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Gender in integrated water management: an analysis of variation

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Abstract

Gender is an important variable in water use, policy, and intervention. This article explores this variation and its policy implications. Concepts are applied in several case studies to draw generic conclusions. Variation is related to the purpose of water use (consumptive or productive) and to the local, culture-specific patterns of the intra-household organization of consumption for family welfare (which includes domestic water provision) and income-generation (for which water is an input, especially in rural areas). For domestic water use, the intra-household sharing of unpaid domestic responsibilities is a key gender issue. Water for productive use, on the other hand, is embedded in the gendered organization of household economic activity, as elaborated for smallholder-irrigated agriculture. In female-managed and dual farming systems, where a high proportion of farm decision-makers are women, irrigation agencies need to better target their support. In male-managed farming systems, however, the majority of women lack their own farm enterprise in which water is an input. Women's access to land, markets and credits besides access to water, is at stake. To conclude, given the strong variation in water use along gender lines, gender analysis is indispensable for any concrete water policy and intervention. © *2001 United Nations. Published by Elsevier Science Ltd. All rights reserved.*

Keywords: Gender; Household; Water; Water policy; Domestic water supply; Irrigation; Rural development; Poverty; Farming systems; Water users associations; Burkina Faso; India; Nepal; Sri Lanka

1. Introduction

It is being recognized more and more that water is a key resource for human development, especially in the rural areas of developing countries. Domestic water supply is a critical determinant of human health, and water is also a major input in income-generating activities. Water is a critical component of farming, gardening, forestry, raising livestock, fisheries, aquaculture, and of many other endeavours that contribute to the livelihoods of the rural poor. Even under the pressure of growing competition for fresh water resources, the potential of water for rural development needs to be harnessed. Gender is an important variable in realizing this development potential, since women are the caretakers of water in most households (Hannan and Andersson, 2001). Furthermore, there is the potential for additional poor rural women to use water more productively, thereby improving their incomes and alleviating poverty (Merrey and Baviskar, 1998). Thus, gender figures high on the water policy agenda. Policy makers and community leaders in the water sector are increasingly asking themselves whether their policies are gender-inclusive, from the local level to the highest policy levels, and if not, what needs to be done.

Concrete, policy-relevant action in the water sector can be taken only if the local variations of gender dimensions in the use of water are fully recognized. Domestic water uses are consumptive and have direct impacts on the health of the family; the provision of water for this purpose is a simple cost, not an input to an income generating activity. In contrast, water used in agriculture generates a net profit and has to be considered in the context of the whole enterprise, also taking into account the local gender pattern within which a household organizes its economic activities. In those regions where most rural women already manage their own enterprises, intervention in the water sector can focus on developing water as an economic input, in contrast to areas where men dominate rural income generation. The following analysis of a wide range of local contexts and intra-household gender roles serves to better define the options for the development agenda. The need to involve women in the various water-related decision-making processes at community, regional, national and international levels, is generally agreed on, as is the need to provide women with training and empowering them in order to facilitate this participation. An intra-household analysis can give the needed focus to current general strategies.

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One aim of this article is to present generic conceptual tools to identify water-related gender issues at household level that are relevant to policy makers and interventionists. These tools are applied in selected case studies in various cultural contexts of domestic and productive water uses and interventions; as an example of productive water use small-scale irrigated farming is discussed. The second aim of this article is to identify the generic policy implications in different contexts, on the basis of selected case studies and other literature. The gendered and diversified nature of water use in society requires multi-faceted policy responses. This warrants a systematic gender analysis to better inform any leaders in charge of policy and intervention in the water sector.

The discussion of conceptual tools for water-related gender analysis aims to identify who is responsible for providing domestic water supply, and who uses water to generate income. Socio-cultural contexts and patterns are also analysed. Over the past three decades, many scholars have argued that the established model, the 'unitary household model', is inadequate for such analysis. According to this model, the household would be a unit in which all members share the same interests and pool resources, and in which the male head is the representative and main decision-maker. Instead, a more realistic and adequate concept of the household has been proposed. This considers intra-household relations as essentially a bargaining process among household members, regarding such issues as the allocation of resources, the contributions of labour and cash for family consumption and welfare, and the organization of income and production. In the case of family farms, this relates to the organization of farm production (Safiliou, 1985; Jones, 1986; Feldstein et al., 1989; Haddad et al., 1997).

2. Domestic water provision: sharing for family welfare

The provision of domestic water supplies for drinking, bathing, cooking, cleaning, and hygiene, contributes to the welfare of the whole family. Domestic water supply is one of a range of items, that contribute to family welfare, besides food, housing, clothing, etc. Cash and labour contributions to provide these items tend to be divided along gender lines, and the patterns of this division differ between cultures (World Bank, 2001). Either men, or women, or both may pay a bill for water supplies that are delivered to households via pipes. In rural environments of developing countries, the intra-household division of more laborious responsibilities is often embedded in a long tradition, and typically divided along gender lines. Men may be responsible for the construction and maintenance of wells, tanks, ponds, or storage reservoirs, and may have the requisite technical and managerial skills, while the women's task is to bring the water into the home to ensure a continuous supply for domestic use. Several variations on this pattern have been reported (Hannan and Andersson, 2001). For example, among the Gourounsi in central Burkina Faso, women are responsible for domestic water supplies, but if husbands ask their wives to bring water to the fields where men are working, men will pay for the service. In Morocco, as in many countries where upper-class women live in seclusion, men and children may take up more responsibilities for water supply (Boelee, 2000). In the arid areas in the Punjab in Pakistan, where water from irrigation canals is the main source of domestic water supply, water is extremely scarce at times of canal closure for maintenance. During such periods, men may fetch water for domestic purposes by bicycle from a greater distance.

The gender issue at stake in domestic water use is the division of unpaid household chores between the genders. A common long-term vision is that work contributing to the welfare of the family should be equally divided between adults in the household. The intra-household division of labour is part of the wider debate that seeks more visibility, recognition and payment for domestic and voluntary work, the value of which may constitute up to 70% of the GNP (UNDP, 1997). Moreover, among the poor, both men and women should be liberated from high labour and monetary costs for mediocre, low-quality water service. Access to safe and convenient drinking water and sanitation is widely seen as a basic human right, and as such, it should be concretised. Gender-sensitive policies in domestic water supply are certainly not meant to burden women with even more unpaid household chores (BRIDGE, 1993).

At the community level, the gender issue concerns women's involvement in decision-making, for instance in water supply projects, or in negotiating over the priority uses of limited water supplies (Van Wijk, Sijbesma, 1998). As women and men perform different tasks, they bring different perspectives that can have significant consequences on project design. For instance, women in a drought-prone part of Gujarat, India, insisted on a collective tap instead of connections in the homesteads, as the men had proposed. The reason was that a collective tap would much better enable them to keep an eye on the quantities drawn by their neighbours and, thus, on a fair distribution (Barot, personal communication). Women's first-hand knowledge and experience are invaluable for water supply projects, and the design of these projects would improve considerably if women were represented in decision-making positions, where their input so far is still very limited. The gender issues are different in the productive uses of water.

