



Gender-Sensitive Irrigation Design

Gender issues in smallholder irrigation rehabilitation: Cases from South Africa

F Chancellor
D O'Neill

**Report OD 143 (Part 4)
December 1999**



HR Wallingford



DFID Department for
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Development

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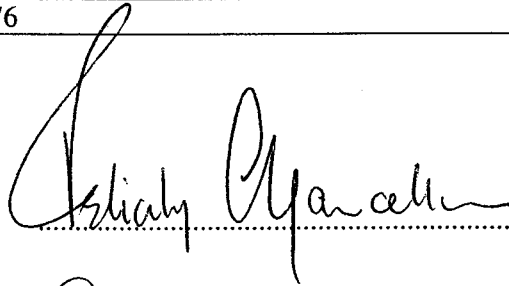
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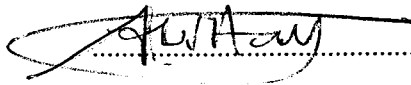


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Executive Summary

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The South African component of the Project focussed on three schemes, two of which were part of a small-scale irrigation scheme rehabilitation programme in Northern Province. Whilst gender issues were identified on these schemes, other concerns dominated the rehabilitation needs. Gender aspects were more prevalent at the third scheme, Elandsdoorn, in Mpumalanga Province, where, a women's club had been established and was operating reasonably successfully

Rehabilitation planning is necessarily broad-based and complex so care must be taken that gender issues are not disregarded or squeezed off the agenda. Rehabilitation is perhaps an understatement for the degree of restructuring impacting on both the water delivery systems and the scheme management, together with the need to develop external linkages. However, throughout these restructuring initiatives, self-determination is the priority and this demands the recognition of women's rights. In the rehabilitation schemes particularly, the emphasis is on **empowerment** of the smallholders as an entity, and does not specifically differentiate between men's and women's needs or aspirations. At Elandsdoorn, where the rehabilitation thrust was not formally imposed it seemed that women's rights were less likely to be side-lined.

The Gender-sensitive Irrigation Design Study (GSID) is concerned to identify the gender-related problems and to assess the quality of participation achieved by men and women in the rehabilitation process. In working with South African partners, GSID aims to pursue the following points, raised in the Workshop at the end of Phase 1 of the study:

- identify aspects of irrigation design that constrain men and women from using their irrigation scheme to the best advantage in terms of profitability and sustainability
- take into account the personal workloads of men and women with particular reference to the temporal and social constraints that apply to them
- identify practical strategies for ensuring effective participation of men and women in the relevant decisions in the rehabilitation process

Of the three schemes studied, Thabina showed the least female participation. However, this scheme, with its inhibited communication between Blocks and with the extension staff, had the poorest participation in general. At such a low level of

participation at the scheme plot level and the non-involvement of the women's club, the women were probably more marginalised than on the other schemes. At Elandsdoorn, a significant female contribution to scheme management appeared to be made by the strong Women's Club, but the (male) Chairman of the farmers still seemed to be the dominant influence. Gender issues relating to participation were least evident at Boschkloof, although the greatest overall disparity, land preparation, occurred there. Ultimately, it is difficult to assess the degree of participation within a particular community, and whether the degree is appropriate for that community. Nevertheless, if long-term decisions are made without the necessary participation, the future viability of schemes is jeopardised.

Land preparation has been reported as a major problem since the withdrawal of Government tractor services in all the schemes and women have been disadvantaged more than men because of their lesser negotiating powers. Women are further disadvantaged on schemes where the levelling is poor and extra work is therefore demanded for soil manipulation to achieve efficient water distribution on a plot.

Although men are also disadvantaged by pump failure, they are generally in a stronger position to take corrective action.

The design of the equipment used on the schemes was never raised as an issue, with accessibility and reliability being the preoccupations. Access to tractor power was the main concern: at Thabina the deep, rich soils needed ploughing for a crop to reach its full potential; at Boschkloof the suggestion to increase plot sizes worried those who feared they would not have access to a tractor. At Elandsdoorn, also, access to tractors was cited as the main problem by women but was ranked as second by men. When issues of availability and accessibility have been dealt with, it is expected that the design of the equipment-operator interface will become increasingly important, as was found elsewhere in this project. There was some evidence for this at Elandsdoorn where farmers were having difficulty in extracting water from the channels into their plots.

Management decisions should be taken with marketing in mind. Choice and quantity of crops can have a major impact on income, particularly at different times of the year, and therefore on scheme viability. Men and women have different cropping preferences, which should be complementary for household food and income needs (ie livelihood), and scheme management decisions must reflect this. One example would be compensating women who may have diverted some of their own resources (assets - labour, land) from household food crops to produce cash crops with their husbands. Both men and women should be consulted but, typically, the women's roles are not fully recognised and their representation is weak.

The most important dimension of capacity building is training. Training has featured heavily in the rehabilitation programme and continues to do so, although more strongly in certain aspects than others. The training in agricultural techniques and practices has been very professional at all the schemes and farmers who implemented their training and applied the recommended crop inputs have had very good returns. Training in scheme administration and management, is less easy to deliver, less easy for farmers to adopt, and less easy to evaluate. The local customs and mores have prevailed and have resulted in women having less opportunity to build up their knowledge and skill bases. When the women did

receive some management training, they preferred to be with the men than separate and did not apparently assert themselves.

Overall very little involvement of women in decision-making has been achieved but it is clear that women's involvement in discussion is increasing, although participation of women varies from scheme to scheme. In rehabilitation, it may be that the gender biases that have grown up with the earlier introduction of irrigation technology, make it especially difficult to involve women without making special arrangements and explicitly targeting women in the participatory process.

Acronyms

- ILI Institute of Agricultural Engineering, Agricultural Research Council, Pretoria , South Africa
- BDDSA British Development Division for Southern Africa, DFID, British High Commission, Pretoria.
- DFID Department for International Development, UK.

Acknowledgements

We gratefully acknowledge the contribution inputs and support of the South African Institute of Agricultural Engineering (ILI), in particular the major contribution of Chris Stimie, Principal Engineer, whose assistance in facilitating the rehabilitation part of the study was invaluable. The support of the Ministry of Agriculture in Northern Province in allowing access to the pilot rehabilitation projects, and in particular to Doctors Tau Mzamane and Michael Shaker for their interest and support. Particular thanks are due to the consultants who were responsible for the institutional and agricultural aspects of the pilot rehabilitation, Loxton Venn & Associates and in particular to Dr Jon Rutherford and the extension specialist Johann Adendorff, who shared their insights and considerable experience. Thanks are also due to Lieve Stoops and Tersha Uitenwerde for their investigations at Elandsdoorn., and to Sean van Rij of the Mpumalanga Development Corporation who had previously been involved with the scheme. Particular thanks are due to the extension staff, Maggie Mbatha, Thembi Mtshweni, Julius and Daniel and to the chairman Joseph Seopseh.

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The team is particularly indebted to the Tribal Chiefs, Development Committees, Extension Officers, farmers and men and women, who welcomed us to their meetings, explained their objectives and difficulties to us, cooked for us and made us welcome with songs and dances.

It is hoped that the output from this study will provide useful reference material and that the guidance will play a part in assisting men and women throughout the region to achieve better, more sustainable livelihood benefits from investment in irrigation.

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1. INTRODUCTION

1.1 Background

The 'Women in Irrigation' study highlighted women's labour as a key factor in the performance of smallholder irrigation. It is important therefore to ensure that women's efforts are used in the best way to improve production and sustainability, while also guarding against exploitation of women. At present, women are among the poorest people in rural areas, largely as a result of their lack of control over productive assets and their heavy workload.

Design of smallholder irrigation does not usually take into account the preferences of the end user. The physical tasks connected with structures, machinery and tools are often laborious and time-consuming. These tasks impact differently on men and women, and different tasks conflict with other gender-specific obligations. The suitability of a system as a whole, or individual pieces of equipment, depend on durability, dimensions, energy requirements, technical skill for operation and maintenance, availability of spares and servicing, access to training and the overall workload of the user. In these respects men and women have different requirements and different starting points. Many of the heavier tasks associated with irrigated farming were found in Phase I of this project were found to be extremely difficult for women, to the point of causing extreme fatigue and bodily harm (Part 1, Appendices 2 and 3). Even in systems built specifically for women irrigators, standard equipment can cause major problems for the users (Chancellor, 1997).

In smallholder irrigation, jobs are traditionally allocated on a gender basis but the interdependence of one job on another means that there are seldom tasks that are entirely 'male' or 'female' concerns. *Gender-Sensitive Irrigation Design (GSID)* refers to designs that recognise the different starting point, constraints and aspirations of men and women regarding the use of irrigation facilities. A good gender-sensitive design would be one that maximises the sustainability and production of the scheme while empowering both men and women to fulfil their objectives for an acceptable level of effort.

1.2 GSID Issues

The South African component of the project focussed on three schemes, two of which were part of a small-scale irrigation scheme rehabilitation programme in Northern Province. Whilst gender issues were identified on these schemes, other concerns dominated the rehabilitation needs. Gender aspects were more prevalent at the third scheme, Elandsdoorn, in Mpumalanga Province, where a women's club had been established and was operating reasonably successfully. Less detailed information was collected for other sites also (eg the small garden scheme at Enkeldoornoog, Mpumalanga and a third Northern Province rehabilitation scheme, Morgen), which expanded the range of experience and information. These schemes are not explicitly referred to in this report.

Rehabilitation planning is necessarily broad-based and complex so care must be taken that gender issues are not disregarded or squeezed off the agenda. Rehabilitation is perhaps an understatement for the degree of restructuring impacting on the water delivery systems, the scheme management and the management need to develop external linkages. However, throughout these restructuring initiatives, self-determination is the priority and this demands the recognition of women's needs. In the rehabilitation schemes particularly, the emphasis is on **empowerment** of the smallholders, as an entity, and does not specifically differentiate between men's and women's needs or aspirations. At Elandsdoorn, where there is no formal rehabilitation thrust, it seemed that women's needs were less likely to be side-lined.

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- take into account the personal workloads of men and women with particular reference to the temporal and social constraints that apply to them
- identify practical strategies for ensuring effective participation of men and women in the design or rehabilitation process
- provide general guidelines for taking gender considerations into account in design or rehabilitation of small-scale, smallholder irrigation
- provide publicity material to encourage gender awareness and appreciation of irrigation design issues among farmers.

Phase I of the project, which was carried out in Zimbabwe, concentrated on investigating gender roles through surveys and focus groups to:

- I identify potential research issues,
- II investigate pilot interventions.

Phase I concluded with a Workshop in Masvingo to enable regional irrigation professionals to prioritise the research issues. Although the Workshop discussion was based on Phase I field work, the issues were not limited to those identified in this preliminary work. Priority areas for investigation in Phase II were identified (Appendix 1). The Workshop prioritised three major issues for concern in relation to gender disparity on irrigation schemes:

- **Marketing**
- **Access to resources**
- **Equipment and land preparation (including indigenous technical knowledge).**

These three issues will be specifically addressed in section 4 of this report.

2. CASE STUDIES

2.1 Overviews of Schemes

Smallholder irrigators in South Africa are facing serious difficulties in getting the best from their schemes. Many schemes are run down, have low levels of production and are characterised by conflict and low motivation among the farmers. This situation has much to do with the way schemes were designed for top-down management and past failure to recognise the real needs of the users. Much of the investment of the past will be wasted unless appropriate ways are found to convert these schemes into sustainable, farmer-managed concerns.

2.1.1 The Rehabilitation cases

In Northern Province there are 167 small-scale irrigation schemes. The Department of Agriculture has responsibility for most of these schemes and is currently exploring effective ways of rehabilitating the infrastructure and remodelling the operations to give farmers autonomy and responsibility in both management and future development. It is recognised as important to enable farmers to manage with confidence in the future, and hence it is crucial to include participation and gender in the remodelling process. The heavy subsidies formerly granted to the sector through provision of agricultural services and marketing are being withdrawn, sometimes causing hardship to farmers, especially women, unfamiliar with the processes of acquiring services and managing for themselves. Existing infrastructure will not necessarily be suitable for farmer management nor for the level of agricultural service that can be afforded without subsidy. It is important therefore that farmers, especially those doing the daily tasks, participate in the plans for rehabilitation in order to meet their needs and for the available funds to be spent wisely in improving manageability and therefore sustainability of the system. The Department of Agriculture has engaged Development Consultants and the ILI (Instituut vir Landbou-Ingenieurswese - the Institute of Agricultural Engineering - part of the Agricultural Research Council of South Africa) to conduct pilot rehabilitation on three schemes to develop a robust participatory process for reorganisation and rehabilitation where needed.

The gap between management experience in smallholder communities and in the competing commercial farmers puts the smallholders at a disadvantage. It is important to explore ways of bridging such gaps and ensuring that in doing so women are enabled to improve their livelihoods using irrigation. This is new territory for the farmers, civil servants, researchers and development consultants undertaking the pilot investigations but demands a confident, albeit cautious, approach. It was appropriate that the case studies should include pilot rehabilitation projects, both to provide an opportunity to observe participation and redesign and to assist stakeholders to increase their gender-awareness and add to the pool of experience.

The Department of Agriculture, Northern Province, is concerned to:

- reduce its commitment to the long-term support of smallholder irrigation;
- ensure that the investments already made in irrigation infrastructure are used to greatest advantage for the farmers using them and for the benefit of communities in the Northern Province;
- enable self-reliance and self-determination among smallholder irrigation managers
- implement the principle that users pay for services;
- ensure that the policies enshrined in the constitution relating to participation and gender issues are met in the process of rehabilitation and transfer to farmer management.

The rehabilitation schemes chosen were at Thabina and Boschklouf.

2.1.1.1 The Thabina Irrigation Scheme

The Thabina scheme has 124 farmers and is in the Lowveld region about 24 km from Tzaneen. It takes water for irrigation from Thabina River, some by gravity flow diverted at an upstream weir and some from an assortment of government and privately owned pumps at points below the weir. The scheme has 188 ha

of a possible 228 under furrow irrigation and an additional 70 ha that is cropped in summer using rainfall, although it was previously under centre-pivot irrigation.

Farms are small, 90% of holdings are 2 ha or less and women do most of the agricultural work. The farmers grow maize in summer and vegetables in winter, producing mainly at subsistence level or below. Many of the farmers and farm workers are elderly (average age around 60 years). The major problems were given as inadequate water, insecure land rights, land shortage, theft of produce and poor support services. Other problems included land levelling, soil erosion, repairs to pumps and infrastructure, access to credit facilities, lack of knowledge, vulnerability to animal pests and lack of health services.

For more details, see Appendix 2.

2.1.1.2 The Boschklouf Irrigation Scheme

The Boschklouf scheme comprises 320 ha, controlled by 26 farmers, and is in the Southern region not far from Steelpoort, drawing water from the Steelpoort River at an upstream weir. The main canal is 5 km long and requires attention in maintenance and repair. The farmers grow maize in summer and vegetables in winter under furrow irrigation. Many of the farmers are retired, but the core of 26 active farmers produce for commercial purposes and each hires, on average, 4 labourers. Problems are mainly associated with obtaining adequate supplies of water and sharing the available water. Shortages of water have reduced the effective size of the scheme to about 100 ha. Draught power and fencing give rise to minor problems, overshadowed by water shortage and low levels of production.

For more details, see Appendix 2.

2.1.2 The Elandsdoorn Irrigation Scheme

Elandsdoorn scheme in Mpumalanga Province, was also selected as typical of smallholder irrigation, although not subject to any current rehabilitation exercise. It was agreed that this scheme would provide an opportunity for considering the options that face most of the smallholder irrigator community today in South Africa.

The Elandsdoorn scheme, which is about 20 km from Groblersdal, draws water from the Elandsdoorn dam in the Mametsé River. Water is delivered by gravity for furrow irrigation. The Scheme comprises about 80 ha divided between 25 farmers and approximately 60 participants in the 'Women's Club'; not all of whom are women but who all have small plots on which they mainly grow vegetables. The farmers normally grow maize, wheat and vegetables. Until recently they had access to farm power through a government tractor service, which has now been withdrawn.

For more details, see Appendix 3.

2.2 Methodology

The DFID research undertaken in South Africa was in response to an invitation from the South African contingent at the Phase I Workshop. The principal contact for all the schemes was Chris Stimie (Principal Engineer, Irrigation and Rural Engineering) at ILI, who is actively involved in all the collaborating schemes. The basis of the collaboration with ILI and the other partners was the expectation of mutual benefits. The development of the irrigation schemes would be enhanced by the knowledge and experience of the DFID team, particularly towards sociologically acceptable systems and user-friendly equipment; the DFID research project would gain from the opportunity to work with schemes already undergoing change and seeking practical advice.

2.2.1 The Rehabilitation cases

The local collaborators, ILI and Loxton, Venn & Associates (in partnership with an Extension specialist, Johann Adendorff), provided the DFID team with a wealth of literature about the Rehabilitation Programme set up by the Northern Province and about the schemes themselves. The team was welcomed

to the schemes for both formal meetings and informal visits, which were characterised by highly participatory interactions with the smallholders and, at times, with other stakeholders. The DFID team took part in, and contributed to, progress meetings between the local Consultants to strengthen its involvement in the whole rehabilitation process.

More visits were made to Thabina than to Boschklouf (4 and 2 respectively) because of their different stages of rehabilitation and the relevance of the current activities to the DFID research project.

Generally speaking, gender issues *per se* were not being considered because of preoccupations with overall management and infrastructure decisions at the scheme level. However, the collaborators were aware of the risks of neglecting women's needs and the potential difficulty of redressing this imbalance at a later date.

