SMALL SCALE FARMER DEVELOPMENT IN THE CONTEXT OF WATER REFORM

D1 BACKGROUND INFORMATION

1.1 DEFINING SMALL-SCALE IRRIGATION

Small-scale irrigation farmers in South Africa can be categorised in terms of their water supply as follows:

- Farmers on irrigation schemes;
- Vegetable gardeners (served by communal water supply infrastructures); and
- Independent farmers each with a "private" water supply.

A further distinction should be made between full-time and part-time farmers in order to understand the technology requirements. Irrigated agriculture is almost invariably aimed at generating a cash income or at least replacing expenditure on food through own production. Even individuals growing vegetables in community gard
ens normally only use a small portion of their produce for home consumption: The bulk is sold to augment the family income. This however creates another area of concern, as the availability of markets for produce must exist else the viability/success of such an enterprise is doomed before it started.

1.2 FARMER IRRIGATION METHODS.

The full range of irrigation systems is found on schemes, viz. flood, sprinkler, center pivot, micro and drip irrigation. Sprinkler irrigation is most commonly found. An indigenous flood irrigation system of short furrows is widely used and very popular because of its manageability and maintainability without sophisticated equipment. Similar systems are used widely in other African countries. In Kenya, a related system is known as "basin irrigation". Another form of small-basin irrigation is used in South Africa for trellised row crops, such as tomatoes.

1.2.1 Management systems.

The management systems of small- farmer irrigation schemes can be divided into two broad categories, viz.:

- Schemes which are totally, or largely, centrally (externally) managed and where farmers have no or very little decision-making powers;

- Schemes on which the farmers themselves are the decision-makers, especially at individual farm level.

The success and acceptability of irrigation schemes to participants seems to be closely related to the management system of the scheme. There is growing dissatisfaction amongst participants on irrigation schemes which are centrally (i.e. externally) managed, however noble the intentions of the developers and/or managers. Farmers have expressed very negative views on being deprived of decision-making powers, especially

when they have no control over crop choice and production and marketing decisions. The worst scenario is where central management not only takes all decisions unilaterally on a" top-down " basis, but also conducts all on-farm operations.

Transparency in financial matters and bookkeeping of centrally "top-down" managed irrigation schemes is often lacking. On some schemes farmers are provided with financial statements in the form of computer printouts, but most find these incomprehensible.
Paradoxically, the companies managing irrigation schemes believe that they are acting in the best interests of the farmers, as advantage is being taken of the economy of scale and the farming the consolidated area, so that the farming enterprise should be more profitable.

A World Bank study into successful irrigation projects in the Sahel (West Africa) concluded that there are two models, which are sometimes successful, namely (i) small privately owned enterprises and (ii) large irrigation estates, employing paid labour. Problems are encountered where these two concepts are mixed, namely when so-called "farmers" are settled on centrally managed estates, where the "farmer" has no decision-making power, yet carries the risks of failure.

1.2.2 Water supply management.

The sharing of a common water source by a group of farmers limits members' flexibility in terms of irrigation, but the choice of suitable technology is important to ensure as much flexibility for each individual farmer as possible. The irrigation technology on some centrally managed schemes in South Africa has been adapted and/or expanded to increase flexibility and manageability by farmers.

A crucial element in the successful sharing of a water source is that the group of farmers be well organised and equipped (trained) to control, operate and maintain their infrastructure and manage their finances.

1.2.3 Financial sustainability.

Irrigation schemes were generally intended to supply individuals with a full income. In practice this does not always realise, especially where expensive infrastructure (i.e. irrigation systems) was implemented and repayment and/or running costs are crippling. Many scheme farmers are seriously indebted and depend almost entirely on production loans and/or off-farm employment to keep them going.

There is a view that farmers should not be artificially kept in business too long and should be "allowed to fail ". Some people feel that by not allowing farmers to fail, the independence of the community is undermined. These arguments could only be valid for those cases where the farmer has decision-making powers and has had access to

adequate training and support services, because only then can they be blamed for failure.

