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GENDER ISSUES, **WATER** ISSUES

A gender perspective on irrigation management

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1 Introduction

1.1 The IIMI Program

The growing awareness of the importance of gender relations in understanding and improving agricultural development led the International Irrigation Management Institute to initiate a special Program on Gender Issues in 1992.

Attention to gender issues arises from two basic concerns. The first is a concern with the ineffectiveness and inadequacy of technologies and institutional choices **as** a result of **the** neglect of gender considerations. This concern stems from the recognition of the **important** roles of women in both productive and domestic activities. Women often perform many more **tasks** and are much more involved in agricultural activities than is generally assumed and reflected in official **statistical** sources. The success of policies aimed at raising the levels of agricultural production, or at alleviating poverty, depends for a large extent on identifying and addressing the appropriate target group. Just **as** there is a **need** to differentiate between large and small farmers for purposes of policy and project implementation, similarly there is a **need** to distinguish between the roles of women and men in agriculture.

The second concern is with the differential impact of development strategies on women and men. It has become clear that in many cases women have not benefitted equally with men from development efforts. In some cases women have even become worse off. Studies arguing that economic development and technological change are not indifferent to the already existing class and gender inequalities and often tend to reinforce these, have shown how poor women have gradually and systematically lost access to and control over resources in favor of their husbands and male relatives.

Despite **the** widespread and growing awareness about the importance of gender issues throughout the world, very few attempts have been made so far to apply gender analysis to problems related to irrigation and irrigation management. There is very little documentation about the interaction between changing gender relations and the introduction of irrigation technology and about the ways in which gender relations structure, and are structured by, changes in irrigation management. :

The Program on Gender Issues and Irrigation Management aims to increase knowledge and understanding about the relation between gender differences and irrigated agriculture. **An** increased understanding of gender divisions gives scope for working towards reinforcing shared and complementary interests of women and men, addressing conflicts of interests, and resolving specific disjunctions between women's responsibilities on one hand and their rights and control **on** the other. It **will** thus help to better understand and accommodate both male and female water **users'** interests, improving the overall effectiveness of irrigation management and ultimately irrigation system performance.

1.2 identification of the problem

Very few irrigation systems in the world are operating at their full potential: areas cultivated are far below areas commanded; water deliveries rarely correspond in quantity and timing to **the** requirements

of crops. Maintenance is often poor and problems of salinization and waterlogging are widespread in arid and semi-arid areas. The importance of a better use of water resources is enhanced by the growing scarcity of fresh water. Irrigated agriculture accounts for the largest single use of fresh water; a more efficient use of irrigation water will thus lead to substantial fresh water savings.

Since its establishment in 1984, IIMI aims to contribute to addressing problems of both food production and fresh water scarcity by working out better approaches to irrigation management. A greatly increased ability of traditional irrigation agencies to respond to changes in the physical, social and political environment; an increased accountability of managers to stakeholders; a system of incentives for good performance are identified as major conditions for improving the use of existing irrigation systems (IIMI, 1991).

One area of important institutional change is the interface between irrigation managers and the farmers to whom they are providing water. In the last decade it has become increasingly accepted that farmers' or water users' considerations of benefits and costs, of what is feasible and desirable, must be taken into account when managing irrigation systems (Chambers, 1988; Uphoff, 1986). In identifying and understanding farmers' perspectives it is important to recognize that not all farmers are the same. In the irrigation context, the source of difference between farmers that has received most attention is the one related to different locations of farmers within the irrigation system. In highlighting these head-end tail-end differences, other sources of differences between farmers have tended to be overlooked. Gender is one of those.

Gender refers to the socially determined attributes of men and women, including male and female roles. Gender roles are based on learned behavior, and are flexible and variable across and within cultures. Although the specific form which gender relations take varies widely, gender relations are present everywhere. In addition to being a source of difference, gender is also one of the structuring principles in society, and more specifically in the organization of agricultural production (Whatmore, 1991; Mies, 198 ; Boserup; ; Whitehead; Oakley). Attention to differences based on gender implies a shift in focus, away from the assumed main and sole male farmer to both the female and the male farmer and/or water-user. In the two problems IIMI is addressing, food production and fresh water scarcity, the roles of women have been identified as being of crucial importance.

Firstly, women are estimated to produce more than half the food in developing countries. In Africa, women farmers raise as much as 80 percent of the locally grown food crops. (Blumberg, 1989:xvi) In addition, women often have a key mediating role in household welfare and nutrition. Secondly, women play an important role in water management. Although specific roles, tasks and functions women may have in irrigation have been very poorly documented, the important roles women play almost everywhere in the provision and use of water for domestic use are now widely acknowledged. As a result, women often have very clearly defined interests with respect to the quality and quantity of water resources. The Dublin Statement of the United Nations Conference on Environment and Development (1992) - concerned with the emerging crisis in global fresh water resources - stated as one of its four principles: "Women play a central part in the provision, management and safeguarding of water".

In short, a focus on gender divisions of labor, responsibility, rights and interests can be considered as a means to start identifying differences between farmers as well as a way of highlighting women in their important roles as food producers and water managers. Recognizing gender can thus be expected to contribute to improving the world's sustainability.

1.3 Scope and contents of the paper

This paper is a first attempt to explore the gender considerations of relevance to irrigation management research, based on a review of available literature and on observations in the field. It presents a state of the art with respect to the available empirical evidence on gender and irrigation. The objective is to identify appropriate concepts and analytical approaches which would enable to link gender with irrigation. It is expected that this in turn will contribute to enabling irrigation professionals to better recognize gender issues of importance in their field of work.

The paper starts (chapter 2) with a brief summary of the most important concepts and tools underlying gender analysis. Chapter 2 will then proceed with presenting some examples of irrigation development which highlight how prevailing gender relations determine the outcomes of this development process. The examples also show how women and men are differentially affected by irrigation interventions. As such, chapter 2 provides the background against which a more narrow identification of gender considerations of importance for irrigation management (chapter 3) needs to be interpreted. Chapter 3 aims to draw together existing frameworks for assessing the performance of irrigation system with methodologies for assessing and ranking gender needs. This chapter is the core part of this paper in that it documents how gender differences can be made visible and expressed in irrigation terms. In the last and concluding chapter, the implications of a gender sensitive way of thinking for irrigation management will be explored.

2. Irrigation development from a gender perspective: concepts, examples and trends

While gender and or women may be a relatively new subject for many irrigation professionals, most gender specialists have heard and read about irrigation systems. The reason is that some very convincing arguments for more and better attention to women are derived from examples of irrigation projects. Settlement schemes in particular have provided some of the most striking examples of gender biased development planning, each scheme sharing a similar format which ignores the scale and significance of women's independent farming or income generation activities, leaving this realm unmodernized or sometimes debilitating it (Dey, 1990).

After briefly explaining some basic concepts underlying gender analysis, this chapter will start with a description of some examples of these settlement schemes. These provide the case for assuming a differential impact of irrigation development on women and men. Examples from settlement schemes also make clear why there is reason to believe that a better recognition of intra-household gender based production arrangements will increase the effectiveness and efficiency of irrigation investments.

Rather than arguing that a deterioration in the status of women (where this has occurred) is due to uninformed, culturally biased policies and technologies, the structural position of women within their households and within the wider economy mediates their access to resources and control over the disposition of household income. This is not to deny, however, that irrigation design and planning are gender biased. This will be illustrated in the next sections of the chapter with some examples from Asia and Africa. Intra-household factors which influence the nature and direction of the development of irrigated agriculture will be highlighted. Particular attention will be given to the position of women within households and the wider society and how it influences the degree to which they exercise control over resources, the terms under which their labor is mobilized, and the share of the household needs for which they are responsible. To conclude, this chapter will pay some attention to the trend towards a 'feminization' of agriculture: the fact that almost everywhere in the world women seem to become increasingly responsible for all agricultural tasks.

The aim of this chapter is to provide the general theoretical and empirical background against which gender issues in the more narrow context of irrigation management can be recognized and addressed.

2.1 Women, gender and family farms

The success of any irrigation policy or planned irrigation intervention ultimately depends on the willingness and ability of the final users of the irrigation systems' outputs to use the irrigation water efficiently and effectively. Many disappointing returns to irrigation investments can be partly explained by water users and farmers behaving differently than they were expected to. A good understanding of water users' livelihood strategies, and their incentives to invest time, labor and other resources in irrigation and irrigated farming thus provides the basis for realistically planning and devising programs to enhance the performance of irrigated agricultural systems.

Such an understanding *begins* with the recognition that **farming**, almost everywhere in the world, remains primarily a family affair (Butler Flora, 1988; Long, 1984; Whatmore, 1991). The persistent existence of small family based farms **has** attracted a lot of research and generated much discussion. What **has** become increasingly clear from *this* debate is that family farming represents a distinctive form of **production** in relation to the dominant features of modern industry. Some of its **distinguishing** features are **directly** related to the biological base of agricultural production, others relate to the fact that **part** of the labor and resources are **geared** towards the direct satisfaction of family consumption.

Since much agriculture is organized on the basis of the family, the household is generally used **as** the basic unit of analysis. Farm households can be defined as kinship-based groups engaged *in* both production and consumption with corporate ownership of some resources and a degree of joint decision **making** among members (Cloud, 1988). It is within the household that decisions are made about what **will** be **grown** and how, who **will** work for wages, who **will** go to **school**, etc.

While accepting that family based households form the principal unit of agricultural production, the world of farming **has** traditionally been depicted as a '**man's world**'. **Analytical attention has** focused on the **male farmer as** business principal, **farm** manager, laborer and decision maker, the word farmer itself **carrying masculine connotations** (Whatmore, 1991:4). The male farmer, in other words, is thought to represent the joint economic behavior of the household.

As a consequence the composite social character of the family farm **has** all too readily slipped **from** View. In particular, **until** the late 1970s, the role **of** women on farms **had** received scant attention, on the implicit assumption that it was much the same **as** that of any other married woman in western societies, namely that after marriage men are gainfully employed while women work in the house and have children (Ibid, 1991:4).

The major contribution of **early** research on Women and Development (WID) **has** been to show the inaccuracy of **such an** assumption and to catalogue the varied combinations of labor roles **performed** by women on family farms. These include agricultural laborer on collectively **owned** fields; farmer of separate crops **or** fields; **co-farmer** and off-farm income earner. Some women contribute routinely to the **production** of the family food supply, others work only during the **peak** labor **seasons**. Women not **only** provide labor, they manage cropping enterprise that provide them with separate income **streams** (Cloud, 1988). Much of the early WID work has been directed towards **filling** the vacuum left by official statistics on farm labor which tend to deal generically with the category '**family labor**' and **fail** to distinguish individual members' contributions within this (Whatmore, 1991). However, while these studies **demonstrated** the economic importance of women's contributions to agricultural production, it remained difficult to incorporate their domestic or reproductive activities **in** the analysis of farm household behavior.

Underlying this difficulty is the narrow concept of labor that was common in earlier farm household **analyses**, which treated farms as firms. **Only** the activities geared towards the production of commodities for the market were included *in* this labor concept. This '**productionist**' concept **has** been criticized based upon evidence from developing countries, where much labor and land **in farm** households are devoted to food, clothing and equipment without ever passing through the market. This subsistence production *in* a way escapes the logic of the market, and is thus difficult to understand by referring to market prices.

Women's involvement is particularly important in these activities geared towards subsistence. In conventional analyses, subsistence activities performed by women were often **automatically** considered

as 'domestic' or 'reproductive' and **treated as** the equivalent of household work performed by women in western societies. Irrespective of the exact nature of women's work, it was invariably conceived as the **fulfillment** of their domestic duties. However, in most family farms, domestic labor is characteristic of all household members' labor, across agricultural as well as subsistence production, and is not restricted to women's work. In fact, the very distinction between subsistence, reproductive and productive activities is often problematic. Many women trade some of the products of their subsistence activities in **informal markets**, selling products such as eggs, dairy products, cooked or **processed** food, homebrewed beer and handicrafts. They may also provide paid services, such as sewing, laundry, cleaning, healing, midwifery and child **care**. **On** the other hand, part of the crops **grown** for sale in the **market** may be **used** for **own** consumption.

A narrow concept of labor thus not only **misrepresents** the farm production process by obscuring the **essential** interdependence between productive and subsistence activities, but it also implicitly helps to **underestimate** women's **participation** in farming.

Gradually, and very much based upon evidence from developing countries, the early farm models have been **expanded** to include production for use as well as for sale, and some reflect both consumption and production behavior. **As** economists have become increasingly clear that the home and the fields compete for capital resources and family labor, they have expanded their definitions of the "products" of the farm enterprise to include increasing amounts of women's productive activities. Recent models include women's labor time as a rationally allocated resource and assign economic value to the **goods** and **services** produced by women, even when these do not pass **through** markets.'

While very **useful** in making women's work more visible, these newer models **still** do not explain **everything** about farm household behavior. One particular weakness is that they **treat** the household as **maximizing** a single **utility** function for purposes of analysis of its decision **making**.² They assume that all **resources** of land, capital and labor **are** pooled and then allocated where they **will** be most **useful** to the household as a whole? Empirical evidence, **often** based on studies that **seek** to explain **unexpected** outcomes of development **interventions**, has shown that **this** model does not apply in much of the world. It does not explain, for example, why **incomes earned** by women are spend differently than those **earned** by men. **Not** does it clarify why male household heads do not always have **perfect** control over the labor of other household members.

Within households there **is** an 'internal economy' of which gender relations are an important **structuring** principle. This **can** be conceptualized as a continuum ranging from domestic **units** characterized by **almost** entirely 'separate purses' among **adult** female and male members to those where women have virtually no income generating opportunities. Household production arrangements do not **just** involve one single household member, but instead involve different male and female members who play more or **less** interlocking and interdependent roles (Blumberg, 1989). Male and female members of farm households may have **shared**, separate and opposing **interests** within the household, **and** may wish to use the same **resources** in different ways. What is in the best interest of the household may not be in the best interest of particular members.

For explaining intra-household resource allocation, bargaining models have been proposed as an alternative to the joint utility function model of the household. Bargaining models recognize that household members may have **conflicting** as well as complementary interests. The 'weight' attached to an individual member's preferences depends on his or her bargaining power. **A** bargaining model of the household forces one to pay attention to **those** variables which give **some** household members

greater leverage in determining the household resource allocation and expenditure patterns (Jones, 1983). A bargaining model **conceptualizes** the farm household as "a **political** arena constituted by particularly dense bundles of rules, rights, and obligations governing relations between men and women, and elders and juniors. The rules defining property **rights**, labor obligations, resource distribution, and so forth are particularly subject to contestation and **must** be constantly reinforced and reiterated. The influence that different household members **can** wield in negotiations and struggles over the mobilization and deployment of 'family'-labor and resources are reciprocally **linked** with the organization of labor and conditions of access to resources in non-domestic spheres" (Hart, 1992).

Bargaining approaches to the understanding of farm household behavior have proven particularly **useful** for understanding African farm household's **use** of unpooled resources (Jones, 1983). **Economists** working with Asian **data** have begun **to** analyze the links between farm household income and the ways in which consumption goods are distributed within farm households (Folbre, 1983).

The development in understanding and conceptualizing farm household behavior shows that paying **attention** to gender in agriculture goes beyond merely adding women to the research or planning agenda; Exploring **the** meaning and nature of the gender divisions of labor, rights and responsibilities in the context of agriculture is an intrinsic **part** of a much bigger project: that of understanding how farm households deal with changing **economic**, institutional and environmental contexts. Gender analysis provides a number of alternative **tools** and concepts to look at the farm household and to interpret agricultural development. Gender analysis efforts **are** both informative to **as** well **as** contingent **upon** the parallel development of new interdisciplinary approaches to agricultural development which **call** for **more** farmer participation and user orientedness of research, extension and planning (Chambers, 1988 and 1992; Uphoff, 1986); for a focus **on** livelihoods instead of production (Chambers, 1988); and for diversity instead of uniformity.