2.2.2 The Elandsdoorn Irrigation Scheme

In contrast to the schemes undergoing rehabilitation, the Elandsdoorn Irrigation Scheme functioned with only the typical inputs from extension officers and mechanisation services, the latter originally being provided by the State but now withdrawn. The scheme was, however, the subject of an ILI study, commissioned by Mpumalanga Province, to estimate the costs of repairing the water delivery infrastructure. It was of interest to the DFID project because of a thriving Women's Club on the scheme. The method of collaboration was largely that for the rehabilitation schemes although the range of problems was less extensive. Extra information about this scheme was obtained by L Stoops, from the University of Ghent, on a placement at University of Pretoria working in conjunction with ILI. Further analysis of these data was undertaken within the DFID project (see Appendix 3). There was strong interaction with the farmers during the course of four visits to the Scheme.

3. RESULTS

3.1 Thabina

The pre-development survey (undertaken by the rehabilitation consultants) identified a number of concerns that can be broadly classed as those to do with water, agricultural, social and other non-irrigation needs.

It was perceived that water is short because of damage to the weir and canals and because the pumps are unreliable, needing frequent repair. In-field water distribution is difficult due to inadequate land levelling. Several reasons were given for difficulties with agricultural production: poor tractor service, poor extension advice, poor credit availability; poor service from the co-operative and soil erosion. Community problems arose from the high level of theft, lack of domestic water provision and long distances from the homes to clinic and school. These last issues are related directly to the relative poverty of the scheme families and surrounding communities.

Somewhat in contrast to the other rehabilitation scheme, the setting up of the Development Committee misfired and this impeded communications both between the Blocks on the scheme and between the scheme and the Department of Agriculture and other stakeholders. It seems that the survey did not properly identify the unofficial but powerful “sub-culture” on the scheme and, consequently, the Development Committee did not represent all the local interests and did not fully understand its own role. Two other factors had a negative impact on the rehabilitation process:- i) the unfortunate coincidence of a change of extension officer, together with the establishment of the Development Committee, occurring with the imposition of water and electricity charges; and ii) the disbelief amongst the farmers that, with all the interest and inputs (especially training) from the Department of Agriculture, the government was intending to withdraw its support within a very short space of time.

The two major processes of rehabilitation with gender interactions are participation and training. For participation, the main gender implications are:

- male domination of Block committees;
- scheme split into 4 Blocks (A-D); Block (ward) committees almost moribund; little communication within Blocks, almost no formal communication between Blocks;
- strongly influenced by extension officers (both male), each being responsible for 2 Blocks;
- “sub-culture” on scheme not recognised in survey;
- at scheme meetings men and women sit separately; women generally less vociferous (by cultural tradition).

For training, the main gender implications are:

- some farmers (all males) enjoyed significantly better yields after their training, but only if they invested in inputs;
- training on crop (maize) establishment and husbandry given at beginning of rehabilitation exercise. No specific gender bias but more men than women attended (domestic duties?);
- training needed on committee structures and roles; women preferred to join with men rather than be separate.

The influences of the major design and management issues on gender-related factors are considered in Table 1.

Table 1 Gender-related design and management factors at Thabina

Issue	Gender perspective
Scheme layout	<ul style="list-style-type: none"> • Unreliable water supply leads to greater marginalisation of poorer people (women) who can not afford portable pumps. • The existence of a women’s garden club close to the scheme administrative buildings was overlooked: involvement of these women may have strengthened the rehabilitation agenda.
Land preparation	<ul style="list-style-type: none"> • The good soil needs deep ploughing to fulfil its productive potential but the unreliable tractor service resulted in this potential not being realised. Women were more disadvantaged than men for two reasons: <ul style="list-style-type: none"> i) men had priority over women for the, albeit inadequate, tractor service; ii) in the absence of a tractor, the soil has to be tilled using hand hoes - women are less able than men to provide the required strength, energy and time.
Water distribution	<ul style="list-style-type: none"> • Long furrows, which reduce versatility, predominate: this would appear to favour the growing of cash crops, mainly an activity of men, rather than smaller areas of various vegetables, which tend to be the women’s priority. • The lack of water adversely affects scheduling: this is a greater problem for women, who must also meet their domestic commitments.
Pumps	<ul style="list-style-type: none"> • The relative costs (both long- and short-term) of repairing the weir and replacing the pumps must be discussed and a consensus reached. It is unlikely that women will be included in such discussions as a matter of course and, themselves, may prefer to be excluded. However, they then risk not being in a position to comment on the various options and the implications for their livelihoods.
Marketing	<ul style="list-style-type: none"> • At present, quality produce can be sold on site. What the market would stand before saturation is not clear but the area is well populated, with several townships, and there is scope for growing specialist crops. Women should be granted as many opportunities as men to sell their produce.
Finance	<ul style="list-style-type: none"> • Most of the plot-holders’ income is from (occupational) pensions, which results in men being in a stronger financial position than women. Women, therefore, have less cash available to purchase crop inputs, leading to a cycle of poorer yields and lower income generation. • Women have less access to credit than men, partly through tradition and partly through lack of collateral, as a consequence of the land tenure system. A woman without title to land is able to request credit if she can present a certificate signed by the extension officer indicating that she is following good agricultural practice. Such a system reduces women’s opportunities.
Health and environment	<ul style="list-style-type: none"> • The survey indicated that the clinic was too far away. The river is prone to flooding, inhibiting access to the scheme. Both these factors put extra pressure on women’s valuable time, particularly travelling to the clinic, which is rarely a man’s activity.

An information leaflet compiled by the DFID research team, as a consequence of involvement at Thabina, is given in Appendix 4. An analysis undertaken together with the preparation of this leaflet indicated that there were no major issues that affected women only, although some inevitably had more impact on women than men.

3.2 Boschkloof

The pre-development survey identified three main concerns relating to plot size, access and infrastructure. Other problems, some consequential and inter-related, included lack of water control and management, lack of a constitution and proper farmers' committee, lack of co-operation between the farmers, inadequate canal capacity, lack of loans, transport and marketing, soil erosion and poor fencing. The stakeholders' views of how the scheme could be improved included larger plot sizes, title deeds, repairs to infrastructure, access to loans, training, soil conservation and better paths and roads.

About half of the plot-holders are not totally reliant on farming: they have 1 ha each and grow solely for domestic consumption. There is, however, a core of 26 commercially oriented farmers who grow 3 to 6 ha of vegetables, which they sell over a wide area. The women tend to grow maize only but the men grow vegetables too, and may hire labour. The main problem for the scheme as a whole, rather than for the current plot-holders, seems to be a shortage of water: this has resulted in only about a third of the available 320 ha now being under cultivation. The farmers suggested that their water supply could be increased by capturing run-off from the hill behind the village and overlooking the scheme. To cope with the reduced water supply, the farmers seem to have made a conscious decision to reduce the area cropped rather than plant a crop and risk losing it.

The notable feature of Boschkloof is the core of commercially oriented and relatively successful farmers. Much of this success seems to be due to their marketing in a fairly well populated area, despite poor roads and transport difficulties. A local mining company had donated an old tractor to the scheme, but there were mixed views on its serviceability. Some farmers preferred to hire tractor services from local farmers but the extension officer felt this was rather expensive.

The two major processes of rehabilitation with gender interactions are participation and training. For participation, the main gender implications are:

- the extension officer had responded well to the rehabilitation process;
- there is now a strong Development Committee with frequent meetings;
- the Development Committee have organised and undertaken canal cleaning;
- that only 26 farmers, in effect, control the scheme suggests that the level of participation could be increased.

For training, the main gender implications are:

- training was requested by farmers as a means of improving their (agricultural) performance;
- training opportunities have been set up by a local commercial farmer: women are included;
- methods of getting easier access to credit, especially for trained farmers, are being pursued.

The initiative by a local commercial farmer (with the support of at least one other commercial farmer) to provide (but, in effect, sell) training and mentorship to a selection of smallholders each year, is seen as a major, and possibly unprecedented, advance to the development of this sector. An elected committee in the smallholder community selects trainees (two from each of the five smallholders' groups), in the first year, the selection has included three women farmers. The training is similar to an apprenticeship, with the smallholders gaining commercial-type experience, whilst the commercial farmer(s) can enjoy greater security against theft and both types of farmer, in combination, can market more effectively.

The influence of design and management issues at the scheme, on gender-related factors is considered in Table 2.

Table 2 Gender-related design and management factors at Boschkloof

Issue	Gender perspective
Scheme layout	<ul style="list-style-type: none"> Plans to increase plot sizes caused concern for women.
Land preparation and equipment	<ul style="list-style-type: none"> Shortage of draught power makes tillage harder for women. Use of spraying equipment requires training that women are unlikely to receive.
Water distribution	<ul style="list-style-type: none"> Most plot-holders are not interested in maintenance but some of the commercially oriented farmers have formed a group to make canal repairs.
Pumps	<ul style="list-style-type: none"> Weir and gravity-fed for irrigation with pumps only for domestic water supply. Any shortages are likely to affect women more than men.
Marketing	<ul style="list-style-type: none"> Not very relevant, as women seem to grow domestic produce and provide hired labour only.
Finance	<ul style="list-style-type: none"> Credit not readily available to any smallholders, but probably less accessible to women than men. The “apprentice” training noted above is expected to link with a Bank to make credit more available. This should not introduce gender disparities.
Health and environment	<ul style="list-style-type: none"> Women apply more pesticides than men and are, therefore, at greater health risk. Use of pesticides also has environmental implications.

An information leaflet compiled by the DFID research team, as a consequence of involvement at Boschkloof, is given in Appendix 4. An analysis undertaken together with the preparation of this leaflet indicated that land preparation affected women much more seriously than men.

3.3 Elandsdoorn

This 80 ha scheme started in the 1970s and a large majority of the plot-holders (average age 66 years, 60 % women) have been farming here since. As this is not a rehabilitation scheme, somewhat different information was available to the DFID team. The scheme has reasonably good physical communications, probably better than average, both internally and externally. Internally, there are gravel roads and the offices of the Department of Agriculture, housing extension officers and serviced with telephone and power lines, are less than 1 km away. The scheme is located adjacent to a tarred road, which connects with the R25 (Globlersdal - Bronkhorstpruit) 5 km away.

Until 1994 nearly all the crop production operations were carried out for the farmers by government contractors, leaving the farmers responsible for only irrigating and weeding, but then they received only a part of the income from the sale of the crop(s). Now that the farmers have to fend for themselves, production has decreased significantly and most of the farmers say that mechanisation services are unaffordable. Consequently, many of the plots are left fallow. A water bailiff controls water distribution and he seems to be able to largely satisfy the farmers’ water requirements. Nevertheless, the farmers do not have a good record of being able to work together and a co-operative they had formed came to an end due to disagreements. This also has prevented them, as a group, negotiating with contractors for better deals on tractor services. The “Chairman” of the scheme, who is also the most successful farmer, has a strong and dominating influence.

In 1980, the Kwenagadi women’s club was formed, based on just one plot. Its main objective is to provide an opportunity for pensioner women, who do not have work, to use a small piece of land to grow food for their families and perhaps even a small surplus (to generate cash income). The club has now been extended to about 4 ha and comprises about 60 members, several of whom are men. There is a joining fee and a monthly subscription which cover the necessary inputs and the enterprise seems to be well organised and enjoys good yields.

Marketing presents very few problems: most people who want to buy vegetables coming to the scheme. One woman, runs a stall and others may sell from their fields or from their homes. Marketing may be less of a constraint here than on other smallholder schemes because of the good communications.

The main problems reported by the farmers were: (i) low farming income, (ii) lack of tractor services, (iii) low crop production and quality, (iv) water shortage and (v) lack of crop inputs.

A report on a small survey involving 18 of the families on the scheme is included in Appendix 3; some of the most relevant findings are given below.

- All the men had jobs previously (eg mechanic, shop-worker, labourer, policeman) but only half the women had.
- The men said they do most of the agricultural work with the help of relatives, but the women said they do nearly all of the work themselves.
- Nearly 80 % enjoy irrigated farming because it saves water, is easy to manage and generates an income. The reasons given by those who dislike it were that it wastes water, they are fed up with the canals and there is no alternative.
- Only half the farmers felt they had an adequate water supply but only a third of the farmers believe that they know how much water to apply.
- Over 80 % sell their produce from their fields and homes.
- About 28 % get advice on crop production (mainly from the extension service) but more than half wished to receive more.
- About 70 % are satisfied with their yields; the others attributed shortages of water, money and the cost of mechanisation services to their shortfalls.
- The three most important problems as reported by men and women are shown in Table 3.

Table 3 Problems reported by men and women at Elandsdoorn

Problem	Women		Men		Total	
	n	%	n	%	n	%
Money	4	33	2	33	6	33
Tractors	7	58	4	67	11	61
Water	3	25	6	100	9	50

- This sample of farmers suggested that the main solutions to the problems on this Scheme would include (i) collecting money on a monthly basis, (ii) discussing their problems together, (iii) cleaning the main dam and (iv) installing pipes and sprinklers.

The influence of the major design and management issues on gender-related factors is considered in Table 4.

Table 4 Gender-related design and management factors at Elandsdoorn

Issue	Gender perspective
Scheme layout	<ul style="list-style-type: none"> • There are problems transferring water from the canals into the field furrows, a predominantly female activity. • The canals and fences are in need of repair: this makes women's tasks of cleaning and, particularly, chasing away the animals more difficult and time-consuming.
Land preparation and equipment	<ul style="list-style-type: none"> • Withdrawal of mechanisation services affected everybody and, typically, women more. • Members of the women's club were less affected. This may be explained, at least partly, by their having smaller (but probably more productive) plots and their group organisation.
Water distribution	<ul style="list-style-type: none"> • People at the end of the daily timetable (often women) have excessive waiting periods to receive water. • The nature of some of the canal damage observed likely to be associated with extraction of water, implying difficulty with that predominantly female activity - (siphons suggested).
Pumps	-
Marketing	<ul style="list-style-type: none"> • No obvious problems for selling vegetables locally; women's club may help those who have difficulties. • Transport to major marketing centres (and eg mills) very limited. • Men probably experience greater transport problems than women because they sell different produce. • Transport needs should be addressed, especially if women have opportunities to diversify into cash crops.
Finance	<ul style="list-style-type: none"> • Loans and credit difficult to acquire and not always trusted. • The women's club seems to have few financial problems (if any) because of subscriptions.
Health and environment	<ul style="list-style-type: none"> • No significant points. May expect some health problems because farmers are elderly (youngest is 50 years old).

An information leaflet compiled by the DFID research team, as a consequence of involvement at Elandsdoorn, is given in Appendix 4. An analysis undertaken together with the preparation of this leaflet indicated that there were no major issues that affected women only although some inevitably had more impact on women than men.

Between the visits of the DFID team in September 1998 and May 1999, the farmers showed a remarkable shift in attitude. Both men and women were buoyant and positive about their situation. The farmers commented that the involvement of the ILI and DFID teams had helped reconcile them to their situation, with the Chairman, seemingly, taking a very active and constructive lead in this process. Improved relationships between the farmers and the government officers had also contributed. In closing the final meeting, the Chairman said that if, they had not been "spoon-fed" for so long (reference to the previous administration), they might have been able to make such good progress long ago. This was a clear sign that empowerment is being actively pursued by farmers.

3.4 General

The views of the local collaborators (expressed by Chris Stimie) were sought on the progress of the Rehabilitation Programme. The success of its participatory approach (almost unprecedented in South Africa) and, most particularly, the degree to which it has been possible with this approach to determine the needs of the women smallholders and integrate them into the Programme. These views are fully given at the end of Appendix 2, presented as a sequence of 10 questions and answers together with some comments from the DFID team. Two of the questions (numbers 7 and 8) and answers most closely associated with gender issues are reproduced below.

“7. Are the women really getting involved in the thinking and discussing design issues?”

Although women are present, both in the farmer groups and the Development Committees, it is very hard to assess their contribution to the discussion. In most meetings the women contribute only when prompted to do so by the development consultants. It is not known if, at the group meetings where the consultants are not present, the pattern of women’s contribution to discussion is the same. The engineers may report some individual discussion with the women but is not clear how much their views count with the men.

8 Is it apparent that male farmers recognise the importance of the women’s contribution to successful irrigated farming?

Yes, they appreciate that women work hard. However, that is seen as being justified and, apart from attention to the issues of land preparation which also have implications for men’s work and yield, relatively little attention appears to be given to reduction of women’s workload. The social and cultural norms appear to vary widely between the pilot projects, Boschkloof being the one where women appear to be able to enjoy the most liberated environment.”

4. DISCUSSION

4.1 General

Overall, the findings confirm that gender disparities exist, but no extreme examples were identified. On all three schemes, gender issues typical of rural southern African communities and small-scale agricultural production were apparent. In all three schemes, general management, land tenure and training were seen as constraints on development and, for each of these topics, the traditional gender bias will lead to the further marginalisation of women unless specific action is taken to avoid it.

Scheme management and land tenure are closely related but, because of the variety of land tenure situations, the problems can not be standardised. This has arisen because the situations evolved whilst there was no expectation of private ownership of plots or farms. Usually the land was tribal or ownership was vested with the scheme authorities, so the farmers are not now in a good position to speak up when such matters are discussed. The Development Committees (as constituted on the rehabilitation schemes) must clarify the land tenure options, reach a consensus with the farmers, including the women, and then implement an appropriate management structure. For example, should the farmers operate as independent units or create a form of Trust? What would women's part in a trust be? All the scenarios imply a substantial training need to introduce the concepts of commercialism in addition to training in agricultural technology and practice.

A key point made by our collaborators in one of their reports bears repeating here:

It is important that the various role players acquire the necessary expertise and motivation before attempts are made to decide on final operating policies and the structure of the scheme.

However, reaching this point requires very careful management. The farmers' response at one scheme (Thabina) to the resources, particularly training, that were being made available to them was to totally disbelieve that government support was being withdrawn (Section 3.1).

Whilst the rehabilitation is under discussion and the management structure not finalised, the farmers themselves are in a difficult position with the extent of the scheme rehabilitation and their own future roles and activities remaining unknowns. Another point made by our collaborators warrants repeating:

There are good reasons for "hastening slowly" and waiting until the community has progressed further towards effective irrigation farming before deciding on the land tenure pattern with all the long-term legal implications that this entails.