3. Productive water use: fostering women's incomes

3.1. Intra-household organization of production

Irrigation development that contributes to greater access to water for women for their own farm enterprises, will also

strengthen women's incomes.[1] Whether this can be realized or not, and how it can be accomplished, depends upon the intra-household organization of irrigated production, women's and men's involvement in the enterprise, and their say over the output. To answer questions about who manages the enterprise in which water is an input, the household can be viewed as being composed of two or more 'intra-household production units' (Safiliou, 1988). In most rural areas in developing countries, adult household members, men and women alike, are traditionally assigned separate and clearly identifiable production units, within which they have considerable autonomy over allocation of labour and utilization of income. While all household members share the common goal of family welfare, each member tries to maximize his or her own individual benefits from the allocation of labour and agricultural investments. This is achieved through negotiations with competing household members, each of whom is 'trying to get the best deal'. However, in all these negotiations, the family's welfare and stability is the limiting factor. Only in extreme situations do household members consider sacrificing family stability, such as if negotiations completely break down and prevailing conditions are untenable (Safiliou, 1988). In other words, there is an intra-household specialization along gender lines with regard to productive activities.[2]

The distinction between intra-household production units not only adequately conceptualises the gendered organization of agricultural production, but it also fits the reality that irrigated agriculture is usually only one activity in a range of income-generating activities in farm households. Worldwide, farm households are typically 'pluri-active'. Besides irrigated cropping, they engage in rain-fed cropping, off-farm employment, trade, processing, fishing and the raising of livestock. An intra-household analysis of irrigated-farming identifies the main decision-maker for only one particular activity: farming on irrigated plots.

3.2. Gender classification of farming systems

The identification of different decision-makers for irrigated plots in a specific scheme, and subsequent assessment of the proportions of male and female decision-makers, makes possible a classification of prevailing farming systems as male-managed, dual-managed or female-managed. A scheme with a majority of male decision-makers, say more than two thirds, is classified here as a male-managed farming system; a similar majority of women constitutes a female-managed farming system; while the dual-managed farming system is more equally divided.

Global variation in gender patterns in (irrigated) farming is considerable. Among the multitude of factors that shape these patterns, land-tenure is certainly important, although there are cases of women decision-makers on farms where their in-laws hold the primary land titles. Additional factors determining the decision-maker include culture, ethnicity, class, wealth status, off-farm gender-based employment opportunities, and agricultural technological developments. Gender patterns also vary according to household composition, stage in the household cycle and age, head of the household, and personal preferences. High male–female ratios in outmigration lead to the feminisation of agriculture, with previously male-managed farming systems becoming dual or female-managed. This can be an endemic feature, as in Southern and Eastern African countries where, in some regions, 50–90% of the farms are female-managed (Safiliou, 1994; Makhura and Ngqaleni, 1996; FAO, 1998). Pockets of female and dual-managed systems can also occur within typically male-managed areas, as was found in Nepal (Zwarteveen and Neupane, 1996). Specific agro-ecological zones such as wetlands or homesteads are also often cultivated by both men and women, or mainly by women. Male-managed farming systems, on the other hand prevail, for example, in South Asia and developed countries (Bock and De Rooij, 2000). The case studies on female and dual-managed farming systems (Section 4) and male-managed farming systems (Section 5) highlight this variation. Also highlighted are the sensitivity/insensitivity to the situation on the part of irrigation agencies, and generic policy implications for both situations.

4. Agency-induced inclusion/exclusion in female-managed and dual farming systems

4.1. Wetlands improvement in southwest Burkina Faso

The wetland improvement project in southwest Burkina Faso provides a clear illustration of the importance for agencies to know and build upon the existing gendered organization of farming (Van Koppen, 1998). This case shows not only the negative effects of an agency's male bias, but also the resilience of a local female-managed farming system. This local reality was the single most important factor that forced the project to change in later schemes from a male-biased towards a gender-inclusive intervention approach. This later gender-inclusive approach is valid wherever female-managed and dual-managed farming systems are present.

In the low-lying wetlands of the West Comoé Province in Burkina Faso, 80–90% of the plots are worked by women, both younger and older, as their production units, mainly cultivating rice. Men are the farm decision-makers in the

[1] Ample evidence has shown that women farmers are as efficient producers as men, provided they have equitable access to productive resources and human capital, and have a say over the output (for an in-depth discussion see Quisumbing, 1996; Zwarteveen, 1997; Udry et al., 1995). Thus, from a productivity perspective also, access to water for women farmers needs to be fostered.

[2] Theoretically, an intra-household production unit can be managed in a truly joint way, but evidence is rare. Probably, the rather egalitarian division of tasks combined with bilateral land inheritance as reported in the Andean regions or parts of Madagascar (Raparson, 1989) come closest.

upper dry lands, where they solicit labour inputs from their younger wives. Inheritance of wetland plots from mother to daughter is common, although husbands and mothers-in-law also mediate in providing rice plots to women. Within the clan of the local land chiefs, women of the clan assume most functions in the wetlands. In some cases, it is even taboo for male land chiefs to enter wetlands during the rainy season, as this is believed to cause inundation. To outsiders, however, brothers, fathers or husbands of the female land chief tend to be the representatives. Male land chiefs also perform religious functions.

In 1980 the regional Ministry of Agriculture started implementating a rice cultivation improvement project, funded by the European Community. The objective of the project was to intervene in eight rice valleys within the project zone. The project involved the construction of central drains, sluices, and contour bunds to provide better water management in wet rice cultivation. As a first step, prior to construction, land was expropriated and divided in equal-sized plots; the plots were to be reallocated after completion of construction. In the first two schemes, which were built simultaneously, the technical project management, in a rush to complete construction rapidly, interacted only with the (male) village authorities. These members of the elite arranged the expropriation of land, promising women landholders that they would get their land back once the construction scheme was completed. Yet, after the improved plots were reallocated, the same small committee, consisting of project management and the village elite, decided to allocate the improved rice plots to men only. It was thought that beneficiaries (men who received the improved plots), as male heads of households, would arrange the intra-household allocation of farming land, thought to be a 'cultural affair'. All project staff were misled by the concept of the unitary household, represented by a male head, discussed earlier. Even the social scientists of the project, who mainly relied on demographic survey data and lists from the tax offices, imagined that rice cultivation would become a 'family farm' activity after the project. Project staff also failed to discover the existence of women's own production units and land rights.

