

Gender analysis for improved irrigation performance

L'analyse genre pour l'amélioration des performances de l'irrigation

Barbara van Koppen

Abstract

The paper aims to improve gender analysis in agriculture in order to enhance its practical relevance for the design of irrigation policy and interventions, by moving on from simple statements of the importance of gender, and developing a set of nine statements that cover detailed aspects of gendered roles, rights and relationships. The discussion emphasises the need to identify the farm decision-maker, and the gender of that person. Farm decision-making is distinguished from merely working on the farm; and from other roles such as household headship, and land ownership. The final sections of the paper address the development of a Gender Performance Indicator for use in irrigation systems. The use of the indicator is illustrated by an example from Burkina Faso, which also shows how neglect of these principles reduced the benefits of initial stages of this project.

Résumé

Cet article vise à améliorer l'analyse genre en agriculture par la démonstration de son importance pratique pour la conception des politiques et interventions d'irrigation. Au lieu de simples assertions sur l'importance du genre, l'article propose neuf principes qui permettent d'analyser, de manière détaillée, les aspects genre dans des rôles, droits et devoirs liés à l'agriculture irriguée. La discussion souligne la nécessité d'identifier non seulement la personne qui prend des décisions au niveau de la parcelle agricole mais aussi le genre de cette personne. La responsabilité pour la prise de décision n'est pas assimilée au simple fait de travailler la terre. Le rôle du décideur au niveau de la parcelle agricole est également distingué d'autres rôles comme chef de famille et propriétaire de la parcelle. Enfin, l'article aborde le problème du développement d'un indicateur de performance genre susceptible d'utilisation dans le domaine de l'irrigation. L'application de cet indicateur à un projet d'irrigation au Burkina Faso illustre la réduction des bénéfices entraînée par la non prise en compte de ces principes lors de l'élaboration du projet.

1. Introduction

Today, it is widely acknowledged that "Women play an important role in agriculture and irrigation in sub-Saharan Africa and should be reached better by both the public and private sectors." However, it often stops at that point. The consensus is not easily translated into action. One explanation for this gap between intentions and action is that the statement is too general to be of much practical use. Especially for the introduction of new irrigation technologies, gender generalities are rather fruitless. Below, we nuance the above statement and elaborate nine new statements on gender and irrigation that are probably better guides for effective action.

(i) Women farm decision-makers differ from women unpaid family labourers

Gender debates tend to focus on differences between all men and all women. If differences between women (or between men) are highlighted, these are differences according to class, ethnic groups, age, culture, etc. However, especially for irrigation development, yet another important difference is one between women who are farm decision-makers and women who work under the authority of male kin as unpaid family labourers. This difference is important because both the public and private sectors primarily seek partnerships with farm decision-makers, who are responsible for mobilising one of the farm inputs; water. Farm decision-makers need water directly. Farm decision-makers are also most motivated to invest labour and capital in to the infrastructure and invest time and fees in to the membership of water users associations. As they are the immediate beneficiaries of these investments, farm-decision makers are motivated in their endeavours.

In contrast, family members working in a farm enterprise, which is managed by male kin (for women) or elder family members (for both sons and daughters) play a secondary role. Evidently, there may be indirect consequences of irrigation investments in terms of extra labour, risks of loan taking that can affect the whole family; and also in terms of indirect benefits, if their kin share the higher farm

- Traditional Irrigation Improvement Programme Tanzania. 1993.** Rights are won, not given. *TIP training on legal issues and gender, 18-20 October 1993. Resource person: Betty Minde (KWIECO, Moshi). Report compiled by Eveline van der Grift, TIP WID North. Dar-es-Salaam Tanzania: SNV.*
- van Koppen, Barbara. 1998.** “More jobs per drop: targeting irrigation to poor women and men.” *Ph.D. Thesis, Wageningen Agricultural University. Amsterdam: Royal Tropical Institute.*
- van Koppen, Barbara; and Marna de Lange. 1999.** Irrigation management transfer in Arabie/Olifants Scheme: an appraisal. *Mission Report. Unpublished.*
- van Koppen, Barbara; Carien Joubert; and Lizinda Grobbelaar. 2000.** Gender and irrigation in the Tongwane Basin, South Africa. *Unpublished Report, Naledi Resourcing and International Water Management Institute.*
- van Koppen, Barbara; Rashmi K. Nagar;;and Shilpa Vasavada. 2001.** Gender and irrigation in India. The women’s irrigation group of Jambar, South Gujarat. *Working Paper 10. International Water Management Institute, Colombo, Sri Lanka.*
- van Koppen, Barbara. 2002.** A gender performance indicator for irrigation: Concepts, tools and applications. *Research Report 59. International Water Management Institute, Colombo, Sri Lanka.*
- World Bank. 2001.** Engendering development through gender equality in rights, resources, and voices. *A World Bank Research Report, World Bank and Oxford University Press, Washington D.C.*
- Zwarteveen M.; and N. Neupane. 1996.** Free riders or victims: women’s nonparticipation in irrigation management in Nepal’s Chhattis Mauja Scheme. *Research Report 7. International Irrigation Management Institute, Colombo, Sri Lanka.*
- Zwarteveen, Margreet Z. 1997.** A plot of one’s own: gender relations and irrigated land allocation policies in Burkina Faso. *Research Report 10. International Irrigation Management Institute, Colombo, Sri Lanka.*