To make genuine sustainable progress on any of these matters, a high level of participation is required. Every action implies a meeting, whether for training, to discuss agricultural or cropping policy, to debate management options in the light of a reasonable, if not full, understanding of land tenure issues. As stated and explained above, unless specific efforts to increase participation (or, at least, representation) and the availability of training and credit are made, women's interests will not be aired and further gender disparities are likely to be perpetrated. It is, however, in the generation of a sense of ownership, through involvement in the thinking and discussing of design and management issues that women are likely to be marginalised, again because of tradition and customs.

The concept of empowering the farmers underpins the rehabilitation rationale (see section 1.2), but there is a degree of reluctance by the farmers to take on the responsibilities that empowerment brings. Hitherto, the planning and logistics required to run even a small-scale irrigation scheme were handled by "the authorities", so these fundamentals were not fully appreciated by the farmers. The top-down approach provided farmers with production successes whilst they were responsible merely for weeding and watering. Farmer reluctance to change is, therefore, understandable and seemed to be stronger on the schemes where there was greater government involvement. Government withdrawal was unpopular with

the farmers for at least three reasons: increased decision-making in communities, the extra effort required and the increased risk of failure. This may explain why the most positive feelings towards empowerment were encountered at Elandsdoorn, which had previously less support than the rehabilitation schemes. It is now becoming clear at Elandsdoorn that better decision-making and increased effort can bring favourable returns.

One of our collaborators has warned of the danger of doing only a “cosmetic” job and not persevering to the point of real change:

Inclusion of women in formal structures is relatively easy. It is much more difficult to discern the role they actually play and the prediction is that change will be slow, gradual and vary from community to community. There is clearly a need to ensure that women are not left out of crucial rehabilitation decisions that will determine much of their work pattern. Separate meetings might still be considered.

The potential advantages to women from rehabilitation will vary from scheme to scheme, but they will always be strongly affected by land tenure. Opportunities to have title to plots, even by leasing, through CPA (Community Property Association) arrangements can bring very positive benefits to women, either as individuals or in groups.

The male farmers readily acknowledge that the women work hard, but the women seem to prefer to carry out their agricultural activities in groups rather than independently. This may give them a greater sense of community and, in terms of decision making, they may feel that their combined voice is stronger than the sum of their individual voices.

The three major issues, expected to be associated with gender disparities, identified at the Workshop are discussed below.

4.2 Access to resources

Access to resources was a more significant issue on all three schemes than both equipment and marketing (see below). This has been the dominant constraint on production since the government services were withdrawn, and neither the scheme managements nor the individual smallholders (save for a very few cases) have adjusted to the “new” situation and made alternative arrangements. Inevitably, because of cultural mores, women are likely to suffer more than men from the loss of services and, furthermore, are less likely to be able to make the alternative arrangements needed.

There was clear evidence at Boschklouf of the benefits of training and at Thabina of the highly beneficial combination of training and crop care (through purchase of inputs) on yield and, hence, income. There is no apparent reason why women should not be equally successful, given the same opportunities and resources. There is support for this view from the situation at Elandsdoorn, where the Women’s Club produce very satisfactory yields, following the Club purchase of inputs. Nevertheless, credit to obtain crop inputs is generally less available to women as they tend to have less collateral, because of the land tenure situation.

4.3 Equipment and land preparation

Equipment and land preparation issues arise for the same reasons as the more general access problems discussed above - withdrawal of government support. The consequent difficulties, stemming primarily from having to pay for these services, are faced by both men and women but, as above, the women are generally more marginalised. The scheme where the most acute equipment and land preparation problems were found was Elandsdoorn, where the plots tend to be larger than elsewhere. However, the women in the Women’s Club at Elandsdoorn seem less adversely affected than women elsewhere, who have not organised themselves so effectively and who generally have larger plots.

On all three schemes, the expectation was for primary land preparation to be done by tractor, with subsequent operations being done by hand. The withdrawal of the government services meant that for many, if not the majority, all land preparation had to be done by hand. No consideration was given to the use of draught animal power as a substitute for tractors and, furthermore, as a possible means of relieving the drudgery of much of the work done by hand. This may be a less attractive option at Thabina, where the soils are heavier than on the other two schemes, but the use of oxen, or even donkeys, there could assist with secondary tillage and weeding. Traditionally, men have better access to draught oxen, as elsewhere in southern Africa, but, in adjacent countries and possibly some parts of South Africa, the use of donkeys by women for farming operations is becoming increasingly widespread.

4.4 Marketing

All three schemes are situated in reasonably densely populated areas and not far from tarmac roads, unlike many of the smallholder irrigation schemes in neighbouring countries. However, despite the seemingly favourable circumstances, smallholders face stiff competition from other local producers, who are likely to have the edge on quality, if not price. Yield may have an influence here, insofar as smallholders may not have such a high productivity and would be less able to pass on the economies of scale as lower prices.

The way forward would seem to be for the smallholders to become more business-oriented and to secure contracts with commercial buyers rather than to rely on one individual selling to another individual. The individuals' efforts of selling small quantities of various crops (vegetables) would still continue but would be of secondary importance. This could be seen as a development of women's current activities, whereas the development of commercial contracts is traditionally in the male domain. It must be the responsibility of the Development Committees (on the rehabilitation schemes) to ensure that these issues are discussed fully by men and women on the scheme and that developments progress in parallel without the one jeopardising the other. There seems to be a general belief that, around these three schemes, the market could stand increased supply and, furthermore, the higher producing farmers do not seem to feel threatened by a boost in smallholder production (Section 3.2, Table 3). This is a positive indication for reducing the "gap" in experience referred to in section 2.1.1

Current marketing constraints at the three schemes, (quality and price at Thabina, training and experience at Boschklouf and transport at Elandsdoorn) do not seem to have a gender dimension, but care must be taken in the development of the schemes that possible gender marginalisation (in either direction) is openly discouraged.

4.5 Workshop Hypotheses

Of the ten hypotheses suggested at the Phase I Workshop (see Appendix 1), three seem relevant to the Rehabilitation Programme in South Africa:

- vi) Lack of Standards and effective guidelines limit system performance, productivity and profitability.
- vii) Taking into account age and gender variables influences sustainability.
- viii) Adopting an ergonomics approach to design will increase the extent to which the needs of men and women are met.

4.5.1 Lack of Standards and guidelines limit scheme performance

In the farmers' needs assessments, shortages of water and draught power were the most common complaints (see section 3). These shortcomings are easy for farmers to identify because they are able to see the dilapidated state of the water supply and distribution infrastructure, and they are directly affected by the withdrawal of government tractor services. Undoubtedly, less water was available than in the early days of the schemes but the farmers seemed rather unsure of how much water they actually needed to grow a successful crop. Some guidelines, accessible to the farmers, on crop water requirements may enable them to use the available water more productively and improve the overall performance of the schemes. It may be appropriate to offer training on the assessment of crop water requirements to scheme extension officers.

Land levelling was found to be a problem on some schemes. It may be appropriate to provide guidelines to farmers on levelling criteria, according to water distribution system, so that they can avoid putting unnecessary effort into land preparation yet not waste any water

4.5.2 Taking into account age and gender variables influence sustainability

At the schemes investigated, most of the plot holders were elderly and appeared to rely on sources of income outside farming, usually pensions, for their survival. On this basis the schemes could not be regarded as sustainable, but younger people, with more energy and drive might achieve sustainability. Very few young people, especially men are attracted to smallholder farming (irrigated or dry, but a number who do become farmers work hard, use their entrepreneurial skills and attain economic security. Whether older or younger, women would find this more difficult because a) they would generally receive less pension and b) men traditionally control power sources, machinery and equipment (i.e. physical capital).

In designing a scheme for older people, consideration would have to be given to the reduced strength and work capacity of older people, especially when selecting infrastructure and equipment. There was no evidence of this but, equally, there was no reason to believe that the schemes had been designed with any end users in mind.

Considering all the livelihood assets (Section 5.5), tradition grants men better access to the natural, physical and financial capitals, whilst women seem better able to exploit the social capital. A good formula for sustainability would seem to be a better sharing of all the livelihood assets and using them constructively in a manner agreed by all the stakeholders. This may include removing gender disparities from title to land and training women in the use and maintenance of machinery (eg pumps). It is worth noting here that when the siphon tubes were taken to Elandsdoorn for the smallholders to experiment with them, the men instinctively took control of them (and this appeared totally acceptable to the women).

4.5.3 Ergonomics design reduces gender disparities

There was no direct evidence of any ergonomics design issues at the three schemes investigated. Gender disparities, were dominated by the traditional division of labour and male control of machinery and equipment. However, that is not to say that ergonomics design issues would not emerge if labour and equipment were shared more equitably. At Boschkloof two women (of similar ages) weeding adjacent plots used a long-handled hoe and a short-handled hoe. The former was a retired civil servant (nurse) who preferred the longer handle to avoid backache; the latter had always been a farmer and used the shorter handle by habit. This illustrates not only the importance of allowing individuals to choose but also the type of attitudes that have become engraved in people's minds¹:

“A woman who can't bend her back to weed is lazy” Women's Discussion Group, Zimbabwe
The implication is that “standing up is lazy. The social issues are stronger than the engineering issues”. Interviewee, University of Zimbabwe

¹

Both these quotes are taken from the IFAD/FAO/FARMESA Study: The potential for improving production tools and implements used by women farmers in Africa. February 1998, 121pp

5. CONCLUSIONS AND RECOMMENDATIONS

5.1 Overview of major issues

Table 5 Smallholder Irrigation Design in South Africa

	South African			
	Elandsdoorn	Beechklipof	Thabisa	Womens club
SCHEME LAYOUT				
Plot size	●	●		●
Fencing	●	●		●
Land preparation	●	●		
Water scheduling	●	●	⊙	●
Water delivery	●	●	⊙	●
PUMPS				
Reliability			●	
Cost		○	●	
Roster - on & off times				
Farmer participation @ design stage		●	●	
Fuel delivery				
Farmer awareness (knowledge)			⊙	
Repairs/trouble shooting			⊙	
Loss of crops			●	
EQUIPMENT				
Problems with land prep. Equipment	●	⊙		⊙
Sprinklers				
Syphons				
Buckets				
INSTITUTIONAL				
Conflict	●	⊙	●	
Lack of training	●	⊙	●	
Communication	⊙		⊙	
Participation in schema design	●		●	●
MARKETING				
Cropping calendar	●		⊙	
Selling	●		⊙	
Contracts	●		●	⊙
Meeting deadlines	●			
Transport	⊙			⊙
COSTS/MONEY/CREDIT				
Access to credit	●	⊙	⊙	⊙
Cost of water				
Incomes (lost)	●		⊙	
HEALTH & LIVELIHOODS				
Poverty reduced		●		●
Poverty neutral	●		●	
Poverty increased				
Health increased				●
Health decreased		●		

- Major issue - men and women
- Major issue - affects mainly women
- ⊙ Minor issue
- Potential issue

5.2 Participation

The level of participation by women is generally low and typical of smallholder farming communities, both irrigated and dryland, in southern Africa. However, women are not necessarily unhappy with this situation. When women do become involved in management and decision-making, they seem to prefer acting as a group. Consequently, participation in scheme stakeholder meetings can be superficial and efforts to increase their involvement can be ineffective. Holding female-only meetings is an option but, even in these, women are aware that, by tradition, their views are less important than men's and this can reduce their motivation and determination. Of the three schemes studied, Thabina showed the least female participation. However, this scheme, with its inhibited communication between Blocks and with the extension staff, had the poorest participation in general. At such a low level of participation and the non-involvement of the women's club, the women were marginalised.

At Elandsdoorn, a significant female contribution to scheme management appeared to be made by the strong Women's Club, but the (male) Chairman of the farmers still seemed to be the dominant influence. Gender issues relating to participation were least evident at Boschklouf although the greatest overall disparity, land preparation, occurred there. The reasons for this were not entirely clear but the relative unimportance of land tenure issues at Boschklouf may be shifting the disparities away from sociological issues towards more mechanical ones. Ultimately, it is difficult to assess the degree of participation within a particular community, and whether the degree is appropriate for that community. Nevertheless, if long-term decisions are made without the necessary participation, the future viability of schemes is jeopardised. In addressing the task of improving participation, the following features are relevant in South Africa:

- Typically, women provided the majority of labour in crop production but seldom participate in decision making.
- Women who do participate prefer to do so as a group
- Women as individuals accept being marginalised and most have no expectation of change
- Prevailing attitudes towards marginalisation are not dispelled by poorly managed participatory processes

It is recommended that:

- *Participatory activities such as meetings, training and demonstrations must be arranged in such a way that women's preferences are taken into account. Their preferences may relate to requirements of content, timing, venue or even a request for separate women's sessions. Women often like to double up their activities and might, for example, choose to talk about irrigation while sewing.*
- *Women should be helped to form groups or identify groups they already are happy to use as a precondition for their greater participation*
- *Women can improve their own self-confidence by taking responsibility for minor management decisions and evaluating their success. Both men and women should be involved in the evaluation.*
- *Transparent efforts should be made to encourage genuine gender participation and not tail off at the 'inactive appearance' level. If people come to meetings and do not take an active part there is usually a reason that can be put right, with thought.*
- *Resources must be specifically allocated to participation not simply assumed as overheads.*
- *Link particular design decisions to likely impact on the livelihoods of different groups of people to encourage and facilitate participation.*

5.3 Design and management

Design and management factors are closely linked because of the dependence of day-to-day management decisions on: (i) scheme layout, (ii) water delivery system and (iii) any shortcomings in either of these, through both a poorly implemented original design and any subsequent dilapidation. On schemes where pumps are used for water delivery, technical issues relating to pump operation and maintenance can cause

women to be marginalised through their relative unfamiliarity with technical matters. However, design of the equipment used on the schemes was never raised as an issue, with accessibility and reliability being the main concern. Where farmers were having difficulty in extracting water from the channels or rivers into their plots, they would improvise but at the same time making the system more vulnerable to damage. The rehabilitation programme and the study found that the men naturally expected to take control of any suggested changes although no lead had been given for them to do this. When the issues of availability and accessibility have been dealt with, it is expected that the design of the equipment-operator interface will become increasingly important, as has been found elsewhere in this project.

- Inadequate levelling of the land during scheme construction, one of the commonest shortcomings, will adversely affect land preparation.
- Land preparation has been a major problem since the withdrawal of Government tractor services and women are disadvantaged more than men due to lack of negotiating powers.
- Inclusion of pumps, increases risk of failure and elderly or poor women are very vulnerable to such increases in risk.
- Inclusion of pumps tends to marginalise women from management activities unless special efforts are made to provide them with some technical education.
- Schemes whose design includes or allows for development of women's gardens have sustained interest and activity in those gardens
- Typically, the women's roles are not fully recognised and their representation is weak so consultation does not always include them.

It is recommended that:

- *Design is responsive to the expressed objectives and needs of the farming community.*
- *Design takes into account the capacity of different sub-groups of farmers to access and afford land preparation and levelling.*
- *Design takes account of the organisational skills and costs that will be needed to keep the scheme functioning to minimise the risk of failure.*
- *Management decisions should be taken with marketing in mind. Choice and quantity of crops have a major impact on income and therefore on scheme viability.*
- *Men's and women's different cropping preferences, should be recognised and validated by scheme management decisions.*
- *If provision is made for different types of irrigation such as farms and gardens, then representatives from both areas participate in management*
- *Institutional arrangements allow for individuals to change their circumstances and move easily between farms and gardens*

5.4 Capacity building

The most important dimension of capacity building is training. Training features heavily in the rehabilitation programme, although more strongly in certain aspects than others. The training in agricultural techniques and practices has been very professional at all the schemes and farmers who implemented their training and applied the recommended crop inputs have had very good returns. Training in scheme administration and management is less easy to deliver, less easy for farmers to adopt and less easy to evaluate. This is in part due to the need for inter-farmer co-operation. Consequently, the farmers' capacity to use committees, handle administrative matters and manage change, have not been advanced by the same degree as their technical skills. In all these areas, encouraging women to become involved has been less successful than hoped.

- Although agricultural training is a major element of capacity building, local customs and mores have resulted in women having less opportunity to build their knowledge and skills
- Women, preferred management training to be with the men rather than separate
- The full benefits of training will be realised only if other inputs and services are available to the trained farmer to establish his/her crop.
- If training is delivered without gender bias, women will only reap benefits if they have the same access to land, resources and credit as men.
- If women's needs are not specifically taken into account, any training delivered to them will be wasted.
- Apprenticeships can provide valuable experience of, and insights to, the commercial aspects of farming

It is recommended that:

- *Special programmes or linkages are needed to improve women's access to training*
- *Women's increases participation in training should be accompanied by increased access to inputs and credit*
- *Community support(financial, logistic and moral) to women trainees needs to be generous and long-lasting to be effective*
- *Community support for the apprenticeship scheme should be sensitive to the needs of the provider as well as trainees.*
- *The capacity of the development committees and other farmer committees to deal with external ministries, agencies and commercial interests is increased through in-service training.*

5.5 Sustainable livelihoods

Livelihoods are enhanced when the overall sum of the five "capitals" - human, natural, social, physical and financial - increases, although they do not all necessarily increase together. In rehabilitation, the physical capital is the focus of attention, with improved infrastructure being the aim. However, improved infrastructure, may not of itself, enhance the livelihoods of the smallholders. This has been acknowledged through the training programmes to improve i) the human capital; the development of committees and linkages to improve ii) the social capital; the greater availability of water (by virtue of the infrastructure) to improve iii) the natural capital. Using the livelihood assets approach, it is evident that one of the important developmental topics that has received relatively little attention has been the availability of, or access to, financial capital.

- It is crucial to identify the role of farmers and developers accurately and agree the scope of these roles at an early stage while allowing some leeway for future change
- Adopting the concept of capitals can assist in evaluating rehabilitation projects.
- Appreciating the different capitals that are accessible to men and women can assist in understanding their different capacity to make use of rehabilitated infrastructure
- Resultant changes in capitals will be different for men and women but the changes should reduce rather than widen existing gender disparities
- The lack of self-confidence and self-esteem that characterises irrigators and the effort that is required to achieve repeated and consistent success, should not be under-estimated and must be budgeted for.

