers in WUAs to ensure proper representation of the needs of all farmers.
- Allow men to designate their wives as members and vice versa and establish liberal membership recruitment procedures.
- Set targets for the percentage of women members in WUAs that correspond to the actual participation of women in irrigated agriculture.
- Ensure that the women members also play a decision-making role in the associations. This may require specific training and support to overcome cultural constraints, e.g., women who are not used to speaking in public or in mixed groups. It may also require separate preparatory meetings in which women prepare their point of view and reach consensus on certain issues, which they can then present in the mixed meetings.

Give both women and men responsibility for water management, such as the operation of gates, guarding the water flow, or the distribution of water.

The above options for action may be more feasible in some socio-cultural contexts than in others. The question should be asked: What is feasible and practical in the current context? Decisions should be based on discussions with the women and men water users.

The documentation and evaluation of the impact of strategies to increase the number of women members and their management roles in WUAs could result in insights that could help overcome resistance against, and skepticism about, the above measures. For example, in Tanzania the involvement of women in decision-making positions in WUAs has resulted in fewer operational problems and better financial recovery of operating and maintenance expenses, compared to WUAs where only men are involved (Masija 1996). The impact on water management efficiency, equitable water distribution, and financial recovery of operating and maintenance expenses should be studied and if possible quantified.

IMPLEMENTATION LEVEL

Practical strategies at the implementation level are needed to guarantee the active participation of women and men in irrigation planning, design, operation and maintenance, and monitoring and evaluation. The main practical strategies are:

- gender-disaggregated data collection
- gender-sensitive design
- gender-sensitive technology development
- equitable land and water rights
- irrigation in the context of the overall water resources and farming system
- equitable access to extension and training
- budgeting funds for gender-sensitive planning and implementation
- gender-disaggregated monitoring and evaluation

Data Collection

Appropriate strategies to include gender issues in irrigation planning can only be identified when gender-disaggregated data are available. Gender-disaggregated data should be collected on land titles and use, division of labor, and barriers related to irrigated agriculture and water use. In reality, use is often made of existing quantitative data, which tend to be unreliable,

outdated, or lack sufficient detail about gender and other important socioeconomic variables. Qualitative methods such as rapid rural appraisal and participatory rural appraisal supplement existing data.

Apart from one-time data collection efforts, recurrent data collection programs in the irrigation context, such as registration of water users and recording the payment of water and maintenance fees by farmers, should be gender-disaggregated.

Irrigation Design

Modern irrigation design criteria are intended to:

- match design to users' wishes because irrigation is a service to farmers, which should be as convenient and efficient as possible
- complement the organization of labor
- allow for freedom of crop choice
- optimize local decision making of technical issues such as site, plot size, methods of field irrigation and number of participants, using participatory approaches in the context of local farming systems and conditions (Wolter and Burt 1997; FAO 1996)

Provided that the planning and design process is truly participatory, and all socioeconomic groups and women and men have an equal say, it is more likely that gender aspects will be better integrated in irrigation programs from the early stages of the design process (Facon 1995). Whether this assumption is actually true has however not yet been documented.

A point of concern is also that not all the implications of certain technical design choices may be clear to the engineers or to the farmers. Engineers may not be aware that their technical decisions have different effects on women and men. On the other hand, farmers may not know the range of design choices that are technically feasible and the impact of each choice. For example, an irrigation design that delivers water for 24 hours per day has the technical advantages that: i) there are lower operational losses from frequent filling and emptying of canals; ii) there is no need to construct a night reservoir; and iii) the carrying capacity of canals and structures downstream of the reservoir can be half the size of those of a system that delivers water for 12 hours a day. However, due to social constraints women farmers are often severely restricted in their movement outside the village at night. They may thus not be able to take their share of water during the night.

It is therefore important that irrigation designs are prepared, presented, and discussed with the farmers, to arrive at a design that is acceptable to both women and men farmers. In addition, more structured information is needed on the linkages between design decisions and differential effects on women and men farmers.

Irrigation Technology Development

Both women and men farmers should have access to information and training and, if interested, access to irrigation technology. Technology must take into account the following criteria to be appropriate for both women and men:

- investment costs in line with farmers' financial means, including availability and access to credit (for women/men)
- investment costs that consider farmers' returns (women/men)
- the available cultivable area (women/men)
- type of crops to be grown (women/men)
- amount of labor required and amount of labor available (women/men)
- physical strength needed for operation (women/men)

During development and extension of a certain irrigation technology, all handling and maintenance requirements need to be assessed, to ensure that the technology is matched to the operational capacity and strength of both the women and men users. This can best be done in close consultation with the users, to avoid decision making and design based on preconceived and possibly mistaken ideas.