incomes. Although family members may oppose or stimulate the farm decision-maker to take up irrigation innovations and negotiate a deal, the ultimate decisions are made by farm decision-makers. Public and private irrigation agencies, therefore, assign great importance to the question whether women's "important role in agriculture" is a decision-making role in farming, or a role in providing labour into a family enterprise, even if it is the bulk of the labour.

(ii) *Reaching women farm decision-makers in irrigation development improves irrigation performance*

The above mentioned differentiation between women also provides clarity about the meanings and merits of a 'gender-inclusive' approach in creating an enabling environment that provides the needed inputs, credits, and markets to smallholders. The lack of clarity about what is meant by 'gender-inclusiveness' was often another factor that may have hampered change agents from undertaking action. Yet, such clarity exists. During the past three decades, virtually unanimous consensus has been reached among policy makers, public and private sector practitioners, researchers, and often also among women and men in local communities, that ensuring support systems reach women farm decision-makers as well as men farm decision-makers serves the goals of productivity and improvement of women's incomes besides men's incomes. Ample evidence has shown that women are as efficient producers as men, provided they obtain equitable access to productive resources and human capital and have a say over the output (for an in-depth discussion, see Quisumbing 1996). Women's equal, if not higher productivity, as that of men's is also confirmed in irrigated agriculture in Burkina Faso (Zwarteveen 1997) and Senegal (Deuss 1994). Therefore, women farm decision-makers should obtain access to new technologies, water, credits, training, and markets on the same footing as men farm decision-makers. Thus, gender-inclusiveness, or "good gender performance" of irrigation support systems means that both men and women are reached and that productivity and incomes increase for both genders.¹

(iii) *A gender classification of farming systems is a prerequisite for private and public irrigation development*

If it is important to reach both men and women farm decision-makers, the next question is who in any specific context are the farm decision-makers: men, women, or both, and what the proportions are quantitatively. For both public and private sector development of new low-cost technologies, this is basic target group analysis. Elsewhere (van Koppen 2002), a majority of more than two-thirds of women farm decision-makers is defined as a female farming system. Less than one-third of women farm decision-makers represents a male farming system, while the dual farming system is in-between. Farming systems can be classified by examining the intra-household organisation of production in household farming in a given locality or scheme, and calculating relative proportions.

As is now widely acknowledged, households in general and farm households in particular are typically *not* units in which resources are pooled with the male head as the main decision-maker and representative. Instead, it is more plausible if intra-household relations are conceptualised as bargaining processes between the household members regarding the allocation of resources and spending of incomes (Jones 1986; Haddad, Hoddinott and Alderman 1997; World Bank 2001). Or, more precisely for the purpose here, there is an intra-household specialisation along gender lines with regard to productive activities. The household can be considered as being composed of one, two or more intra-household production units (Safilios 1988). Individual adult household members have production units that are identifiable as theirs, and they have considerable autonomy with regard to labour allocation and income utilisation. While all household members share the common goal of family welfare, each household member tries to maximise benefits for him or herself from the allocation of their labour and other agricultural investments, through negotiations with other members "trying to get the best deal out of it." In all these negotiations, the limiting factor is family welfare and family

¹ Gender-inclusive action for women unpaid family labourers would address the *prior* issue that their status is only that of unpaid family labourer. In rural societies where women's subordinate position is a structural condition for the majority of women, society's unequal distribution of the range of production factors, including land inheritance, education and farm training, access to capital, mobility, socialisation patterns, gender-biased support systems, etc., is at stake. Irrigation agencies can change that only by fostering synergy with a wider movement for more gender equity (Schreiner and van Koppen 2001).