2.2 Gender analysis in agriculture

In contrast to **earlier** WID approaches, which focused solely **on** women, gender approaches focus **on** men **as** well **as** women, and **on** the relations between them. Gender refers to the socially or culturally **established roles** of women and men. Although gender is universally one of the key ways in which Societies and **cultures** demarcate rights and responsibilities, the specific form gender relations **take** **Varies** widely across and within cultures and societies (Feldstein and Jiggins, 1993). 'Women' are a category within gender analysis, and they **are** not a homogeneous category.

Gender analysis in agriculture **is** based **on** the premise that women are primarily involved in farming through specific forms of familial gender relations, most significantly through marriage, **as** wives, but also **as** daughters and mothers of male farmers (Whatmore, 1991). While **initially** inspired by a **concern** about the differential impact of development interventions **on** women and men, the focus of gender analysis is less on **equity** for women and more **on** the effectiveness and efficiency of policies and interventions. Understanding the meaning of gender relations for how family farms operate and decide **on how** to allocate resources is the central project of gender analysis efforts in agriculture.

One basic underlying notion of gender analysis in agriculture is that the farm labor process encompasses productive and reproductive activities. Rather than a dualistic conception which separates production from reproduction, **a** gender analysis framework highlights the essential interdependence

of the two processes. By doing so, the often made distinction between family and farm which attributes the reproductive functions to the family (and especially to women) also loses its importance.

Feldstein and Poats (1990) have developed a basic, and simple to use framework for laying out the distribution of activities, resources and benefits between household members. Using this framework provides the skeletal understanding of intra-household decision making, but it does not directly reveal the actual process of negotiation within the household concerning the pooling or complementarity of resource allocation, or the subtler pressures which affect individual and household choices. Nor does it reveal much about the norms and values which shape male and female identities, physical and emotional powers or the social institutions in which these are sited.

The Poats and Feldstein framework is very useful for getting an overall picture of the gender based organization of productive and reproductive activities, and helps to identify problems and opportunities for improvement. It helps to guide questions about the effects of changes at the household level. However, to gain a more in-depth understanding of the underlying social relations in which decisions about labor and resource use are embedded, additional and more detailed information is needed.

The framework proposes three sets of questions:

(1) Activities analysis; or who does what, when and where? These questions are concerned with what tasks are performed by men, women and children which contribute to farm production, to household production, to child-bearing and rearing, and to other productive activities including off-farm activities. The activities analysis reveals periods of labor shortage and identifies all competing tasks by gender, not just those in farm production.

(2) Resources analysis; or who has access to or control over resources for production? By control is meant the power to decide whether and how a resource is used, how it is to be allocated. Access refers to the freedom or permission to use the resource. For example, "where men have control of livestock or traction, their wives and female relatives may obtain traction services from them. Women have access to traction, but men have control of it. Where women keep the cash and make decisions about expenditures, women have control of cash, men have access to it. The question of access to and control of land can be confusing, but is also illustrative. For instance, in the case where land is allocated by a senior male, but decisions about what to plant are left to the person to whom it is allocated, one would argue that both adult males and adult females have access to land (with some indication that female access is through males); and that both have control of land, but that male control is greater (allocation and decision making on use) than female control (decision making on use only)". (Feldstein and Poats, 1990:16).

Resources include land (and the terms on which it is available); capital, including cash, tools, and livestock for production or traction; labor (one's own, family/children's, others'); other inputs, including seed, fertilizers, and pesticides; services such as credit and education; and knowledge.

(3) Benefits and incentives analysis; or who benefits from each enterprise?

Benefits analysis refers to who has access to and control of the outputs of production. This includes all the end uses of a product, for example of a crop: home consumption, sale, income from sale, fodder, compost, crafts, building materials, etc. Benefits can also refer to changes in the farm labor process, such as reduced labor demands or reduced risks. It also includes the output of alternative or competing enterprises. The extent to which individual household members benefit, or expect to

benefit, from activities will partly determine their willingness to invest their time and resources in these activities. Women may, for example, be willing to increase their labor contributions to irrigated crop production when they benefit from increased yields or incomes. However, whether or not they **will** actually do **so will** also depend on their roles and responsibilities, **as well as** their control over resources. Is the extra work compatible with their other tasks; does their husband allow them **to work longer** hours **in** the field; do they have the know-how and **skills** to **perform** the specific **tasks** concerned? Incentive analysis deals with these questions. It is the analysis of preferences which underlie farm household members' incentives to continue **or** change what they do.

2.3 Settlement schemes

Settlement schemes provide some of the most striking examples of how a neglect of prevailing gender relations **in** planning and implementing irrigation negatively affects project outcomes **as well as** impacts **on** women. Examples of these negative impacts have been used widely by **WID** professionals **in** their attempts to advocate more attention to women in development.

Most settlement projects, **unlike cases** where irrigation is introduced **as** a means of developing existing smallholder agriculture, are established with the specific purpose of promoting or controlling production of surplus food or non-food **cash** crops. Control of the labor provided by poor settler families was often considered a major **condition** for achieving the project's ambitious production targets. **Free** family labor, to be provided by the wives of the male settlers, was ensured by measures which deprived women of the possibility of exercising their **former rights** to cultivate personal crops. This left **them** with little choice **than** to work for their husbands. **Often** only the male household heads were **recognized** and accepted **as** official tenants, who could sign the tenancy agreement, **receive** inputs and **services** and participate **in** the scheme associations. **And**, although **rainfed** land was quite often **made** available for household **food** and vegetable production **this was** invariably insufficient for women to cultivate a personal **cash** crop and was sometimes **inadequate** even to meet consumption needs. Male **control** over the product of female labor further increased due to most schemes' requirement that irrigated crops be marketed through the household head (Dey, 1990).⁴

One of **the** earliest descriptions of this **pattern** **is** probably that of the Mwea irrigation scheme in Kenya⁵, where women had access to only a very small piece of land on which to **grow food** crops. Outside of the Mwea settlement scheme, women used to have **unirrigated** plots on which they cultivated food crops. The land was **usually** obtained from a husband at marriage and was very rarely taken away. With very few exceptions, the woman held complete **control** over this garden. Its primary purpose was to supply her family's food, but any surplus could be traded or sold by her to accumulate a small additional income.

The most significant difference of life on Mwea from the traditional pattern arose not **because** of the extra work entailed in rice growing - though this did put an extra burden on the wife at the peak **season** - but rather because women could **no** longer depend upon their **own** resources to provide the family's food and to **earn an** individual income. Within the Mwea scheme, some provisions had been made for home gardens, but as they are not a part of the Scheme's official system (and **so** not an embarrassment to a management that permits their **use** but denies their necessity), official **allocations**

had not **been** made. Despite of the extra labor contributions women were making to the rice **controlled** by their husbands, women could **make** little official claim on the **gross** income that her husband received for his delivered paddy.

It **was** important for women **to earn** an individual income, because "Mwea women continued to feel **that** it was their responsibility **as** wives **to provide** food for their family" (Hangar and Morris, 1973:230). Women were very reluctant to depend on their husbands for providing food, or **cash** to buy food with, **as** they considered their husbands' contributions unreliable and insecure. In fact, it often occurred that husbands spent a substantial amount of the rice money on beer or other individual purchases.

Women had various ways **to cope** with the new situation. One way was to sell small amounts of the "subsistence" paddy on the black market. A man could not refuse his wife **the** access to this "subsistence" amount of paddy. Even though the **amounts** of paddy thus **traded** were **small** (as the Scheme Management was **doing** everything it could to reduce the black market trade) **the access to this** income **was of** extreme importance for women. A second way for women **to adapt** themselves to the new situation was to engage in off-scheme enterprises⁶ or to work **as** agricultural laborers for other villages which were **on** a different harvesting schedule. A third and more radical way women reacted **to** Mwea life was **to leave** their husbands; even though the **rate** of marital instability **was** not studied it was observed **that** many tenants were deserted by their wives.

Another example of a settlement scheme is that of the Mahaweli in Sri Lanka. Here, the **reduced** possibility of women for growing foodcrops placed the poorest of the settler families in a very **stressful** situation. Whilst rice, the **traditional** 'male' crop was the food most **appreciated**, the population **has survived** throughout the centuries on millet, the 'female' crop.⁷ The poorest settlers in the Mahaweli area could not grow enough paddy for family subsistence, and the traditional 'emergency food-stock' of millet could no longer be depended **upon**. In the Mahaweli area some land had been **reserved** for homesteads, but this half acre compound around the **house** "was hardly big enough for a latrine and some fruit trees" (Schrijvers, 1985:68).

Schrijvers argues that:

"the chronic undernutrition in the Mahaweli H-area is a direct result of **planning** that cuts women **off** from their productive resources. It is of primary importance that women, who have **to provide** the daily food for children and other members of the family, have the means themselves **to obtain** sufficient food. (...) Research showed that only 35% of the net-income of the male farmer (after debts were **paid** off) benefitted the rest of the household" (Schrijvers, 1985:77).

Settler women in the Mahaweli area had several coping strategies. One way of **coping** their isolation was **to get** pregnant, which gave them an alibi to leave the scheme and **to stay** with their mothers for a **period** of the year. Many women **tried** to grow at least part of their food-crops **on** the homestead. Also, in order **to cope** with the heavy work load, some women started organizing 'work-parties' and labor exchanges; forms of non-monetized, reciprocal labor that were rapidly disappearing outside the scheme (Schrijvers, 1992:15). Other more recent studies suggest that many women have fallen back **on casual wage labor** " thereby **gaining** some autonomy by **earning** a **minimal** income of their **own**. It **has** been documented that some women were effective in bargaining with their husbands for **access** to a **small** part of the irrigated land, **in** return for the labor they contributed to the male-controlled

crops. And, **as** in the case of Mwea, some women opted for the radical **solution** of leaving their husbands (Rajapakse, 198958).

It **has** been argued that many of **the** problems of women in settlement schemes are **as** much due to the 'normal adjustment problems' which accompany the early phases of resettlement, **as** they are the result of gender biased planning. Not **only** women suffered; the **hardship** and isolation women are reported to experience are faced by men as well. While this may be true, and while it is also true that settlement schemes can be criticized on many more reasons than just gender blindness, settlement schemes do clearly illustrate some persistent assumptions that have guided many irrigation interventions.

These assumptions center around **the** expected behavior of **farm** households. Irrigation planners **typically expect** farm households to 'adapt' their farming and irrigation decisions and practices to the irrigation **system** in order to **realize the technical** potential of the system. It is assumed that irrigated crop production **is the only, or** by far the most important, activity of farm household members both in **terms of** the **resources** allocated to it, as well **as** in **terms** of its contribution to **total** household income. The fact that most farm households combine the functions **of** enterprise and family are overlooked; **as** are the specific gender based intra household arrangements which balance the **household** and enterprise goals.

More **specifically** focusing on these arrangements, the following ideas implicit in irrigation planning emerge:

1. **Farm** household resources and labor are effectively controlled and allocated by the male household head;
2. Raising male farmers' incomes leads to improved well-being for himself as well as his family;
3. **Farm** households **are** composed of **two** able bodied adult members (one male and one female) and a number of children.

Evidence **from** irrigation development experiences, mostly from African and Asian countries, have showed **that** these ideas **need** to be empirically verified rather than assumed.

2.4 Some examples from Africa: pooled and unpooled resources and incomes

In many African societies women have always done, and still do, independent work. Women's and men's work traditionally was situated in a sexual division of labor growing out of domestic and kinship arrangements. Within **these** relations labor was exchanged between men and men, and between men **and** women. Usually, men could call **upon** their wives to work for them. One of a wife's most significant obligations was to work for her husband and his senior close kinsmen. The effect **was** that many women combined fanning independently for themselves with work done **as** unremunerated labor on the farms **of** others. In their independent work, women required effective access to resources **including** land to farm. The work women did for her husband or other senior men was usually **not** directly remunerated, it was part of her obligations as a wife in return for which she enjoyed the general welfare and **security of** the household.

Traditionally, all **these** arrangements were in the context of a domestic economy in which an sharing of resources in marriage not always existed. Very often, land, cattle, money, clothes and much else tended to be owned separately by husband and wife. It, too, was rare to encounter a joint family

budget or single **common** purse out of which family **needs** are met. Rather, the **separate** resource **streams** of husbands and wives, which were the basis for their independent economic activities, also **entailed** a way of keeping incomes **separate**. These **often** included conventionally divided **responsibilities** for different **aspects** of household spending and consumption, for example for the clothes or medical and other **needs** of children, and a complex division of responsibilities for providing different items for food.⁸ (Whitehead, 1990)

How has **this** gender-based organization of agriculture affected the development of irrigated agriculture?

A well-documented example is **that** of the Jahally Pachar project in the Gambia (Dey, 1990; Carney, 1988; van Hooff, 1990) Here, an **initial** assumption was made that men were rice growers with full **control** over the **necessary** resources. Incentive packages included cheap credits, inputs and assured markets offered to **male** farmers. Negotiations about the allocation of the land to be irrigated were made with the male elders of the villages, **as a** result of which land **traditionally** controlled by women **now came** under the **control** of men. **All access** to inputs, labor and finance was mediated through **husbands**. Women were **expected** to contribute their labor to the newly irrigated fields, but they became **increasingly** reluctant to do so as they did not directly benefit from the higher yields. They demanded a compensation from their husbands for their work, in the form of cash, a share of the paddy harvest or in access to their own irrigated plot. If the husbands were not **Willing** or able to provide their wives with some **sort** of compensation, women withdrew their labor from the irrigated plots. **This** had a far-reaching impact **on** the **social** organization of the household production and **on** the **overall** productivity of the project.' **As a** consequence of female labor withdrawal, there has been an **increase** in labor hire, **because** -given the high **rate** of polygamous marriages in the **area**- men cannot compensate for the loss of female labor by an intensification of their own.

Jones (1983 and 1986) gives a **similar** example of an irrigated rice project in **North Cameroon** which failed to **attract** sufficient farmer interest, with the result that about a **third** of the developed area remained uncultivated. A contributory **cause** was the **inability** of the project to adjust for intra-household conflicts in interest with regard to labor **allocation**, **control** of crops and monetary reward. While women were obliged to provide **additional** labor for new male controlled crops, their right to cultivate a personal crop placed **limits on** their obligation to their husband. Thus, in order to acquire more than the **minimum** female labor input, men were obliged to pay their wives cash **rewards**, the size of which was directly related to the level of their labor input.

Traditionally, red sorghum was the main crop. With the exception of the **collective** field, to which every compound member contributed **several** days' work each year, sorghum fields were usually cultivated **on** an individual basis with little labor exchange. Of the time women spent **on** cultivating sorghum, 95 percent was **on** their own fields, which indicates that women had a minimal obligation to work **on** their husband's fields or **on** the collective field. Wives usually had their own **granary** and **cooked** **each** day for themselves and their children. With co-wives alternating the **task** of cooking for their husband. The woman's sorghum was consumed first, followed by her husband's supply and **finally** the sorghum from the collective field.

Unlike sorghum fields, the new rice fields were cultivated jointly by members of a conjugal household, irrespective of who actually registered for the field." The woman is expected, however, to turn over **all** the **income** from her field to her husband even if the field is registered in her name. Following the paddy harvest, men reserve a **certain** number of sacks for home consumption which

they **return** over to their wives for safe-keeping. **In** effect, the paddy retained for home consumption, **compensates** for the sorghum production that both husband and wife forgo in favor of rice production. In addition, men **also** give their wives a lump **sum** in *cash* following the sale of paddy. Women perceive this money and paddy to be compensation for their rice cultivation labor. It is given to them, they say, "in return for their sweat".

The amount of remuneration women receive from their husband is the subject of **serious** conflict **within** households. If women feel that they are insufficiently compensated for their labor, they will minimize the amount of time spend in rice cultivation. The intra-household conflict over income is thus a significant factor in depressing the amount of labor allocated **to** rice production.