1.3 VEGETABLE GARDENERS

Small- and micro-scale vegetable farming present a significant and important sector of irrigation farming in rural and urban areas. It is estimated that at least 150 000 growers participate on community gardening projects in South Africa and an unknown number grow food in home gardens. Community gardens are the "Portuguese market gardens" of rural and sometimes urban areas, so that millions of people benefit from the availability of locally produced fresh vegetables at reasonable prices, while growers augment the family budget.

Community gardens are similar to irrigation schemes in that a group of farmers shares infrastructure for water supply. ***These "irrigated food plots" constitute one of the biggest success stories in agricultural development in South Africa.*** Their success is in sharp contrast to the problems of many of the sophisticated top-down managed larger irrigation schemes.

Community gardening provides individuals with the opportunity to develop virtually a full range of entrepreneurial and farming skills on a small enterprise, as growers have autonomy in decision-making on cultivation and marketing, yet have to co-operate in an organisational structure around shared water supply, infrastructure and equipment. Community gardening is unique in the opportunity it can provide the poorest of poor people to improve their standard of living. Community garden participants are mostly women.

1.3.1 External support.

Participants are empowered in the sense that they manage their own garden, but are often still dependent on the Department of Agriculture for maintenance of pumping equipment. This often leads to delays and frustration, for instance where a garden has to cope without its diesel engine (and thus water supply) for a period of three months during the growing season.

The extension official often plays a major role in the success of a garden project. Her role is that of technical adviser, motivator, runner of errands, provider of transport and even mediator.

1.3.2 Garden irrigation technology.

A variety of irrigation technology is currently being employed on community gardens. Many gardens are being irrigated by bucket, directly from rivers and springs or from earth furrows. Some gardens have pumping equipment and water is pumped either into a reservoir or directly into a distribution network of pipes and tap stands. Hosepipes are

sometimes used with a tap stand system. One community garden was even equipped with a solar pump system, although it was not operational due to sabotage.

Furrow irrigation is used widely on community gardens in Northern Province. This system works well, although methods need to be developed to limit water loss from supply furrows in low-clay soils. The irrigation cycle in one garden could be reduced from 16 days to less than 8 days by eliminating infiltration losses in the supply furrows, thereby increasing yield and profitability significantly.

“Ownership” of community gardening projects usually rests entirely with the participants. The participants through their management committee handle common garden management matters, while each participant retains full authority over the cultivation and marketing produce on her own garden plot.

1.4 INDEPENDENT FARMERS

Independent irrigation farmers are those not participating in an irrigation scheme or in a gardening group. Independent farmers have a "private" water supply, such as pumping directly from a river, or an own borehole. Independent farmers are often *bona fide* farmers, aiming to make a living out of farming. Others consider farming an additional income. Many are shopkeepers or other entrepreneurs and develop the irrigation as an added dimension. An independent farmer typically started his irrigation enterprise using own or family capital and built it up over a period. These enterprises range from the very small vegetable or fruit tree plot, to fairly large commercial units, e.g. 100 ha intensive tomato cultivation under sophisticated drip irrigation.

There are virtually no statistics on independent farmers, as they are not being financed or managed by formal institutions. Yet, the "independent farmer" sector probably forms a significant component of small irrigation farming in South Africa.

1.4.1 Irrigation technology.

Independent farmers are probably in the best position to adapt technology to their requirements and circumstances. Many farmers "learned their trade" working for large commercial farmers. However, some of these independent farmers have made serious and expensive mistakes with irrigation and water supply technology.

Independent farmers survive because they are successful at farming, as they have only themselves to rely on. There is no question of anybody being kept solvent artificially, except where the irrigation farming is subsidised from a farmer's other businesses and then the decision is his, he will only continue as long as he considers it worth his while.