stability. Only in extreme situations in which negotiations completely break down and the prevailing conditions are untenable, household members may consider sacrificing family stability (Safilidou 1988).²

Distinguishing intra-household production units not only adequately conceptualises the gendered organisation of irrigated agricultural production, but it also indicates that irrigated agriculture is usually only one activity in the range of income-generating activities of farm households. Worldwide, farms are typically "pluri-active," in that they are engaged in rainfed and irrigated cropping but often also livestock, off-farm employment, trade, food processing, fisheries, etc. An analysis of the intra-household organisation of irrigated farming allows identification of the main decision-maker in one particular domain: farming the irrigated plot.

The existence of these semi-autonomous intra-household production units is also manifest in the provision of capital for cultivation or the adoption of new infrastructure such as treadle pumps. Women may negotiate loans for production factors on their own plots through their own family, neighbours and friends rather than from their in-laws. This was found in the Arabie/Olifants smallholder scheme in South Africa (van Koppen and De Lange 1999). If spouses do lend money to each other, they sometimes charge an interest rate (Safilidou 1988). An example of an issue that needs further investigation, is the impression that their husbands often finance the treadle pumps or bucket drips that women use in Kenya (Kabutha et al 2000). This situation may be one in which women are merely family labourers. Or, if these women are farm decision-makers, they possibly made a deal with their husbands. A better understanding of both men's and women's attitudes with regard to mutual capital provision will highlight whether there is a need for credit systems that are open to women, in order to foster the adoption of the new technology by women farm decision-makers.

(iv) *The gendered nature of farming strongly varies, within sub-Saharan Africa as well*

The gendered organisation of farming needs to be assessed in each specific situation, because gender patterns of farming vary greatly and change continuously. A multitude of factors influences these patterns. Land tenure is certainly an important one. The spouse with the stronger land titles usually has a stronger voice in the farm enterprise. However, this is not always the case, as elaborated below. Other factors that influence gender patterns of farming include culture and ethnicity, class and wealth status, or gender-biased agricultural technological development. Reportedly, specific agro-ecological zones like wetlands in sub-Saharan Africa also have higher proportions of women-managed plots than adjacent dry lands (Dey 1980; Richards 1986). Worldwide, homestead cultivation is often also a female farming system, although homestead land may belong to the men who also perform specific activities such as ploughing, as in Jambar, a village in South Gujarat, India (van Koppen et al. 2001).

Locally prevailing gender patterns in farming also vary according to household composition, stage in the household cycle and age (Bastidas 1999), head of the household, personal preferences, etc. Gender-segmented off-farm employment opportunities and high male ratios in out-migration lead to the feminisation of agriculture and the change of male farming systems into dual and female farming systems. In Southern and Eastern Africa female and dual farming systems are endemic. In some regions 50 or even up to 90 percent of the farms are female-managed (FAO 1998; Makhura and Ngqaleni 1996; Safilidou 1994). Dual systems may also occur pocket-wise in typically male irrigated farming, as reported in Nepal (Zwarteveen and Neupane 1996).

(v) *The method of classifying farming systems can be quick and easy*

The variation in the gendered organisation of agricultural production warrants an assessment in each specific situation. A first indication in each specific context is often quite easily obtained. Local project staff, extension workers, or farm leaders, who know existing or potential irrigation contexts, often have considerable insight in the gender of the decision-maker on the various plots, if the questions clearly concern a specific farm. A small random and representative sample already provides

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

useful insight. Evidently, the method of assessing the intra-household organisation of agricultural production can also be much more sophisticated, leading to more refined typologies, etc.

In carrying out such research one may find that the initial answer to questions about the intra-household organisation of production is 'jointly'. Interestingly, this may be the case in both male and female farming systems (van Koppen 2002). This answer is easy and nowadays socially acceptable, also in male farming systems. Some further probing is usually sufficient to give unambiguous answers as to whether the farm manager in general, or the household member taking specific decisions or carrying out certain activities, is a man or a woman, or whether spouses or parents and children farm jointly.

A methodological warning is that existing lists of farmers are notoriously misleading, because these tools are for administrative or demographic purposes and tend to register either the household head or the landowner, that is if there is clarity about the registration criteria at all. Administrative simplification tends to ignore production relations and to incorrectly equate farm decision-making to headship of a household or land-ownership.