The examples from the Gambia and Cameroon **can** be supplemented by a great deal of basically similar experiences, challenging the notion of farm households behaving **as** joint production and consumption units. In Kenya, in the Turkana Irrigation **project**, women also withdrew their labor. Traditionally, Turkana men had **been** herders and women had been the *cultivators*, who controlled the produce from their **rainfed** sorghum plots. The project counted on women providing unpaid labor for their **husbands'** irrigated crops, but paid all **cash earnings** solely **to the male** household head. Women resisted this arrangement by neglecting the irrigated project crops for their own off-project **rainfed** sorghum (Blumberg, 1989:18). In Zanzibar (Dey, 1990) and in the Comoé province in Burkina Faso (van Koppen, 1990) new irrigation facilities were primarily **used** by women. In both countries low labor **returns** to rice significantly **reduced** men's interest in irrigated rice production. In Burkina Faso **initial** arrangements were to allocate land through men. The project's **stratagey** changed when women **working** the plots belonging to their husbands appeared to be reluctant to invest **time** and money **in these plots**. They feared their husbands might decide **to take** the plots away **from** them once the land would be improved. In a **later** stage, plots were directly **allocated to** women (van Koppen, 1990).

The **incorrectness** of the idea that farm household resources and labor are pooled and **can** be mobilized by male household heads is **most** clearly **illustrated** by these and other examples from *Africa*. The way in which resources, including water and land, are **used** depends very much on who controls this resource **within** the household. Control over resources is not only determined by intervention policies. In Burkina, land directly allocated to women turned out to be more profitably exploited than land **allocated** to women **through** their husbands. **Because** men did not have much interest in irrigated rice cultivation, they allowed the land to be **controlled** and **used** by women (van Koppen, 1990). In the Gambia, the recognition of the importance of women in rice production **led to a number of** adaptations to the original intervention policy. Landtitles, for example, were now given **to** women. **This** did not prevent male family heads to change the nature of the irrigated plots into 'family plots'. Although the land officially **belonged** to women, this family character gave men ultimate control over its **use** and the **use** of its products (Dey, 1981). Hence, while it is important for devising realistic policies to understand intra-household arrangements of responsibilities and rights, policies and interventions by themselves cannot **always** guarantee that benefits accrue to all household members equally. In general, men **will** be better placed to take advantage of policies and actions.

The examples also show that for **African** women in peasant households, recruitment primarily **as** family labor represents the construction of a hitherto rare form of dependence within and on marriage.. **While total** household incomes may increase considerably **as** a result of new irrigation facilities, this' not automatically relieves women **in fulfilling** their specific responsibilities towards the household. And especially in countries or regions with high rates of abandonment or divorce (*see 2.6*), women are quite **motivated** to secure control over household expenditures and **to** maintain independent incomes

(Safilios-Rothschild, 1991:45). In the Cameroon case, the compensation women received for their labor contributions was higher than the income they could have earned pursuing their own income-generating activities (Jones, 1983). The fact that, despite of this, many women did not maximize their labor to their husbands' fields may be explained by their unwillingness to economically depend on their husbands.

Male farmers are thus not always in the position to effectively mobilize the labor of their wives. The extent to which women are able to resist their husbands' claims to their labor or secure some compensation depends on their relative bargaining position within the household, which is strongly determined by their access to other income-generating opportunities in and outside farming. It is typical that there are no cases of settlement schemes (where these possibilities are most limited) of women receiving a contribution for their labor from their husbands.

2.5 Some examples from Asia: influences of class and religion

In much of South Asia (Bangladesh, Pakistan and India, and to a certain extent also in Sri Lanka), the prevailing picture is that of the family-based household, which is sometimes composed of extended families, but often also of nuclear units. Purdah norms, property rights and familial hierarchies coalesce within the household to produce a corporately organized, patriarchal collectivity. Men tend to control most of the household's material resources, including the labor of the female and junior members of their households, and also to mediate women's relations with the outside world. Women are socially constructed as passive and vulnerable, dependent upon male protection and provision for their survival. They are generally reluctant to seek incomes outside the socially sanctioned relationships of family and kin, first because there are few options to do so and second because they could forfeit the support of their kin. In contrary to the African picture, women's well-being tends to be tied to the prosperity of the household collectivity. Their long term interests are best served by subordinating their own needs to those of the dominant male members of the household. Since women have very constrained access to material resources outside the familial domain, it is in their interests to try to maximize their security within kinship networks (Kabeer, 1990).

In theory this gender configuration more closely resembles the neo-classical household model of a unit of consumption and production. Still, even though they can rely more on sharing in the income controlled by their husband, in many cases women appear to be very eager to secure some individually controlled income, which they may keep secret to their husbands". Studies have also shown that male and female members of households often have different preferences for expenditure, women being generally more inclined to spend their income on her children's nutrition (Blumberg, 1989; Safilios-Rothschild, 1990, IFPRI, 1992).

In many Asian countries, the impacts of agricultural development on traditional gender patterns are very much determined by the socioeconomic position of the household. Generally, in the larger farm households women do not participate in any way in field activities. In Pakistan and Bangladesh, women belonging to richer families generally are the most strict observers of purdah¹². A woman who can afford to remain inside the house is a symbol of prosperity and honor to the family. However, these women often are indirectly involved in agriculture, since they provide meals for the hired workers or are involved in the organization and supervision of hired labor. (Basnet, 1992; Hart, 1992 and Rajapakse, 1989) In smaller households, women and men are both engaged in field work.

However, as a result of the prevailing ideology and idealization of motherhood, more than in Africa, the work of Asian women tends to be culturally invisible. The cultural unacceptability of women working in the fields means that it tends to be denied if a direct question is asked about it. It was observed in Bangladesh that the women who could be found working in the fields referred to this work as fulfillment of their "family" obligations, thus avoiding negative associations (White, 1989:46/47).

An illustrative example of how the norm that places a high value on women remaining in their homes can affect attempts to develop irrigation is that of the introduction of hand tube wells in a Bangladesh village. Hand tube wells were introduced as a means to boost vegetable production. However, the tube wells did not result in the anticipated growth in vegetable cultivation. A first reason was that people preferred to use hand tube wells for drinking water instead of irrigation. In fact, many people applied for hand tube wells for irrigation on paper only, always intending them for domestic use. After a year on show outside the homestead, many were then relocated within for greater convenience. Also, the low water table made manual pumping of water a very heavy task, for which people preferred to use machine run shallow tube wells. A third important reason was that vegetables are usually grown by women, in and around their homesteads, whereas the project envisaged field cultivation by male farmers. Women were interested in intensifying their vegetable growing activities. Some women actually did use the tubewell water for expanding their vegetable gardening activities in their homesteads. However, the project management considered the project to be a failure and prevented people from relocating the wells by substituting plastic pipes for metal ones (White, 1989:52-53).

The development of irrigated agriculture affecting women belonging to different classes differently is illustrated in many studies. In Sri Lanka, the sexual division of labor and resources (within the Mahaweli Scheme) vary greatly according to the extent to which the family has succeeded in becoming 'entrepreneurial'. Whereas in the richest families women's labor has been effectively withdrawn from all agricultural activities in the field and has been replaced by hired laborers, in poorer landholding households both men and women engage in almost all agricultural activities and jointly decide on how to spend the income. In the poorest households, both women and men, in addition to cultivating their own plots, work as laborers and control and spend the small incomes they derive from their work individually. (Rajapakse, 1989)

A similar picture emerges from Malaysia. In the Muda irrigation scheme, a comparatively high percentage of women from large landholding households are actively involved in mobilizing and organizing agricultural labor, and in allocating contracts to poorer women for transplanting and harvesting. Women with medium landholdings work mainly on their own lands and on lands belonging to members of their labor exchange groups. Poor women are mainly involved in wage labor (Hart, 1992:8 15).

Evidence from Asian countries suggests that women belonging to irrigating households are likely to benefit from new or improved irrigation facilities, even if it involves an increase in their workloads. An example from India shows how the introduction of irrigation in a northeast Indian village in 1954 brought significant changes in the lives of the villagers, e.g. an increase in household income and new employment opportunities. In this village, purdah was practiced, but this didn't inhibit women's participation in agricultural work, as women tended to work separately from men in the field. The most apparent impact of irrigation on women from landholding families was an increase in agricultural work¹³. The introduction of cotton brought about a sharp increase in women's labor, since cotton is harvested primarily by women and children. The increase in work was slightly compensated by a

decrease in the time women needed to collect fuel wood and water. More important, the increase in agricultural work was accompanied with an increase in income and food, since irrigation also allowed for more food crops (wheat, gram, bajra and vegetables) to be grown. Women were quite proud and happy to contribute extra labor, since they benefitted from it through an increase in family welfare (Stanbury, 1981).

While the direct benefit of access to irrigation water (increased or more reliable production) is most obvious to irrigation professionals, many Asian examples mention a number of indirect positive or negative effects of irrigation development. For women, these indirect effects may be of particular relevance. The relation between irrigation water and the availability and quality of water for domestic uses is one widely documented example. Since women are almost everywhere responsible for providing water for domestic uses, they are most directly affected. The example of hand tube wells in Bangladesh already indicated the importance attached to good drinking water facilities. In Nepal, when asked about their opinions and views about a new irrigation system, many women said that the biggest advantage of it was that they needed less time for fetching water. Even though the quality of the canal water was not as good as the well water they earlier used, the convenience of the proximity of the canals made women prefer to use this water (Backer, 1992). In Pakistan, the decreased quality and availability of water due to salinization was mentioned by women gathered at the First National Conference of Peasant Women as their most critical problem. They referred to irrigation water; drinking water and to water used for consumption by livestock. Some women reported that they had to walk two hours to get water, three or four times a day (Aurat, 1991).

Other indirect effects are for example the fact that canal irrigation may increase the growth of weeds used as fodder for livestock. This occurred in the earlier referred to example of India. Indirectly, irrigation thus increased milk and ghee production. This was particularly beneficial for women of the landholding families, since they earned a substantial individual income by selling ghee (Stanbury, 1981). In Bangladesh, the impacts of the introduction of shallow tube wells were studied, with special reference to the implications for women. It was found that the introduction of shallow tube wells boosted agricultural production, which meant an increase in income for most households. However, since the use of tubewells lowered the ground water table, there was also a sharp decline in food and fuel that used to be freely available. The canal, which used to be a good source of fish, dried up much earlier in the year. Fruit and vegetables that used to grow with little or no tending, now gave much lower yields due to reduced soil moisture. The cutting down of forest areas for fuel and for cultivation has reduced the availability of fuel and land for pasture. Especially the poorer women in the village were affected by the decreased availability of fuel; gathering of fuel materials (a female task) took up much more time than it used to do (White, 1989:44-45). In Nepal, the reduction in the growth of trees used for fuel and fodder negatively affected household's possibilities for keeping cattle. Cow dung is used as fertilizer, and the decreasing availability of it negatively affects yields of irrigated crops (Bruins and Heijmans, 1992).

These indirect effects of irrigation development, some of which become apparent when focussing on women's roles, show the interrelatedness of the various activities farm household members are engaged in. They also illustrate how increases in production through improved water supplies may have trade-offs in terms of health or environment, and thus question the long-term sustainability of irrigation interventions.

2.6 Poverty: changing gender norms and changing household formations

In the **face** of increasing **scarcity** and hardship to secure family survival, the norms that dictate women's and men's behavior **appear** to change. In South Asia, the **norms** to remain invisible and that prevent women to engage in productive activities, are documented to become less **strict** or **only** valid for **well** to do households. The poorer the household, the more the women's income is critical for **survival**. Several studies from rural Bangladesh show how the norms and practices of purdah are slowly changing **as** women and men are developing strategies to **cope** with poverty. A well documented example in the context of a water development project is provided by Jordans. Her study **shows** the eagerness of poor women to **earn** an individual income, even though this means that they have to confront **social norms** by giving up purdah:

"Group members mention the fact that DDP (Delta Development Project) created opportunities for them **to** work **on** the embankment and roads. (...) To start the work they had to break down the 'purdah' barrier, facing disapproval and teasing of the society." One woman commented: "My husband does not like that I work outside. "Don't go to the road", he says, "stay at home". He prefers that we starve and he **beats** me up if I still want to go. But I do not **listen** and after the **beating** go **to** work **on** the road" (Jordans, 1991:53).

Kabeer (1990) observes, also for Bangladesh: "Hitherto strictly enforced rules preventing women engaging in field-based **stages** of rice-production are showing signs of crumbling and women are being employed **in** harvesting, weeding and transplanting work" (Kabeer, 1990:141).

Some evidence from Sri Lanka also seems to suggest that the **traditional norm** which **tells** women not to engage in productive activities is gradually disappearing. In traditional *purana* villages, women contributed as much as men to agricultural activities", but their labor inputs were **generally** underestimated, also by themselves, because of the cultural **norm** that the male is the **head** of the **family** and the main farmer, whereas the female is mainly respected **because** of her motherhood and corresponding domestic activities. Nowadays, women who contribute to the household in financial **terms** are increasingly respected (Rajapakse, 1989:58). Also, formerly quite strict divisions of **tasks** according to gender are changing **as** a result of mechanization and the growth of **wage-labor**. Direct observations in the field seem to suggest that generally there exists a considerable flexibility in the division of **tasks**.

"Except for second land preparation, sowing, threshing and winnowing (in the field), none of the tasks habitually performed by men exclude females in **toto**. Similarly, none of the "female" **tasks** including transplanting, weeding and **thinning**, **bundling** and **carrying** paddy, or even Winnowing (**on** the compound), boiling and drying the edible rice are done by women only, **as** in rich peasant households it is the resident (male) laborer who **performs** these **tasks**. In fact, today many activities such as water diversion, making water channels **within** asweddumised **areas**, first land preparation, sickling, bundling and carrying **can** be considered joint **operations**" (Rajapakse, 1989:48).

Another result of increasing poverty is that in many parts of the world male or female household members leave -either permanently or temporarily- the rural areas to find jobs elsewhere. This not

only leaves the responsibility for all the agricultural work with the left-behind household members, but in many cases **also** changes the **rationality** of the farming enterprise **as** farming is no longer the only or the most important means of subsistence.

In Malaysia, for instance, a large number of **rural** men engage in government jobs while they keep their farms, thus becoming part-time farmers. This part time farming encompasses different sets of intra-household arrangements with very different implications. In middle class households, women don't engage in farming activities. Men hold lucrative nonagricultural jobs through connections with government and supra village relationships; which they combine with occasional visits to the rice fields. In contrast, for poor men and women 'the household' has become a more spatially and sectorally divided sets of arrangements. Women have taken over agriculture which they organize along the lines of organized labor exchange groups, while men have moved into low-wage non-agricultural jobs and many engage in circular migration. These jobs are sporadic, however, and poor men depended heavily on their wives' agricultural labor -both in retaining hold over tiny plots of land, and in generating agricultural wage labor income (Hart, 1992:819).

In Bangladesh, 'male survival strategies in the face of increasing impoverishment often entail the abdication of responsibilities to wives and dependents; a number of studies confirm the link between poverty and the incidence of desertion, divorce and female headed households' (Kabeer, 1990:143).

In Senegal, during the seventies, over one-third of Haalpulaar farming families became excluded from the cultivation of sorghum under flood-recession, which was their only secure source of livelihood. Migration of men to neighboring states and to France earned incomes which were used to buy grains. A new irrigation method was invented using floating pump-sets to irrigate small local schemes of some 20 ha. Thereafter, earnings from male migration were used by their left behind wives and other extended family members to buy fuel, lubricants, etc. for the pump set and to contribute to its amortization. Increased production meant less money had to be spend on food (Diemer and Vincent, 1992:139). In the Nyanyadze irrigation scheme in Zimbabwe, the highest incidence of female headed farms was found in those blocks within the system with the poorest water supply. The little reliability of irrigation water led to insecure and low yields, which in turn made men to temporarily or permanently migrate in search of off-farm employment.

In Africa, the disruption of marriage has been reported to be one possible reaction to increased intra-household conflicts over the use of household labor and over the allocation and distribution of resources and income. In Tanzania "some women leave their husbands, children and household farm and go to town. Others remain, but refuse to work without payment on cash crop production under their husband's command" (Mbilinyi, 1990:121). Whitehead even suggests that there is a major crisis over marriage itself in some African rural areas: "In some cases marriages are difficult to secure and do not last; in others there is intensified pressure on women to marry and to remain married, and evidence of oppression within marriage" (Whitehead, 1990:58).