When the two first schemes started functioning, the new male land titleholders expected women to continue providing all necessary labour inputs, while the men's new land rights entitled them to appropriate most of the harvest. The women felt 'betrayed by their men'. They had lost their plots plus their say over the rice harvest. This discouraged them from producing. Moreover, membership in the new water users' association, which entailed the obligations for maintenance, was also vested in land titleholders. In most parts of the two schemes, men failed to fulfil their labour obligations to the water users association, because their primary interests were in the uplands. Lack of maintenance of the infrastructure further contributed to decreased production and even abandonment of large parts of the schemes.

4.2. Resilience of the female-managed farming system

As a result of initiatives by local women, their husbands, and female and male land chiefs as well as receptive field staff, important changes were made in the design of the land expropriation and reallocation procedure for the third and fourth schemes. What made a crucial difference was that during the period of 2 or 3 years between the first contacts with the project area and the start of construction, full consensus had been reached in the community regarding land re-allocation. Existing plot holders, whose names were known to the land chiefs, obtained priority rights for new allocation. This consensus-building procedure evolved into a standard gender-inclusive model for all later schemes in the project zone (and indeed, elsewhere in the world). In this approach, open meetings are organized, to which current farm decision-makers are invited, as well as anyone else interested. The participants in the meetings are informed about the project, its technical aspects and the proposed organizational design. Current plot holders and other candidates are registered as future land and water titleholders before any construction begins. After construction and land reallocation, the plot holders become members of the new water users' associations, fulfil their maintenance obligations, and elect their leaders. In all later schemes, men were explicitly invited to apply for new rice plots. Invariably, the majority of new applicants were women, except for one site, where land pressure on upper dry lands had become high. This caused some men to apply for rice plots as well.

This case illustrates how, in the early efforts, the agency was the only cause of women's marginalization and gender conflicts. Such exclusion had never existed before in the local area. This marginalization was the result of the agency's complete ignorance of the gendered organization of farming, combined with an authoritarian approach in which, due to pressure of time, far-reaching decision-making powers were vested in a handful of men of the local elite. In later schemes, the existing local organization of farming smoothly re-emerged as the most obvious basis for the new farming system and irrigation institutions. It only required some time to crystallize. None of the later schemes had the productivity and maintenance problems encountered by the first two. The inclusive approach adopted later by the agency is straightforward: its key ingredients are recognizing and organizing farm decision-makers, whether male or female, in a bottom-up way and before construction starts, and strengthening the resource rights of the farm decision-makers, while demanding that they fulfil corresponding obligations.

4.3. Other evidence

The Burkina Faso project discussed above illustrates in a nutshell the core argument of most of the gender and irrigation debate up until today. Other case studies also document and criticize the inability of agencies to recognize prevailing

female-managed or dual farming systems. Thus agencies have vested far-reaching decision-making powers in male elites only, with the consequence that women farmers lost their rights to water and irrigated land, which led to declining productivity (Hanger and Morris, 1973; Dey, 1980; Carney, 1988; Illo et al., 1988). More recently, success stories emerged, in which agencies themselves learned and actively adopted the inclusive approach from the very design stage onwards, with expected results (Carney, 1994; Traditional Irrigation Improvement Program Tanzania, 1993; Arroyo and Boelens, 1997; De Lange et al., 1999).

In the West Kano irrigation project in Kenya, the agency accepted to hold meetings only if women constituted at least half of the participants, otherwise, the meeting would be cancelled. Moreover, in the first years of the project, the agency organized women-only groups, in which members were well informed and encouraged to articulate their interests in preparation for the subsequent mixed-gender meetings (Hulsebosch and Ombara, 1995). While most case studies of successful, bottom-up rural organization involving women originate from Africa and Latin America, there is also evidence of such schemes from India. In the village of Jambar, South Gujarat, the Aga Khan Rural Support Programme recognized women to be the main cultivators of homesteads and successfully organized them in a bottom-up way to own and manage a collective pump to irrigate their crops (Van Koppen et al., 2001).

Farm decision-making, membership in water users' association, and primary land rights are not necessarily vested in the same person. In southwest Burkina Faso, for example, women decision-makers generally also have the primary land titles and they are also the de facto members of water users' associations. However, this is not always so, as illustrated by the following case involving irrigator farmers in the Tongwane sub-catchment in a former homeland in South Africa. Out of 176 irrigated plots in various irrigation schemes in this basin, 62% are cultivated by women, 24% by men, and 14% jointly by both spouses. However, among the women farm decision-makers, 36% are not the title-holders of the land they cultivate. Ten percent of the male farm decision-makers also cultivate land of others (Van Koppen et al., 2000a). In such cases, vesting membership of water users associations in the de facto irrigator (who is also most motivated to increase the farm's productivity), rather than the person with the primary rights to the land, would generally benefit women as they tend to have weaker land rights.

4.4. Generic policy implications

Where female-managed and dual farming systems prevail, in Africa, Asia or Latin America, not only is there scope for irrigation agencies to enhance women's incomes by supplying them with water in their own name—this is often absolutely necessary in order to meet the productivity goals set for irrigation investments. Agencies need to analyse and build upon the gendered organization of local farming and recognize both male and female farm decision-makers as competent producers. To include women in water users' associations, alongside with men, is a straightforward matter of organizing all members in a bottom-up fashion, thus ensuring accountability on the part of the leaders (Shah, 1996). Although gender-specific support may be needed to develop women's skills, especially in organization, accountancy and leadership, there are hardly any gender-based problems at the local level. In female-managed and dual farming systems, the key issue is that policy makers and interventionists themselves need to learn.

5. Gender issues in male-managed farming systems

As explained above, in male-managed farming systems, men manage the majority of farms. In most households there is only one production unit. This raises two issues for irrigation agencies that seek to improve women's conditions within their irrigation mandates. First: precisely how are women involved in the male-managed farms? Would, for example, a policy option of joint water rights between spouses and joint membership in water users' associations be beneficial for women and acceptable to men? In industrialized countries (as also, for example, in Gujarat, India), cooperative bye-laws may offer such options (Government of Gujarat, 1996). However, such formal rights are rarely concretised.

The second issue concerns a minority of women who farm in their own name. Who are those women, which gender-specific problems do they encounter, and what support can irrigation agencies offer, if any? Answers to these questions will also highlight the need for irrigation agencies to go beyond their core mandates if they aim to support women's economic empowerment through irrigation. These issues are illustrated by the following case study.

The study was carried out in large-scale canal irrigation systems in Andhra Pradesh and Gujarat, India. Recently, the government handed over the management of these schemes to newly established water users' associations (Van Koppen and Parthasarathy, 2000). Seven water users' associations were chosen randomly from the main agro-ecological zones in both states. A stratified sample of 700 households was selected, consisting of small farms with operational holdings of less than one hectare and larger farms with holdings of more than one hectare. Female-headed households were purposely included.