. It is recommended that:

- *It is crucially important to treat farmers as farmers, not beneficiaries. They are the clients in the development business.*
- *Banks need to explore how they can cheaply and effectively administer small loans for small farmers.*
- *Farmers have to realise that a bank is a bank and not a charitable body.*
- *Much basic awareness-raising work and participatory experimentation needs to be done to be sure*

that farmers understand the basic principles of irrigated cultivation, organisation and business management.

- *Linking achieving basic understanding to credit worthiness may be achieved through a system of training certification.*
- *The importance of extending credit to women as a strategy for poverty alleviation is recognised*
- *Developers explore the potential for increasing women's access to credit through training.*
- *The success of women's clubs in financing group purchases is recognised and built upon.*

Appendices

Appendix 1

Gender-sensitive irrigation design – Phase I report to DFID,
March 1998

Appendix 1 Gender-Sensitive Irrigation Design - Phase I Report to DFID, March 1998

1 Introduction

The Gender-sensitive Irrigation Design project is organised in two phases. Phase I identifies and prioritises the design issues which have important gender implications in the region. Phase II will be devoted to testing hypotheses that address the prioritised research issues. The recent Workshop in Masvingo marked the close of Phase I, which began in October 1997.

The participants in Phase I were:

- HR Wallingford, UK
- Silsoe Research Institute, UK
- Institute of Development Studies, University of Zimbabwe
- AGRITEX (Ministry of Agriculture), Zimbabwe
- Support and assistance has been given by CARE, Zimbabwe

Phase I activities were:

1 Identifying a representative sample of smallholder irrigation projects

From nine irrigation schemes visited and evaluated, five were selected for further investigation. The selection was based on criteria such as identification of gender issues, identification of potential for changes to take place, typifying smallholder irrigation types found in the region, accessibility for researchers, being representative of socio-economic rural groups and willingness to participate.

The final selection included schemes under the auspices of AGRITEX, CARE and Ministry of Cooperatives. Schemes included those where water was delivered by gravity flow and by pump and where supply was dam backed and came from groundwater. Application methods included flood, sprinkler and bucket and the scale of individual holdings ranged between garden plots of less than 0.005ha and commercially viable units of 1.5 ha.

2 Investigating gender roles in the projects through surveys and focus groups to identify potential research issues.

A primary identification of issues was facilitated by a random sample questionnaire carried out at the five selected schemes. In-depth focus groups discussed the issues identified, expanding and augmenting where relevant, to produce an understanding of the different gender issues that emerged from different irrigation situations. Detailed reports from the investigation can be found in the folder (N. Matshalaga, Nov 1997; F. Chancellor & N. Hasnip, Jan. 1998). The main findings are summarised in Section 2 of this note.

3 Investigating potential pilot interventions

At three of the schemes the team, in conjunction with the irrigators, identified issues where specific investigation or information could be agreed to promote further understanding of the gender issues in particular aspects of irrigation work. At one scheme, it was agreed that a demonstration of the correct use of existing equipment would help men and women to assess their equipment needs to achieve the desired ploughing depth. The intervention has led to a greater appreciation of the possible uses of different tools and equipment. At another site, farmers experiments succeeded in stimulating women to consider their equipment needs more critically. At the third site, an attempt was made to analyse and cost use of existing equipment. A detailed account of the interventions is in preparation.

4 Formulating and organising a workshop in which regional irrigation professionals participated in a prioritisation process

A Workshop was held in Masvingo, Zimbabwe from 10-12 February 1998. There were 20 participants including the research team, representatives from Zimbabwe, including AGRITEX, CARE and other DFID supported projects, and participants from South Africa, Zambia, Namibia and Tanzania.

The workshop aimed to:

- Identify issues from the Masvingo investigation
- Identify issues from the region
- Prioritise the issues identified
- Facilitate participation in region-wide research on the prioritised issues in Phase II

2 Findings from investigation and workshop

The issues that emerged from the preliminary investigation in Masvingo Province, Zimbabwe, illustrate the complexity of the gender disparities that occur in irrigated agriculture and the difficulty that arises in clearly identifying the impacts of these disparities on production or on the levels of poverty experienced by people of different gender. In all of the aspects mentioned below there were gender disparities evident.

- Irrigated agriculture is highly valued – men and women may place different values on it.
- The importance of land preparation and weeding and the associated benefits of deep ploughing on water use and weeding*
- Marketing difficulties – eg. access and transport is different for men and women*
- Use of unsatisfactory agricultural tools
- Lack of knowledge about hardware – such as pumps*
- Division of labour - often women do more than half the work but have less access to resources and to support services*
- Women are not often involved in decision-making*
- Importance of time scheduling (eg. water delivery, timing of training, information delivery and meeting times) and how irrigation planning influences the workload of women*

These findings formed that basis of discussion at the workshop alongside the contributions of the invited participants, which can be found in the workshop folder. These contributions were augmented by contributions from the participants, which will be circulated shortly.

The main findings from the workshop (in addition to the survey) are:

- Inappropriate design of equipment eg low-lift pumps
- Different crop preferences eg. men often prefer cash crops and women food crops
- Access to training and women's availability to attend training
- Access to information and the importance of having literature in local languages and use of pictures for illustrating important issues
- The success of women's clubs and their efficient use of money
- Improved irrigation leads to marginalisation of women farmers

2.1 Workshop priorities

The Workshop participants were divided into three groups of balanced interests to discuss: **farming factors**, **equipment factors** and **human factors**. The participants then reconvened to receive the group reports and reach a consensus on the cross-cutting issues. The participants agreed on nine critical issues. These nine issues were prioritised using both pair-wise priority ranking and urgency priority ranking

methods. The top three issues were taken from each list and combined to produce agreed areas for future activities.

Table 1 Results of the two methods of priority ranking

Pair-wise priority ranking	Urgency priority ranking
Gender disparities	Equipment and land preparation
Marketing	Gender disparities
Access to resources	Marketing
Participation	Access to resources
Support services	Management and Institutions
Equipment and land preparation	Training
Indigenous Technical Knowledge	Indigenous Technical Knowledge
Training	Participation
Management and Institutions	Support Services

In moving forward from the findings of the Workshop, it was decided that identification of “gender disparity” is relevant to every activity proposed in the project and is not an issue in its own right. Participants had emphasised the need to flag the issue at national level in the spirit of promoting gender awareness. It was therefore agreed that the three main areas for future activities should be:

- **Marketing**
- **Access to resources**
- **Equipment and land preparation (including indigenous technical knowledge)¹**

2.2 Marketing

Although there is much evidence showing that marketing is a widespread agricultural problem, the investigations carried out in Phase I confirm that there are gender disparities in marketing which need to be addressed.

Although transporting produce to potential markets can be a major problem for both women and men, women tend to find it more difficult. In many cases where vehicles are available, males tend to have greater access to them, leaving the women to carry produce on foot or to wait for infrequent buses.

Women have more problems with sourcing markets than men, partly because they tend to be responsible for marketing small quantities of vegetables, for which contracts are not usually sought and partly because they have more social difficulty in travelling away from the homestead. Many farmer committees (both men and women) stressed that they would appreciate training in marketing, especially how to source for potential markets.

Competition when markets are flooded with produce reduces prices and leads to produce remaining unsold. Farmers, who have less access to extension advice, commonly bear more losses and these are often women.

The papers from South Africa (Oral presentation – Chris Stimie) and Tanzania (R. A. D. Kweka, 1997) also stressed that the lack of well-defined markets is a major problem for most small-scale farmers and that

*Subsequently confirmed at the workshop

¹ The participants agreed that Indigenous Technical Knowledge is very strongly linked with equipment and land preparation and thus should be treated as one issue

adequate crop marketing strategies are needed. One participant pinpointed a problem in that in the rural communities women are unaware of “marketing” as a concept and see only a problem in selling which limits their ability to address the problems they face.

2.3 Access to resources

Throughout the region land tenure arrangements favour men. Women landholders are often widows whose access to other resources is limited. However, for many irrigators in the region land ownership is not an option and access to user rights is the central issue.

In Zimbabwe in communal areas, user rights are commonly dispensed by the state through its agencies or departments or by traditional leaders or chiefs. In such systems the area of land controlled by women is generally less than that controlled by men, although barriers to women in obtaining user rights are not necessarily formal or even recognised as existing. Where women’s ownership is promoted there are positive impacts for productivity, also experienced in Tanzania (see contribution from R. A. D. Kweka, 1997).

Access to water is closely linked to land rights, but rights to land do not necessarily confer access to water. The geographic position of the plot influences water delivery (N. Matshalaga, 1997, page 27) as do social and cultural pressures, for example treadle pumps in Zambia (contribution from D. Moono, 1998) or physical restrictions such as individual strength (contribution from D O’Neill). Operational requirements of the system in terms of timing and duration also influence the individual irrigator’s access to water. For example, domestic obligations of women and stock-keeping activities of men, may restrict their access to water at certain times of the day. Clearly these factors should be taken into account to ensure that neither group suffers unduly.

The ability of the irrigators to pay for the inputs themselves, the transport costs and the logistics of field application are crucial. Women have restricted access where there are social and economic constraints to their reaching distribution points. Collateral links credit availability to land tenure. The attitude of banks to women borrowers is unsympathetic. Physical access to lending institutions (often in distant towns) is poor.

Energy has to be purchased, either as electricity or fossil fuel or as work by draught animals or hired labour. Use of purchased energy implies prior purchase of capital equipment such as pumps and ploughs. Women on their own and elderly men and women, due to weak finances and control of other assets, may have poor bargaining power and pay excessively for such services and equipment or receive a lower level of service.

2.4 Equipment and land preparation

The preliminary investigation and the Workshop raised several issues regarding the hardware and mechanical inputs used by small-scale irrigators. Most prominent in the investigation were the importance and difficulties of land preparation (Chancellor and Hasnip, 1998), particularly in achieving a good depth of ploughing (eg c 150 mm [N. Matshalaga, 1997], but depending on soil type). Shallow ploughing was believed to be responsible for less efficient use of water and greater weeding demand. The main benefit of deep ploughing was the greater penetration of water and, thus, reduced run-off and less frequent demand in the scheduling cycle. The project was able to address this by organising a demonstration on the setting and operation of (animal-drawn) ploughs, which the recipient farmers (at Mushandike) found most helpful. They had been unaware of the significance of the design features on ploughs and they believed that the demonstration and practical experience gained would enable them to plough deeper, faster and with less strenuous demands on both themselves and their animals (field visit 6 Feb 1998). This was felt to be particularly helpful for women and farmers with donkeys.

The most prominent issue to emerge through the Workshop (also supported by the findings of the preliminary investigation) was the inappropriate design of pumps, be they human- or engine-powered. Other pieces of equipment and tools were also considered to be of unsatisfactory design, particularly for

use by women. The problems of women operating low-lift pumps were described by D. Moono (1998) and, more generally, women's difficulties in dealing with minor breakdowns of engine-powered equipment were reported by Stimie (oral presentation, South Africa) and our investigation (N. Matshalaga, 1997). Many reasons (mainly cultural) were given, such as male dominance, lack of confidence, unavailability of training. Inappropriate selection of pumps, often in donor projects, because of unavailability of spares and technical knowledge were reported in 3 of the 5 of the participating schemes in Zimbabwe (Chinyamatumba, Longdale, Rufaro).

The generally unsatisfactory status of tools and equipment can be succinctly summarised by quoting from Kweka: "Access to improved technologies is a right for men and women. The problem of women's workload can be minimised by the introduction of appropriate technology which will reduce working hours on the farm as well as simplifying the work" (R. A. D. Kweka, 1997). An important aspect that emerged in the workshop discussions was that opportunities to build on indigenous technical knowledge were often missed because women who hold that knowledge lack confidence in the value of what they know.

3 Discussion and conclusions

Although it is well known that addressing gender disparities in agriculture contributes to reducing poverty, the differences between the needs of men and women are often ignored or wrongly identified by irrigation designers. It is important that these gender disparities are recognised so that they can be considered in the participatory design process. Phase I identified several issues including:

Participation

Throughout the region there are social and cultural constraints, which result in women participating less in formal consultation on irrigation development than men. Research to evaluate methods of increasing female participation is in progress in Tanzania, detailed in "Women in Smallholder Irrigation in Tanzania" (R. A. D. Kweka, 1997). Formulation of the new Water Law in South Africa acknowledges the need to formally recognise women's rights in relation to allocation and use of water. The Workshop confirmed the need for widespread evaluation of the impact of women's participation on productivity and sustainability.

Infrastructure

Participants agreed that care should be taken to select irrigation infrastructure that enables both men and women to develop their preferred irrigated agribusiness. This implies that flexibility is given a high priority. For example, design for long furrows determines the need for engine or animal-powered land preparation, which may restrict women's opportunity to cultivate. In addition, long furrows do not readily permit different watering regimes for the different crops preferred by men and women. This constraint to diversification reduces sustainability (Experience of South Africa – Chris Stimie).

Organisations and Institutions

The links between organisations and irrigators are often heavily influenced by social and cultural conventions. The problems faced by men and women irrigators are therefore likely to be different. These differences must be taken into account in setting up crucial lines of communication, particularly those that relate to ensuring water delivery. The Chinyamatumba case study illustrated that women's access to town restricted their ability to interact with the Ministry that controlled their water supply, with the result that their crop suffered and water use was ineffective (N. Matshalaga, 1997; Chancellor and Hasnip, 1997).

Tools and equipment

In Zambia the use of treadle pumps has been particularly targeted to women to promote their control of irrigation water. Men find the ungainly activity of their wives unacceptable while the wives find the physical strain unacceptable. The pumps are regarded to be unsuitable to meet the objective. Unreliable pumps cause problems where the operational skills of either men or women are poor and where repair services is restricted for financial or social reasons.

Hand tools used in rainfed cultivation may be inappropriate in the irrigation context either because the gender of the user is different or because the task is different. For example (1) available hoes are unsuitable for use in close planted vegetable gardens, (2) often more physical strength than women can provide is needed – such as for moving long sprinkler pipes. These mismatches reduce productivity and increase energy requirements.

Training

Training is often less accessible to women than to men for a variety of social and temporal reasons. The importance of providing training, at times and places suitable for the trainee, was agreed. Providing training in the local idiom and training materials, manuals etc accessible to all users is thought to have a potentially large positive impact.

Suggested hypotheses:

- I. The use of labour is of equal importance to the use of water.
- II. Purchased inputs such as herbicides when used as a substitute for labour can raise profitability.
- III. Alternative tillage techniques (eg ripping, mulching) can reduce or ameliorate (eg by reducing bottlenecks) overall labour demand.
- IV. Gender-based Associations can operate constructively to raise scheme productivity / profitability.
- V. Design factors to facilitate women's use of equipment can be identified.
- VI. Lack of Standards and effective guidelines limit system performance / productivity / profitability.
- VII. Taking into account age and gender variables influences sustainability.
- VIII. Adopting an ergonomics approach to design will increase the extent to which the needs of both men and women are met.
- IX. Participation based on work contribution can contribute to reduction of existing gender biases.
- X. Attention to gender aspects of marketing for small-scale producers can improve the profitability of schemes and the livelihoods of individuals (i.e. reduce poverty).

4 Phase II Activities

In assessing the feasibility of research to support or refute the hypotheses, it must be borne in mind that some changes will be technically feasible, whereas others may take time, for example if a change of policy or law is necessary.

Zimbabwe

The question of appropriate pumps is of particular interest in Zimbabwe where a number of existing schemes rely on pumps which the farmers have a limited capacity to maintain and repair. Selection of the pump has in the past been heavily influenced by donor policy and has resulted in long term difficulties. There are two issues to be addressed. What are the criteria farmers and professionals should apply when selecting hardware? How can both men and women farmers access information about available technology and training and how are they motivated to do so? Hypotheses i, v, vi, and vii would be addressed in this context.

A second major concern is the gender aspects of land preparation. The long-furrow system, common in many existing smallholder schemes, has gender implications, which may support either government or donor policy objectives for rural women. Hypotheses viii and ix could be investigated in this context. Although, individuals within AGRITEX show interest in these problems, in the team's estimation there is doubt about the level of commitment to gender issues at policy level. Before proceeding with a detailed proposal for Phase II in Zimbabwe, we therefore wish to take advice from DFID, Harare, as to how the research could be linked to other DFID funded work in progress in Zimbabwe, such as the Small Dams Rehabilitation Project, to produce the best use of resources and opportunity

South Africa

The Ministry of Agriculture in Northern Province is in the process of compiling an inventory of some 170 smallholder schemes. Mainly sited in the former homelands of Lebowa, Venda and Gazankulu remarkably little is known about the schemes, their design, operational status, agricultural performance and impact on local economies. Some eleven have been selected for more detailed appraisal and it is planned to select two or three of these for development/improvement. At the same time DFID are supporting a programme of improvement in rural support services in the province. Our research partners in the Institute of Agricultural Engineering (IL) have undertaken to link the Gender-sensitive Design Research with these on-going programmes. The intention is to use the current investigative work in the Province to identify sites that will allow us to use matched pairs of schemes, preferably one pair of "food plot or garden scheme" and one pair of smallholder, commercial schemes. Introduction of participation towards gender-sensitive design in one of each pair would be initiated to test hypotheses iv, vii and viii.

Zambia/ Namibia

The issues surrounding the introduction of treadle-pumps were clearly brought out in Mr. Moono's paper (D. Moono, 1998). Further investigation of how participatory design can incorporate the physical and social needs of communities as well as production needs is recommended. The questions raised in hypotheses i, vii and viii should be answered. We await further details of proposals from Zambia and expect to be able to initiate work during the second quarter of 1998/9.

Regional

Hypotheses viii, ix and x will be addressed in all locations as these issues are fundamental to both irrigation scheme sustainability and profitability as well as impact on poverty alleviation.