Although there are specific instances of high female migration, for example in Thailand and Sri Lanka (Jayaweera, 1989¹⁵ and Shinawatra, 1992), it is more common that men leave. Women then become the sole responsible for all farming activities. The implications of male migration for the viability and sustainability of agricultural development is a new area of study. Different scenarios can be envisaged. High rates of male migration may lead to a decline in productivity because of labor shortages and because de facto female heads of households will have less access to credit and other support services

(Safilios-Rothschild, 1991). Evidence from Nepal suggests **that** single women have less easy access to irrigation water, partly because they are not supposed to attend water **users' meetings** (Bruins and **Heijmans, 1992**).¹⁶

It may also be (like in the example of Senegal) that male migration decreases the importance of irrigated agriculture in household's livelihood strategies, because the remittances from migration labor supplement household income, which reduces the necessity and incentives to invest resources in irrigated production.

3. Gender Issues and Water Issues

The previous chapters showed how gender relations, and specifically intra-household divisions of labor, responsibilities and rights, affect and may be affected by the development of irrigated agriculture. It provides the empirical and conceptual background against which gender needs and interests with respect to irrigation management need to be understood.

This chapter will focus more narrowly on those gender considerations that are of specific relevance for irrigation management. It starts from the hypothesis that the invisibility of gender and/or women in irrigation management studies is not the result of women being not interested in irrigation or irrigation management being gender neutral. The first section will focus on the causes of the absence of gender in most irrigation management studies. In the second section, some concepts and tools for identifying gender considerations of importance to irrigation management will be proposed. Are gender needs and interests compatible with those of irrigation planners and managers? This question will be further explored illustrating where and how female and male water users' interests and needs with respect to irrigation water may differ. On the basis of examples from literature and first observations from the field, it will be shown that although women's interests are not necessarily opposed to those of men, women often have less power to defend them. Among other, and sometimes more structural, reasons is the fact that women have less formal access to irrigation water and irrigation management decision making.

3.1. The invisibility of gender in irrigation management

In most of the literature concerned with irrigation management, no specific mention is made of women or of gender considerations. Uphoff, in an analysis of fifty case-studies about irrigation-management only found three direct references to women (Uphoff, 1986:68). The most easily recognized relations between gender and irrigation are those that relate to women's use of irrigation water for domestic purposes (Agarwal, 1981), and the effect of irrigation on employment opportunities for female wage laborers (Agarwal, 1981 and Chambers, 1988).

The lack of attention to gender considerations is probably as much caused by the fact that approaches to planning and managing irrigation often are technically biased, top-down and hierarchical as it is caused by explicit or implicit gender blindness. Most approaches to planning and managing irrigation have not adequately conceived or accommodated the role of farmers of either gender. Decisions about water users' organizations and behavior are often based upon wishful thinking, rather than upon empirical evidence (Uphoff, 1986). Water users or irrigators are often considered as a group which is only differentiated as far as their place, role and function in the irrigation system is concerned. Thus, not only differences between water-users which can be attributed to gender are often neglected, but many other differences as well. Water-users in fact have very differing and sometimes opposing interests, grossly depending on:

1. Their relation to the resources land and water. Direct water-users may be tenants; share-croppers; leasers; care-takers; family laborers; etc. In addition, people who use water for other than agricultural activities, for drinking, washing, bathing may also be considered an interest group.

2. The importance of irrigated agriculture in relation to other income-generating or subsistence activities. Irrigated agriculture may be the main source of income; the main source of food, it's cultivation being 'subsidized' by other activities; a side activity; etc.

As a result from these different positions, water-users will have different perspectives; differential incentives for investing time, labor and capital in activities related to irrigation and differential information needs. Gender analysis may be a good starting point for recognizing these differences and understanding their impact on on-farm and system water management, because the ways in which labor, money, land, water and information are allocated to various activities are often structured by gender relations. At the same time, more and better attention to gender issues in irrigation planning and management is contingent upon a better understanding of the real problems farmers, irrigators and water users are facing.

This is not to argue that the adoption of more farmer oriented approaches to irrigation will automatically reveal concerns related to gender. The invisibility of gender is also due to the fact that women, generally, seem to be less involved in irrigation related activities. In many societies the processes of acquiring, allocating, distributing and draining the water appear to be strict male activities. This is often justified by the supposed physical strength or technical dexterity required for irrigating. In Peru 'water' is very much considered a male affair (van de Pol, personal communication, 1993). In India, irrigation researchers who were eager and willing to pay attention to women as well as men found it difficult to do so, because there were no women involved in irrigation (Mollinga, 1992). In Pakistan some women even were offended when asked if they were involved in irrigation (Basnet, 1992). In addition, the collective decision making that irrigation requires seems to be more compatible with men's roles. Attending meetings and discussing matters in public may be thought of as male activities, associated with political gatherings which are often traditionally confined to men.

While norms and perceptions (of both irrigation professionals and of male and female water users themselves) may deny female involvement in irrigation, actual patterns of involvement often differ. Even in Pakistan, where very strong norms and values prevent women from working outside the four walls of their homes, nine women out of a sample of 87 were directly engaged in irrigation (Basnet, 1992). In Peru, many women are directly involved in on-farm water management and they also play important roles in settling water related conflicts (van de Pol, 1992). While it is true that in much of India men's roles are more predominant in irrigation than women's, some first anecdotal evidence from Andhra Pradesh shows that wives of male irrigators may join efforts with their husbands to secure adequate water supplies (UMP, 1991). A few recent experiences aimed at increasing the involvement and participation of water users in irrigation management also show that low female involvement refers to norms rather than to actual practices. In the Philippines during the process of turning over operation and maintenance responsibilities from the irrigation agency to farmers, female irrigators unexpectedly turned out to be very interested and willing to participate in water users' associations. This wish was strongly supported by their husbands; it was felt that some tasks would be better performed by women and that irrigation decision making is something which concerns both male and female members of households (Ilo, 1989). An experience in Indonesia proved that, once women were explicitly addressed and encouraged to express their ideas and needs, they became very motivated and enthusiastic about getting formally involved in irrigators' groups (van Dok et al., 1992).

Part of the difficulty of directly relating gender to irrigation is probably caused by the fact that women's roles as mothers and housekeepers are more readily identified and recognized than their roles as producers, irrigators or managers. It is typical that many planned efforts within irrigation systems to explicitly address women focus on women's domestic roles, rather than on their roles as producers and providers. The use of irrigation water for domestic uses, for example, is often recognized. Special bathing steps may be constructed, or washing places build and drinking water and sanitation facilities are sometimes taken care of within the context of irrigation projects.

The widespread initiation of small income generating projects for women within irrigation systems also illustrates the persistence of the assumption that women are not yet involved in productive activities. An example is that of an irrigation system in Burkina Faso. Here, the (predominantly male) staff of the project were ignorant of women's roles in irrigated agriculture. When discussing possibilities of better integrating women in the project, they expressed fear that women would not be able to understand the new production system and the new communal water management. All the newly irrigated land was allocated to men, while their wives performed at least half of the agricultural tasks, in addition to working on their individually owned rainfed plots. Despite of their labor contributions, women were not formally involved in the cooperative organization of the irrigation system. In order to comply with donor requirements to pay attention to women, rather than addressing women as co-farmers and direct stakeholders of the project, a separate project for women was envisaged. Three thousand women were organized in groups of around forty. The women received as little land as twelve ha, or 1% of the total command area, to be used for the cultivation of vegetables (van Koppen, 1990). Also in Senegal, rather than recognizing women as stakeholders on similar terms as men, small separate plots alongside the main irrigated plots were designed specially for women (Helsloot, 1990). Or, as Diemer and Vincent conclude in a review of the policies of a number of major technical assistance groups working in Africa:

"While technical assistance groups do express support for initiatives to support income-generation for women, there seems to be continuing unease at debating the issue of shifting economic and political power between men and women, or of actually developing interventions which preserve women's rights in tenure and decision-making" (Diemer, G. and L. Vincent, 1992:137).

Even where irrigation has traditionally been a male affair, it is likely that male migration increases women's direct involvement in irrigation related tasks. This has been observed in several countries, including for example Nepal and Sri Lanka. A Peruvian woman observed: "Currently more women irrigate, because men go to work elsewhere. We do all the irrigation related tasks in the gardens and in the fields" (van de Pol, 1992).

In summary, it is likely that the common perception of irrigation as a male activity (both by water users themselves, as well as by planners and professionals) has made female involvement in irrigation and irrigation management to go unnoticed. In some cases it has even become a self-fulfilling prophecy: because women are not conceived as direct stakeholders or irrigation systems they have been excluded from planned efforts to organize water users. As a consequence, many women have remained outside of formal irrigators' associations and thus lost the possibility of voicing their concerns.

3.2 Identifying gender concerns in irrigation management

Gender analysis in the context of irrigation is meant to facilitate the identification of where and how irrigation policies and planning (differentially) affect women and men, and to understand how achieving objectives set by irrigation professionals depends on contributions of male and female water users. This basically implies asking where and how men and women's needs and interests are compatible with the objectives of the irrigation system. The fact that WID and gender advocates would negatively evaluate the performance of an irrigation system if it does not meet the interests of women, while irrigation professionals may consider specific users' interests only when meeting these is likely to contribute to production and efficiency goals shows that devising gender sensitive irrigation approaches is likely to raise a lot of controversy and discussion. Unfortunately there is not always a direct positive correlation between achieving higher a higher irrigation's systems' performance and more equitable gender relations, or greater well-being for women. A high production levels at the level of the irrigation system does not automatically imply greater well being for all irrigator families. Nor do all household members automatically benefit from higher household income, when this income is controlled by men. Also, even when irrigation systems do contribute to overall prosperity, environmental or health-related trade-offs may occur which will affect different people differently.

The differing and sometimes conflicting and contradictory perspectives of different parties involved in irrigation cannot be denied or easily solved. However, recognizing that they exist and understanding how they affect an irrigation systems' performance do provide the basis for realistically planning and managing irrigation. Gender is one possible source of division, and gender analysis is a tool for analyzing and understanding how different views, interests and needs of the direct users may affect the performance of irrigation systems. Gender analysis is particularly useful in highlighting perspectives which generally tend to go unheard and unnoticed, but which are present always and everywhere: the perspectives of women.

In order to better qualify how gender relates to the performance of irrigation, some consistency in the many definitions and objectives of irrigation is needed. Small and Svendsen (1992) in an attempt to bring some order in the irrigation discussion. propose a framework for assessing the performance of irrigation systems. This framework is based on the identifications of various "levels" of performance. They define an irrigation system as a set of physical and social elements employed to acquire, convey and distribute water to fields and disperse it to the root zones of crops. The output of this system (water delivered) becomes a major input into the next level, the irrigated agricultural system, the outputs of which (crops) are the input into the agricultural economic system.

Parallel to these "levels" of performance one can distinguish organizational levels in an irrigated agricultural system. Bos et al. (1993) distinguish three functional levels: the irrigation sector, i.e. policy makers and planners usually located in ministries; the agency level, i.e. larger institutions responsible for allocation and management of goods and services in support of the farmer community; and the irrigation system level, i.e. the organization responsible for management of a physical system for allocating and distributing water. Broad objectives are set at the system level which (in principle) are turned into specific targets at regional or district levels by the macro-level agency; these in turn are the basis for specific targets at system level that presumably reflect objectives at the agency level (Bos et al., 1993). The organizations operating at these various levels supply services to a range of "customers" or stakeholders. These include the direct water users, but irrigation agency employees

may **also** be considered stakeholders. people more indirectly affected by the irrigation system, Like agricultural wage laborers or consumers of the crops produced, or traders *can* likewise be viewed as stakeholders (Ibid., 1993).

The focus here **will** be on the most direct and obvious stakeholders; farm households^{*}. However, households are **not just** receivers of irrigation system's **services**. Farm household members 'transform' **the** irrigation water into agricultural products by **skillfully** coordinating their labor, knowledge and other resources. In **many** instances, farm household members are **also** directly (either formally or informally) involved in **allocating** and distributing the water, **as** well as in the organization of and collective **decisionmaking** regarding **these tasks**. The nature of women's and men's needs with respect to **irrigation** and their assessment of the possibility to satisfy **these** needs **will** determine their **willingness** to invest labor **and** resources to irrigation **and** irrigated agriculture. Therefore, the level of satisfaction of **female** and male members of households using irrigation water is not **only** one important measurement of the effectiveness of irrigation systems (cf. Bos et al., 1993), it also is one important **factor** determining its effectiveness. Unless **water users** employ their **own** labor and capital in a way which makes good use of available and anticipated land and water resources, the ultimate benefits of irrigation **will** be restricted.

It is for **this** reason that the identification of gender issues of relevance to irrigation management necessarily **starts** at the farm household level" by **trying** to analyze and understand differences and similarities between women's and men's interests and needs with respect to irrigation. Gender differences are the result of the specific roles, tasks, responsibilities, rights and priorities of women and men. Identifying **gender** needs of women is distinct from identifying **women's** needs, **because** not all **needs** women may have **are** determined by their gender. The **position** of women in society depends on a variety of different criteria, such **as** class, caste, **ethnicity**, **as well** as gender. The needs women may have in common stemming **from** gender are called women's **gender** needs. To illustrate, the needs female heads of households may have in participating **in water** management decisions derive from their position **as** main farmers and irrigators, and not from their gender. The particular constraints these female heads of households may face in obtaining access to irrigation management decision making may be **related** to specific gender norms and **rules** derived from **these** norms. **This** is what makes their need to participate in water management **gender specific**.

Although the starting point for gender analysis in irrigation is the farm household, gender relations and **norms** are not confined to households. The gender **needs** identified at the **household** level will often be a reflection of, and **determined** by, gender **norms** and relations at other levels of irrigation organizations and in society **as** a whole. **Also**, meeting identified gender needs with respect to irrigation will **often** be conditional upon the removal of gender biases in other sectors. For instance, when increasing the availability of water for cultivating crops controlled by women, their **access** to credit **and** **agricultural** information may also need to be improved. Hence, the analysis of gender needs within **farm** households **needs** to be placed and understood **within** the context of the prevailing **social** structures, of which gender relations **are** one important determinant

Gender **needs** with respect to **irrigation** need to be formulated in 'water' terms in order to be meaningful to managers and planners. Following Small and Svendsen's logic of nested systems, irrigation needs of water users **can** be identified with respect to the **inputs** of the irrigation system, with respect to the **outputs** and with respect to its internal **processes**. Impacts refer to the effects of the irrigation system on the wider environment, which includes relatively direct **outcomes** of irrigation (such **as** crop production) and those effects that are farther removed causally, such as welfare changes.

Outputs relate to the amount, timing, uniformity and quality of water delivered. Process measures refer to a system's internal operations and procedures that lead to the production of outputs.

Once gender needs with respect to irrigation are identified at the household level, and an understanding is gained of how gender structures the way in which resources and labor are allocated to irrigation and irrigated agriculture, it will be possible to find out to what extent these needs are and can be met through (changes in) irrigation management. It will also allow to make a realistic estimate of costs and benefits, including the social and environmental ones, of meeting these needs. Irrigation managers are most likely to be interested in knowing how meeting gender needs contributes to achieving higher levels of performance. NGOs and donors promoting women's empowerment will be particularly interested in estimating how meeting women's gender needs with respect to irrigation relates to their relative bargaining position within the household and in society at large. There is no direct and automatic relationship between meeting practical gender needs and the empowerment of women.²¹ The satisfaction of practical needs may in some cases reinforce existing gender inequalities²¹, in others it may be a first step towards realizing more strategic gender goals of empowerment.

3.3. Gender needs with respect to the impacts of irrigation systems

The direct impact (which Small and Svendsen (1992) refer to as outcome) most often attributed to (and aimed for with) irrigation is increased agricultural production. Accepting agricultural production as the major objective of irrigation has several advantages of which the fact that production is relatively easy to measure is probably particularly important (Chambers, 1988:6). While increased production may be the most important objective of irrigation from a policy point of view²², not all irrigating households and not all members of those households necessarily share this objective to the same extent. Also, objectives of households may change over time.