1.4.2 Support services.

In most areas there is a serious lack of support services for independent irrigation farmers. The most serious of these is a lack of specialised irrigation extension technicians, who can advise them in regard to cropping aspects, as well as lack of technical advice on engineering aspects, as well as lack of technical advice on engineering aspects. Maintenance support services are often also poor or non-existent. Problems are also encountered regarding the availability of inputs such as seed, fertilisers and pesticides.

Quite apart from the physical problem of procuring seed, fertilisers and pesticides, maintenance services and spare parts are seldom locally available. Specialised technical advice on cropping, irrigation management and equipment installation and operation is usually conspicuous by its absence.

1.5 ISSUES AROUND SMALL-SCALE IRRIGATION

The suitability of an irrigation system is particularly related to the manageability of the system for a specific set of circumstances. The distance from the fields, the priority the irrigation farming enjoys in the life of the farmer and the size of the enterprise should all influence the recommendations.

For example, a housewife irrigating crops to supplement family income, but whose fields are 3 km away from home, will not find a sprinkler irrigation system with a 12 hour stand time practical. This system would require her to be away from home very early in the morning and again in the late afternoon to move the irrigation pipes which coincides with the times of her day when her household duties and family need her full attention. In her case, a short-furrow system, requiring one visit to the fields for a period of 3 to 4 hours to complete the irrigation, weeding and other cultivation, would probably be more suitable.

Conversely, a full-time farmer with larger fields may find furrow irrigation too time-consuming or may find it difficult to find labourers willing and experienced enough to flood irrigate. Such a farmer may want a system which leaves him adequate time to pay attention to other activities, such as marketing, financial and labour management, maintenance, etc.

In all cases, the farmers and the irrigation technologist working as a team, with each contributing from his experience should investigate the most suitable choice of equipment. The farmers themselves should make the final decision on irrigation technology, once enough information exchange has taken place to enable them to make an informed decision.

In Kenya, a rule applies that at least 70% of the farmers aspiring to participate in an irrigation scheme must attend all planning meetings. During these meetings, irrigation technologists share their knowledge on alternatives for irrigation technology with

farmers. Farmers then take decisions on layout, technology, etc. and the technologists design the scheme accordingly.

It is critically important that, in the identification, adaptation or development of appropriate technologies for specific situations, all relevant factors must be taken into account. Apart from labour aspects already mentioned, and especially keeping in mind that women often have their labour burden increased by irrigation, which can seriously affect scheme productivity, these *inter alia* include:

- **Availability of the necessary infrastructure and support services** ensuring sustainable maintenance of sophisticated equipment such as overhead irrigation systems, pumps, etc. Although the situation in South Africa is probably better than in most other African countries in this regard, its importance in the more remote rural areas of South Africa is possibly underestimated;

- **Affordability.** Net farming income per hectare on the Coetzeedraai scheme, based on flood irrigation, was found to be more than double that on the Grootfontein scheme, based on a centre pivot;

- **Selection and adaptation of irrigation systems according to soil condition**. With the increased shift from flood irrigation to overhead system, it has become clear that Southern Africa has large areas of soils that are extremely prone to very severe soil crusting under overhead systems, and even under drip and micro-sprinkler irrigation. On the other hand, water-logging is found under flood irrigation on sandy soils with high infiltration capacities; and

- **Looking at indigenous systems with great potential,** such as the short-furrow systems, identifying flaws that may occur in these systems (e.g. water loss through seepage from supply furrows) and developing appropriate measures to eliminate these flaws.

Worldwide there is great disillusionment with the failures of large mechanised soil and water conservation projects and mega irrigation projects in developing countries, especially in Africa. The 1990s is characterised by the concept of "building on tradition", whereby there is an approach of looking at traditional indigenous systems as the basis from which to develop improved soil and water conservation and irrigation systems for small farmer situations.