5.1. Exclusion of the majority of women

The intra-household organization of production in male farming systems in Andhra Pradesh and Gujarat are presented in Figs. 1(a), (b), 2(a) and (b).

The figures show the proportion of households in which a certain farm decision is taken and an activity is carried out respectively by men, by both men and women, or by women household members. The patterns appear quite similar in

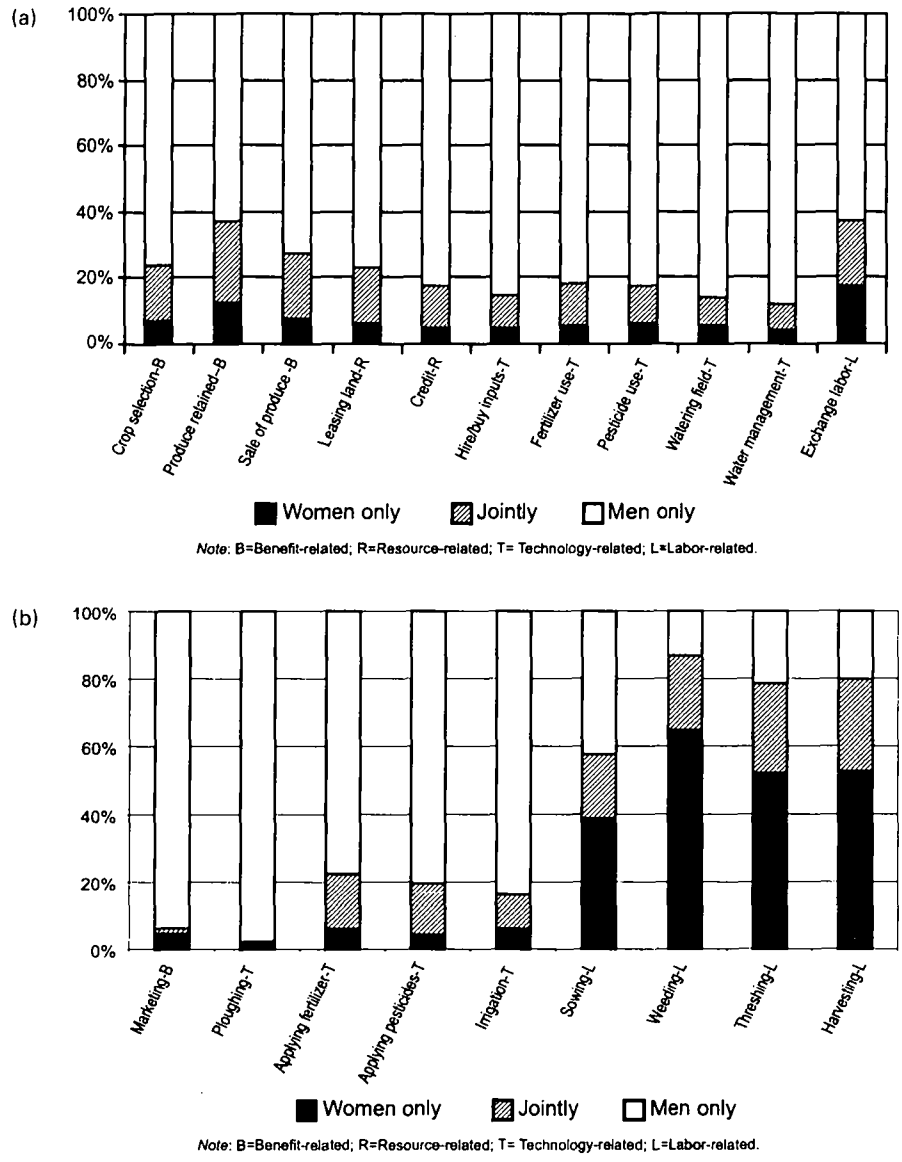

Fig. 1. Distribution of households (percentage) by gender of decision-maker ($n = 359$) (1a) and person carrying out activities ($n = 359$) (1b). Data from Andhra Pradesh.

both states. In the majority of irrigated farms, women's activities are confined to the unskilled, labour-intensive tasks ('L' = labour) of weeding, threshing, harvesting, and, in Andhra Pradesh also transplanting of paddy.[3] On most of the farms in this study, men take up core tasks that are essential for overall business, and require investments, technological skills and outside contacts, such as ploughing, application of fertilizers and pesticides ('T' = technology-related). Men also do the marketing, an activity strongly related to say over the allocation of benefits ('B' = benefit-related). With regard to decision-making as well, in the majority of households, men take most decisions, including those regarding resources ('R' = resources) such as land and credit. Decisions and activities related to irrigation are of the same gendered nature as other technology-related decisions and activities. Slightly more women participate in decisions over the produce that is kept at home, and crop choice, a related issue. This probably reflects women's roles as housewives and their estimations of the future family consumption needs, from which they themselves also benefit. However, women's say over the produce does not extend to the decision as to whether to market produce or decisions over the use of the money gained.[4] Lastly, a slightly higher proportion of women decide about labour exchange, probably so because of women's preponderant roles in labour provision.

[3] The main crops in Gujarat are wheat, mustard, and tobacco. Ploughing and sowing is usually done at the same time.

[4] Women may sell small portions to traders who visit the houses or regularly put small quantities of produce aside for saving, and thus have more say over the use of the produce.