> *In Zimbabwe women adopted sprinkler irrigation and were among the first to acquire an adept knowledge of it. However, sprinkler irrigation was inconvenient for them because it required frequent moving of heavy sprinkler laterals and thus permanent presence for the women who lived far from the schemes* (Chimendza 1989). *After recognition of these problems, the sprinkler laterals were successfully replaced by drag-hose sprinkler systems. Drag hoses do not require frequent movement and are much lighter to handle* (Bosma 1997).

A greater acceptance of a certain technology will benefit more farmers and help realize a project's full potential. Mistakes made in the selection of an appropriate technology must therefore be mitigated as soon as possible, ideally during a pilot-testing phase.

Land and Water Rights

Irrigation design (technology) and management (institutions) have the potential to create, transform, or reproduce entitlement structures. The very legitimacy of women's needs for rights to land and water is often questioned, even in situations where women held such property rights in the pre-project situation (IIMI 1997). A number of researchers hold the hypothesis that access to water is determined by existing land rights: water rights are often derivative from land rights

(Merrey 1997). Women almost everywhere have restricted access to land, and probably even more so to high-value irrigable plots. With the direct linkage between land rights and water rights, the possibilities for women to obtain formal access to irrigation water are limited. Independent ownership of resources, especially land, is of crucial importance in promoting the well-being and empowerment of women. The issue is not just one of property ownership; it is also one of property control (Agarwal 1994).

A second way of obtaining land and water rights is through active participation in irrigation infrastructure construction. In these cases, there is some correlation between rights (property) and responsibilities (investment in property creation) (Ambler 1990). Women who head their households often have little time for these kinds of additional activities, which may reduce their access to land and water rights. In addition, women who participate in construction activities do not always get equally compensated as men.

Strategies identified to promote more equitable access to water and irrigated land for women and men could, depending on the local situation and in coordination with the community, include measures to:

- conduct more in-depth research into the local legal position of women and men concerning their access to and control over natural resources
- support national, regional, and local advocacy groups that aim to enhance and enforce the legal position of women
- provide legal education to women and men, as well as government and other organizations' staff
- allocate irrigated plots to women identified as heads of farm households
- put the title to irrigated plots in joint names of the couple or divide family land between husband and wife (or wives) with individual titles
- promote collective land and water rights for women, especially those from marginal groups
- stimulate organization of women's groups to claim and protect their rights
- pay attention to measures that secure the land and water rights of women in male-headed households, so they are able to continue to farm the land upon the death of the husband or after divorce (Fong and Bhushan 1996; Benda-Beckmann et al. 1996)

With irrigation increasingly a private investment, access to capital becomes a determining factor for access to land and water. Water markets are being established where water is for sale. A strategy to increase women's access to land and water should include efforts to increase their access to capital and credit.

Water Resources and Farming System

Irrigated agriculture should not be dealt with in isolation, but should be seen and understood in the context of the overall water resources system and farming system. In many areas, rain-fed agriculture and livestock are equally important for livelihoods of rural households, or more so, than irrigated agriculture.

Other uses of water in the watershed area need to be included in an overall water use plan, possibly with the effect of reduced water availability for irrigation.

> *In the Mahango scheme in Tanzania, FAO has assisted in the construction of an intake in a small river for the irrigation of women farmers' fields. In 1995 and again in 1996, a serious water management problem arose, not within the village, but with the village downstream whose inhabitants are predominantly cattle herders. In the dry season there is not enough water for all the different user groups. Conflicts center around the gates that control the water flow; gate handles have been stolen, and gates have been demolished. The downstream villagers are in the process of digging upstream from the intake a deep trench that will divert the water to their village. As a result, no crops were cultivated during the 1996 irrigation season.*

In discussions with local groups, all water uses need to be discussed and a preferential ranking needs to result in a comprehensive water use plan. In addition, a range of both men's and women's agricultural and nonagricultural activities within the farming system could be supported. Activities in this field should only be promoted once women's involvement in mainstream irrigation activities has been secured. This avoids the danger of limiting women's involvement to women's components which are outside mainstream irrigation activities. Specifically, planning could include:

- provision of the rural infrastructure needed to alleviate increasing demands on women's time, including household water supplies, woodlots, and fencing for livestock
- inclusion of value-adding activities for produce from irrigated farming
- inclusion of technologies for rain-fed areas and household vegetable plots
- construction of extra inlets or pipe connections to provide improved irrigation to subsistence vegetable and fruit production (Fong and Bhushan 1996)

Extension and Training

Strategies to involve both women and men farmers in the planned extension and training programs are not specific for irrigation programs, but apply to most agricultural development programs. Preconceived ideas about training needs for different groups of farmers should be

avoided. Instead, there should be a training needs assessment, so that women farmers can express their interest in such training activities as operation and maintenance of pumps and water management.