(vi) Farm decision-making differs from headship of household

It may be useful to re-emphasise the difference between headship of a household and farm decision-making. In female farming systems, such as wetland or homestead cultivation, most women farm decision-makers are typically married while their husbands' main occupation can also be farming. Households in which men have off-farm jobs while women do the farming activities, may well be seen as male-headed households, even though others would call these *de facto* female-headed households, especially if off-farm employment is at a large distance. Problems of definition of headship easily arise without providing any additional insight into the issue at stake here: farm decision-making. On the other hand, in *de jure* female-headed households, which are more clearly defined, women may leave farm decision-making to others. This was found in male farming systems in large-scale canal irrigation schemes in India. Farm decision-making was only in women's hands in half of the cases (van Koppen et al. 2001). Hence, targeting female-headed households to reach women farm decision-makers would mean that both targeting mistakes are made: women "heads of households" who are *not* the farm decision-makers would be included; and women farm decision-makers in male-headed households would be overlooked.

(vii) Farm decision-making is prior to land-ownership in public schemes, and a possible obstacle in private technology development

The various relationships between farm decision-maker and land tenure need to be disentangled. Women farm decision-makers tend to have weaker land rights than men in many sub-Saharan countries. Some categories of women, however, have the primary land rights under some conditions, while other women cultivate in their own names on land of their in-laws to which they have life-long tenure security. Men may also cultivate land of their female in-laws. A mix of these situations was found in the Tongwane sub-catchment of the Olifants River in a former homeland in South Africa. Out of 176 irrigated plots in various irrigation schemes in this sub-catchment, women cultivate 62 percent, men 24 percent and both spouses jointly cultivate 14 percent. However, among the women farm decision-makers, 36 percent are *not* the titleholders of the land they cultivate. Of the men farm decision-makers, 10 percent also cultivate land belonging to others (van Koppen et al. 2000). It is also possible, as found in south Malawi and Mozambique, that women have the primary land titles while men are the farm decision-makers on those lands.

The distinction between farm decision-making and primary land titles is especially important in situations in which governmental agencies define water rights and membership rights of water users' associations. Irrigation management transfer often requires reconsidering such membership criteria. Generally, vesting membership of water users' associations in the factual farm decision-maker (who is also motivated to increase the farm's productivity through water) rather than the person with the primary rights to the land, benefits women and stimulates production. This concern of opening up membership of new water users' associations to women farm decision-makers, irrespective of the type of their land rights, was one of the reasons for the Government of the Republic of South Africa to disconnect land-ownership from membership of water users' associations in the National Water Act (Republic of South Africa 1998).

Evidently, the real solution for women farm decision-makers who only have weak land rights is to strengthen women's land rights as well as their water rights. Investments in new infrastructure and processes of irrigation management transfer may offer such opportunities of reallocating land in the command area (Traditional Irrigation Improvement Program Tanzania 1993; Projet Sensibilisation 1995).

Land tenure also plays a role in the development and up-take of low-cost individual technologies, such as treadle pumps and bucket drip systems. In these situations, land tenure is often given. In the case of mobile technologies, one could assume that even cultivators, whether men or women, who risk being shifted from the land in which they invested through irrigation infrastructure, are sufficiently motivated to make the investment in irrigation as they will never fully lose their investments. But for land-bound irrigation investments, weak land rights may appear a basic obstacle for women and men to make long-term investments. This issue needs more research, for example, to identify forms of contracts that make the investment attractive to both the landowner and cultivator.

(viii) *Gender performance of irrigation institutions in collective irrigation schemes can be measured*

In the specific case of externally supported collective irrigation schemes and their institutions, there is yet another issue besides classifying the farming system precisely, as described above, which is the performance question. This second gender issue addresses the question as to whether irrigation institutions reach men and women farm decision-makers equally well in providing water, or other services, and if not, what could be done to change any deficiencies. Irrigation institutions are defined here as the collective arrangements that govern the construction, operation, and maintenance of infrastructure, water acquisition and distribution, and resource mobilisation. It is useful to distinguish three aspects which all require different forms of action, if gender-based exclusion is found to be the case.

- Equal farm-level access to water and related obligations, which is directly related to women's and men's equal access to resources for higher productivity and incomes.
- Equal participation in 'forums' or networks for collective water management arrangements as generally required for strengthening access to water at farm level.
- Equality at leadership-level in the sense that the gender composition of leaders reflects the gender composition of the farmers in the scheme and that women function as well as men.