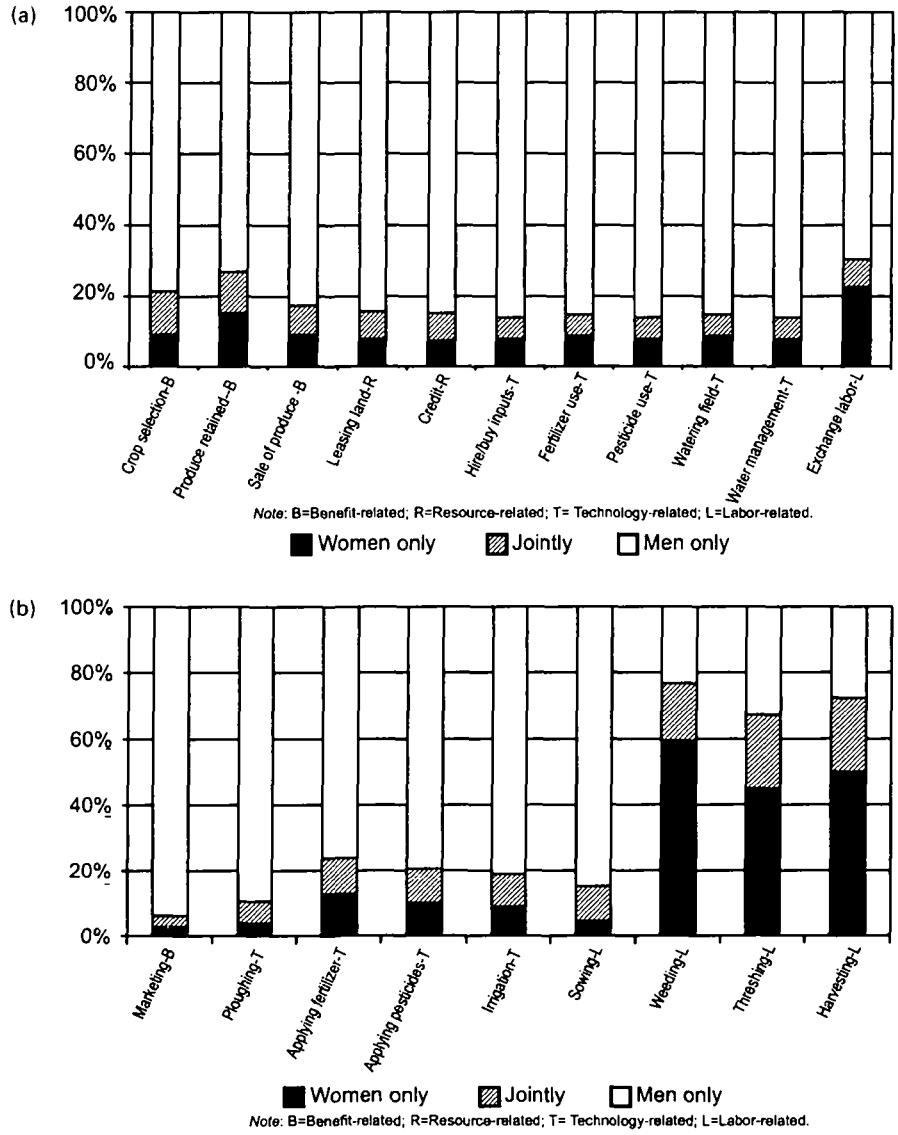

Fig. 2. Distribution of households (percentage) by gender of decision-maker ($n = 341$) (2a) and person carrying out activities ($n = 341$) (2b). Data from Gujarat.

Thus, the majority of women are unpaid family labourers, while men are the main irrigators and decision-makers for the farm in general, including field irrigation and management. These conclusions hardly support massive promotion of joint membership to include women in water users' associations. This could change if further research finds that women's roles as secondary irrigators are considerable, for example replacing male irrigators or assisting them, and if these women face problems because their rights are only secondary or derivative; and, third, if joint membership would solve these problems.

5.2. The minority of women farm decision-makers

Figs. 1(a), (b), 2(a) and (b) also show that there is a minority of women farm decision-makers in both Andhra Pradesh and Gujarat. Three variables that influence women to become farm decision-makers were identified. Female headship of the farm household has the strongest impact on women's role in farm decision-making, as illustrated in Figs. 3(a), (b), 4(a) and (b).

Women heads of households in this sample are primarily widows. In around 50% of the female-headed households, women take most decisions on their own, even though a portion of these women decision-makers leave technology-related tasks to men. In male-headed households, women are farm decision-makers in only 3% of the cases.

The second strongest variable influencing whether women take up farming is women's land ownership (see Fig. 5(a) and (b)). In around 30% of the farms in which at least one plot is in a woman's name, the woman takes most

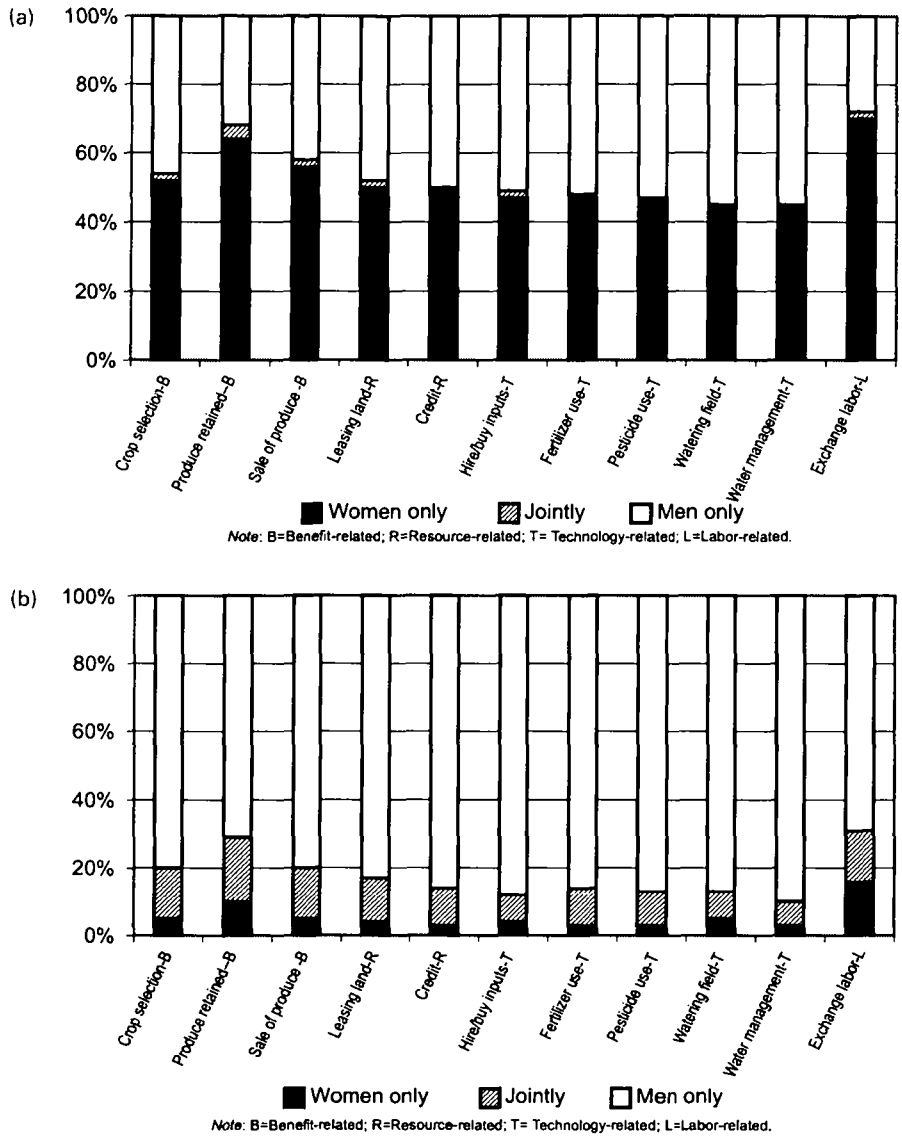

Fig. 3. Distribution of households (percentage) by gender of decision-maker in female-headed ($n = 48$) (3a) vs male-headed ($n = 652$) (3b) households. Data from Andhra Pradesh and Gujarat.

decisions alone. In the other 70% of the farms in which women have land registered in their own name, male relatives such as husbands, sons, or brothers, or male sharecroppers and tenants are the farm decision-makers. Three quarters of female landowners live in male-headed households. In total, women landowners constitute 8% of the sample.