5 Phase II Funding

The Workshop highlighted a greater range of issues than was envisaged in the original proposal and has clearly illustrated that professionals in the region accord high priority to dealing with the gender aspects in mainstream smallholder irrigation development. As detailed plans unfold it is increasingly evident that the amount of research time required to address the priority issues exceeds the original estimate. We would like to take the opportunity to flag the need for additional funds so that as detailed proposals become available in a few weeks time, adjustments can be made to the original estimate.

Appendix 2

South Africa

Appendix 2 South Africa

Background information on the Northern Province Department of Agriculture Rehabilitation Project and the Smallholder Irrigation Schemes at Boschklouf and Thabina.

Compiled from information provided by the Directorate of Agricultural Engineering of the Northern Province Department of Agriculture, Land and Environment and by the consultants Loxton, Venn and Associates.

1 INTRODUCTION

The Directorate of Agricultural Engineering of the Northern Province Department of Agriculture, Land and Environment is engaged in the process of re-planning and rehabilitation of a number of irrigation schemes in four regions of the Northern Province.

The understanding is that government is prepared to upgrade the infrastructure of the schemes as required provided that:

- this is done in close co-operation and involvement with the stakeholders, t
- the schemes are to be totally owned, managed and maintained by the participant farmers
- the level of technology applied should be clearly related to manageability and ease of maintenance i.e, it is essential that the technology be appropriate to the particular scheme and its participants and
- the schemes can be shown to have long-term viability.

2 THE TASK

The consultants are required to

- Undertake a fact-finding exercise of identified schemes leading to a broad assessment of each scheme, the reasons for malfunction or collapse and development potential.
- Establish clear understanding of the aspirations, interests and problems of the participants on the schemes and affected communities.
- Determine the influence of the surrounding region on the future viability of the scheme (e.g. infrastructure, markets, and agro-industries).
- Prepare a broad economic evaluation of each scheme based on the above findings.
- Select one scheme from each of the regions as pilot projects for more detailed planning and rehabilitation or upgrading.

Pilot projects will establish models for sustainable development of the other irrigation schemes in the Northern Province in the future. The project is being carried out in four phases

- Phase 1: A situation analysis and broad evaluation of all eleven schemes and the selection of the pilot projects
- Phase 2: Planning of the selected pilot projects and the establishment of appropriate development models.
- Phase 3: Detailed design and preparation of tenders for engineering aspects of projects.
- Phase 4: Setting out of works, supervision of implementation and commissioning.

3 THE PARTICIPATORY PROCESS

The successful implementation of the project will be dependent on a thorough participatory process with all stakeholders during all phases of the study.

The involvement of stakeholders in this way is essential in order to:

- Create a development awareness amongst stakeholders and allow them to request development assistance.
- Encourage people to participate in and accept ownership of that development.
- Fully understand the needs, problems and fears of the farmers and other stakeholders.
- Overcome suspicion and fear of the unknown.
- Avoid the creation of false expectations.
- Be aware of adjacent resource-poor people and the possible impact that poverty might have on the development of an irrigation scheme.
- Get people to explain
 - why their scheme failed
 - why they think their scheme should be upgraded
 - what is required to achieve this
 - how it should be done
 - who should do it
 - in what way the community is prepared to assist

This is to be achieved by holding village meetings and personal interviews, forming and working with voluntary farmer interest groups (where each group elects its own committee) and optimally involving local service personnel such as extension officers.

4 COMMON CONSTRAINTS

A number of important constraints to the development and viability of irrigation schemes were found to be common to most of the eleven schemes investigated. These include:

- Irrigation plots are generally 1ha in size and have been allocated by traditional authorities to people living in nearby villages - sometimes as much as 5 km from the plots.
- The 1 ha holdings are generally not economically viable unless they exist in close proximity to a very favourable market. In such cases, an outstanding farmer can make a successful living from intensive vegetable production but these are exceptional instances and cannot be adopted as yardsticks for production for the entire scheme.
- It was established that a large number of plot-holders are not actually interested in farming. Many participants and pensioners are too old to work whilst a large number of plots belong to non-resident breadwinners with most of the income on the scheme being derived from pensions and money earned elsewhere.
- It is frequently the case that the breadwinners consider their plots as some type of retirement security and are not interested in commercial farming. These people often confine their cropping to special maize varieties from which the families' preferred maize meal is milled and otherwise plant only traditional crops such as spinach and those used in connection with tribal and religious customs.
- The whole concept of ownership of the land will need to be re-examined so that individual property rights will allow farmers to take out commercial loans and enjoy true ownership of the land and the development on it.

- There is a great need for easier access to credit and the farmers on traditional irrigation schemes, especially women, have great difficulty in obtaining small loans for crop input requirements.
- Scheme roads and conservation works are generally in serious disrepair.
- Water supply management is a problem on all schemes. Conveyance systems, and especially night storage dams have deteriorated over the years and much water is wasted. There is a great need for training in water supply management, proper irrigation scheduling and in-field water use efficiency. In many cases the infrastructure requires radical redesign in the interests of "user friendly" management.
- A serious lack of interaction exists between farmers and agricultural extension officers. Extension officers are mostly poorly trained for support to irrigation schemes, feel inadequate in their important role and are not respected by irrigation farmers.
- Farmers are often poorly organised in terms of common lobbying, providing inputs for the scheme and marketing of produce. There is generally a lack of joint initiative for the benefit of the scheme as a whole.
- Irrigation schemes are often found in the heart of resource-poor communities. Development of the schemes must involve the resource-poor and take their situation into consideration.

5 POSITIVE TRENDS

Encouraging positive trends found in a number of the schemes are as follows.

- A number of innovative small-scale commercial farmers are successfully developing farms of up to 5ha have emerged on certain schemes. An active farmers' committee in association with the traditional authority on those schemes have gradually increased the size of holdings of certain individuals on the basis of proven performance over the years.
- Twenty-six "commercial farmers" on a scheme in the Southern Region are developing plots of up to 6 ha in size by leasing moribund 1 ha holdings in exchange for a percentage of the crop or annual profit
- These "commercial farmers" are having a positive effect on existing schemes The individuals are entrepreneurs who develop their own markets arrange transport and are in the forefront of pressing for improved access to credit, improved water supplies and improved extension services.
- There is a growing awareness among scheme participants of the need to take ownership of and responsibility for the schemes on which they farm and an acceptance of the need for farmers to make a greater contribution to the upgrading and maintenance of the schemes.
- There is a growing awareness of the need to move from subsistence agriculture only to an increasing emphasis on high value crops such as perennial fruit crops and vegetables that can generate income and improve the chances of long-term viability of schemes.
- It would appear that the establishment of a block of small food gardens on each scheme could accommodate a number of pensioners and others who are not interested in farming as such but are nevertheless devoted gardeners. These gardens can make a large contribution to the food requirements of both the individuals and the community. Interest in this concept was found at most schemes.

6 PHASE 1

The successful completion of Phase 1 of the study resulted in the selection of the following three pilot schemes for more detailed planning and rehabilitation.

REGION	PROJECT	IRRIGATION SYSTEM	IRRIGATION AREA	NO.OF PARTICIPANTS	ENTERPRISES	
					PRESENT	PROPOSED
Lowveld	Thabina	Flood	228	124	Vegetables and field crops	Vegetables, field crops and sub tropical fruits
Southern	Boschkloof	Flood	320	26	Vegetables and field crops	Vegetables and field crops
Northern	Morgan	Flood	75	24	Tomato	Vegetables, field crops and sub –tropical fruits

BOSCHKLOOF IRRIGATION SCHEME

Location: Southern Region Sekhukhune district
Co-ordinates: 24°48'S 30°05'E

Nearest town: Jane Furse (40km)
Topocadastral maps (1:50000) 2430 CC Kennedy's Vale

Irrigated Area: 320 ha of which the actively farmed consists of small-scale "commercial farms" controlled by 26 farmers who form a separate committee.

Land tenure: Plots are of 1ha but the "commercial farmers" have control of a number of plots varying in total area from 3 ha to 6 ha.

1. Soils and topography

The elevation of the Scheme is 780m amsl along the left bank of Steelpoort River. Soils are sandy clay loams and clay loams of moderate depth. Slopes range from 2% to 4%. Soils are well-drained and suitable for irrigation of field crops as well as perennial orchard crops.

2. Water source, supply and rights

- A weir situated about 5km upstream of the Scheme provides a gravity supply from the Steelpoort River via lined canals and three night storage dams.
- The main supply from the Steelpoort will be improved by the construction of a proposed dam (some 10km upstream of Boschklouf) as a joint venture by a number of mining houses and the Department of Water Affairs.
- Water quality appears to be satisfactory but requires further investigation as regards possible contamination from the numerous mines in the catchment.
- A water right for the Scheme exists but the situation should be further re-affirmed or clarified according to the new Water Law in September.

3. Climate

- The mean annual rainfall is 560mm of which 85% occurs from October to March. Droughts are frequent. Mean annual "A" pan evaporation is approximately 2000mm with a maximum of 7,1 mm/day in December and January. Frosts can occur in winter.

4. Cropping

- The majority of the small plot-holders are not actually interested in farming and confine their cropping to maize for home use or traditional special crops such as spinach. The few "commercial farmers" are active and grow crops of tomatoes, onions and other vegetables for sale as far afield as Ohrigstad.

5. Irrigation infrastructure and layout

- The take-off from the weir on the Steelpoort River needs repair as well as an improved method of silt removal.
- Further downstream, the canal inlet box requires repairs and an improved method of silt disposal.
- Two major canal crossings under the access road to the Scheme need major repairs and soil protection works are needed where the canal runs adjacent to a stretch of rocky mountain-side.
- The night storage dams need upgrading and repair of the inlet/outlet controls. One of the dams is used for the extraction and purifying of domestic water which is pumped to the main village in the foothills

6 Other infrastructure

- Twelve km of an extremely poor and rocky access road from the Scheme connects with 28km of tarred road to Schoonoord and Jane Furse.
- The access road also connects via a bridge over the river to the R555 main road from Witbank to Steelpoort. This road gives access to many mines and potential markets in the area.
- There is no telephone connection to the Scheme but electricity is available.

7 Condition of infrastructure and maintenance

- Some major repairs are required as outlined under the heading of “Irrigation infrastructure and layout”
- The condition of the canals is generally fair to good although a certain amount of upgrading is required.
- Soil protection works are generally required as protection from rapid mountain run-off. A soil conservation team in the district is concentrating on dry-land catchments not connected with Boschkloof.
- The existing small plot-holders are not interested in maintenance but the self-established “commercial farmers” have contributed labour in repairing crucial breaks in the main canal system.

8 Stakeholders' Views

The twenty-six small-scale commercial farmers of Boschkloof have already exhibited their enthusiasm and initiative by obtaining larger holdings through share cropping. We feel that this initiative deserves support and development.

Based on one formal stakeholders meeting and a number of site visits, the following issues and views were raised.

The stakeholders felt that the scheme had not been totally successful for the following reasons:

- Lack of water control and management
- Inadequate canal capacity
- Lack of co-operation between farmers
- Lack of a constitution and a proper farmers committee
- Lack of loans for input costs
- Lack of marketing and transport facilitation
- Scheme access road in very poor condition

- Soil erosion
- Poor scheme fencing

The stakeholders identified the following requirements for upgrading the scheme:

- An increase in the size of farmers' plots
- The provision of title deeds
- Access to input loans
- Scheme upgrading i.e. canals and storage dams
- Farmer training
- Upgrading of the access roads and internal Scheme roads
- Provision of soil protection works

Stakeholders suggest that government and possible donors finance the rehabilitation of the Scheme whilst the farmers are prepared to contribute labour and take over Scheme maintenance. The participants are not prepared to pay for irrigation water unless farming becomes viable.

9 Broad Economic Analysis

Potential Enterprises

Potential enterprises would include high value vegetable production and the gradual introduction of perennial orchard crops in the future.

Marketing

- No organised system of marketing exists. The “commercial farmers” have successfully marketed their vegetables in the large markets of Steelpoort, Burgersfort and Ohrigstad
- Markets are also available in the highly populated areas of Sekhukhuniland such as Jane Furse.

Potential Economic Linkages

- The project is well-placed to establish links with established agriculture in Marble Hall and Groblersdal where processing facilities are available.
- From an agricultural perspective, the immediate surrounding area is poorly developed and therefore this scheme could become an agricultural development node in the area.

Overall Economic Viability

- A broad economic model was developed on the assumption that most of the scheme would be put under vegetable production. The same assumptions apply to the economic model as was given in the previous scheme. The internal rate of return (IRR) for this project is estimated at 53%. The estimated net present value for the project at a discount rate of 8% is R3.7 million.

10 Evaluation Summary

- The Boschkloof soils are well drained and suitable for irrigation. The water supply to the Scheme is adequate if the necessary upgrading to the canal intakes, capacities protection works are carried out.

- The 26 farmers who form the “farmers committee” are enthusiastic and have applied their own version of “share-cropping” to the Scheme. This has resulted in a number of successful commercial farms of from 3 to 6 ha.
- The farmers have had excellent contact with one of the adjacent mines which donated a tractor and implements to the committee. They are successfully running the tractor as a commercial unit.
- Excellent marketing opportunities occur in the nearby markets of Steelpoort and Burgersfort as well as in Sekhukhuniland itself, as well as all the mines in the area.
- The sub-regional staff of the Agricultural Department in Sekhukhuniland support the view that the whole concept of land ownership on this Scheme should be re-examined so that it can achieve its true potential in the development of more commercial farmers. This will have to be done during negotiations to be conducted by the sub-regional staff with the tribunal authorities and the stakeholders.
- It is envisioned by the scheme farmers, the sub-regional staff and the consultants that Boschkloof can be re-planned into larger, viable units in consolidated blocks with smaller areas made available for communal gardens and food plots. The re-planning will greatly increase the efficiency of water use and simplicity of operation.
- The initiative of the full-time farmers under very difficult conditions deserves recognition and we suggest immediate support and development through government assistance and training.

SELECTION OF A PILOT PROJECT FOR SOUTHERN REGION

Boschkloof is submitted as the first choice for a pilot project from the three Southern Region schemes of Grootfontein, Koedoeskop and Boschkloof. The reasons are as follows:

- Boschkloof has a more secure water supply than the other two schemes.
- The potential markets for Boschkloof in the rapidly developing towns of Steelpoort and Burgersfort, the numerous mines in the area and the whole hinterland of Sekhukhuniland itself provide a great marketing potential. The other schemes do not have the same favourable marketing opportunities.
- Boschkloof presents an opportunity to establish a large core of commercial farmers whilst catering for other participants on the scheme with food plots. This fact is largely due to the enthusiasm of the self-established commercial farmers" on the scheme.
- Boschkloof can be developed at reasonable cost into a more efficient scheme whilst the technology will still remain appropriate to the participants.
- The upgrading of the Boschkloof scheme would have substantial spin-off benefits to the local communities in terms of food supply, some job creation and the opportunity for related enterprises such as vegetable hawking.
- Grootfontein cannot be considered as a pilot project whilst all other communal centre pivot schemes have proved to be failures in the Southern Region, and the possible flooding of part of the Scheme should the Rooipoort dam be built.

- The stakeholders at Koedoesdorp will be most ideally served by the establishment of food gardens as a contribution to the food requirements of the community and for sale of the surplus to the surrounding markets. When the water supply alternative of pumping direct from the Olifants River is considered and approved and participants consider that they are ready to take on the responsibility of larger commercial holdings, upgrading of the Scheme shall be reconsidered.

THABINA IRRIGATION SCHEME

Location:	Lowveld Region: Retavi 2 district
Co-ordinates	23°57'S 30°18'E
Nearest town:	Tzaneen (24km)
Topocadastral maps	(1: 50 000): 2330CD Letsitele
Irrigation infrastructure:	Canal construction commenced early nineteen fifties
Irrigated area:	228 ha under furrow irrigation (additional 65 ha previously under centre pivot).
Number of farmers:	124
Land tenure:	Various size holdings controlled by an active farmer's committee in association with traditional authority. Holdings of 1 ha, 2 ha, 3 ha, 5 ha and 7 ha exist.

1 Soils and topography

The Scheme elevation is 560m. Slopes are gentle and vary between 2% and 6%. The soils are generally deep (1,5m), well-drained red clays with high available water-holding capacities and relatively low infiltration rates. Sub-surface drainage of the soils is satisfactory.

2. Water source, supply and rights

The Scheme was originally designed to extract water by gravity canal from a weir on the Thabina River. The flow was insufficient during periods of drought and was supplemented by a number of pump stations downstream on the river. The Thabina River discharges via the Groot Letaba into the Olifants and the Limpopo rivers. Water quality is excellent. The new national Water law is to be implemented in September, when all water rights will be reviewed.

3 Climate

Mean annual rainfall is 800mm of which 80% occurs from November to March. Droughts are not infrequent. Mean annual "A" pan evaporation is 2 200mm with a maximum of 7,4mm/day in January. Temperatures and photo-thermal units for the production of subtropical fruit are more favourable than those of Levubu, Zebediela or Nelspruit. Frost is not generally a problem.

4 Cropping

Maize is grown as a staple food with groundnuts often interplanted. Vegetables, in particular pumpkins, tomatoes, cabbage, chillies and paprika are grown for sale. The standard of production varies from fair to good in the case of some commercial farmers on larger holdings. Sub-tropical fruit production and other tree crops were not encouraged by previous government departments on this scheme.