In the second chapter of this paper some examples have already been given of how women and men differentially contribute to, and are differentially affected by increases in agricultural production. It has been shown that this may lead men and women to differentially evaluate new irrigation opportunities. Gender differentiated impacts not only indicate that women and men may be benefitting differently from irrigation, they also may explain if and why women and men are differentially motivated to invest time and resources in irrigation and irrigated agriculture. In some African examples, women completely lost interest in cultivating irrigated crops since they felt that their extra labor contributions were not compensated by additional benefits or gains. Examples from India and Sri Lanka have shown that men not always share the income from irrigated agriculture with their wives and families.

How increases in production relate to gender depends on the specific gender configuration of the agricultural and household economy; on the sexual division of labor and on the intra-household allocation of resources; incomes and responsibilities. Following the Feldstein and Poats framework (see 2.2), potential gender differences with respect to the agricultural production impact of irrigation can expect to occur around:

1. The allocation of labor, land, water and other resources to the cultivation of crops; to construction and maintenance activities; and to participating in irrigators' meetings;

2. The **use** of the **outputs** of irrigated agricultural production, e.g. consumption, storage for use, later exchange of later sale.

As has been briefly discussed in section 2.5, **indirect** impacts of irrigation (defined **as** effects by Small and Svendsen (1992)) may be **as** or even more important to household members **as** the **direct** outcomes of irrigation. Women in Nepal were highly positive about new irrigation **facilities**, since it considerably **reduced** the time needed for fetching water (Backer, 1992). In India the unforeseen positive **impact** of canal irrigation **on** the growth of fodder was particularly beneficial for women, since it **enabled** them to produce and **sell** more ghee (Stanbury, 1981). Irrigation water may also be directly used for watering **cattle**, which in may the the specific responsibility of women. **These** indirect effects **are often less** obvious to irrigation professionals, but may partly govern choices and behavior of water users.

A very clear example of side effects is given by Sarah White (1992). This example looks at the changes due to the introduction of tube-well irrigation in a village in Bangladesh:

- The new profitability of agriculture **has** meant forest areas have been cleared to provide more cultivatable land. With rising demand for fuel this has dramatically reduced **tree** cover. The land available for pasturing animals has similarly **been** reduced and numbers of milch cattle in particular have fallen sharply. This again means less proteins and vitamins in the diet as **milk** becomes scarce, and the **loss** of income for some of the poorer women who used to sell **milk**. Also with wood and bamboo, **cattle** dung has been a key domestic fuel: dung sticks may be sold by women to generate income. The shortage of these **sources** **has** thus increased the time **that** poorer women spend gathering fuel, and pushes them towards more and more **marginal sources**, **such as** leaves and bark of **trees**, which hastens further the destruction of **natural** resources. In general, **since** the installation of the shallow tube-wells and the deep tube-wells in Kumirpur, there **are** noticeably fewer common resources. The **canal**, which used to be a good source of fish, is now dried up much earlier in the **season**, by the use of STW engines **as** low-lift pumps (**using** surface, rather than ground water, to give much lower running **costs**). Fruit and vegetables that used to grow with little or **no** tending, now give much lower yields, due to **reduced soil** moisture. (...)

Not all side effects of irrigation **are** negative of-course. The increase in crops **means** for **example** that there is **more** straw available for fuel - though the new crops are predominantly shorter **stalk** varieties so the supply of straw **has increased less** fast than grain production. **Use** of straw for fuel has its **own** drawbacks, however. The fire **has** to be **fed** constantly so cooking **time** expands and quicker **flames** increase danger of injury. Also **straw leaves** nothing but **ash**, whereas the **charcoal** left by burnt wood could be sold to local blacksmiths and so used to provide women with a marginal income source. Formerly, the lower straw left **after** paddy was cut used to be burnt **in** the fields. The shortage **means** it is now used **as** domestic fuel and **this** denies **soil** restoration of some of its lost nutrients (White, 1992:49/50).

This example **leads** the author to the conclusion that “the ‘random’ unintended consequences (...) are **in** fact not random at all, but **show** a clear class and gender bias (Ibid, 1992:51). Chambers (1988:9) **also** clearly recognizes the class bias in discussing indirect **gains** and losses to the land-poor from irrigation. However, he just **mentions** **two** gender specific impact indicators, namely changes in employment opportunities for female wage laborers and changes in unpaid work-loads for women. This suggests **that** most of the other mentioned effects are gender neutral, which is not true. **How**

some of the indirect effects listed by Chambers are gender specific is indicated in table 3.1.

Other indirect effects of irrigation that are gender specific include the relation **between** irrigation and the **growth of** other crops and **trees**. Seepage from **canals** may **raise** the water table and unless **soil conditions** are such **as to increase salinity**, usually the effect **can** be expected to be positive in that it may stimulate the growth of fodder and trees. Women being **often** responsible for the provision of fuel wood, and sometimes for the care **of** cattle, are particularly affected by such changes. Canal irrigation may also replenish groundwater **used** for domestic purposes. In contrast, groundwater irrigation may have the opposite effects; lowering water tables and consequently reducing the **growth** of **trees**, fodder and other rainfed crops. A reduction in the availability in fodder may lead to a reduction in the **amount** of cattle, which in turn **will** affect the availability of cow-dung used (among other **uses**) as fertilizer.

Table 3.1 Gender specificity of indirect effects of irrigation

Gains	Gender Specificity
Return migration	Migration may be confined to one gender (see 2.6); young men are most likely to migrate
Lower food prices	Gender division in responsibilities; it may be either men's or women's specific responsibility to provide food
Non-agricultural uses of water, including uses that improve health	Gender division in responsibilities; women are often responsible for carrying water, washing, bathing children, and sometimes for watering cattle
Losses	
Increase in land prices	Differential access to and control over land of men and women; women's access to land is often mediated through their husbands or male relatives
Market competition between irrigated and rainfed farmers	Gender division of crops or fields; a possible division of rainfed and irrigated land or crops along gender lines. Differential access to markets.
Increase in water-borne diseases	Gender division of responsibilities; women being most often responsible for caring for the sick
Labor displacement	Gender division of labor; tasks being done predominantly by one gender being mechanized

Source: Adapted from Chambers 1988:9

The many direct and indirect linkages between gender and irrigation development are hard to foresee. They **will** be different in different cultural, institutional and environmental contexts and depend upon the **type of irrigation technology Used**. Even if it would be possible to come up with a model or framework which **incorporates** all potential intervening factors and underlying social **relations** which may **determine** the outcomes and effects of irrigation development (which is rather unlikely), it would be highly **time-consuming** and unpractical to **use**. Probably the most easy and reliable way to **start** identifying how gender **relates** to irrigation development is to ask male and female water **users** themselves to **evaluate** the outcomes and effects of irrigation.

3.4. Gender needs with respect to the outputs of irrigation

Some of the differential **interests** women and men may have **with** respect to the impacts of irrigation systems are reflected in differential **needs** with respect to the irrigation system's outputs. Output measures directly assess the **nature** and **quality** of irrigation **services** delivered to farm households, **services** which in **turn will** be important **in** determining production, income and other livelihood indicators; **Output measures** are thus critical to understanding the **connections** between irrigation **services** and its broader impacts. The **concern** here is with the criteria of male and female members of irrigating households to evaluate **outputs**.

Knowing and understanding the priorities and perspectives of irrigators, and possible differences or **conflicts** between those, will help to set realistic operational targets for irrigation systems. Operational targets are usually predominantly derived from the physical infrastructure of irrigation systems (cf Bos **et al.**, 1993). This may be **one reason** that these targets **are** seldom achieved: the **viability** of targets is not **just** determined by the physical infrastructure. The people who **manage** and **use** this infrastructure, as well as the **social** and economic relations between them **are** equally important **in** determining optimal levels of operational performance. Irrigation water **often** is a crucial productive **resource**, access to and **use** of which **will** reflect prevailing dynamics of power. Its impact on production **will** depend on who has **control** over it and how the people in **control** are using it; its **use** in turn **will** affect **social** relations (cf. White, 1992:51).

What are the **criteria used** by the **direct** users for evaluating the outputs of irrigation systems? Specific criteria **will** again depend on specific local, environmental, political etc. circumstances. Chambers suggests that farmers, in general, **can** be expected to be interested in the "delivery **to his or her** farm of an adequate, convenient, predictable and timely water supply for preferred **farming practices**" (Chambers, 1988:30). Svendsen and **Small** (1990) discuss, in more detail, a set of measures of irrigation service they judge to be of interest to farmers. The authors in discussing these measures focus **on** potential differences between farmers (whom they consider to be one person, instead of recognizing that farming often is a family undertaking) and managers and therefore, fail to recognize possible differences between farmers, let alone differences 'within farmers', or within farm households.²³

One fundamental remark on both Chambers' and Svendsen and Small's suggested criteria is that they limit their **attention** to the flow of water from the irrigation system to the agricultural enterprise'. While **this** may seem to be logical for those primarily **concerned** with agricultural production, it may be very **unlogical** from farm household members' **points** of view. This is **because**, and **as** earlier explained in the **second** chapter, **farm** household members are **often** engaged in a number of agricultural and **non-**

agricultural activities, including activities aimed at direct subsistence. For some, but not all, of these different **activities** water (derived from the *irrigation* system) may be relevant in different ways. It may be that irrigation water is not intended to be **used** for other purposes than irrigating main agricultural crops, the reality learns that is often is. Examples already referred to **concern the use** of irrigation water for domestic purposes, and for watering cattle. It was observed in Ecuador, **that** some households **used** almost **all** their irrigation water for poultry farming (Smit, 1988).²⁴

Keeping these shortcomings in mind, the criteria proposed by Svendsen and Small will be **used** here to illustrate how men and women possibly differently value *the outputs* of irrigation. If, **as** is often the **case**, the **various activities** of farm households are divided **among** household members according to their gender, it **logically** follows that women and men may differently value irrigation **services** and that irrigation differently relates **to** men's and women's individual well-fare. The list of possible differences given **below** is **by** no means meant to be complete. The main aim of **identifying** some potential differences is to show that they exist and to provide some pointers **as** to where they might **occur**.

The **first** set of measures Svendsen and Small identify are death-related measures: adequacy, equity and **timeliness**. Adequacy refers to "the average depth of water delivered over a season relative to some standard" (Ibid, 1990:393). Adequacy relates to the amount of irrigation water required, which is most often expressed in equations which balance the available water from rains and irrigation with the required soil moisture for optimal crop growth, sometimes with additional provisions for unavoidable percolation losses or leaching requirements.

Possible gender differences in judging the **adequacy** of irrigation **outputs** may first of **all** arise **because** of a gender **division in** crops, men being responsible for different crops than women. **This** was for example **observed by** Lynch during a visit to the **Uda Walawe** system in Sri Lanka. She **talked** to a female farmer who **expressed concern about** her chilli crop. The farmer **had** invested expensive inputs and time **in this** crop, **but** the plants **were** showing signs of **water stress**. She did not know when she could expect a **water** delivery, since rice (the main irrigated crop) was no longer receiving water and deliveries were less frequent. Her husband attended the meetings of the farmers' organization, **but** he was merely concerned with rice cultivation (Lynch, 1991:27). In Niger, women cultivate vegetables on plots separate of those of their husbands, where rice is **grown**. The rotation schedule for water deliveries **is based** on the crop water requirements of rice. When rice is ready for **harvesting**, water **deliveries are** stopped, despite of the fact that the vegetables **still need** additional water **gifts**. **As a result**, **women** have experienced severe losses due to withering of their vegetable crops. Like in Sri Lanka, most women in the Niger irrigation systems do not participate in the meetings of the **cooperatives** responsible for irrigation management (Dadi Fatima Massalacbi, 1993).

When the 'main' irrigated crops are the most profitable, these **can** be expected to be controlled by and **fall** under the responsibility of men. Women often contribute labor to growing **these** crops, but very often they will also grow **some** crops of their own. **These** crops are often meant for own consumption, but surpluses may be sold. When there is an opportunity of doing so, women will make **use** of irrigation water in growing these crops. They may take water directly from the **channels**, or sometimes they use drainage water. In the examples from Burkina Faso and Niger, specific plots were allocated for **use** by women. Since crops grown by women are not considered being the 'main' crops, or **because** it is not even **realized** that they are grown, their water requirements are seldom taken into account when devising water delivery schedules. In some cases, the **use** of irrigation water for growing crops other than the planned one, or for using water on plots outside the designed command

area, **will** even be considered illegal. The fact that most interactions between managers and farm household members **take** place with men obviously contributes to women's water needs going **unnoticed**.

Gender differences in irrigation needs with respect to adequacy may also occur **as** a result of a gender division in **tasks**. Water **can** substitute labor, **like** for example in the case of **pre-season** applications to soften **soil** for land preparation (Svendsen and **Small**, 1990:393). Land preparation is often done by men, which **means** that **pre-season** applications reduce the amount of male labor needed. Women may be expected to do the bulk of **weeding** in paddy cultivation. **Unless** they work **as** paid laborers, women are thus **likely** to be in favor of increasing the **ponding** depth which reduces weed growth. In Nepal, women **reported** that the increased **availability** of irrigation water had considerably reduced the time needed for weeding (**Backer**, 1992). For the same reason of reducing the amount of their labor needed, women may prefer that rice be broadcasted instead of **transplanted**. In **Sri Lanka**, like in many other **Asian** countries, **transplanting** is done by women and it is a physically very demanding **task**. Broadcasting is most often done by men. Water requirements in terms of amount of water needed, **as** well **as** in terms of the timing of water deliveries are different when rice is broadcasted instead of transplanted.

Some **uses** of irrigation water also substitute for expenditure on inputs, such **as** herbicides, rodenticides and fertilizer (Svendsen and **Small**, 1990:393). A gender division in resources may thus also be the basis for differing opinions between men and women on the adequacy of water deliveries.

Equity refers to the spatial distribution of water across the irrigation system. When water is short, both farm households and managers **will** have to address the **question** of how to distribute the available water among plots and farm households. **Equity** then **becomes** a measure of fairness of the **allocation** of the shortage. It is obvious that **notions** of fairness **will** depend very much on existing **social** and **economic** differences and power hierarchies. It may be considered **fair** that an influential farm leader receives a relatively larger **share** of water, for example. Also, farm household members may **take** local differences in **soil-moisture** holding capacity or seepage and percolation rates **as** valid reasons for differences in water deliveries (**Vermillion**, 1990:138).

A first and very direct gender difference with respect to equity may be that, justified by existing gender ideologies, female **irrigators** receive **less** water than male irrigators. **This** gender **discrimination** in water allocation **will** **often** not be very direct and open. It may for example be that crops grown by women may be considered less important and therefore receive less priority when water is **allocated**. Female heads of households in **Nepal** felt that they received **less** water than men. Because they were not supposed to **participate** in agricultural planning meetings, water allocation plans were made in their absence (Bruins and Heijmans, 1993).

Considerations regarding equity may **also** be valued differently by women and men **because** of differences in the nature and importance of social relations to men and women. In Nepal,

in Bhanjayang Tar Ko Kulo (canal) the head reach people initially **took** much interest in the improvement of the head reach section of the canal, but they were not concerned with the improvement of the **tail** reach **because** of local politics. There was a critical section in the canal from which most of the water leaked, requiring improvement if the **tail** end people were to receive reliable water. Some women from the head reach said to the head reach male farmers

that "if you do not further improve the canal, we females will do the job." This embarrassed the male farmers, resulting in further improvement of the *canal* in the tail end (Pradhan 1989:52),

Investments in extra-household social relations and networks may *carry* a specific significance for especially poorer women on at least **two** grounds. They tend to be more disadvantaged in relation to other more tangible forms of **resources** (see for example White, 1992). Furthermore, it may offer women a measure of autonomy from male authority within the household and *can* help furnish them with powers of persuasion in their dealings with men (Kabeer, 1992:12). It may therefore be that women place a higher value on fairness of water distribution than men do.