The third variable that influences women's involvement in farming is farm size (see Fig. 6(a) and (b)). In around 10% of the farms of less than one hectare, women make most decisions. In contrast, in almost none of the larger farms do women carry out core farm tasks or take decisions. Hence, with increasing farm size, women's labour inputs decline and women participate less in farming.

In absolute numbers, women farm decision-makers belong slightly more often to male-headed households than female-headed households, due to the fact that the proportion of female-headed households in the sample is only 7%. Hence, targeting female-headed households as a gender policy would entail two mistakes: about half of the women heads of households are not the farm decision-makers, but would be included. Conversely, women landowners and on small farms in male-headed households would be overlooked. Studies in Nepal (Van Koppen et al., 2001) and Sri Lanka (Van Etten and Van Koppen, 2001) also found that most women farmers belong to male-headed households, even though the chance of finding a woman farmer in a female-headed household is considerable.

5.3. Gender-specific constraints for women farm decision-makers

The exceptional woman farmer in an environment where

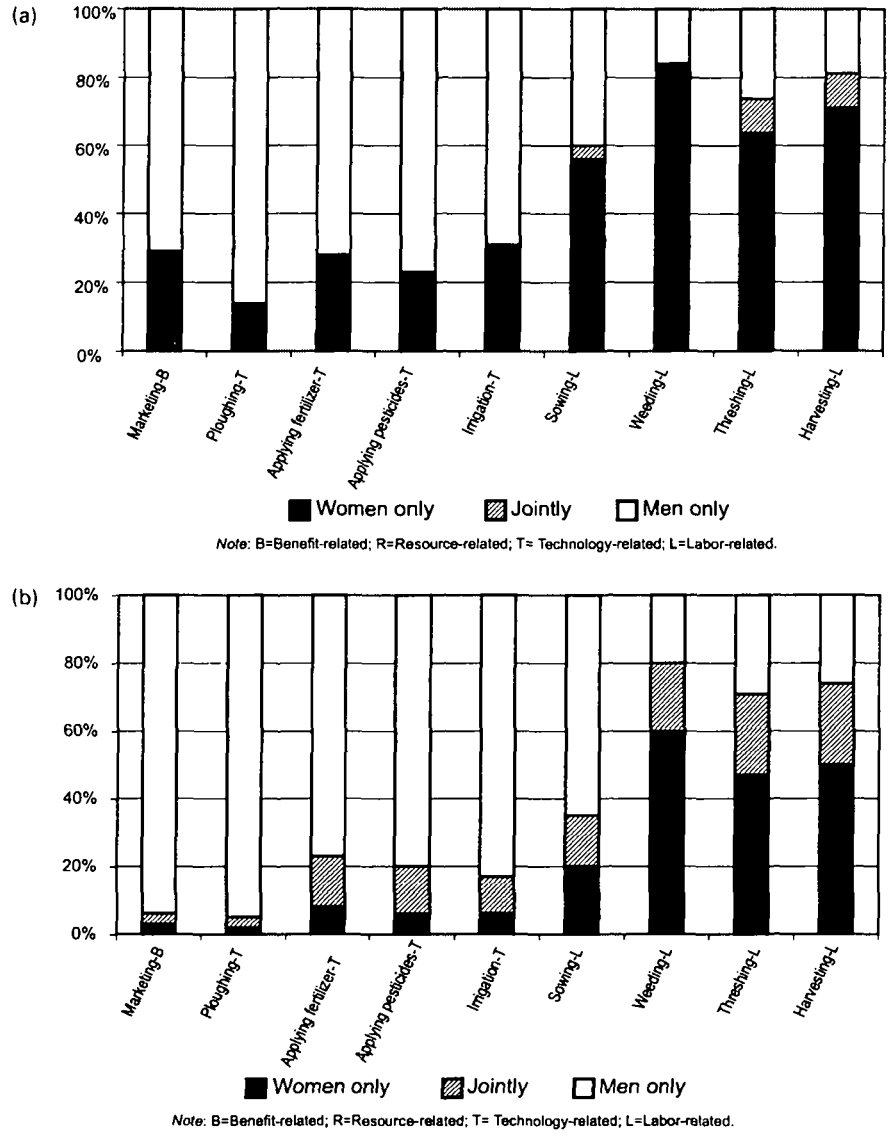

Fig. 4. Distribution of households (percentage) by gender of person carrying out activities in female-headed ($n = 48$) (4a) vs male-headed ($n = 652$) (4b) households. Data from Andhra Pradesh and Gujarat.

most farmers are men faces a range of gender-specific obstacles to farming in general and to access to water in particular. Various qualitative studies in India, Nepal, and Sri Lanka mention constraints such as the lack of social and physical mobility, taboos on interactions with 'strange men' for credits, for the purchase of inputs and for marketing, and dependency upon men for core tasks like ploughing. Primarily because of these constraints, many women landowners hand over the actual cultivation to men, often at below market rates (Agarwal, 1994; Van der Molen, 2001).

Women farmers in male-managed farming systems face specific constraints in accessing irrigation water as well (although in individual cases, advantages like favourable plot location near the water source may outweigh the constraints). First, the labour obligations for canal maintenance that water users are supposed to undertake in compensation for water rights may pose problems. In some ethnic groups, women farm decision-makers are culturally not supposed to do that type of work, for example in Nepal (Van Koppen et al., 2001; Zwarteveen and Neupane, 1996; Pun, 2000) and, indeed, worldwide (Duyne, 1994; Prins, 1996). Especially if there is enough labour available, women are obliged to find men to replace them, or they will be charged fines or special fees. Usually, the payments are quite high if not excessively high (Pun, 2000). In the Chhatis Mauja scheme in Nepal, women in female-headed households mentioned problems of fulfilling labour obligations as the major reason to give land out for sharecropping rather than cultivating it (Zwarteveen and Neupane, 1996). However, these taboos are culture-specific. In other situations, women's participation in repair and