5 Irrigation infrastructure and layout

- A poorly constructed weir feeding a gravity canal from a site on the right bank of the Thabina river, about 2 km upstream of the Scheme proper, was washed away and has recently been repaired.
- Due to insufficient flow in the canal a number of pump stations were installed on the river adjacent to the Scheme to augment the supply. The Department of Agriculture presently pumps water to the command canal at no charge to the farmers.
- The pump consists of:
 - A Lister diesel-powered unit near the main road at the start of the Scheme, discharging into the gravity canal.
 - A second Lister diesel unit, downstream, discharging into the command canal.
 - An electrical powered unit situated at a large and well-constructed weir pumping into a night storage dam connected to the gravity canal
 - A poorly constructed makeshift weir below a large pool on the river was formerly constructed to enable a Fiat diesel-powered unit situated on the left bank of the Thabina to pump into the command canal. The pump unit has been removed with the intention of installing it on the right-bank of the river, abutting the Scheme.
 - Farmers purchased a number of small portable units to obtain irrigation water at peak periods from the makeshift weir site.
- The command canal is concrete-lined, 3,5km in length and utilises two night storage dams of capacity 33 000m³ and 35 000m³ respectively. The main canal has a capacity of 200 l/s but seldom flows full. Off-takes discharge into smaller concrete lined furrows which provide for furrow irrigation in the plots.
- The flow of the Thabina river, above the main canal and confluence with its tributary the Mgwabitsi River, (above the canal take-off), and a storage dam capable of irrigating 400 ha has been totally reserved by the Department of Water Affairs for primary allocation to the large townships of Lenyenye and Maale as well as for environmental purposes (i.e. maintaining the riverine system). The Thabina Scheme is thus dependant in the long run on gravity flow from the Mgwabitsi river and pumping from weirs in the Thabina river adjacent to the Scheme. A dam site on the Mgwabitsi should be investigated to lessen pumping costs and provide more irrigation.

6. Security of water supply

A Soil conservation team is presently active with a protection programme in the Thabina catchment area. This should assist greatly in stabilising the river flow and also the irrigation scheme in the long run.

7 Other infrastructure

- Internal Scheme roads are in poor condition.
- The nearest major electrical power supply is that at Lenyenye township, 2 km from the Scheme headquarters.

- Telephone connections are installed in the Scheme offices and in the local co-op.
- The local agricultural cooperative is small and not of great assistance to the farmers.
- The nearest railway line is at Letaba (12kms) whilst the Tzaneen station is 24kms distant.

8 Condition of infrastructure and standard of maintenance

- The repaired weir feeding the command canal (2km upstream of the Scheme) needs further improvement or it will be taken away again by the floods.
- The main weir on the Thabina adjacent to the Scheme (electrical pump) is in good condition and well maintained.
- The makeshift weir downstream of the above leaks badly and is in poor condition. It can be repaired and improved at no great cost.
- The large number of diesel pump units are not maintained speedily, leading to water shortages. They should be replaced by a single electrical unit of greater capacity.
- The concrete canals have been kept in a fair state of repair but are broken in many areas. They need upgrading in capacity and repair.
- The night storage dams require cleaning and repair.
- The long narrow plot strips and contour layout of the plots has led to weed infested banks and difficulty in ploughing in more than one direction, leading to a very uneven surface for furrow irrigation.
- The contour layout can be easily altered to a more efficient system of flood irrigation and surface run-off control.

9 Stakeholders views

The participants give a definite impression of enthusiasm, Some can already be categorised as small scale commercial farmers who are making significant use of their holdings. We feel that this initiative (which does not exist on all schemes) deserves support and development.

Based on two formal stakeholders meetings and a number of Site visits, the following issues and views were raised.

The stakeholders felt that the scheme had not been totally successful for the following reasons:

- An insufficient water supply
- Insufficient tractor services
- Poor administration and management
- Lack of co-operation
- Lack of farmer training
- Lack of co-ordination between farmers
- Lack of markets
- Shortage of inputs

- Poor Scheme maintenance
- The problem of theft from surrounding areas
- Lack of readily available credit

The stakeholders identified the following requirements to upgrade the scheme:

- Enlarge and repair canals
- Provide an additional storage dam
- Repair the downstream weir
- Upgrade the scheme roads
- Provide title deeds
- Provide financial assistance to farmers
- Training of extension staff
- Training of farmers
- Repair scheme fences
- Improved access to markets

The stakeholders felt that government should also provide the finances for upgrading whilst the farmers would assist with the maintenance of the scheme. The stakeholders stated that they were not prepared to pay for irrigation water, which they considered a basic need.

10 Broad Economic Analysis

Potential Enterprises

- Potential enterprises would include high value sub-tropical fruit and vegetable crops. Some maize would be produced as a staple food source but it is envisaged that this would be reduced over time. Small food gardens for subsistence would be retained as parts of the scheme.

Marketing

- There are large potential local markets in the nearby (2 km) townships of Lenyenye and Maake. Apart from the local marketing of vegetables, no organised system of marketing currently exists. There is currently a demand for tomatoes from a processing plant in Politsi, who are offering contract cropping to farmers in the area.
- The viability of a packaging and storage facility close to the scheme for fruit and vegetables should be investigated as this facility could serve the wider area.
- Farmers wish to convert the local agricultural co-operative, which is currently not effective to an NTK satellite co-operative.

Potential Economic Linkages

- The infrastructure and location of this Scheme is favourable, and it can exert a positive influence on the surrounding areas. The Scheme is adjacent to the R36 tarred main road from Tzaneen to Lydenburg with Tzaneen 24 km distant. The nearest railway line is at Letaba (12kms). A main electric power supply is situated at Lenyenye and telephones exist on Thabina.
- There are potential linkages with existing large commercial estates growing high value crops such as sub-tropical fruit and nuts. There is presently a proposal to establish a large fruit and vegetable processing plant at Letsitele.

Overall Economic Viability

- In order for the project to be viable, high value enterprises need to be produced. A broad economic model was developed on the assumption that half of the irrigated area would be developed to orchard enterprises with the remaining area producing mostly vegetables and some staple field crops. The model assumes that all development costs to date are sunk costs and are not included in the analysis. Also not included in the analysis is the initial cost of land. Only refurbishment costs are included that would enable the scheme to operate to its full potential. The internal rate of return (IRR) for this project is estimated at 39%. The IRR is the discount rate which equates to the present value of cash inflows with the initial investment associated with the project. Not much emphasis should be placed on the absolute amount of this figure but rather it should be compared relative to the estimated IRR of the other projects. The estimated net present value for the project at a discount rate of 8% is R12,8 million.

11 Evaluation Summary

- The Thabina soils are deep, well-drained clays with high water-holding capacities and relatively slow infiltration rates. Topography is flat. The soils lend themselves to a good surface (furrow) irrigation layout. It is estimated that at least 70% of the scheme is actively farmed.
- The water supply needs upgrading and more security of water supply is required during drought years and during periods of low flow during August and September.
- The standard of water control, the percentage of land actually farmed and the standard of scheme maintenance is better than that of most other Schemes. Nevertheless, intensive training is required for extension staff and farmers in water management and scheduling.
- Small-scale commercial farmers already exist on Thabina. They are developing their own markets and are having a positive effect on their neighbours.
- Farmers, both male and female, are enthusiastic and are keen to develop commercial markets and their own NTK co-operative. They recognise the potential for tropical fruit and vegetable production. Contacts already exist with large commercial farmers. e.g. at Politsi who have requested a regular supply of tomatoes.
- The preliminary economic model, which provides for the gradual inclusion of subtropical fruit crops, shows that the scheme can be viable into long-term sustainability.
- The initiative of the farmers deserves recognition and we suggest immediate support and development through government assistance and training.

THE THABINA PRE DEVELOPMENT SURVEY

1 Introduction

One of the conditions that was set in order for government to upgrade the infrastructure of the irrigation schemes was that the planning process has to be done in close co-operation with the stake holders. Ultimately, the schemes are to be owned, managed and maintained by the participant farmers. In order to assist in the involvement of the participant farmers in this development process, a pre-development survey of the Thabina farmers was initiated.

The survey was carried out at Thabina Irrigation Scheme which lies in the Lowveld Region, about 24 km from Tzaneen. The scheme has 228 ha under furrow irrigation and an additional 65 ha previously under centre pivot irrigation which is now cropped in summer only under rainfed conditions. The irrigation scheme produces mainly maize in summer and a range of vegetables in winter.

2. Objective

The objective of the survey was to develop a broad understanding of the problems, needs, fears and aspirations of the Thabina farmers. A clear understanding of these issues is essential for preparation of a sustainable development plan and development strategy for the irrigation scheme. The concept is for communities to drive their own development by identifying their needs, priority actions and strategies to meet their needs. A participatory or bottom-up approach involving participants at all stages will also assist the farmers to take ownership of their project.

The survey was also used to establish a sound relationship between the farmers and the consultants so that there is no mistrust and fear as farmers get to understand the objectives of the project. A sound relationship between the farmers and consultants enables collection of more detailed and accurate information to monitor progress in future. Complicated and sensitive personal questions were therefore avoided.

Profile of the Thabina farmers

Predominant ethnic groups	Shangaan (about 110 farmers) Sotho (about 26 farmers)	
Number of farmers in the irrigation scheme	136 (total). 41 females 95 males.	
Average number of people per household	9	
Age of farmers	Many of the farmers are in the older age group of 60 years and above	
Illiteracy	About 45%	
Active Farmers	60% of those interviewed said actual farming activities are done by women.	
Part-time/full time farmers	39% are part-time farmers and the remainder are full-time farmers.	
Major sources of income	Pension, income from formal employment and sale of farm produce.	
Land Allocation	<u>No. of Farmers</u>	<u>Size of Land</u>
	104	1.0ha
	21	2.0ha
	6	3.0ha
	1	4.0ha
	4	5.0ha
Eating habits	Have between 2 and 3 meals a day.	
Standard of agriculture practised	Sub-subsistence to subsistence. Farmers rely on other sources of income to survive.	
Crops Grown	Mainly maize in summer and vegetables in winter.	
Major problem in the irrigation scheme	Inadequate irrigation water.	
Constraints	Theft of produce.	
Land Tenure	A sensitive issue which farmers would like to have addressed.	
Development perceptions	Upgrade and rehabilitate irrigation scheme in order to become self-sufficient.	

Summary of problems, needs, fears and aspirations of Thabina farmers

PROBLEMS	NEEDS	FEARS	ASPIRATIONS
Inadequate water for irrigation.	Construction of a dam, and boreholes.	Drought and therefore hunger	Irrigation water for farmer food security.
Damaged main canal and sub canals.	Repairs and upgrading of canals.		Scheme rehabilitation
Theft of produce. Thieves cut fences.	Security to prevent theft.	Hunger and deprived income.	Some form of a security system.
Poor tractor services.	Adequate tractor services.	Low yields.	Higher and better quality produce.
Inadequate water pumps and frequent breakdown of pumps.	Repairs to broken down pumps and additional pumps		
Access to water for drinking (Lefara)	Upgrade the domestic water pipe system.		
Poor service by Co-operative.	Upgrade business management.		Easy access to crop inputs.
Transport to markets is a problem.	A more efficient marketing system.	Loss of income.	Improved income and a better standard of living
Poor performance by extension officers.	Transport, training and support.	Low yields.	
Lack of Title Deeds.		Loss of land to government	To own the land, and become self sufficient
Lack of credit facilities to purchase inputs and equipment.	Access to credit.	Poor production by farmers.	To become more productive farmers.
Farmers lack knowledge and crop production skills.	Further training of farmers in all production aspects.	Low quality produce and low yields	Self-sufficiency.
Land (size) is inadequate.	More land for farming and new projects such as piggery and poultry		Additional income from other sources.
Soil erosion a problem as contours have been ploughed down.	Construction of contours to prevent soil erosion by water.	Soil loss and nowhere to farm in future.	
Poor water flow in the lands.	Land levelling.	Poor irrigation.	
Unavailability of vegetable seedlings.	Nursery to supply seedlings to farmers.		
Walk long distance to Clinic	Build clinic near Lefara		
Children travel too far to school.	Secondary school		

DISCUSSION

As this was the last opportunity to gather views from the South African collaborators, an attempt was made to structure discussion by looking at a number of questions relating to the pilot project. The responses in Italics were given by Chris Stimie of ILI and the final note to each response is the team reaction.

1. What have the needs assessments carried out in the pilot rehabilitation process contributed to the determination of rehabilitation design changes?

It is felt that the contribution is limited so far. There is a need to combine technical knowledge and agricultural understanding with concern for human needs. It is felt in South Africa that there is potential for addressing this through a Sondeo approach in which a team, intensive approach is combined with the needs assessment. Each discipline picks up specific needs and a team works with the farmers. Team building occurs and an expert unit could be developed.

The farmers might be submerged by such an approach unless it was handled with caution.

2. How have the engineers used the information from the needs assessments in drawing up initial recommendations for changes?

Engineers have been exposed to the needs assessment process and, despite the general lack of technical information, they have a good appreciation of the features of the system that the farmers find inadequate or difficult. A sympathetic approach is needed and much of the success of the interaction between engineers and the farmers depends not only on the personality of the engineer himself but also his appreciation of the farming methods used. The engineer has to enter into the spirit of the community, he has to take great care not to mislead farmers and has to know the community well. The needs assessment process gives a good start to achieving this but it is essential to follow on with an open, interactive and flexible approach to allow the farmers to customise the changes to meet their needs.

Perhaps there is a case for a continued team approach as this is a lot to expect of the engineer alone. The Development Committee, to some extent, fulfils this role.

3. How have the engineers set out the alternatives for the farmers to decide upon? Has this relied on understanding the spoken (interpreted) word, or drawn plans or 3-dimensional models?

The lessons learned so far have rather been on how not to present designs. An example was quoted of a women's club in which there was a strong spirit of working together. The introduction of drag hoses and sprinklers eroded the spirit of co-operation and demanded technical care that the women found stressful. Eventually the system was rejected and the equipment lay unused. In the pilot studies, it is still too early to judge the quality of farmers satisfaction with yet-to-be implemented design or to assess the degree of ownership that farmers will feel.

Engineers are well able to interact with individuals in the field. It may be necessary to check that the needs of important subgroups are being addressed. There is a danger of strong lobbying by those who are favoured by the existing or potential biases of the system. In the long run that may have a negative effect on sustainability.

4. How do the engineers ensure that the farmers understand the long term possibilities and limitations of different design options?

To do this effectively they need to have some idea of the farmers' long-term aims. This is to some extent addressed in the needs assessments. The engineers face problems in producing affordable designs that are sufficiently flexible, especially when it comes to the farmer's option not to water his/her land. The complexity of designing for smallholders should not be underestimated, as it perhaps was in the past.

In rehabilitation the budget has a strong limiting role. This is likely to be even stronger in cases where farmers finance change themselves.

**5. How do engineers estimate costs to guide the farmers in their choices at the design stage?
Is a percentage of capital cost used to represent O&M costs?**

Efforts are made to calculate kW-hour costs (ie energy) but beyond that an approximation of 5% of capital cost is assumed. They make the farmers aware of the trade-off between pipe size and cost and the potential economic benefit of building for expansion at the outset. There are 'pipehawkers' who offer farmers 'design for free' with pipe purchase which can result in high cost to the farmer.

It is unlikely that these approximations will be very helpful to the development committee. Information on the life of the components and materials and on the labour costs would perhaps provide an understandable basis for farmer judgement.

6. Do the farmers really feel part of the decision?

It appears that this is so at Boschkloof, where farmers have already begun to implement the work decided upon. The other schemes are not at that stage yet.

7. Are the women really getting involved in the thinking and discussing design issues?

Although women are present, both in the farmer groups and the Development Committees, it is very hard to assess their contribution to the discussion. In most meetings the women contribute only when prompted to do so by the development consultants. It is not known if, at the group meetings where the consultants are not present, the pattern of women's contribution to discussion is the same. The engineers may report some individual discussion with the women but is not clear how much their views count with the men.

Clearly, where the proposed system changes have the effects of reducing watering difficulty and the time taken to water, women are likely to benefit. Benefits to be gained by women will be strongly affected by the land tenure conditions and these are under discussion with the Development Committees and the local traditional leaders in the pilot schemes. The potential for women to be able to lease the plots they now work opens up new opportunities.

8. Is it apparent that male farmers recognise the importance of the women's contribution to successful irrigated farming?

Yes, they appreciate that women work hard. However, that is seen as being justified and, apart from attention to the issues of land preparation which also have implications for men's work and yield, relatively little attention appears to be given to reduction of women's workload. The social and cultural norms appear to vary widely between the pilot projects, Boschkloof being the scheme where women appear to be able to enjoy the most liberated environment.

Women themselves appear to be more comfortable with their roles in women's clubs and women's centres at Thabina and Elandsdoorn. It appears that when those opportunities are available women

prefer to focus their efforts on the clubs and centres rather than to exert influence on mainstream irrigation development. However it is not clear if the preference arises from opportunity or demand.

9. Is the design process really able to assimilate the farmers' contributions successfully?

Design changes are always difficult. Rehabilitation brings added difficulty in that big changes in the system are generally out of the question so, maybe, the farmers' more fundamental problems cannot be addressed. There is a need to help farmers to compromise between what they want and what is achievable within budget. The experience gained so far in the pilot projects indicates that there are much greater gains to be made from significant changes and redesign of management than from significant change in infrastructure. If reliability of delivery to the field edge can be achieved, relatively small improvements in on-farm layout and improved techniques can produce significant improvement in production. The answer seems to be in the holistic approach, co-ordinating improvements so that one aspect is not seriously neglected, potentially negating improvements achieved elsewhere. Johan's wheel analogy is particularly relevant.

This seems to be borne out by the findings of the GSID research in Zimbabwe and in Zambia.

10. Is it possible to distinguish between the overall needs of the scheme to achieve sustainability and the needs of the poorer farmers and women.

It is always easier for professionals to work with better-off, highly motivated and stronger role players. If you leave the powerful out and attempt to erode their interests, problems will undoubtedly arise and trouble in achieving results will be the outcome, simply because of their powerful, established position. It is therefore essential to work with the existing farmer body. However, if that body encompasses severe biases, that too has to be addressed. It is difficult to get results if the poor are the main focus of the effort, as their capacity to respond may be too limited by poor levels of confidence and hope.

It has been difficult to include the poor and women at Thabina and it is feared that farmer-to-farmer transfer often leaves these groups out, although there seems to be some evidence of the extended family as a dissemination path. Poor people's lack of self-esteem can lead to grabbing and distrust among the group itself.