The answers to these questions give a full-fledged picture of gender performance, which can also be specified. Absence of gender-based differences means good gender performance (+); mild gender-based differences mean moderate performance (+/-); or categorical exclusion means low gender performance (-) for that particular aspect.

The specific role of external intervening agencies in shaping the irrigation institutions, and thus in contributing to a good or weak gender performance of a particular scheme can also be specified at these three levels: farm, forum, and leadership level. The explicit study of the role of external agencies in shaping irrigation institutions, and, hence, gender-based inclusion and exclusion processes, render the study more policy-relevant. Roughly, one can compare the influence of agencies with the role of locally prevailing production arrangements. This helps in defining whether agencies are the "main performer" (which they can change) or whether local reality is the main cause of gender inclusion or exclusion (which agencies alone can hardly change). This approach was elaborated into a "Gender Performance Indicator for Irrigation" by the Poverty, Gender, and Water Project of the International Water Management Institute, Sri Lanka, and tested in nine case studies (van Koppen 2002).

To conclude, one example of the application of the complete Gender Performance Indicator for Irrigation is given, which highlights why gender analysis is important, especially for public irrigation agencies.

(ix) In dual and female farming systems, public irrigation agencies are the main gender performers

This application of the Gender Performance Indicator for Irrigation is in a wetland improvement project in Southwest Burkina Faso (van Koppen 1998). This case not only shows the negative effects of the agency's male bias, but also the resilience of a female farming system. These locally prevailing production relations were the most important factors that "forced" the project to change in later schemes from the male-biased towards a gender-inclusive intervention approach. The later gender-inclusive approach that the project adopted as its standard procedure also appears effective wherever female and dual farming systems exist to enhance both productivity and women's income. The Gender Performance Indicator for Irrigation that was applied before the project, during the first schemes and during the later schemes, captured the essence of the inclusion and exclusion of women farm decision-makers.

2. Gender classification of farming system and gender performance of local schemes

In the low-lying wetlands in the West Comoé Province in Burkina Faso that are used for rice cultivation, 80 to 90 percent of the plots are cultivated by younger and especially older women as their production units. Men as a gender are the farm decision-makers on the upper dry lands, for which they solicit labour inputs by their wives as long as they are young. Inheritance of wetland plots from mother to daughter is common, while husbands and mothers-in-law also mediate in providing rice plots to women. Wetlands are governed by the low intensity common property regimes, mentioned above (Ostrom 1994). Within the clan of the "land chiefs," the local land custodians the 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, though, brothers, fathers or husbands of the female land chief tend to be the representatives. Male land chiefs also perform religious functions. The Gender Performance Indicator for Irrigation for the pre-project situation is given in Table 1.

This case study is an in-situ experiment, so the respective roles of the project or local arrangements as main cause of events, or "main performer" in the Gender Performance Indicator for Irrigation, can easily be identified, and is identified in the final line of Table 1 and subsequent similar tables below.

Table 1. The Gender Performance Indicator for Irrigation in wetlands in South-West Burkina Faso, before the wetlands improvement project.

Land rights	Membership rights	Water rights at farm level	Inclusion in forums	Inclusion as leaders	Ability to function as leaders
+	+	+	+	+	+/-
Main performer: local arrangements					

3. Exclusion by the agency in the first two schemes

In 1980 a 'Rice Cultivation Improvement Project' started in these wetlands. This project was initiated and implemented by the regional Ministry of Agriculture and funded by the European Community. The project intended to intervene subsequently in eight rice valleys in the project zone up till 1987. It was foreseen that central drains, sluices, and bunds would be constructed according to the contour lines, for better water management in the respective valleys. Before construction, land was expropriated. Land was then divided in to equal-sized plots and reallocated after construction.

The first two schemes were constructed simultaneously. In these two schemes the technical project management, who fully concentrated on rapid construction, only interacted with a handful of (male) village authorities. This elite arranged the expropriation of land, promising to the women that they would get the land back. Yet, after construction when the improved plots were to be reallocated, this

small "committee" of project management and village elite decided to allocate the improved rice plots to men only. As "male heads of households," beneficiary men were supposed to arrange the "intra-household" and "cultural" affair of farming and land allocation. All project staff were misled by the above-mentioned concept of the unitary household, represented by the male heads. Even the social scientists in the project, who mainly relied on demographic survey data and lists from the tax offices, imagined that rice cultivation would become a "family farm" after the project. Even they had failed to discover the existence of women's own production units and land rights.