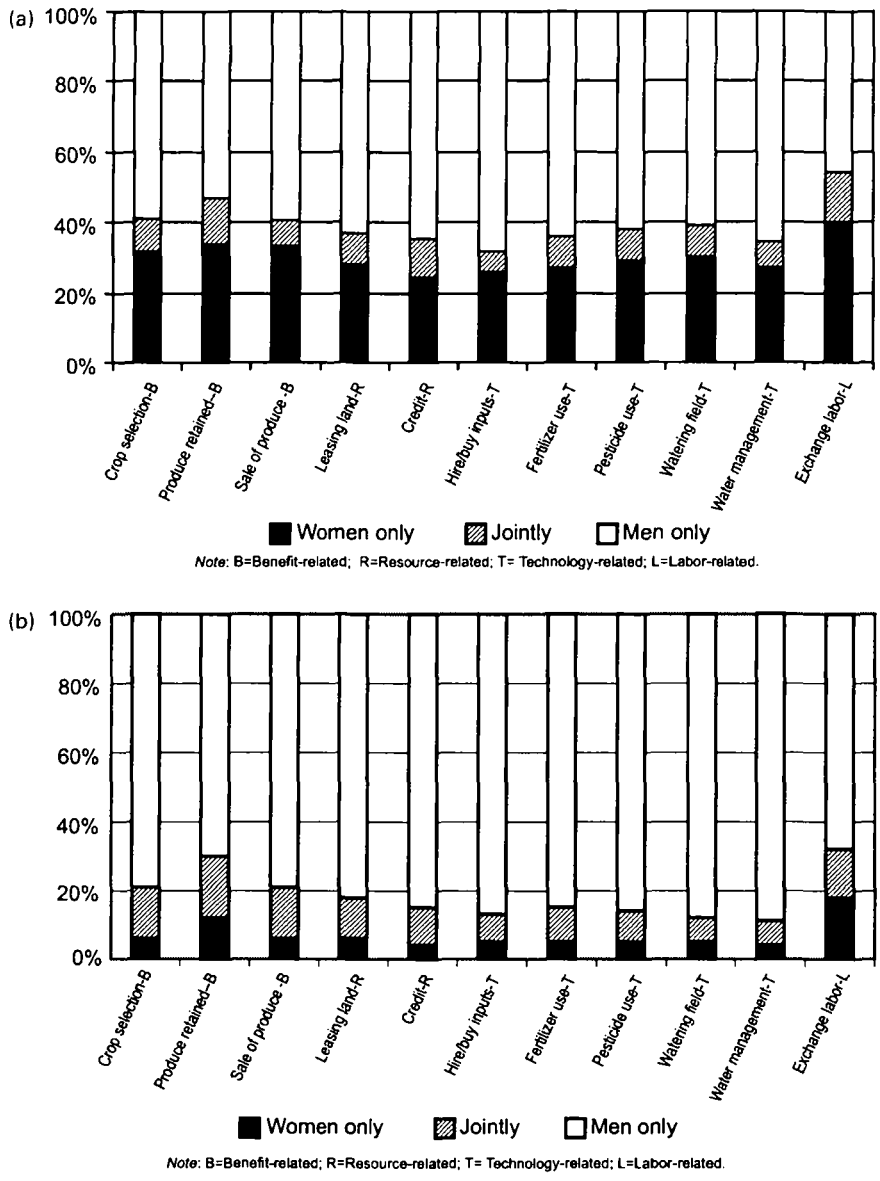

Fig. 5. Distribution of households (percentage) by gender of decision-maker in households with female landowner ($n = 56$) (5a) vs male landowner ($n = 644$) (5b). Data from Andhra Pradesh and Gujarat.

rehabilitation work is equal to men's, as found in the above-mentioned large-scale canal irrigation schemes in Andhra Pradesh.

The second constraint for women farm decision-makers in accessing water is that women are generally excluded from the male-dominated informal networks in which access to water is negotiated, and certainly from the formal water users' associations. Even if women are the landowners and formally entitled to membership, they do not participate; they prefer to take water when it arrives in the canals or negotiate with neighbouring farmers. Some women irrigate at night, despite the fact that cultural norms mostly do not favour it. In several cases, where water distribution among farmers sharing a canal had changed from a disorganized system of ad hoc taking of water into a transparent system of predictable rotation, the weaker water users were especially benefited (Von Benda-Beckmann and Von Benda-Beckmann, 2000; Van der Schaaf, 2000).Women generally are not even invited to formal meetings of water users' associations. Factors contributing to this are: women's lack of physical and social mobility (Agarwal, 1994); norms about appropriate behaviour for women; risks of indecent proposals; and also gaps in education, language, literacy, and information. When women do attend meetings, they usually do not voice their interests. In Nepal, male-dominated irrigation fora are considered 'hostile environments' (Zwarteveen and Neupane, 1996); in northern Sri Lanka, tank irrigation systems (Van der Molen, 2001); and in Bali, Indonesia, *subaks* (Jha, 2000). As can be expected, hardly any