The role that the regular availability of wage labouring jobs plays in the livelihoods of poor people needs further investigation in the irrigation sector, alongside innovative ways of enabling resource-poor people to derive income from leasing or selling land.

Final discussion of design issues with Charles Crosby and Chris Stimie

Charles Crosby expressed concern that the project had swung the design process too far into the complex areas of socio-economic and participatory issues, to the neglect of good engineering practice in which the topographic and agro-ecological issues were thoroughly addressed. The risk of failure for physical reasons is still present no matter how effective participation is, and to neglect that aspect courts disaster. This is a perfectly valid comment and poses some fundamental questions about the potential for effective participation by communities that have severe limitations to their appreciation of the engineering and resource use issues. An attempt has been made to address this concern in the ICID checklist which, whilst paying attention to social issues, was aimed primarily at protecting inexperienced engineers from ignoring vital physical warnings of potential failure.

Yet participation is widely and correctly recognised as vital to ensuring the commitment and responsibility of communities.

Appendix 3

Background information on the Elandsdoorn Irrigation Scheme,
Mpumalanga Province.

Appendix 3 Background information on the Elandsdoorn Irrigation Scheme, Mpumalanga Province.

Compiled from information provided by the Institute of Agricultural Engineering (ILI), Silverton, Pretoria.

The survey of 17 farmers was summarised by HR Wallingford Ltd (N. Hasnip) from work done by L. Stoops (University of Ghent) on a student placement at University of Pretoria and working in conjunction with ILI.

NATURAL RESOURCES

Situation

The Elandsdoorn irrigation scheme is situated in Mpumalanga, approximately 20 km from Groblersdal and can be reached on the Dennilton Loskomdam tarred road.

It lies at an altitude ranging between 985 to 1050 m above sea-level and is situated between the following co-ordinates:

29° 12' and 29° 15' East
and 25° 15' and 25° 18' South

Climate

Elandsdoorn lies in a summer rainfall region with mostly frost-free winters. The annual rainfall is approximately 610 mm with an average maximum and minimum temperature of 27,5 °C and 13°C respectively. Provided there is sufficient water, the climate allows for crops to be grown through most of the year. It must be noted however that there are occasional spells of frost.

Soil

Below is a list of the soil forms which are to be found on the Elandsdoorn irrigation scheme. The soil survey was conducted in 1985 with the planning of a sprinkler irrigation system for the scheme and is as follows:

<u>Soil form</u>	<u>Area</u>	<u>Irrigation classification</u>
Katspruit	7 ha	class C
Westleigh	8 ha	class B2
Arcadia	12 ha	class B2
Valsrivier	13 ha	class C
Oakleaf	31 ha	class A2
Clovelly	9 ha	class A2 and B1
Hutton	18 ha	class A1

Where: class A1 - high potential soils
class A2 and B1 - medium potential soils
class B2 and C - low potential soils

From this soil survey it can be seen that most of the soils are medium to low potential soils which means the yield obtained from these soils will thus be lower than expected.

Water

Water for the scheme is supplied via the Elandsdoorn dam which lies in the Mametsé river approximately 1 km from the Dennilton/Loskopdam road. A weir, built in a branch of the Mametsé river, also supplies water to the scheme during the rainy season. The Mametsé river is a seasonal river which, with a catchment area of approximately 3000 ha and an average rainfall as indicated, can provide enough water to fill the Elandsdoorn dam 3 times in the rainy season. (See References).

A night storage dam on the scheme itself is fed by a canal, with a capacity of 100 m³/h, which runs from the Elandsdoorn dam to the scheme. The following factors/values were used to determine the possible capacity of the scheme:

Total area of scheme: 80 ha

Total volume of Elandsdoorn dam: 240 000 m³

No of times Elandsdoorn dam can be filled per year 3

∴ Total water available from dam per year: 720 000 m³

Volume of night storage dam = 4 000m³
Inflow from canal = 100m³/h
∴ If canal runs 24 hrs/day then 2 400m³ of water can be replaced per day

Length of cycle: 7 days
No. of working days: 5days
Bruto application = 5mm / day
∴ Bruto application per cycle : 35 mm

Volume of water available per day for irrigation = 2 400m³/day + 4 000m³ / 5 days = 3 200m³

Volume of water necessary per hectare per cycle = 350m³
∴ No of hectares that can be irrigated per day = 3 200 m³ / 350m³ = 9,14 ha
∴ No of hectares that can be irrigated per cycle = 45,71 ha

No of hours of irrigation per day = 10
Flow rate = 3 200m³ / 10 = 320m³ / h or 889 l/s

With the possible crops that can be grown in this region, there will be at least 2 months per year in which crops need not be getting irrigation water (Estimated Irrigation requirements of crops in SA part 2):

Thus: Water requirement	=	350 m ³ / week / ha
	=	15 400m ³ /year/ha
Possible irrigation area	=	720 000 / 15 400
	=	46,75 ha per year @ 5mm gross application

INFRASTRUCTURAL FACTORS

Land tenure

Most of the farmers on the scheme have been working there for 26 years according to them. The land, however, does not belong to them, but to the government. The farmers have to pay a sum of R12 / ha / year for the use of the land and water as well as for the maintenance of the water supply system. Their payments have however stopped when government services ceased and as they heard the government was going to take their land away.

Fence

The fence that was originally constructed around the scheme is in a very poor condition and no longer keeps animals out which now come in and damage the crops. Apart from the fences that need repair, the people also leave the gates open which also allows access for animals into the fields.

Communication services

The scheme is located 5 km along the Dennilton / Loskopdam tarred road from the R25 running from Bronkhorstspuit to Groblersdal. All the roads on the scheme itself are gravel roads. The offices of the Department of Agriculture are situated 500 m away from the scheme and is responsible for the wards. Elandsdoorn forms part of one of the wards for which these offices are responsible. There are telephone lines and power lines.

INSTITUTIONAL FACTORS

Land preparation and maintenance services

In the past the land preparation, seeding, harvesting and marketing was done by the government for the farmers and they were only required to irrigate and weed. These services were not paid for directly, but subtracted from the crop income. In 1994 the government withdrew its services leaving the farmers to fend for themselves. They now have to pay contractors for any mechanisation services required and most of

them say it is unaffordable. Many of the plots are now left fallow because the farmers say that they cannot afford to pay a contractor for land preparation services. Mechanisation is a big problem which needs to be overcome before the scheme will be fully utilised.

Four women are employed by the government to keep the water channels clean. These women also have to make the garden around the offices of the Department of Agriculture and seem not to be able to clean the canals as often as they should be cleaned. The farmers also do not clean their own canals and as such, there is a lot of unnecessary water wastage. The farmers have to take responsibility for the upkeep of the canals before the system will be run and maintained as it should be.

Water scheduling

The water scheduling is controlled by a water bailiff. He controls the flow of water from the Elandsdoorn dam to the night storage dam and sees to it that the night storage dam stays full and decides which farmers should get water at what time. If a farmer wants water, he asks the bailiff who then decides when he will be able to get the water according to which farmers all require water. The flow of water to the respective farmers is controlled by sluices and, where missing, a metal sheet, rocks, soil etc. When a farmer has applied all the water that he wants, he reports back to the bailiff who then diverts the water to the next farmer that needs it. There is no real limit on the amount of water that can be applied and as such, there is probably too much water being applied. Only in drier periods is there a stricter schedule, limiting the amount of water that can be applied. The farmers at the end of the scheme seem to have more problems in obtaining water and often have to wait much longer before they can get their supply of water.

Training and extension services

There is an extension officer at the offices of the Department of Agriculture who is meant to assist the farmers and give advice when necessary. The farmers however do not go to him for assistance and he seldom goes out to the fields. He is responsible for the whole ward for extension services and is also in charge of the animal husbandry.

There is a female community development officer who is involved with the women's club and there appears to be a reasonably good understanding between the two parties. The farmers on the scheme only received training when they started farming and are still using these older, more conservative techniques. Training is necessary to teach them new, more productive, techniques of farming and irrigation.

SOCIO - ECONOMIC FACTORS

Profile of the individual farmers

The average age of the individual farmers is 66 years, the youngest one being 50, with women comprising 60% of the total. Most of the farmers have been working on the scheme for 26 years according to them and had previously worked for white farmers in Loskop.

Because of their age, most of the farmers receive a pension. According to the household typology (household typology for relating social diversity and technical change, source; paper from IME symposium 1998 SA) there are two types of households - households who derive a minor part of their income from commercial farming (type 5) and households whose main source of income is farming (type 4).

The chairman, who is the most successful individual farmer, appears to have a strong influence over the other farmers and dominates the group.

The farmers also had a co-operative which had to close due to disagreements between the members of the group. The farmers experience difficulties in working together. The main crops grown are: wheat (depending on rain), maize, beetroot, cabbage, pumpkins, onions, spinach, tomatoes, carrots, peas, green beans, potatoes and green mealies. Their production decreased tremendously when the government withdrew its services in 1994.

The Women's club

The Kwenagadi women's club started in 1980 with 1 plot and has now extended to approximately 4 ha. The main objective of the women's club is for pensioner women, who do not have work, to come and work a small piece of land and, so doing, provide food for their families and perhaps a small amount of money should there be surplus to sell. Three of the thirteen members are males which coincidentally also got involved. The average age of the members is 67 years. A joining fee and monthly fee is paid by each member of the club and any inputs are bought with money collected from each member. Money is also collected for charity purposes such as assisting to finance a creche. The women's club appears to be run effectively with good production results.

Constraints

When the government withdrew its mechanisation services, local contractors have had to be used to plough. The cost of these services from the contractors is very high and the farmers are finding it difficult to secure reliable services to plant and to harvest. This has led to under-utilisation of the plots, they are unable to afford the contractors as well as other inputs and implements. They don't consider any fundamental changes to the production system in response to their changed circumstances. They are unable to form a unified group which could negotiate with the contractors and other service providers in order to attain lower input prices.

Marketing services

Most of the people who would like to buy vegetables come to the scheme. There is a woman who runs a stall next to the scheme who sells the vegetables from the women's club in return for some vegetables for her own use. The individual farmers sell their vegetables on the fields or take them home to sell. The children also help to sell the crops.

One of the farmers has a bakkie to take his crops to the vegetable market in Pretoria (160 km). Maize is collected and sold to the Mill in Marble Hall (30 km) for mealie-meal which is taken via hired transport to the OTK in Groblersdal (20 km) where it is sold.

Elandsdoorn – South Africa

Seventeen farmers were interviewed at the Elandsdoorn Irrigation scheme in South Africa on their farm-household and family, land resources, crops and marketing and irrigation.

1 Farm household and family

1.1 Demography

Females		Males	
Interviewed	12	Interviewed	6
Average age	66	Average age	69
Average family size	7	Average family size	10
Married	6	Married	6
Widows	4		
Single	2		
Never been to school	11	Never been to school	3
No answer	1	Sub A-STD5	3
Average length on scheme	14	Average length on scheme	19

The average age of the twelve farmers interviewed is 67 and most have been farming on the scheme for an average of 16 years. Jobs before the scheme were given as; cattle herder, police man, shop worker, labourer for white farmers, builder, mechanic, and sewer. All the men had jobs beforehand, whereas only half of the females had a job previously. All of the women who answered the question on schooling have never been to school, whereas half of the men have been educated to SubA-STD5. The average family household size is 8.

1.2 Who does what?

Weeding, planting, water application, harvesting, and post process harvesting have the same pattern of who does the tasks. The men said that they do most of the work, with the help of relatives and labourers, whilst the women (married, widowed and single) think that they do nearly all of the work by themselves. In most cases land preparation seems to be done with the help of the women's club. Women report that their daughters have a great involvement in cooking, minding children and domestic water provision.

1.3 Who decides what?

Sixteen farmers answered this question relating to decisions on farm inputs and equipment. The six males all think that they make the decisions regarding farm inputs, although two stated that it was done together with their wife. From the ten women who answered the question, half think that they decide on farm inputs on their own (1 married), three think that the women's club helps them make decisions (1 widow, 2 married) and two think that they do it with their husbands.

Only eight answered the question on decisions relating to schooling (4-M and 4-F). Three of the four males think that decisions are made jointly with their wives, whereas of the females whom answered, two are not married and make the decisions on their own as does one of the married women.

It is mainly the women (70%), without the help of their husbands, who make decisions regarding food. Two of the male farmers however think that they make the decisions without the involvement of their wife.

The men however make all decisions regarding transport. Only six farmers answered the question about social occasions, of which four were male and two were female. The later (both not married) make decisions on their own, whilst three of the men do it together with their wife.

2 Land Resources

2.1 Resources and satisfaction

Over 80% became farmers in Elandsdoorn because they wanted to be, including all of the men and nine of the women (5 not married). Two women inherited the land.

Nearly 80% enjoy irrigated farming that they are involved in (64% women, 36% male) and of the eighteen farmers, 44% want to continue as they are and 56% would like to expand. Nearly 90% of the farmers who want to continue are female. The gender split for those who want to expand is 50:50.

The reasons given for liking this type of farming (small plots) were that it saves water, they are used to it, little plots are easy to manage and control and it generates an income. The reasons given by those who do not like this type of farming were that it wastes water, there is nothing else, and they are fed up of the canals.

Half of the farmers couldn't suggest an alternative form of farming that they would prefer, about a third suggested sprinklers and the remainder would like pipes. Only one farmer suggested something that she would like to do other than farming, which was building a flour mill. The majority would like to expand, produce greater quantities and better quality produce. One farmer wants to be professional like white farmers yet only one said that he would like to encourage his children to farm.

3 Crops and Marketing

3.1 Selling

Over 80% of the farmers sell their produce from their fields and home, which doesn't involve transport as the buyer collects. Although only five women said that they use the women's club to help them sell, there were only five of the eighteen whom said that they sell alone (3-M, 2-F). Eight of the farmers who don't sell alone did not say with whom, or how they sell. The majority did not give an indication of how much they kept for home consumption.

High demand and home consumption are the reasons why two-thirds of the farmers grow the crops that they do. All of the farmers said that they plant different crops every year, with rotation being the main reason and market demand also playing a role. Four of the men, who do not belong to the women's club, and therefore probably have a larger area of land, also gave expectation of rain and money for land preparation, as considerations for planting different crops each season.

3.2 Advice

Only about 28% of farmers receive advice on crop production. Four women receive advice from the women's club and one man gets advice from the extension worker. Only one farmer said that she has received any advice on marketing. Over 50% would like to receive more advice (5-M, 5-F) but only one gave an indication that they would like more information on marketing and business.

3.3 Resources and income

Nearly 70%, nine women and three men, are satisfied with the yields they get at present from their crops. Four of the farmers who are not satisfied with their yield blamed it on the fact that there is not enough irrigation water. Money shortages were also to blame, as farmers cannot afford to pay for the tractors.

Only two female farmers could give a figure for how much they earn from farming. One earns 10-20R/day and the other 1000R/yr. Nine however receive an income from another source – mainly a pension of 490R/mth, although one woman receives 1000R/mth from her husband. None of the farmers have ever had

a loan, but only two (both female) would like one. It seems that the farmers at Elandsdoorn do not know how to go about applying for a loan. One woman does not trust loans and thinks that the common bank account that they already have for land preparation is sufficient.

Five of the farmers (28%) keep animals.

4 Irrigation

4.1 Resources and infrastructure

Only half of the farmers think that they have a good enough water supply – 89% female, 11% male. The main reason given for not having enough water is a lack of rain in the winter causing the dam to dry out. One woman complained that as she is at the end of the daily timetable – she has to wait all day to receive her water.

All of the farmers do the watering themselves and most also maintain the canals themselves, although they all agree that the canals belong to the government. The government is responsible for maintenance of the dam.

Only a third of the farmers think that they know how much water to apply (1-F, 4-M) and only apply water when the soil is dry. None of the farmers actually gave an answer to the question of how much to apply, just when they think that watering is necessary.

4.2 Advice and training

Only five farmers have received advice relating to irrigation and watering, mostly from the extension worker. It is also the extension worker that the farmers go to if there is a problem (although only five answered this question). Nearly 80% of the farmers did receive training on irrigation and farming, when they first started work on the scheme, however, they have not received any training since then. Only 50% would like to receive further training (8-F, 1-M). The men tend to think that further training is not necessary.

4.3 Problems

	Female	Male	Total
Money	4	2	6
Tractors	7	4	11
Water	3	6	9
Fencing	3		3
Disease	1		1
Cracked infrastructure	1		1
Poor quality seeds	2		2
Lack of equipment	1	1	2

The men and women agree that the main problems on the scheme are money, transport and water. The women also think that fencing is a problem as they probably spend more time chasing away the animals from their crops than the men.

4.4 Suggestions for improvement

Suggestions that the farmers made for solving these problems were limited to collecting money every month, discussing problems together, cleaning the main dam and installing sprinklers and pipes.

Appendix 4

Farmer feed-back sheets

Elandsdoorn

Issues affecting scheme performance at Elandsdoorn

Issues affecting both women and men	Issues having a greater impact on women
Major issues	
<p><i>Scheme layout</i></p> <ul style="list-style-type: none"> • Plot size • Fencing • Land preparation • Water scheduling • Water delivery <p><i>Equipment</i></p> <ul style="list-style-type: none"> • Problems with land preparation equipment <p><i>Institutional</i></p> <ul style="list-style-type: none"> • Conflict with former management • Determining training needs • Participation in decision making <p><i>Marketing</i></p> <ul style="list-style-type: none"> • Crop choice • Contracts and meeting deadlines • Transport <p><i>Costs/money/credit</i></p> <ul style="list-style-type: none"> • Access to credit • Lost incomes 	<p><i>Scheme layout</i></p> <ul style="list-style-type: none"> • Fencing • Water delivery <p><i>Costs/money/credit</i></p> <ul style="list-style-type: none"> • Access to credit
Minor Issues	
<p><i>Institutional</i></p> <ul style="list-style-type: none"> • Communication 	

Comments:

At Elandsdoorn, the main irrigation scheme contains a 'Women's club' which has been allocated land to divide into small plots that are available to both men and women irrigators. The members grow vegetables that are mainly sold on the plot to customers who come in to buy. The small plots are less demanding in terms of labour and land preparation, which seems to allow the growers to intensify successfully.