Different appreciations of timeliness, which relates to the distribution of water across the season relative to some utility-based standard (Svendsen and Small, 1990:395), may again **arise** because of a **division** along gender lines **between** crops. Potential gender differences may **also** occur **because** of male or female **labor peaks**; the availability of labor being the standard of utility **used**. In **traditional** swamp **areas** in **Gambia**, for example, women used to cultivate rice in stages in accordance with the **tidal** movement of the water, thus staggering their labor inputs. The new pump irrigation system which was **introduced** required **all tasks** to be done at one go, which was difficult to **realize** for the female farmers. While **minimizing peak** water **use** was the rationale of planners for timing water deliveries, the female farmers preferred to time water distribution **so** as to avoid labor **peaks** (van Hooff, 1990:7/8).²⁵

A second **set** of output measures discussed by Svendsen and **Small** are the farm management-related measures. Particularly important with respect to gender is convenience, which refers to preference **patterns** for **timing** of water deliveries (Ibid, 1990:396). Women may have some **specific wishes** with respect to the daily **time** at which to irrigate, **because** they have to plan their domestic and productive **activities** alongside each other. Some of those activities have to be done **at** a more or less fixed time of the day, **like** preparing the meals. As a result, women may have a different preference for the time to irrigate or to **work** on the irrigated field than men. In a **small scale** irrigated vegetable project in Senegal, for instance, even though a canal system for surface irrigation would have physically **facilitated** the task of irrigating and would have required the presence of the female farmers in the field only once in a few days, the women preferred a reservoir system which made it necessary for them to **go** to the fields every day in order to water the crops with **watering-cans**. **An important** reason for women to prefer the reservoir system was that it left them **free** to decide when to **irrigate**, without **having** to consult other women (Helsloot, 1990:10). In Nicaragua, there **was** a marked difference in the time women and men were willing and able to spend irrigating their fields: women preferred to **start** later in the morning than men, **because** of their domestic duties they had to perform early in the morning (Blaauw, 1992:60/61).

Night irrigation may be particularly difficult for women, **because** of social norms **which** prevent women to **go** out at night. In Pakistan, the few women that were directly involved in irrigation would send a male relative or neighbor when their irrigation **turn** was at night. If there was no other possibility, they would try to be accompanied by a family member or friend (Basnet, 1992). Also, in **Alto Piura** in Peru, women complained of the specific dangers they **had** to face when irrigating at night (van de Pol, 1992).

Of the third set of output measures, water quality related measures, women are more likely than men to place a high value on having access to irrigation water which is clean enough to **use** for domestic

purposes. It has been observed in Sri Lanka that, even though women used the water from the irrigation channels for daily purposes, this water was not considered pure enough to use for ritual bathing and religious purposes (Perera, 1989:90). Also, the health hazard presented by mosquitoes and snails which transmit diseases such as malaria, encephalitis and schistosomiasis (Svendsen and Small, 1990:399) may be felt more by women, since they are often responsible for caring for the sick.

3.5. Gender needs with respect to the process of irrigation management

In the past, when attention was paid to the organizational requirements which have to be met in order to fully exploit the potential of the irrigation system, these requirements were often deduced from the physical characteristics of the irrigation infrastructure, rather than from the social, political and economical environment in which the infrastructure is used. Users were expected to adapt themselves to the technology, rather than vice versa. More recently, the lack of direct interaction and dialogue with users, both in the design process (Vermillion, 1990a; Horst, 1983; Meijers et. al. 1990) as well as in the management process (Uphoff, 1986; Orstrom, 1990; Vermillion, 1990b) has been identified as one major cause for poor performance in irrigation systems. Increased users' participation in decision making and resource mobilization is now widely advocated as a means of improving irrigation performance.

Attempts to elicit more user participation in managing irrigation systems have, since the late eighties, often been part of

- “a more thorough-going approach – which is the turnover of primary management authority itself to water users' associations or other nongovernmental institutions. In response to poor management performance, financial pressures, increasing agricultural diversification and commercialization and increasing numbers of rural non-governmental institutions, many governments in developing countries are privatizing irrigation institutions and turning over their management to water users organizations, or other non-governmental institutions (Vermillion, 1990b:7).

Because addressing and accommodating gender concerns in irrigation can be expected to be more successful when user concerns are addressed and accommodated, and because of the many efforts all over the world to better and more involve users in irrigation management, the focus in this section will be on the potential gender differences with respect to participation in users' organizations. Looking at attempts to increase users' participation in irrigation management from a users' perspective means looking at whether and where men's and women's participation is desirable and possible. This will ultimately depend on how women and men evaluate the possibility of meeting their needs with respect to irrigation through formal participation, and it will depend on how irrigation professionals think that male and female users' involvement contributes to the overall performance of the irrigation system.

Evidence shows that if users' priorities are taken into account at all in irrigation management, the users' group will usually be thought of as consisting of men only. This is a reflection of the assumption that each farm household is benevolently headed by an adult male, who is able and willing to take all decisions on behalf of his dependent family members. The few irrigation management studies that focus explicitly on women reveal that in most cases women are virtually absent as official

members of irrigator's associations. The most important reason is that membership is confined to either official landholders or heads of households. Both criteria far more often apply to men than women. Only in cases where men are not or hardly involved in irrigated agriculture, women will be officially involved in water users' associations.

The most well documented case about women's relative participation in irrigators' associations comes from the Philippines. Here, the Irrigation Community Organizers (ICO's) in identifying prospective association members consider either the owners or the actual cultivators of land which will be served by the proposed system.

“Consequently, the membership rule which evolved considers only one member, often the male head, from each of the qualified farming households; thus at least 80% of the members of irrigators' associations formed in National Irrigation Administration (NIA)-assisted communal irrigation projects was male” (Ilo, 1988:29).

However,

“the ICO's have responded positively to alternative arrangements suggested by local communities. In the Mountain Province, for instance, several irrigators' associations insisted in having both husbands and wives as members representing their household in the association” (Ibid, 1988:29). One reason for this was that allowing both wives and husband to become members of the association allowed for more flexibility; either the woman, the man or both would then be able to attend the meetings. Another reason was that, even though agricultural decision making is very much a joint affair of both husband and wife, women and men have distinct domains of influence. As women most often control the cash-flow within the household, it was found that associations encountered problems when collecting irrigation fees, unless the women were involved in formulating policies regarding irrigation and membership fees collection schedules. Community organizers also learned that unless women were encouraged to participate, financial obligations of farming households could not be guaranteed (Ilo, 1990:).

The few women who occupied positions of leadership, held the posts of secretary and treasurer.

“The assignment of women to these posts was rationalized on the basis of their persistence, patience, and neatness - “female” attributes which association members considered as important for record keeping and financial management” (Ilo, 1988:34).

This experience of the Philippines is one where the involvement of women in irrigation management was judged positively, by women themselves, as well as by their husbands. Gender needs with respect to the process of irrigation management also proved to be compatible with the interests of the Phillipino irrigation agency (NIA), since meeting them obviously improved the performance of the associations.

Another rather well known example of women's involvement in irrigation management is that of Bangladesh. Here, some first impressions seem to suggest that the involvement of women in owning and managing irrigation equipment sometimes meets with the resistance of men. In Bangladesh some NGO's have initiated innovative programs to enable the landless poor to gain access to and control over irrigation equipment and water. Two of those NGO's (BRAC and Proshika) are actively testing

and developing programs to support **poor** women's ownership, operation and management of irrigation assets. While BRAC's program works with joint male-female groups, Proshika works with all-male and all-female groups.

All-women groups managing the irrigation equipment have faced specific difficulties; **two** groups were discontinued after a few years operating. **This** was at the insistence of their husbands, not because of profitability or mastery of **operations**, but because of various social resistances and **constraints** on their mobility. Their husbands **took** over the shallow tubewell operations, while **encouraging** their **wives** in more "appropriate" or "traditional" occupations such as livestock rearing. Also, women faced difficulties stemming from their dependence on male relations to harvest and collect crop-share revenue for water in the farmers' fields, and to help them sell the paddy in the **market**. This sometimes undermined women's ability to directly control the financial **aspects** of the operation (Jenkins, **M.**, 1991:2/3).

These Bangladesh's efforts to directly address and involve women **in** tubewell ownership have not **been** carefully documented or evaluated so **far**, and unfortunately **no** attempts have **been** made yet to study **the nature** and degree of women's involvement in the mixed groups in a **systematic way**²⁶. However, first **impressions** suggest that women cannot expect to benefit **fully** from the programs, **unless** their structural position within households and within society is strengthened. Unlike the Philippine **case**, directly addressing and involving women in the ownership and management of irrigation equipment in Bangladesh **seems** to challenge existing gender relations. It is a situation where meeting a practical gender **need** of women, that of having access to irrigation water (or more broadly that of gaining an income), seems to be conditional upon more structural change in gender **relations**.

There exist a few examples that suggest that the absence of women in irrigation management activities might have **been** a factor in the poor performance of irrigation systems. A study carried out in Indonesia **suggests** that a major **reason** for the **poor functioning** of water users' associations was the fact that the **official** members of the **association** - the male '**heads** of the household' - were not the actual irrigators and farmers. Their wives **often** performed most of the agricultural and irrigation management activities, while the men were away for long **periods** of the year (Schrevel, 1989). In Nepal, in the Baurahua Irrigation System in the Terai, the absence of women in the pre-seasonal **planning** meeting **led** to inefficiencies in the water distribution. Female farmers were sometimes not **aware** of their **turns**. Acknowledging this, the male farmers took the initiative to invite **women** as well to the meetings (Bruins and Heijmans, 1993:31). In Burkina Faso, the failure to incorporate women from the beginning in project planning and construction of the irrigation infrastructure, **on** the pretext that women did not own the land, made women (who were the actual cultivators) reluctant to do the maintenance. They feared that their husbands would confiscate either the land or the **proceeds** of the harvest (van **Koppen**, 1990:10).

Even though women may be absent in water user's associations, and are not recognized as water-users by irrigation managers, they may be able to defend their interests and meet their **needs** in 'informal' ways. The **success** of 'informal' ways of influencing decisions may even be another reason for women not to be willing to participate officially in male dominated farmers' associations. Bunker and Seligmann found women playing a crucial role in surveillance and conflict management in a small scale system in the department of Cuzco (Peru):

"For the most part, women control the **canals** while their husbands and other male relatives imgate, and it is not uncommon to meet a grandmother walking above and below the canal

with a large stick in her hand and a ferocious look. Men explain that women play this role because men have to respect each other and not fight. But, as all the men are in agreement that the women should control the ditch, the women fight among themselves like cats and dogs.. Full negotiations take place at the side of the canal, but even when it seems that they have reached an accord, as soon as the petitioner goes his way, the other opens the gate again" (Bunker and Seligmann, cited in Lynch, 1991:42).

Another study in Peru gives women's own explanation for their important role in settling water related conflicts: "Since we don't have money to pay for a water guard, we do it". Women also thought that they were more astute in settling conflicts than men, "because we can talk in a good way". Men stated that women are likely to have more success in settling conflicts, because men will *not* easily start to fight with women. Men also related it to women's overall responsibility for maintaining social networks (van de Pol, 1992).

In a study concerned with women's roles in irrigation management in India, it was found that female and male villagers situated at the tail end of a distributary organized themselves in order to secure a reliable supply of water. In one case, men surveyed the upstream sections of the distributary, while women worked together in the field to apply water to the crops. In another case it was the women who performed the task of guarding the water in the distributary, while the men worked in the fields (UMP, 1991).

Another way women may try to exert some influence in irrigation decisions is through participating in maintenance and construction activities. One reason for women to be willing to contribute to construction and maintenance activities may be the anticipated greater say about the use of the irrigation system. Pradhan for example observed that

"in well-organized systems in the western hills (in Nepal), the organization encouraged women to do sand, gravel and stone collection for wages" Women said the most important reason for them to participate was the need to earn some extra income. Some women were also anticipating the benefits: greater agricultural production with irrigation, ownership of the canal; reduced canal maintenance; improved water supply for cattle and washing clothes and dishes" (Pradhan, 1989:51).

In Burkina Faso, women worked alongside with men on the perimeter, men breaking earth and women shoveling it into wheel barrows and hauling it away.

"Women's participation is motivated in large part by their desire to bring more land into communal garden cultivation, but also in part by their interest in getting assistance to purchase more basic gardening and construction equipment --wheel barrows, hoes, fencing to keep animals out of garden plots, watering cans for hand irrigation" (Lynch, 1991:24).

While women may anticipate future benefits from their participation in construction activities, participation in construction in itself doesn't guarantee that women benefit from the irrigation system. An example from Nepal documents women's dissatisfaction with the fact that their contributions to the rehabilitation work did not lead to an improved access to and availability of water. More water would have reduced the competition for water with men, in which women have a weaker bargaining position." (Bruins and Heijmans, 1993:25)

Sometimes women have their own, often informal, organizations where they organize and discuss **matters** of relevance to them, which may include **issues** related to irrigation. In the **Muda irrigation** scheme in Malaysia, for **instance**, many **poor** women had organized themselves in labor groups. The character and organization of the **groups** varied. At one extreme was a group of older women who only worked **on** one mother's farms. At the other extreme were two **highly** commercialized groups of landless and very **small** landholding women who functioned primarily **as** labor gangs working both inside and outside the village. In between were two groups comprising women **from medium** to small-landholding households who mainly worked on one **another's** land but who also did a **certain amount** of contract work for wages (Hart, 1992:820-821). In the hills of Nepal the organization of literacy classes, which were attended by women only, provided a forum for women where they discussed problems of mutual **concern**. In **some** villages these included irrigation matters (Backer, 1992).

Even though the informal ways of solving **conflicts** and **settling** matters sometimes may be quite **successful** from the point of view of the irrigators, the fact that women are not formally included in water **users'** organizations certainly is one factor which contributes to the myth of women not being interested **and/or** involved in irrigation matters. The recognition of informal decision-making mechanisms **and organizational structures is essential** for realistically planning and devising **institutionalized** forms of farmer participation in irrigation management.

If (increased) participation of female water users is considered beneficial or desirable, the question **arises** of how this *can* best be achieved. Just allowing women to become members of water users' organizations **will not necessarily** guarantee their equal and **full** participation, and may thus not in every **situation** be the most effective way of achieving sustainable local management. Organizations which **function** for men, are not **necessarily** successful for mixed or **women-only** groups. **This** is best **illustrated** by examples from female heads of households, who are officially entitled to join irrigators' associations.

In Nepal female heads of irrigating households **often** preferred to send a male relative **as** a proxy to the **meetings**. If women did attend the meetings, they only listened. "Decisions are made by men and women must follow these" (Pradhan, 1989:53). In Sri Lanka

"participation by female landholders in the Farmer Organizations is seen largely to be passive. Many women landholders reported that they are sometimes represented by their sons or husbands in the Farmer Organizations. When women need to present some problem, they usually do so through a male Farmer Committee colleague (IMI, 1992: III-4).

Also in Niger it **was** observed that female irrigators, although they were formal members of the **users'** cooperative, they did not attend meetings. Many women were not even aware of when and where meetings were held, and they knew the cooperative only **as** a body which **looked** after the **collection** of the irrigation fees.

These examples show that the effectiveness of users' organizations may sometimes not be very high for women. Women themselves will often acknowledge **this**, and report the difficulties they have in having their irrigation needs **fulfilled**. One female irrigator in the Minneriya irrigation system in **Sri Lanka** related that although her male farmer who cultivated the field adjacent to hers was good enough to **represented** her interests at farmers' meetings, she had to pay for it by allowing **him** to gradually encroach **on** her land. In Peru, women complained that they were always given the most inconvenient **times** for irrigating; one **woman stated** she always **had** to irrigate at night. While in principle irrigation

turns are distributed **among all** irrigators in such a way that every irrigator has the same amount of night shifts, **in practice** men are able to negotiate the timing of water gifts (van de Pol, 1992).