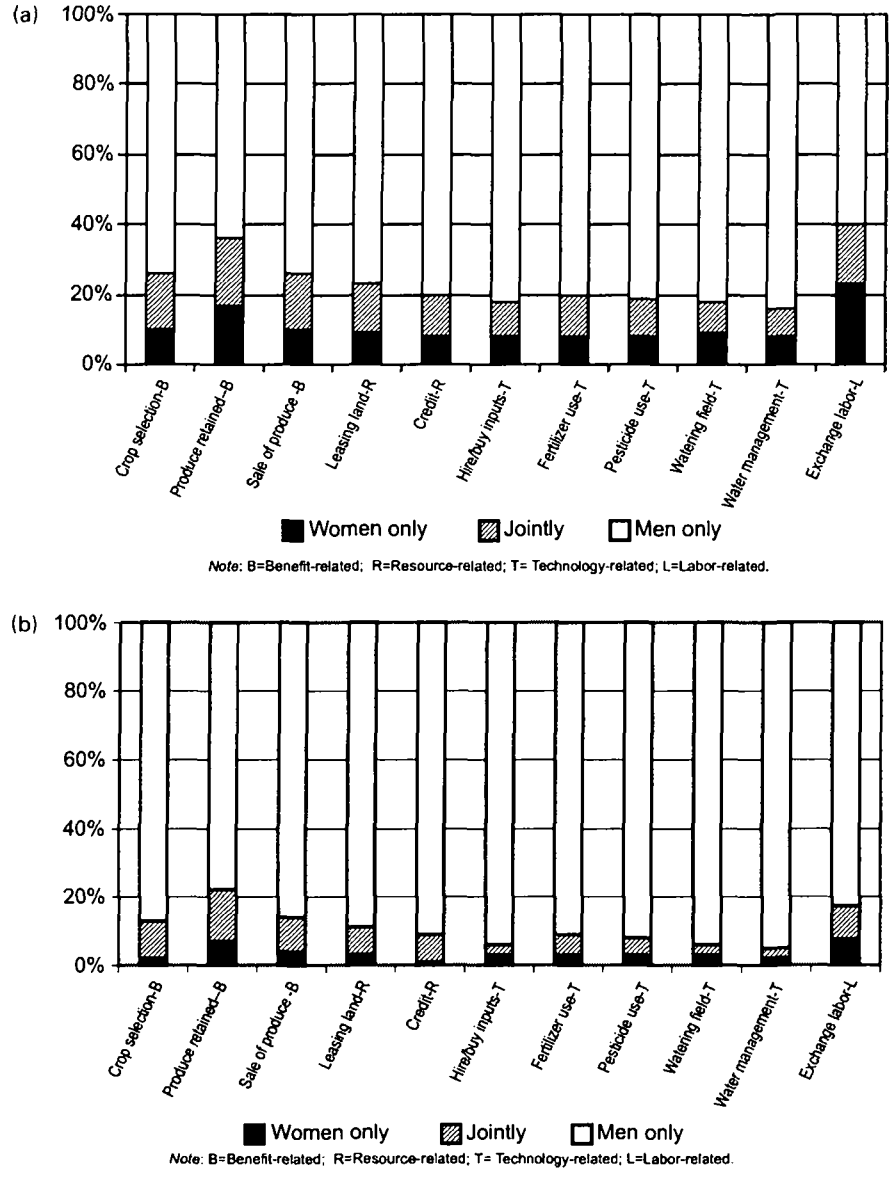

Fig. 6. Distribution of households (percentage) by gender of decision-maker on small (< ha, $n = 490$) (6a) vs. larger farms (> 1 ha, $n = 210$)(6b). Data from Andhra Pradesh and Gujarat.

woman occupies a position as committee member or chairperson.[5]

In South Asia, formal water rights and membership of water users associations tend to be vested in landowners. This to some extent empowers women landowners, who either have given their land in lease, or cultivate it themselves.[6] However, this rule formally excludes women farmers and irrigation managers who are cultivating land held by their husbands. In the above-mentioned study of Andhra Pradesh and Gujarat, two thirds of the women farmers belong to this category. For these women, introducing joint water rights seems most relevant. Public acknowledgement of the roles these women play as irrigators would facilitate their communication and negotiation regarding

[5] Shyamala and Rao (1999) studied women in leadership positions of the new water users' associations in Andhra Pradesh. During the statewide elections in 1997 in all new 12,292 Water Users' Associations, only about 98 women became presidents and 830 women became committee members. As the authors observed, 'the majority of these women did not voluntarily enter the water users associations, but were pushed into it to function as 'token' members to serve the self interests of their male farming member who is either a contractor, a political party activist, an influential person in the village, etc. but cannot directly obtain the position as the land is not in his name'. Of the 18 interviewed committee members, 16 had been informed of their selection after the fact (Shyamala and Rao, 1999).

[6] Although water rights are formally vested in landowners, women landowners may be overlooked. In the West Gandak irrigation scheme, water shares were incidentally still in men's names, for example a 10-year old grandson of a widow landowner (Van Koppen et al., 2001).

water-related issues with fellow farmers and with the water users' association.

5.4. Generic policy implications within an irrigation mandate

In male-managed farming systems, the majority of women are unpaid family labourers, while a minority of women farm decision-makers face strong normative, practical and material obstacles from the dominant male-managed system. Irrigation agencies and farm leaders who aim to support women farmers having access to water and their inclusion in water users' associations have to challenge the locally prevailing male dominance, just like the women themselves. Agencies in female-managed or dual farming systems are in a very different situation, merely having 'to go with' local gendered practice.

As far as taking concrete action, irrigation agencies and local leaders can, within their narrow mandates, proactively identify the dispersed minority of women farmers, and assess their problems in accessing water. They can publicly recognize these women as irrigators, for example through joint membership; they can explicitly invite them to meetings; train them and facilitate cross-visits; stimulate women's election or nomination in committees; and challenge the rigid norms that hold irrigation to be a matter only and exclusively for men. The leaders of the newly established water users' association of the West Gandak Irrigation Scheme in Nepal recently engaged in such action, requiring all sitting committees to nominate at least one woman member (Van Koppen et al., 2001).

How effective can agencies be in ensuring that the minority of women farmers are included in local water institutions? In addition to factors discussed above, this also depends upon the 'critical mass' of women farmers. At least, this is suggested by a case study from the Ridiyagama irrigation scheme in South Sri Lanka (Van Etten and Van Koppen, 2001). Here, 26% of the farm decision-makers are women and the land titles of 33% of the irrigation plots belong to women. In this male-managed farming system at the edge of a dual-managed farming system, none of the women farm decision-makers reported gender-related inequities in accessing water at field level (water was generally sufficient for all) or in participating in local meetings. In fact, in this scheme women were even elected as members of the committees of the water users' associations. About 7% of all committee members are women, which is probably the highest proportion in Sri Lanka. The government agency that organizes farmers into associations in this area proactively targets both men and women farmers without distinction. They implement precisely what was identified above as an effective generic gender policy and intervention for female-managed and dual farming systems.

5.5. Generic policy implications beyond the irrigation mandate

In male-managed farming systems, the majority of women, who are unpaid family labourers, gain at best indirectly, via their male relatives. As non-entrepreneurs, women have little to gain from intra-household attempts to replace the farm decision-maker in negotiations with third parties for water—as water is only one of the necessary inputs. Women can improve their own incomes from water-based enterprises only if they obtain access to the full range of factors needed to start enterprises into which water is an input. Access to land, markets, agricultural inputs and technologies, training and credit are as important as water. This gender agenda can only be realized if irrigation agencies go beyond their strict water related mandate, and foster synergy with other rural development and gender initiatives on the range of factors that, together, can bring more gender balance in rural economic activity. Rather than considering water as an end in itself, water needs to be developed as a tool for rural development and gender equity. Thus, for more equal sharing of the benefits from water use in society, irrigation agencies need to become development agencies.

6. Conclusions

The foregoing analysis of the intra-household division of costs and benefits of water use identified new and different key issues that policy makers and interventionists need to address in order to be more gender inclusive.

- Liberating poor women, and also men, from the hard work and excessive costs of domestic water provision and establish equal sharing of remaining costs.
- In female/dual farming systems: Recognizing women farmers and including them on an equal footing with men.
- In male farming systems: Supporting the minority of women farmers and broadening the mandate of irrigation agencies to encompass gender-balanced rural economic development.

The roles proposed for water agencies also vary from being the main actor determining gender-inclusion or exclusion (in female-managed or dual farming system) to being a minor actor, at least within a narrow irrigation mandate (in male-managed farming systems).

This article has sought to demonstrate that the highly variable, intrinsically gendered nature of water use has far-reaching implications for policy. Gender dimensions need to be thoroughly analyzed and integrated into policy and intervention in the water sector.

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