Project and Program Costs

It is important to include in budgets all additional costs for activities to integrate socioeconomic and gender issues in an irrigation project or program. Even if precise costs are unknown at the time of formulation, proper inclusion of estimated budget items is very important. Availability of a budget is often a determining factor in the extent to which an irrigation program or agency can respond to specific constraints for women.

Cost estimates for inclusion of activities in the field of socioeconomic and gender issues could include:

- institutional support to increase the capacity of institutions to plan and implement the project, e.g., experts on gender issues in irrigated agriculture and on participatory planning
- crop development aimed at both irrigated and rain-fed crops grown by women and men farmers
- training to improve staff and farmers' capabilities, e.g., gender and irrigation training
- research support aimed at proper inclusion of socioeconomic and gender issues in all research and data collection efforts, or additional research on gender issues
- water supply, sanitation, and other infrastructure construction that facilitate use of water for nonirrigation purposes
- project coordination, specifically for the implementation, management, and monitoring of the irrigation program, including a gender-disaggregated monitoring system

An assessment needs to be made of the estimated benefits of these additional costs, especially in the situation of an investment project, although benefits may very often be very difficult to quantify.

Monitoring and Evaluation

The planning of irrigation development should include arrangements for the collection and analysis of gender-disaggregated data for monitoring and evaluation. This includes the definition of gender-disaggregated indicators for measuring changes. Regular data collection and analysis could be done by field staff who are directly involved in the implementation of activities. Monitoring can also be carried out in a participatory way, e.g., through regular meet-

ings or workshops with farmers, field staff, government representatives, and community organizers. It may also encompass self-evaluation methods for women's and men's groups and WUAs.

It is important to monitor participation of women and men and the impact of the activities on their relative positions to better adapt plans and to introduce additional activities or modify ongoing activities. Collection and analysis of gender-disaggregated data and participation in monitoring and evaluation meetings can increase the gender awareness among the staff. They may become more attentive to differences between women and men in their daily work.

Irrigation development should include an evaluation of the gender strategy and its impact on the program. Useful lessons can be drawn from strategy evaluations for future irrigation programs.

> *The positive impact of paying attention to gender issues is detailed in the project completion report of the Philippines Communal Irrigation Development Project. This project exceeded physical development targets and appraisal estimates of irrigation intensity and paddy yields. The project's success has been attributed to the full participation of the farmer-beneficiaries. The project partly draws on a tradition of farmer-built irrigation systems and responds to a cultural context in which women exercise independent land rights in the community by:*
>
> - recruiting community organizers, two-thirds of whom are women
> - ensuring membership of both spouses in water user associations
> - actively encouraging women to assume leadership roles
>
> *It was also noted that women's membership facilitated the payment of fees, because women control family finances* (Quinsumbing 1994).

OPPORTUNITIES FOR IMPROVEMENT

To identify the opportunities for improvement, two questions can be asked:

- What additional data and information are needed to develop more efficient and successful strategies to incorporate gender in irrigation planning?
- What actions are needed to translate the above-mentioned research-based information into the actual development and implementation of gender-sensitive irrigation planning?

Table 2 presents the opportunities for improvement that have so far been identified at the policy, institutional, and implementation levels.

Table 2. Information and action needs.

	Information needs	Action needs
Policy level	• Linkages between gender and water resources management policies • Cost-benefit analysis of women's involvement • Women's and marginal groups' involvement in participatory irrigation planning and stakeholder consultations	• Add gender expertise to the formulation of water resources management policies • Improve tools for linking participatory community planning and irrigation planning at national level
Institutional level	• Impact of institutional changes to incorporate gender issues • The usefulness and effectiveness of gender and irrigation guidelines • The impact of existing training activities in gender and irrigation • The impact of strategies involving women in water user associations	• Change existing institutions, including the budget • Improve and pilot-test gender and irrigation guidelines • Incorporate gender issues in general irrigation guidelines • Develop training material and organize training sessions that focus on gender and irrigation specifically, including the production of audiovisual materials
Implementation level	• Linkages between design decisions and differential effects on men and women • Impact of strategies involving women farmers in irrigation planning	• Pilot-test recommendations resulting from research studies • Disseminate successful practical strategies

The research and action needs have been identified at the three levels of irrigation planning. Different groups or actors will be involved in the research activities or implementation of actions, depending at which level these are situated.