When these first schemes started functioning, the male land title-holders expected women to continue providing all labour, while 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, all of which discouraged them from producing. Moreover, membership of the new water users' association, which entailed the obligations for maintenance, was vested in land title-holders as well. Women were excluded from the forums where collective rules were set and implemented. In most parts of the two schemes, however, men failed to fulfil their labour obligations because their primary interests continued to be in the uplands. Lack of maintenance of the infrastructure further contributed to the decrease of production and even abandonment of large parts of the schemes.

Remarkably, even the regional director of the Ministry of Agriculture, who was one of the very few who had understood the previous local farming system and recognised the negative consequences of the project for women and their dependants in the first two schemes, failed to see a solution. His personal interpretation of law was that "after public intervention, the administrative allocation ignores women whose juridical existence is only through the family head." Thus, even he contributed to the introduction of new forms of exclusion, based on a personal interpretation of marital law, which was totally alien in local land and water tenure. The low gender performance of the first two schemes is summarised in Table 2.

Table 2. The Gender Performance Indicator for Irrigation in wetlands in South-West Burkina Faso in the first two schemes of the wetlands improvement project.

Land rights	Membership rights	Water rights at farm level	Inclusion in forums	Inclusion as leaders	Ability to function as leaders
-	-	+	-	-	-
Main performer: agency					

4. Resilience of local production relations and women's inclusion

The change in the procedures of land expropriation and reallocation in the third and fourth schemes was the result of local initiative by women, their husbands and female and male land chiefs, and receptive field staff. The crucial difference from the first two schemes was the time span of some years between the first contacts of the project and the start of construction. During this period full consensus was reached in the community that the existing plot holders, whose names were known exactly by the land chiefs, obtained priority rights for new allocation.

This procedure evolved into a standard gender-sensitive procedure for all later schemes in the project zone (and elsewhere in the world indeed). In this approach, first, open meetings are organised, for which the current farm decision-makers and anyone interested are invited. The participants in the meetings are informed about the project, the technical aspects, and the land redistribution and proposed organisational design. Current plot holders and other candidates are registered as future land and water title-holders before any construction. After construction and land reallocation, they become members of the new water users' associations, fulfil their maintenance obligations and elect their leaders. In the committees, however, the minority of male rice cultivators remains over-represented. By extensive literacy and other training programmes, the project builds the critical mass for a pool of women candidate leaders.

In all later schemes men were still explicitly invited to apply for new rice plots. Nevertheless, the majority of new applicants were invariably women, except for one site where land pressure on upper dry lands had become high, which caused some men to apply for rice plots as well. Table 3 captures the good gender performance in the later schemes.

Table 3. The Gender Performance Indicator for Irrigation in wetlands in South-West Burkina Faso in the later schemes of the wetlands improvement project.

Land rights	Membership rights	Water rights at farm level	Inclusion in forums	Inclusion as leaders	Ability to function as leaders
+	+	+	+	+	+/-
Main performer: initiated by local arrangements, accepted by agency					

The local socio-economic conditions in the subsequent schemes are rather similar. Only the procedures for land expropriation and reallocation differed. In the first two schemes the agency was most dominant, while in later schemes communities obtained a stronger say. The agency was, therefore, the *only* cause of women's marginalisation. Locally, such exclusion had never existed before. This marginalisation was the result of the agency's complete ignorance of the gendered organisation of farming combined with an authoritarian approach, in which under high time pressure, far-reaching decision-making powers were vested in a handful of local elite.

In later schemes, the locally prevailing organisation of farming smoothly re-emerged as the most obvious basis for the new farming system and irrigation institutions, in spite of the project. It only required time to crystallise. None of the later schemes had the productivity and maintenance problems of the first schemes. The inclusive approach that the agency later adopted is straightforward: recognising and organising farm decision-makers, whether male or female, in a bottom-up way *before* construction, and strengthening the resource rights of the farm decision-makers, while demanding that they fulfil their obligations.

5. Conclusions

The case of the wetland improvement project in Burkina Faso highlights, in a nutshell, the core arguments raised in many other case studies: agencies' blindness to recognise prevailing female or dual farming systems, and the ways in which agencies vest far-reaching decision-making powers in male elites only and exclude women farmers from membership of forums, let alone leadership positions. Reportedly, the loss of women farmers' earlier rights to water and irrigated land, and declining productivity are similar results (Hanger and Morris 1973; Dey 1980; Carney 1988; Illo et al 1988).