The farmers who own big plots are keen to become commercial farmers but cannot progress due to the lack of affordable land preparation and harvesting equipment

Land preparation

The main problem for farmers here is the cost and timely availability of tractor services for land preparation and harvesting. Formerly the farmers benefited from government services but nowadays government can no longer subsidise farmers in this way. The problems that have to be overcome involve high costs and farmers face a number of difficulties in finding the best solution to these changed circumstances.

There is some reluctance among the farmers to make a fresh start after the loss of the tractor and this slows up positive actions to improve the present situation. The local private tractor owners who act as a group to keep costs high for tractor services add to the problems.

Irrigation delivery system

The general condition of the water delivery channels is poor and in many places water has scoured the soil away from the channels leaving the structures vulnerable to tractors and damage by people. Washing away of soil will go on as long as water is applied to the field by blocking the channels and flooding the fields directly.

Fencing

Fencing to keep animals off the crops, particularly vegetables is costly. The women particularly find problems in keeping animals off .

Resolving conflicts with former management

The farmers are experiencing an unfair situation but there is no likelihood that former services will be restored or wrongs put right. It is probably safer in the long-run for farmers to assume that help will not be forthcoming.

Participation and training

If irrigation is to continue in a sustainable way at Elandsdoorn, it is clear that some things need to change. The farmers have to be clear about what sort of changes will be right for them and will make their farming easier and more profitable. Training could help them to judge what is possible in terms of cost and organisation. At present the farmers have a limited view of the potential of training. They see it as only lessons in agriculture. Everyone should have a voice so that the final decision can be accepted and supported by everyone.

Marketing and credit

Marketing of vegetables at the scheme poses less problems than transporting bulk produce to markets at a distance. Ownership of transport is limited. Finding sources of credit often involves transport and access to banks.

Women's Issues

The women's club has been successful in many ways, lessons from this experience will be useful to the whole scheme. Women have useful information to share with the farmers. For women with big plots , land preparation problems are acute.

Recommendations

Problem	Suggestion	Main actors
Tractor services withdrawn and hire is difficult and costly	New initiatives to secure the co-operation of local contractors are needed. This may require several meetings and drawing up a bargain between the farmers and contractors. draught animals could be considered if any are available.	Farmer's committee
Plots too big to manage	It might be worth while considering expansion of the small plot system used in the Women's club, either permanently or as a temporary measure until the main land preparation issues are resolved.	Womens Club Farmer committee
Water delivery	Siphons used to bring the water from the channel to the field would give farmers greater control of the water delivery. At the same time it would reduce damage to the canal banks. Trials to investigate this with help from ILI will make it clear if this is a possible improvement	Women's club
Maintenance of canals	Clearing the canals should be accompanied by repair of the embankments and compacting of the soil around the outside of the channel to support the structure and reduce cracking of the concrete.	Farmer committee Extension Staff/ ILI Maintenance gangs
Releases from the main dam	It is important to know exactly the water entitlement of the scheme. That may be written in the formal records. If you want to ensure that it is released in a way that allows the farmers to make good use of it, you need to make a schedule of when water is crucial for your crops then go for discussions on how that can be achieved. You might need assistance from experts that the extension staff can help you to contact.	Dam administrators Farmer committee Extension staff ILI Local council

Boschkloof

Issues affecting scheme performance at Boschkloof

Issues affecting both women and men	Issues having a greater impact on women
Major issues	
<p><i>Scheme layout</i></p> <ul style="list-style-type: none"> • Plot layout • Fencing • Water reliability • Water delivery <p><i>Planning</i></p> <ul style="list-style-type: none"> • Farmer participation in rehabilitation plans <p><i>Productivity and commercial marketing</i></p> <ul style="list-style-type: none"> • Commercial farming success 	<p><i>Scheme layout</i></p> <ul style="list-style-type: none"> • Land preparation <p><i>Health and livelihoods</i></p> <ul style="list-style-type: none"> • Health implications of workload
Minor Issues	
<p><i>Pumps</i></p> <ul style="list-style-type: none"> • Organisation and costs <p><i>Equipment</i></p> <ul style="list-style-type: none"> ▪ Problems with land preparation equipment <p><i>Institutional</i></p> <ul style="list-style-type: none"> • Lack of training • Lack of linkages to commercial markets <p><i>Costs/money/credit</i></p> <ul style="list-style-type: none"> • Access to credit 	<p><i>Institutional</i></p> <ul style="list-style-type: none"> • Lack of training • Lack of linkages to commercial markets <ul style="list-style-type: none"> • Access to credit

Comments:

Boschkloof is ideally situated to improve irrigation performance and market successfully to the surrounding area as well as to commercial buyers. The farmers are enthusiastic and have already seen the benefits of training in their crop yield.

Land availability.

Land was available for women but only on a very limited scale.

Water availability

Availability of water for irrigation throughout the season is a major concern for the farmers, although, shortages are worst from May to December. The main supply canal is long and the potential for water loss is high. At present the irrigated area had fallen from the original 320 to about 100 hectares. Some farmers have an interest in harvesting water from the adjacent rock outcrops to supplement the existing supplies. However, rumours of a proposed new weir also present potential for improvement in the supply situation. Much more information is needed before options can be discussed effectively.

Marketing

Some farmers are already working on a commercial footing although people are not totally satisfied with results, believing that yield and quality can be improved. Extension is available, however, the officer is hampered by poor communication facilities and long distances to travel. The pilot project has addressed some of these difficulties already by restructuring the scheme organisation to include five farmer groups and a development committee. The group representative's role is to bring the problems and interests of their groups to the attention of the committee.

A neighbouring commercial farmer has agreed to have ten farmers from the scheme to farm a fifty-hectare portion of his farm under his tuition. The farmers will be exposed to commercial farming demands and opportunities and it is expected that the experience they gain will be shared with the people of Boschkloof Irrigation scheme. The pilot scheme consultants, Loxton, Venn & Associates are overseeing that the terms and conditions of the arrangement will be defined in a contract. This presents a unique opportunity and should be well monitored as a potential model for new entrants to commercial irrigation.

Training

The training that is given to the ten apprentices will be relayed, with the help of the extension officer, to farmers who remain at Boschkloof scheme. It may however be difficult for those who are working on their new enterprise to afford time to fulfil this duty. Nonetheless, farmers are confident that the idea can be made to work. Each trainee farmer will have to provide his/her own labour and credit, so that the employees will also benefit from learning new skills and methods. It is expected that about 50 people altogether will be in contact with commercial farming methods.

Recommendations:

Problem	Suggestion	Main actors
Water availability and reliability	Information has to be sought relating to the weir. It is necessary to make the point that no reasonable decisions can be made before it is known if a plan exists, if it is definitely going to be funded and what is the proposed time scale for implementation. Rehabilitation and desilting of the canal is also part of the water availability problem and farmers could plan this work themselves.	Development committee in conjunction with the farmers
Land allocation and tenure	The diminished supply has favoured some land. New layout on rehabilitation will change water availability and is a good opportunity for reallocation to take account of the users needs and capacity to manage land. Fear of land reallocation is real but there is no need for reallocation to be unacceptable, particularly, if all the stakeholders are included in the discussions and if at the same time the irrigated area can be increased. If it is clear that land reallocation must take place, various opportunities should be exploited. There is an opportunity for discussing if the Right To Occupy is appropriate or if other arrangements such as Community Trust Associations (CTA) or Water User Associations (WUA) would be better. This might also provide an opportunity to allocate land to women in their own right and give single women and widows a chance to meet family and income needs, through allocation of an appropriately sized plot.	Traditional chief, farmers and Development committee
Lack of equipment for land preparation	The layout of the land in the rehabilitation process will, to some extent, dictate the equipment needs for land preparation. It will be necessary to think through how the land preparation can be managed before accepting any particular layout and land allocation. Check that people who have big plots are going to be able to afford the land preparation from year to year. If the tractor is to be rehabilitated or a new one bought, check that the charge for using it covers not only the driver but a reasonable, allocation for maintenance and repair, remembering that a fund for eventual replacement has to be built up. If you fail to do that, then there may be interruption to work later while funds are raised for a replacement.	Development committee, farmers, hired workers and rehabilitation agencies working with existing local service providers
Funding and managing equipment	Hiring the tractor to non-scheme members should always have lower priority and should be charged at a higher rate. However, it can be a useful way to ensure profitable service, otherwise the tractor may be under-employed. Overuse is also undesirable so careful scheduling and planning of work is needed. Consideration might be given to a female candidate for this role.	Development committee

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<p>Labour</p>	<p>Many of the hired labourers on the scheme are women. To get the best from hired labourers, consideration should be given to the tools and equipment they use. The efficiency of hired labour is often neglected but can be an effective way of improving production. If some people are restored on their irrigated land the impact on the availability and cost of hired labour may be to make labour more costly. If this is likely to be the case then it will be important to use labour efficiently and to consider their welfare. Awareness of workload changes and health issues such as increased weeding and hazardous spraying should be promoted. The long-term nature of pollution impacts makes them of particular concern to the community as a whole, but caring for damaged people tends to be a women" issue.</p> <p>The trade off between reduced labour requirements brought about by use of herbicides and the environmental and health issues should be discussed. Training and education relating to health issues can be integrated with interactive extension approaches.</p>	
<p>Credit</p>	<p>Improved access for those participating in the training should be matched by improved access for those still operating in the scheme. There are linkages with the land allocation changes. Small loans for women may be a priority.</p>	<p>Development committee and local banks</p>
<p>Production and Marketing</p>	<p>Many of the concerns relating to improved production and marketing are likely to be addressed by the training scheme, offered by the nearby commercial farmer. The farmers will be paying for the training and therefore will be well motivated to use it to the full to improve their commercial farming. The impact on the farmers who remain outside this scheme requires consideration. It may be necessary to plan the transfer of skills and techniques carefully to check that they are appropriate for farmers in the setting of the scheme. All scheme members should have the opportunity to benefit. Particular attention should be paid to women and poor people who may have the greatest need of improved farming but least opportunity to participate.</p>	<p>Development committee, men and women, local wholesalers, local community, local commercial farmers</p>

Thabina

Issues affecting scheme performance at Thabina

Issues affecting both women and men	Issues that have a greater impact on women
Major issues	
<p>Scheme layout</p> <ul style="list-style-type: none"> • Water scheduling • Water delivery <p>Pumps</p> <ul style="list-style-type: none"> • Access to spares • Reliability • Cost • Farmer participation in rehabilitation <p>Institutional</p> <ul style="list-style-type: none"> • Establishing a strong working system within Thabina • Creating better, useful links with suppliers, producers and markets <p>Training</p> <ul style="list-style-type: none"> • Realising the potential of continued education in farming and management <p>Marketing</p> <ul style="list-style-type: none"> • Contracts and quality assurance 	<p>Scheme Layout</p> <ul style="list-style-type: none"> • Awareness of what each different design proposed for rehabilitation will mean for their workload • Access to non-commercial plots or food-plots <p>Pumps</p> <ul style="list-style-type: none"> • Women cannot irrigate if pumps are unreliable <p>Participation</p> <ul style="list-style-type: none"> • Women's needs expressed and considered seriously <p>Costs/Money/Credit</p> <ul style="list-style-type: none"> • Access to credit <p>Training</p> <ul style="list-style-type: none"> • Recognising women's potential to benefit from training and to pass on information to the next generation.
Minor Issues	
<p>Pumps</p> <ul style="list-style-type: none"> • Knowledge of alternatives • Repairs/trouble shooting <p>Institutional</p> <ul style="list-style-type: none"> • Communication <p>Costs/Money/Credit</p> <ul style="list-style-type: none"> • Access to credit 	

Comments

Thabina has changed over the years from a gravity fed irrigation system to a partially pumped situation. This has increased the cost of irrigation for the farmers and, although, pumps were needed due to the failed weir, their use has introduced an element of unreliability into production.

The generally under-resourced and poorly supported extension has not been able to provide all the farmers with sufficient agricultural knowledge to farm and market successfully. Thabina has a ready market on the doorstep and should be able to profit from production.

Institutional

Recent interventions have aimed at involving the farmers in assessing and prioritising their own needs so as to address them in ways that benefit the farmers directly. It has been difficult to access funds to support this work but much progress has been made in identifying the system's problems about water delivery, production, agricultural services and marketing.

One major source of difficulty is the number of issues that need to be addressed in order to put the scheme on a better footing. The effort required to succeed is daunting for farmers and all participants in the development committee. Nevertheless, the gain from successful irrigation is significant and progress has already been achieved in improving yields. This level of success shows that farmers are on the right track. There is still much to be done and the assistance of local experts is yet to be tapped.

Participation

Far-reaching decisions about allocating the available budget to the best rehabilitation plan requires serious consideration by farmers and their advisors. Farmers must assure themselves that they have enough information to make good decisions. All the men and women on the scheme should take part in these decisions, so it is important to share information widely. It will not be possible for everyone to agree every action but care must be taken to ensure that no one group always loses out as that would leave an opening for conflict. Conflicts usually harm everyone's interests in the long-run. Special efforts should be made to make sure women's views are heard as they may be shy during public meetings. Women's work contribution is very important for the success of the crop, so if they can do work in a better way the crop has a better chance of yielding well.

Pumps

The organisation and cost of maintenance and repairs plus the cost of fuel needs to be clearly understood by the farmers, particularly the development committee. It is important to estimate the possible cost to farmers of losing crops as a result of pump failure when making decisions about the affordability of maintenance and repairs.

Farmers on pumped schemes who rely on generating funds when a crisis arises, rather than saving money for repair and replacement on a regular basis, nearly always suffer delays and major disruption to production when pumps fail. They often lose the entire season's crop. They also lose what they spent on land preparation, fertiliser and pesticide. They then cannot buy inputs for the next season and suffer poor yield as a result, so that the cost of failure reaches out over time.

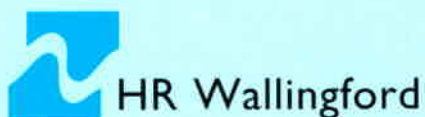
Recommendations

Problem	Suggestion	Main actors
<p>Choice of the best rehabilitation plan for reliable efficient water delivery for everyone</p>	<p>Check that you have considered the following points:</p> <ol style="list-style-type: none"> 1. Even though the capital cost is covered by government consider how will farmers meet the running costs and the inevitable repairs and replacements in the future. Draw up a plan. 2. Everyone understands the implications of the changes for their farms, particularly if it involves changes in boundaries 3. Everyone, including the scheme staff, farmers families and the hired farm hands understands what the changes will mean for the work they do. 4. Ensure that information is made available to all the farmers about proposals for change. 5. Ensure that there are opportunities for all the different interest groups to discuss issues among themselves 6. Ensure all interest groups put forward their points when all farmers are present. 7. Include the views of the women's centre. 	<p>Development committee</p> <p>Development committee</p> <p>Development committee Extension Women's club</p> <p>Development committee Extension Women's club</p>
<p>Creating a working system within Thabina</p>	<p>Most irrigation schemes have a both formal ways of doing things and informal ones. Often the informal ones grow up because the formal system is not working well. If the development committee is to be successful, it must understand the informal systems and ensure unfairness does not exist. If the formal system needs changed, do it openly.</p>	<p>ALL FARMERS</p>
<p>Creating links with services and producers in the area</p>	<p>Consider how you are going to support the extension officer to make contacts and arrangements with people outside the scheme, such as meetings between the development committee and other producers or sourcing inputs and markets. He or she would need support</p>	<p>Development committee</p>
<p>Ensuring reliability of pumps</p>	<p>If the rehabilitated system is to rely on pumps, good organisation of maintenance must be arranged. Members of the scheme to be trained in pump maintenance must be carefully selected for keenness, skill and reliability.</p> <p>It will be very important that whoever is trained is at the scheme most of the time. Women might be ideal candidates</p>	<p>All men and women Development committee</p>

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<p>Getting the best out of training</p>	<p>Make sure the courses are what farmers want. Make sure they are at times when most farmers can attend Make use of the existing women's training centre Make sure that the success of training is made known to both men and women. Give people recognition for training, especially youngsters Make learning fun, competitions are good. Have an annual produce show in the scheme, try getting local agricultural suppliers to donate prizes for the best maize cob, the biggest cabbage etc. Start small and work up.</p>	<p>Development committee</p> <p>Women's group</p> <p>All Farmers</p>
<p>Finding out more about marketing techniques</p>	<p>Look at success and look for ways of copying it. Think about grading your harvest. Offer good quality to those that can afford to pay. Offer poorer quality at cheap prices to those that are seeking bargains. Always try to satisfy customers, then they come back.</p> <p>Listen out for what customers want and remember that when you are going to plant. Don't try to grow things you don't know about - ask for advice - other people like to show off their knowledge.</p>	<p>All farmers</p>
<p>Making more profits</p>	<p>Sometimes there are good bargains if you buy in bulk. Find out how much the merchants charge for bulk orders and see if it is possible to benefit.</p>	<p>Development committee</p>
<p>Credit availability</p>	<p>When credit from outside is expensive or if the conditions are confusing, some people make a success of savings clubs. Every member gets a turn at borrowing and repaying what has been saved. It works best with small groups who know each other well.</p>	<p>All men and women Development committee</p>

HR Wallingford is an independent company that carries out research and consultancy in civil engineering hydraulics and the water environment. Predictive physical and computational model studies, desk studies and field data collection are backed by large scale laboratory facilities and long term programmes of advanced research. Established in 1947 as a Government research centre, the Company now employs more than 200 engineers, scientists, mathematicians and support staff, many of whom are recognised international experts. Based on a 36 hectare site near Oxford, HR Wallingford has extensive national and international experience, with offices and agents around the world.



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