Information Needs

Research activities can provide the data and information needed to develop more effective strategies to incorporate gender in irrigation planning. Research activities, as identified in this paper, should focus on the impact analysis of current gender strategies, including cost-benefit analysis, and on the exploration of linkages between gender issues and water resources management.

Information Needs at Policy Level

- linkages between gender and water resources management policies in the different sectors, such as industry, environment, agriculture
- cost-benefit analysis of women's involvement in irrigation programs and quantification of social and economic benefits
- women's and marginal groups' involvement in participatory irrigation planning and stakeholder consultations, including methods and tools used

One hypothesis could be that the involvement of women farmers has a positive economic effect on scheme performance, which would then justify additional costs for gender-sensitive irrigation planning. Another hypothesis could be that the current support for participatory irrigation planning does not automatically lead to gender-sensitive planning, if no special measures are taken.

At the policy level, the aim should be the active involvement of governments and institutions that provide policy advice, such as lending institutions, international research institutions and United Nations agencies.

Information Needs at Institutional Level

- impact of changes in the institutional framework that integrate gender issues in irrigation institutions
- usefulness and effectiveness of existing gender and irrigation guidelines
- impact of existing training activities on gender and irrigation
- impact of strategies involving women in water user associations

A possible hypothesis for research at the institutional level is that so far, these institutional efforts have not been adequate as they have mostly led to ad hoc activities and programs, which show varying degrees of effectiveness. Irrigation institutions should play a major role in research efforts at the institutional level. Ministries of irrigation, irrigation programs, and projects as well as WUAs need to be involved.

Information Needs at Implementation Level

- linkages between design decisions and differential effects on men and women, especially in the context of rehabilitation and upgrading of irrigation schemes
- documentation and analysis of the impact of various practical strategies that involve women farmers in irrigation planning

At this level active involvement of water users, women and men farmers, and WUAs in the identification of research issues should be sought. Their needs and priorities should be included in the research efforts. Furthermore, NGOs, field staff, engineers, and community organizers could be directly involved in the research activities.

Information can be obtained partly through specific socioeconomic and gender studies as described above. In addition, an effort could be made to ensure that regular studies and surveys on irrigation management and farmers' participation collect their data disaggregated by gender. This would increase the amount of available gender-disaggregated research data tremendously.

Action Needs

Some of the activities listed below can start simultaneously with the research activities identified, or in some cases they can be combined. For example, the research into linkages between gender and water resources management policies could be combined with gender experts who participate in teams that assist governments with the formulation of new water management resources policies. Other activities require prior research before they can be implemented, such as the dissemination of successful strategies.

From the discussion in this paper the following needs for action at the three levels have been identified:

Action Needs at Policy Level

- Include gender expertise in the formulation of new water resources management policies.
- Improve tools, linking participatory community planning to irrigation planning at scheme, district, and national level.

Action Needs at Institutional Level

- Change existing institutions to integrate gender concerns in irrigation planning, including separate funds for gender activities.
- Improve and pilot-test gender and irrigation guidelines.
- Incorporate gender issues in general guidelines on irrigation planning.
- Develop training material and organize training sessions that focus on gender and irrigation, including the production of audiovisual materials that illustrate women's roles in irrigation management.

Action Needs at Implementation Level

- Pilot-test recommendations resulting from research studies, especially in the context of water saving and irrigation management transfer programs.
- Disseminate successful practical strategies to a large audience.

JOINT EFFORT

In sum, there is still a lot that needs to be done before the planning of irrigation will incorporate gender issues successfully. Research organizations and researchers have only a limited capacity to ensure that their research results and outputs actually lead to the desired changes in the irrigation planning practice. A mechanism to ensure application of research results in irrigation practice is close cooperation between research and implementing organizations, such as national irrigation organizations, NGOs, and advisory bodies such as lending and United Nations agencies. A second mechanism is close cooperation, in the form of participatory research, with farmer groups and WUAs. For example, joint participatory workshops involving researchers, local organizations, and farmers could be organized to identify and prioritize research issues and discuss preliminary research data. Furthermore, using a similar method, the data could be validated and preliminary lessons learnt could be formulated to improve current strategies and practices.

Other mechanisms that stimulate or enforce implementation of gender strategies at the different levels of irrigation planning are necessary. Requirements and criteria for implementation of gender strategies formulated by donor and lending agencies as a prerequisite for funding can be effective. Another mechanism is the documentation of the cost-effectiveness of gender strategies and their positive impact on irrigation scheme performance, which provides an economic justification for their implementation.

Therefore, dialogue and cooperation between research and implementation are needed to develop and implement successful strategies to incorporate gender in irrigation planning. The goal should be to strengthen the link from theory to policy to practice, and back, through a joint effort of research and action.

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