The other side of the coin is also documented. In female and dual farming systems, quite a number of agencies learned from their mistakes and started actively adopting the above-mentioned inclusive approach from the design stage onwards. This had the desired effects (Carney 1994; Traditional Irrigation Improvement Program Tanzania, 1993; Hulsebosch and Ombarra 1995;³ Arroyo and Boelens 1997; De Lange et al. 1999).

Hence, where female and dual farming systems prevail in Africa, Asia or Latin America, there is not only scope for irrigation agencies to enhance women's incomes by supplying them with water in their own names, but also to vest in them the rights to irrigated land. It is often absolutely necessary to

³ In the West Kano irrigation project, Kenya, the agency only agreed to hold meetings if women constituted at least half of the participants. Otherwise they cancelled. Moreover, in the first years, the agency organised women in women-only groups, in which they were well informed and encouraged to articulate their interests in preparation for the subsequent mixed meetings (Hulsebosch and Ombarra 1995).

achieve the productivity goals of irrigation investments. Agencies themselves are the main performers in either excluding women farm decision-makers or, more recently, successfully including women and men on an equal footing in irrigation institutions.

As women are managers of farms in which water is an input, women's inclusion in irrigation institutions besides men's is a straightforward matter of bottom-up organisation of all farm decision-makers, irrespective of the type of land rights into member-based water users' associations that can demand accountability from their leaders (Shah 1996). Then, gender-based exclusion at farm or forum level is unlikely to occur. Only for inclusive leadership, does support remain necessary in order to develop women's organization and leadership skills. In female and dual farming systems, the key policy issue is that policy makers and interventionists themselves should finally learn.

Bibliography

- Arroyo, Aline; and Rutgerd Boelens. 1997.** Mujer campesina e intervencion en el riego Andino. Sistemas de riego y relaciones de género, caso Licto, Ecuador. *Servicio Holandés de Cooperación al Desarrollo (SNV), Central Ecuatoriana de Servicios Agrícolas (CESA) and Sistema de Capacitación en el Manejo de los Recursos Naturales Renovables (CAMAREN), Quito.*
- Bastidas, Elena P. 1999.** Gender issues and women's participation in irrigated agriculture: the case of two private irrigation canals in Carchi, Ecuador. *Research Report 31. International Water Management Institute, Colombo, Sri Lanka.*
- Carney, Judith. 1988.** Struggles over land and crops in an irrigated rice scheme: the Gambia. In: Jean Davison (ed). *Agriculture, women and land. The African experience*, pp. 59 – 78, Boulder, Colorado: Westview Press.
- Carney, Judith. 1994.** Gender and the sustainability of irrigated farming in The Gambia. In: Ingrid Yngstrom, Patricia Jeffery, Kenneth King, and Camilla Toulmin (eds). *Gender and environment in Africa. Perspectives on the politics of environmental sustainability*, Centre of African Studies, University of Edinburgh.
- De Lange, Marna; Lydia Pardelle; Dumisani Magadlella; Stephanus Smal; Annie Sugrue; Chris Stimie; and Barbara van Koppen. 1999.** Rural Women's Association: an assessment of the success factors and sustainability. *South Africa Working Paper No.1. International Water Management Institute, Colombo, Sri Lanka.*
- Deuss, Marleen. 1994.** "Do women's gardens hold water? Gender relations and the introduction of irrigation systems at the Ile à Morphil in Senegal." *MSc thesis, Department of Irrigation and Soil and Water Conservation, Wageningen Agricultural University and Third World Centre, University of Nijmegen. Occasional paper 42, Third World Centre, Catholic University of Nijmegen, The Netherlands.*
- Dey, Jennie. 1980.** "Women and rice in The Gambia: the impact of irrigated rice development projects on the farming system." *Ph.D. thesis, University of Reading.*
- FAO (Food and Agriculture Organization of the United Nations). 1998.** Rural women and food security: current situation and perspectives. *FAO, Rome.*
- Haddad, L.; J. Hoddinott; and H. Alderman. (eds). 1997.** Intra-household resource allocation in developing countries: methods, models and policy. *John Hopkins University Press, Baltimore, for the International Food Policy and Research Institute.*
- Hanger, Jane; and Jon Moris. 1973.** Women and the household economy. In Robert, Chambers, and Jon Moris (eds). *Mwea: an irrigated rice settlement in Kenya*, Munchen: Weltforum Verlag.
- Hulsebosch, Joitske; and Doris Ombara. 1995.** Towards gender balance in irrigation management: experiences in Kenya Southwest Kano Project. *Irrigation and Drainage Systems*, 9, pp. 1-14, Kluwer Academic Publishers Netherlands.