In the Baurahua irrigation system in Nepal, water is allocated and distributed according to an on-demand system in wintertime, and according to a scheduled rotation system during monsoon. Both male and female irrigators preferred the on-demand rotation, because this ensured them of an adequate and timely water supply. However, during ploughing and transplanting (when there is a **peak** demand for water) women found it more difficult to bargain for convenient water supplies than men. Women did not expect much from participating in the water **user** group; they **feared** that men would not listen to them. One woman suggested that maybe women should organize: together they might succeed in having more **influence**. Although women also preferred the on-demand rotation, they also clearly saw an advantage in the scheduled rotation system: the guarantee of getting water, without having to go through the hassle of negotiating for it (Bruins and Heijmans, 1993:49).

Attending meetings and discussing **matters** may be thought of **as** 'male' activities, associated with **political** gatherings which are often traditionally confined to men. Women are often not expected to speak in front of men or in public. Women's **own** attitudes **as well as** those of their male colleagues thus may inhibit open exchange of information. In contexts other than irrigation, the fact that women are not used to **speak in** public, or that they do not want to raise their voices in front of men has often been described **as a** factor inhibiting women's equal participation in decision making processes. According to Moser:

"The spatial division between the public world of women (where the neighborhood is an extension of the domestic area) means that men and women undertake different community work. While women have a community managing role based on the provision of items of collective consumption, men have a *community leadership* role, in which they organize at the formal *political* level generally within the framework of national politics." (Moser, 1989:1801).

An often advocated way to include women's views in decision making processes is to set up special women's organizations. The ideological barriers women face when they are together with men in public meetings are removed in these organizations. A successful attempt to **better** include women in water-users' organizations in Indonesia started with organizing women separately. **Special** training sessions were organized, both for female water users as well as for field agents and other officials. Special female field staff were also appointed and trained. This made women gain confidence and helped them to overcome some of their initial reluctance to attend 'male' meetings (van Dok et.al., 1992).

Special women's organizations can be very useful for helping women to articulate and define specific needs and interests and in recognizing their gender specificity. If the nature of women's needs vary greatly from those of men, for example because women grow different crops or because women are mainly interested in non-agricultural uses of water, it may be more appropriate to create a distinct forum where women can meet and discuss. However, a danger of these organizations is that, unless they have the same legal status and power as men's organizations, they may tend to exclude women even further from mainstream decision making processes ²⁸

It is often argued that an important reason for women not to attend meetings is that they are too busy with other activities. However, even though women may face severe time-constraints, evidence has

shown *that* if women **feel** that their attendance **is** useful they will manage to accommodate time for meetings (Ilo, 1985:43). It may however be *that* certain times for meetings do not pose problems for men, while they do for women **as** a result of their domestic duties, or as a result of social norms which **tell** women not to go out at night.

Another problem may be ~~that~~ women are less well educated than men are. Often, many **more** women than men are **illiterate**, which makes it **difficult** for them to make use of any written information. **Being illiterate** may **also** add to women **feeling** incapable and insecure, and in itself it is often a reflection of a gender ideology which places a higher value on intelligence and leadership qualities in men ~~than~~ in women.

The fact that field agents and irrigation managers are predominantly men may be another factor which inhibits open exchange of information between them and women. In the Philippines the relatively large number of female **Irrigation** Community Organizers has been identified **as** a factor contributing to the community's acceptance of women **as** leaders in the irrigators' associations. However, the relation between the **sex** of the field-agent and the frequency and efficiency of communication ~~with~~ female farmers is not **as** obvious **as** is **often** assumed".

In summary, it *can* be expected **that** in many situations the perspectives of men and women on participation **in** irrigation management differ. This is so first of all **because** the nature and degree of their interests and **needs** with respect to irrigation differ, as has been illustrated in 3.4 and 3.5. Female and male perspectives may also differ **because** men and women have different perceptions *on* the costs and benefits **involved** in participating in users' groups. The attractiveness of participation may be less for women, because the **costs** and time spent for travelling or attending meetings may be relatively higher **for** them, but **also** **because** social norms and values are not always supportive of women engaging in public meetings. **Qualities** for being an active and vocal member of irrigators' groups may be valued in men, but considered inauspicious when found with women.

4. Conclusions and implications for irrigation management

The previous chapters provide a broad list of issues and matters that deserve attention when looking at irrigation management from a gender perspective. The presented evidence suggests that there is considerable potential within irrigation systems to improve efficiency as well as equity by paying better and more attention to gender.

A very first and fundamental step towards realizing this potential is the introduction of a more user oriented approach. This basically requires a change from a way of looking at water users and irrigators as mere instruments in realizing goals and objectives formulated by planners, policy-makers and engineers. Instead, water users need to be recognized as actors who actively and rationally modify and shape their technical and socio-political environments in order to optimally make use of the services provided by the irrigation system.

Inherent to a more user oriented approach is the acceptance of diversity. The group of water users is a diversified group. While most irrigation professionals and managers are aware of and do account for differences between water users based on different locations within the irrigation system (head-end tail-end), other differences that affect the ways in which people use water tend to be overlooked. Gender is a potential source of difference which cross-cuts all other social distinctions.

While a user oriented approach does create the necessary room for gender issues, by itself it does not guarantee that all gender aspects and issues are adequately recognized and addressed. Evidence so far shows that persistent biases exist which prevent irrigation planners, engineers and managers and even water users themselves to recognize women as users or customers of irrigation systems. This concluding chapter will start with summarizing some of the biases that appear to be inherent to normal irrigation thinking.

The ability to recognize gender biases thus can be seen as the second important step towards improving the performance of irrigation systems. Improvements will partly stem from a more realistic assessment of optimal performance levels and partly from better recognizing and accommodation specific needs and constraints women water users may face. The second section of this chapter will deal in more detail with potential gender contributions to irrigation performance.

One crucial question when dealing with gender is whether and how women can be expected to benefit from (changes) in irrigation or its management. Policies and interventions taking prevailing gender relations into account may inadvertently help to sustain or even reinforce existing inequalities between women and men. The potential trade-offs between gender equality and high performance are explored in the third section of this chapter.

4.1 Gender biases in irrigation thinking

Certainly the most persistently wrong assumption in much development and irrigation planning is that of the unitary household. Households are typically conceived as consisting of a male farmer, his wife and a number of children. The male farmer is thought of as being the manager of all household and farm resources; and he is normally conceived and addressed as the single focus of decision-making and

as the person to whom all costs and benefits accrue. While it is acknowledged that the male farmer's wife performs certain tasks in irrigated agriculture, her position in the farm is generally referred to as that of her husband's assistant. She helps her husband whenever a need arises, her main occupation being that of a mother, cook and housekeeper.

The examples have shown that this picture seldom reflects the reality. There are a number of assumptions derived from the use of the unitary household model for irrigation planning purposes. When rejecting this model, these assumptions automatically also need to be reviewed.

1. Raising male farmers' incomes (through improved irrigation facilities and services) leads to improved well-being for himself as well as for this family. Or: the male farmer is the main (or sole) provider and income earner.

This assumption basically asserts that household expenditure patterns are not affected by who in the household earns the income. Examples provide evidence of the contrary, showing that women and children do not always and automatically benefit from increased incomes controlled by men. It is widely-perceived that men tend to spend some of their income on goods for their own personal consumption, whereas women's personal incomes are usually fully committed to meeting household needs. This does not necessarily reflect selfish behavior of male family heads, but illustrates differential powers and responsibilities of women and men within rural households.

The importance of women's contributions in meeting rural household's needs are now well documented. Women may be co-breadwinners, either working together with their husbands on collective household fields or pursuing their own independent income and food generating activities. Women's independent income generation often helps ensure stability and income for the household, which is particularly important if men's breadwinning ability is problematic. In addition, in some countries where there is a high rate of divorce-or abandonment, women are particularly motivated to secure control over household expenditures and to maintain an independent income.

2. Farm household resources and labor are effectively controlled and allocated by the male household head. Or: male household heads can mobilize family labor and resources for irrigated farming.

Irrigation planners have been generally unwilling to champion principles that might reduce the availability of family labor. The allocation of land to both male and female household members, viewed from this perspective, is a possible threat to the availability of unremunerated women's labor for the cultivation of irrigated crops.

The examples show that appropriating women's land or denying women access to cultivation resources is no guarantee that their labor will be forthcoming. A husband's ability to mobilize his wife's labor, at least in many parts of Africa, seems to be contingent upon the remuneration he offers her, and on her relative bargaining power to resist his claims to her labor.

In highly patriarchal societies like Bangladesh and Pakistan a male household head is often the norm, and the word of the male is law. Even here, many women will try to secure some individually controlled resources and incomes. In other societies, like the Philippines, the norm is that of couples making decisions jointly. There may be specific domains of female or male influence. Women may be particularly involved in the selection of seeds and other inputs, the amounts of fertilizer and

chemicals to purchase, or in deciding how much the household could pledge to irrigators' associations.

The willingness of farm household members to invest (more) time and resources in irrigated farming does not only depend on the viability and profitability of irrigated farming as compared to other available alternatives. It will also depend on their individual interests and strategies. Any household members' willingness and ability to increase their contributions will depend on the extent to which they **can** expect to benefit from it, which in turn is often (at least partly) a function of their bargaining position within the household.

3. Rural household are composed of two able-bodied adult members (one male and one female) and a number of children.

The composition of households, and of its constituting consumption and production units, varies widely across regions **and** countries. **As** a consequence, the 'household' is not necessarily a decision making unit, controlling production, consumption and investment decisions. Consumption units may crosscut the boundaries of residential units and neither may correspond to a cooperative unit of production. Furthermore, production, consumption and investment patterns will not only adapt to changing economic opportunities but will also vary according to the household life cycle, migration of some members and the incidence of polygamy.

A wide range of different domestic and productive arrangements exist, which are difficult to grasp by using the term 'household' without clearly specifying this term.

What seems to be pertinent almost all over the world is the increasing number of single-adult households. Intra-household conflicts over the remuneration of female labor, the decreasing profitability of (irrigated) farming and other reasons have generated the migration of especially young men from rural areas to towns, and even to other countries. Their number **is** high enough to suggest a 'feminization' of agriculture in some countries. The consequences of this trend have not been adequately studied, but the economic cost may be high when, as is often the case, it is less easy for single women to mobilize land, labor and capital inputs on the same terms as their husbands or married households.

4. The labor of wives of male farmers is confined to assisting their husbands on his or family fields, in addition to domestic or reproductive **tasks**.

While it is true that wives of male farmers often contribute labor to the cultivation of the 'main' crops, very often women also pursue some independent income generating activities. These may include agriculture, livestock, crafts or wage labor activities. Women's work has tended to be forgotten, because many goods and services provided by women do not pass through the market. These include goods and services for **own** consumption, but also those traded **in** informal markets.

The distinction **between** productive and reproductive activities is often problematic. Many productive activities are (partly) geared towards meeting household food demands, and can thus be considered reproductive. Reproductive activities, on the other hand, sometimes generate services or products that are sold in formal or informal markets. **Also**, women may be responsible for providing food for hired laborers.

Referring to the work of wives of male farmers as 'assistance' helps to underestimate the amount of labor they actually contribute. Wives and daughters may contribute routinely to the production of family food supply, or they may only work during peak labor seasons. Many adult women also participate in managing the **total** farm operation. The perception of wives as 'helpers' also neglects the fact that farm decisions may be taken jointly by husband and wife, or that there may be specific tasks or domains which fall entirely under the responsibility of women.

5. Irrigated agriculture **is** the main and only income and food generating activity of farm households. **All** available household resources and labor will be allocated to irrigated agriculture and the main objective of irrigated farming is *to* maximize the returns to these resources.

Very often irrigated agriculture will only be one of a number of income and food-generating activities farm household members are engaged in. In some cases, (the, Gambia, Cameroon) women pursue their own farming or off-farming income generating strategies. **In** other cases (Senegal, Nepal) irrigated farming is 'subsidized' by incomes from off-farm employment and only serves for meeting the household's consumption needs. **In** Pakistan and Sri Lanka, irrigated farming is often a very important **source** of income and food, but it hardly ever is the only one. Vegetable gardening, cattle rearing and various off-farm jobs often supplement the process from irrigated farming. The various activities performed by the different male and female household members are interlinked and interdependent; the proceeds from one activity being invested in another activity, for instance.

Much of the land and labor of farm households may be devoted to subsistence production - to food, clothing, and equipment that are consumed without ever passing through the market. **An** understanding of **farm** household behavior needs to take these outputs of the farm enterprise into account. Since much of women's work **is** occurring in this usually invisible subsistence domain, the inclusion of production outputs for subsistence in farm household analysis will help *to* make women's productive work more visible.

4.2 Potential gender contributions to improving irrigation performance

Unless there is a clear potential for improving the performance of irrigation systems, irrigation planners, policy-makers and managers cannot be expected to be interested in changing their thinking and behavior, their procedures and practices. Where and how, then, can gender analysis and gender awareness be expected to contribute to better performance?

1. At the sector level - which is constituted of policy makers who are concerned with overall performance of the irrigation sector vis a vis other sectors - the recognition of gender based' patterns of agriculture production will contribute to realistically determining objectives of irrigation interventions, and to creating the most suitable conditions for achieving these objectives.

It is at the sector level that investments in irrigation, as compared to investments in other sectors, need to be justified. Investments in irrigation infrastructure are usually justified by anticipated rises in production of either food or cash crops, which in turn are thought to contribute to broader objectives of reducing poverty and economic inequality.

Yield *or* production increases to be achieved through irrigated interventions are often over-estimated. One contributory cause are wrong, gender biased, assumptions about users' behavior. The availability of unpaid family labor may for example be over-estimated in situations where women have separate income or food generating activities and distinct responsibilities towards the family. The expected impacts of irrigation on rural well-fare may be misjudged when the roles women have ~~in~~ mediating household income ~~are~~ misconceived. The expected contribution of irrigated **food** production towards meeting national food demands is likely to be optimistic when returns to male labor are higher outside agriculture and when women cannot easily mobilize resources for making optimal use of available irrigation facilities.

At the same time, irrigation interventions are likely to generate a number of changes which are of particular relevance to women, but which are often overlooked partly because of gender blindness. These include positive changes, such **as** the increased and easier access of women to water for domestic uses and watering cattle; ~~the~~ possibility of using irrigation water or drainage water for irrigating homestead crops; or the indirect effects of irrigation on the growth of fodder and trees. When these positive effects of irrigation are not recognized, irrigation water used for these purposes or generating these effects may inadvertently be accounted for as losses.

Some more negative effects of irrigation interventions will also become more easily recognizable when focussing at gender. These include for example the increased incidence of water borne diseases; or changes caused by a lowering of ground water tables due to groundwater irrigation, such **as** a reduction in the growth of fodder, vegetables and trees.

Prevailing gender relations thus structure the outcomes of irrigation development, and acknowledging this will help in more realistically assessing the long-term physical, economic and social sustainability of irrigation systems. **A** focus on gender will also highlight changes induced by irrigation interventions that normally escape the view of irrigation professionals, but which are crucial to the livelihoods of households living in irrigated areas.

2. At the agency level - the various institutions which share responsibility for management of inputs and services that support the farming community - gender issues that repeatedly turn up relate to the differential access women and men have to productive resources (including land); support services and education. Even if the irrigation services delivered by the irrigation system meet the specific needs of women, women will be in a worse position than men to optimally make use of these services. Especially the fact that women often do not have official land use rights makes it more difficult as well **as less** attractive for them to invest labor and resources *in* irrigated agricultural production. Land titles may also be required for obtaining credit, or for being recognized **as** official members of water users' organizations.

Also, women often do not or hardly meet with agricultural extensionists; they are hardly ever invited to participate in agricultural training courses. Extension services are often not geared to crops grown primarily by women *or* to cultivation practices preferred by women farmers.

3. At the irrigation system's level a more gender sensitive approach can help to make the flows of water, information and resources up and down the system more effective. By recognizing who does what and why, water and information flows can be targeted more precisely to the category of people who are responsible for turning water into agricultural products. Likewise

the provision of support services will be more effective when tailored to the needs of the category of people with the greatest interest in using the services.