- Illo, Jeanne Frances I.; Susan E. Leones; Grace C. Ignacio; Karen H. Jacob; and Victoria R. Pineda. 1988.** The Philippine Communal Irrigation Program. In: *Jeanne Frances I. Illo (ed). Gender issues in rural development. A workshop report, Institute of Philippine Culture. Quezon City: Ateneo de Manila University.*
- Jones, Christine W., 1986.** Intra-household bargaining in response to the introduction of new crops: a case study from North Cameroon. In *J. L. Moock. (ed). Understanding Africa's rural households and farming systems., Westview Press, Boulder, Colorado, USA.*
- Kabutha, Charity; Herb Blank; and Barbara van Koppen. 2000.** Drip irrigation kits for smallholder farmers in Kenya: Experience and a way forward. *Paper presented at Micro2000 Congress, Cape Town. International Commission for Irrigation and Drainage.*
- Makhura T.; and M.T. Ngqaleni, 1996.** An analysis of women's status in agricultural development in the Northern Province. In: *M. Lipton, F. Ellis, and M. Lipton (eds). Land, Labour and Livelihoods in Rural South Africa Vol. 2, chapter 13. Durban: Indicator Press.*
- Merrey, Douglas J.; and Shirish Baviskar (eds). 1998.** Gender analysis and reform of irrigation management: concepts, cases and gaps in knowledge. *Proceedings of the Workshop on Gender and Water, September 1997. International Water Management Institute, Colombo, Sri Lanka.*
- Ostrom, Elinor. 1994.** Neither market nor state: governance of common-pool resources in the twenty-first century. *IFPRI Lecture Series. Washington: International Food Policy Research Institute*
- Projet Sensibilisation et Formation des paysans autour des barrages. 1995.** Etude évaluative de sept périmètres maraichers féminins encadrés par le Projet Sensibilisation et Formation des Paysans autour des Barrages. *Ministère de l'Agriculture et des Ressources Animales. Ouagadougou, Burkina Faso.*
- Quisumbing, Agnes. 1996.** Male-female differences in agricultural productivity: methodological issues and empirical evidence. *World Development, v 24, no. 10, pp 1579 – 1595, Elsevier Science Ltd, Great Britain.*
- Raparson, Emilianne. 1989.** Impact du développement de l' irrigation sur la femme en milieu rurale. *Rome: FAO. Cited in: Dey, Jennie 1990: Gender issues in irrigation project design in sub-Saharan Africa. Contribution to: International Workshop on Design for Sustainable Farmer-managed Irrigation Schemes in sub-Saharan Africa. Department of Irrigation and Soil and Water Conservation, Wageningen Agricultural University, The Netherlands.*
- Republic of South Africa. 1998.** National Water Act. *Government Gazette, v. 398, 26 August 1998, no. 19182. Office of the President, Cape Town.*
- Richards, Paul. 1986.** Coping with hunger. *London: Allen and Unwin.*
- Safiliou, Constantina. 1988.** Farming systems and gender issues: implications for agricultural training and projects. *Unpublished paper, Ministry of Agriculture and Fisheries of the Netherlands and the International Agricultural Centre, Wageningen.*
- Safiliou, Constantina. 1994.** Agricultural policies and women producers. In: *Aderanti Adepoju and Christine Oppong. (eds). Gender, work and population in sub-Saharan Africa. International Labour Organisation, London: James Currey and Heinemann.*
- Schreiner, Barbara; and Barbara van Koppen. 2001.** From bucket to basin: poverty, gender, and integrated water management in South Africa. In: *C.L. Abernethy. (ed). Intersectoral management of river basins, Proceedings of the International Workshop on Integrated Water Management in Water-Stressed River Basins in Developing Countries, 16-21 October 2000. Colombo, Sri Lanka: International Water Management Institute, and German Foundation for International Development (DSE), in collaboration with the Water Research Commission of South Africa.*
- Shah, Tushaar. 1996.** Catalysing co-operation: Design of self-governing organisations. *New Delhi: Sage Publications.*