Normally information, resources and water flows are mediated through men, even when women are more knowledgeable or involved in certain tasks or decisions or when they are the ones most affected. Since women and men **do** not automatically have the same priorities and interests, it is unlikely *to* expect that decisions made by male farmers accurately reflect an intra-household consensus. Information or resources given to men will likewise not always automatically reach women. The reverse is also true: irrigation officials **are** often not aware of crops planted, or of the timeliness and adequacy of water supplies in the field when crops or specific **tasks** fall under the responsibility of women.

Recognizing and accommodating differences between water users based on gender at the irrigation system's level simply **starts** with asking whether women and men differently use water, either for plants or for other uses. **As** has been illustrated in the third chapter of this paper, differences in water needs between women and men do exist. These may be the result of women and men growing different crops or cultivating different plots of land; of gender divisions of labor, responsibilities, resources and rights; and of differential access women and men may have to support services. In some instances not recognizing the gender specificity of water uses directly affects levels of agricultural productivity, like in the discussed examples from Africa where the expected female labor was not forthcoming. In other cases, gender specific irrigation needs of women may refer to crops or plots of land that are not officially included in the irrigation system and its management. **As** a consequence, they may be considered irrelevant or even conflictual *to* meeting the system's performance objectives. Even though denying women the access to irrigation water **for** their specific uses may thus seem to improve water use efficiency, it will often have important trade-offs, for example in terms of a decline in productivity of other crops; the time women need to spend on collecting water or fuel; or in terms of health or environment.

Sustaining gender biases in irrigation policy, planning and management can thus be functional for the achievement of performance objectives stated in the irrigation system's level, but at the same time dysfunctional for the achievement of development objectives expressed at other levels, or by other interested parties. The major implication of this for irrigation management research is that it must encompass the analysis of institutional and organizational cultures so as **to** explore whether these allow enough room for both male and female water users to voice their concerns.

Potential irrigation contributions to improving gender equality,

The specific needs women may have with respect to irrigation are embedded in or derived from the everyday situation ~~that~~ women find themselves in. The satisfaction **of** these needs will be more feasible when compatible with the broader objectives of the irrigation system. However, even though meeting identified gender needs may be evaluated positively from *an* irrigation point of view, *to* what extent can the satisfaction of women's irrigation needs be expected to reduce gender inequality?

While this question may seem to be of little direct relevance to irrigation managers and other irrigation professionals, the evidence especially from Africa shows that when irrigation projects directly or indirectly undermine women's bargaining position within households, this influences the longer term

effectiveness of the project. The failure to anticipate and accommodate the effects of changes in gender relations on irrigation system's objectives may therefore not only work against issues of moving towards conditions of equality **for** women, but also cause an apparent failure of the irrigation system to sustain its performance objectives.

At the same time donors and funding agencies are placing more and more emphasis on objectives of gender equality, **or** empowerment of women. Within the context of irrigation this has resulted in a proliferation of small projects, working either with women's groups in isolation or focusing on women **as** a discrete component separate from other project activities. Irrespective of the success of these WID projects, a recurrent problem is that the ways in which the 'mainstream' irrigation interventions interrelate with relationships between men and women remain to be neglected. Consequently, those gender issues that directly affect and are affected by irrigation, or its management, are unrevealed.

Changes in irrigation management, practices or policies need to be analyzed within the broad social context in which they are implemented. Since gender relations **are** one significant determinant of this **context**, **an** analysis is incomplete without exploring the linkages between changes in irrigation and gender. This **also** implies that an analysis of gender relations by itself may obscure rather than **illuminate** when not supplemented and integrated with an analysis of other social, economic and political differences. Gender differences and conflicts are present everywhere, but will not have the same nature, nor the same priority in all settings and for all people.

Any assessment of the quality enhancing, or empowering, potential of irrigation necessarily **starts** with realizing that irrigation is only one component of society. Gender, and other social and political relations, are present everywhere and not just in irrigation systems. Many of the gender imbalances **within** irrigation systems are a reflection of gender imbalances in wider society. **As** a consequence (changes in) irrigation alone can hardly be expected to redress these imbalances. On a practical level this means that improvements which help to better meet women's direct practical irrigation needs will need to be backed by awareness education or other kinds of changes and support if strategic goals, which mean women conceptualizing and challenging their social positioning, are to be met. It also implies that creating more possibilities for women within irrigation systems will often be conditional upon changes in other sectors. The official recognition of women **as** irrigators and cultivators within the irrigation sectors will **for** instance have little impact if women are not entitled to land and if they have constrained access to credit and other support services.

While irrigation interventions by themselves will do little to challenge prevailing gender inequalities, it is possible that irrigation related interventions provide a starting point for addressing these inequalities, at least at the field level. The reality of every intervention aimed at empowerment is that it will have to **start** with concrete activities that are geared towards meeting very immediate and practical needs. If the most important practical needs, as identified by women themselves, relate to irrigation there is a definite scope for mobilizing women around irrigation matters. This is for example likely to be the case in situations where, because of male migration, women have become more responsible **for** agricultural and irrigation matters at the field level without being, as yet, involved in irrigation management decision making. Institutional changes which given women better opportunities to participate in the process of irrigation management will then support the already on-going changes in gender relations. In such a situation, empowerment **of** women can even be considered a condition for achieving irrigation performance objectives: unless women feel confident enough to meet with officials or discuss their needs and problems at official meetings, flows of communication, water and other resources can be expected to be inadequate.

Other concrete examples of opportunities for women's empowerment that can both be identified as well as realized within the irrigation context are for example the official recognition of women's uses of irrigation water, which would provide women with official rights to water. In theory, a greater certainty of getting water for specific purposes (like watering homestead crops) may induce women to invest more in these activities, and thus to earn more income.

On the other hand, it is possible that meeting the direct gender needs of women with respect to irrigation undermines their long term strategic interests. They may be so because the needs expressed by women derive from the activities and enterprises that they are currently involved in. These are themselves a manifestation of an existing culture which often both reflects and determines the way that women perceive themselves. It may for example be that meeting the needs expressed by women for improved access to good quality irrigation water for domestic uses sustains the image of women as mothers and domestic caretakers and helps to underestimate their roles as producers.

Addressing questions of gender inequality, either directly or indirectly, is bound to meet with conflicts and resistance. At policy levels objectives of increasing the power or status of women are sensitive to the interpretation that men will lose out in the process. Also, it cannot always be expected that women themselves have an interest in interventions that challenge the existing political or social order. In the South Asian context for example women generally have very constrained access to material resources outside the familial domain. Women's well-being is closely tied to the prosperity of the household collectively, which makes that their long-term interests may best be served by subordinating their own needs to those of the dominant male members of the household.

In summary, the question of how irrigation interventions can reduce gender inequality is not easy to answer. Although there will often be some very clear linkages between irrigation and women's well-being, in the final analysis it is women themselves who will decide about their willingness to challenge existing gender relations. Specific changes within the process of irrigation management can sometimes lend support to this process of empowerment.

For a more detailed discussion on how to understand and conceptualize 'the household' in the context of farming, see for example Folbre (1986) and Haney and Knowles (1986). Political economy approaches to intra-household dynamics are discussed by Mies, Bennholdt Thomson and Von Werlhof (1988). Long (1984) in a discussion about non-wage labor, also discusses women's domestic labor and its importance for farm production. Also Whatmore (1991) gives a detailed summary of theoretical concepts and tools for interpreting family farms in the introductory chapters of her study on farm women in England. Frank Ellis (1988) proposes some simple tools to incorporate intra-household dimensions into the economic analysis of farm production.

2. Using a single utility function is preferred, because economic relationships between people within households are not mediated by prices (Ellis, 1988:175).
3. The underlying conceptual notion is that household members subordinate their individual inclinations to the pursuit of common household goals. This supposition would require altruism as a behavioral trait within the home, or the household being ruled by a benevolent dictator (the family head) who sets the goals of the family in the interests of the family as a unit. For empirical and conceptual critique on these assumptions see for example Nancy Folbre (1986).
4. Almost all settlement schemes provide a similar picture with respect to the changes in gender relations. For other examples than the two described here, see for example Chimedza R. (1990) (Zimbabwe); Conti, A. (1987) (Burkina Faso); Bernal, V. (1988) (Sudan); Jackson, C. (1985) (Nigeria).
5. The Mwea project was longtime considered one of the more successful irrigation projects in Africa. The authors of this particular study, which was published as early as in 1974, state that: "it is our contention that the unsatisfactory recognition of women's rights and needs within the Scheme remains one of the greatest weaknesses of the 'Mwea system'. It is our doubts about this central aspect, so important to the long term welfare of Mwea families, that has led us to question (...)whether the Mwea pattern ought to be replicated elsewhere" (Hanger and Moris, 1974:244).
6. Even though these enterprises are being referred to as "family"-enterprises in the study, it seems very likely in view of the described context of hardship for women that they also started their own individual enterprises.
7. Unlike in some African situations, in Sri Lanka there is no very strict gender division of crops. Millet is called a 'female' crop because of the relative large labor contributions of women to the cultivation of this crop as compared to male labor contributions. For the same reason, paddy is called a 'male' crop.
8. This short description is a somewhat rough generalization of gender patterns of responsibilities and powers found in Sub-Saharan African countries. The reality is of-course always different from this general picture.
9. In the project's first year (1984), average dry season pump-irrigated yields were 7.5 tons per hectare. In the 1985 and 1986 dry seasons they averaged 5.7 tons.

10. In this area, women are permitted to and, in fact, do register for fields in their own names; about twenty percent of the women in Vele had a rice field in their own name.
11. See for example Risseeuw (1990) who describes how female coir workers in the South of Sri Lanka have developed a strategy to hide part of their income in several places in the house. When their husband claims her money, she will show him only one **of** the hiding places, pretending it is the only **one**. Similar examples have been described for Bangladesh (White, 1992) and India (**Rama Devi K.**, 1992). The very fact that women have an interest in keeping the exact amount of this income secret implies that it will often not be reflected in estimates about household incomes.
12. *Purdah* refers to the practice of female seclusion. It is a social institution dividing the public male sphere from the private female sphere of life, excluding women from both the economic market place and political decision making. While *purdah* **is** most often associated with Islam, the seclusion of women from public life is found among non-Muslim communities as well (Shaheed, 1991).
13. The impact of new irrigation facilities on women from landless families was different, see Stanbury (1981) for the details.
14. See for example Sirisena. This study shows that the total participation of women in paddy agriculture in two villages in the Dry Zone of Sri Lanka was respectively 32.4% and 42.8% **of** the total labor input. In chena agriculture women contributed 72.3% and 59.3% **of** the total labor (Sirisena, 1985).
15. In Sri Lanka, in 1981, 52,5% of all migrant workers and 77% of unskilled labor among them, were women (Korale, 1983 and 1984 cited in Jayaweera, 1989).
16. Benchaphun Shinawatra (1992) shows the reverse trend in a study about **female** migration in Thailand. Here, the left behind family members used the wages (send back by young girls who work in the tourist sector **as** entertainers and prostitutes) to invest in farm modernization.
17. The very term 'income generating activity' reflects a gender bias. The term implies that women need a side economic activity that provides them with small supplementary income; rather than a regular income that allows them to support themselves and their families. **The assumption** is that the male head of the household is employed as the main breadwinner, thus denying the reality in many rural contexts that men and women are co-breadwinners and the fact that **a** large number of households are headed by women. Self-employment for men would imply a new double standard (cf. Safilios-Rothschild, 1991:43).
18. Unlike Small and Svendsen (1992); Bos et al. (1993) who use the word 'farmer', here 'farm household' is used: The use of 'farm household' instead of 'farmer' makes it possible to recognize that in each household more than one person may be interested and involved in irrigated agriculture and irrigation management.
19. 'This is not to deny there are no specific gender issues at higher levels in irrigation organizations. The fact that the majority of employees in many irrigation organizations are male is a very obvious gender question, which will not be dealt with in this paper. It may, however,

be important to note that there is no clear and direct relation between the male/female ratio of staff employed by irrigation organizations and the gender sensitiveness of its products or services.

20. Molyneux (1987) and Moser (1989) introduce the fundamental distinction between strategic gender **needs** and practical gender **needs of** women. The first refer to the needs that are formulated from the analysis of gender relations, and deriving out of strategic interests for and alternative, more equal and **satisfactory** organization of society than that which exists at present. Strategic needs include for example the abolition of the gender division of labor; the removal of institutionalized **forms** of discrimination such as rights to own land **or** property, or access to credit; the establishment of political equality; freedom to choice over childbearing; and the adoption of adequate measures against male violence and control over women. Practical gender **needs** refer to practical, direct **needs** women may have, stemming from the practical interest to survive. **Practical needs** do not generally entail a strategic goal, such as women's emancipation *or* gender equality, nor do they necessarily challenge the prevailing norms of subordination even though they arise directly out of them. Practical gender needs may for example refer to specific **constraints** women face in achieving optimal levels of production, such **as** the time required for routine domestic tasks or inadequate access to extension and credit.

For *an* example of how the concepts of practical and strategic gender needs can be used in the context of an irrigation project, see Schenk- Sandbergen (1991).

21. **See** for example Alsop (1993), who discusses how practical gender needs can undermine strategic interests, based on a case from India.
22. Generally, irrigation systems have the triple objective of 1) increasing agricultural production; 2) reducing poverty; and 3) reducing economic inequality (Gosselink, 1993).
- 23.. Though Chambers explicitly recognizes that farmers may be male or female, Small and Svendsen consistently refer to farmers as male persons. They even go as far as to claim that: "He (the farmer) depends on irrigation water to produce **his** crops and therefore to provide his **family's** sustenance" (Svendsen and Small, 1990:387).
24. Irrigation water is **not** only used for other purposes than irrigating the main crop, **it** may also **be** derived from other sources than the main irrigation system. This is **for** example observed in Indonesia, where "farmers (..) tap multiple water sources as supplements to system channels, as a strategy for avoiding risk of water shortage" (Vermillion, 1990:139).
25. This example is not a good gender example; also male farmers in the Gambia preferred to minimize labor peaks for their crops. Since male and female labor are often not mutually exchangeable, however, it **can** be expected that **for** crops grown jointly by men and women timeliness standards for judging irrigation outputs based on labor availability are different for men and women.
26. The Department of Irrigation and Soil and Water Conservation is currently conducting a study in Bangladesh on gender aspects of tubewell management. **Also**, IIMI Bangladesh is in the process of developing a research project to look specifically into the gender related factors

determining the performance of the group-owned tubewells

27. **As** the authors rightly point out (Bruins and Heijmans, 1992:25), a high involvement of women in construction activities is often referred to in project documents as a positive sign, supposedly showing a high commitment of the project to women's issues. However in this particular case (which is probably no exception) the high participation of women is a result of intra-household and wider gender relations, rather than of an active concern for women's interests. Within the household men can decide on the allocation of female labor. In the wider economy, labor wages for men are higher than for women, which explains the preference expressed by male household heads to send their wives to construction sites.
28. **A** study in several irrigation schemes in Sri Lanka describes several attempts to organize women. In Minneriya, special Women Farmer organizations were set up "by two particularly active women from cultivator families". Instead of focusing on irrigation related issues, however, these organizations were used to start some ad hoc non agricultural income generating activities, all of which failed after some time. The link between Farmers' Organizations and Women Farmers' Organizations was weak. On some occasions, members of the women's organizations were requested by the Farmer Committee to participate in siramadana to clean the canals. In 1990, a System Level Women Farmers' Organization (SLWFO) was set up, as the counterpart of the system level confederation of Farmer Organizations. However, this SWFO was not registered with any state authority and had no financial resources. These Women Farmer Organizations seem to be based on the ideology of women as helpers of their husbands, who spend most of their time inside the house and need to be entertained (Athukorala, K. personal communication).
29. The conclusion of a study about women's access to extension was that female field-agents not necessarily had better contact with female farmers than male extension workers, because both male and female extension workers tended to focus on male farmers (Carloni, 1987:30).

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