1.6 LIMITED IRRIGATION AND CROP WATER REQUIREMENTS

One of the most significant observations with regard to small-scale irrigation farming in South Africa, is that small farmers seem to apply much less irrigation water than is recommended for conventional full irrigation. Consequently the need arises to investigate actual crop water use to enable recommendations to be made for lower planting densities and low-input cultivation methods. Lower irrigation recommendations

may bring irrigation within financial reach of farmers who cannot afford a full capacity system. On the other hand, a full capacity system may be under-utilised in a low input, limited irrigation farming approach, or may lead to over-irrigation.

Under these low-cost, low-input regimes, irrigation is employed to reduce risk, in contrast to intensive high-input irrigation farming, which is high risk farming.

An implication of a low-input regime is that design crop water requirements and consequently irrigation scheme costs could be reduced. This could make a scheme affordable to both farmers and funders.

The value of simple flood irrigation approaches to fill up a soil profile to field capacity and then exploiting the stored water, with or without additional irrigation during the cropping season, is well known in South Africa and other parts of the world. The best known in South Africa is probably the "sowing dam" system ("saaidamstelsel") used by farmers along the Sak River in the extremely hot, arid North Western Cape. The Sak "River" is normally just a dry, flat riverbed, flowing only during rare occasional floods. Farmers construct earth bunds across the area, creating shallow, relatively flat basins, which are filled during the floods. After the water has infiltrated, wheat is planted at a low planting density. The crop is grown and matured on the water stored in the soil profile. Farmers in the Graaff-Reinet district in the Eastern Karoo have used a similar system.

At the University of Fort Hare, Van Averbeke and Marais (1991) demonstrated the value of planting a maize crop on a deep, medium textured soil filled to field capacity before planting during a low-rainfall season. On the plots filled to field capacity by flood irrigation, and thereafter receiving no further irrigation, they harvested more than 8t maize per hectare. The normal dry land plots, had a complete crop failure -the plants did not even survive until the end of the season.

An important aspect in regard to the approach of utilising the water stored in a soil filled to field capacity, is to know the amount of plant-available water that can be stored in a specific soil profile.

PAWC and "deficit irrigation" form two of the main components in the BEWAB computerised irrigation scheduling programme developed by Bennie *et al* (1998) at the University of the Orange Free State. BEWAB is an extremely simple, easy to manage programme by means of which the soil profile is steadily filled to field capacity under any type of sprinkler irrigation system (including centre pivots) before the peak crop water demand period. During the peak period, deficit irrigation is practised and the PAWC of the soil is exploited. The simplicity of irrigation scheduling under this approach should make it highly suitable for small-farmer irrigation. Apart from optimising irrigation water use efficiency, the BEWAB approach also reduces the size of the system that is required, thus reducing the cost of the system.

1.7 SHARING OF INFRASTRUCTURE AND EQUIPMENT – NEED FOR ORGANISATION OF FARMERS

The sharing of water supply infrastructure, such as reservoirs, weirs and canals, but also equipment such as pumps and pipelines, is often inevitable for a project to be practical and feasible. Such sharing requires that the group of farmers are organised to manage and maintain their infrastructure and equipment. A conventional irrigation board is a formalised structure set up to fulfil this function.

Note that the emphasis is on the farmers themselves being well enough organised to be able to manage their own affairs – experience worldwide and in South Africa has shown that management and control by "outsiders" should be avoided at all cost. Farmers are resentful and negative and the failure of the scheme is inevitable.

The sharing of irrigation equipment, however, is much harder to manage satisfactorily and is often a cause of dispute between farmers. Experience suggests that farmers should be as independent as possible in terms of their irrigation equipment.

1.8 MANAGEMENT OF IRRIGATION SCHEMES AND EMPOWERMENT OF FARMERS

It has been indicated that the management system of an irrigation scheme (project) is critically important. "Top-down", centrally (externally) managed systems are unacceptable. Farmers have made this very clear. Experience in the rest of Africa confirms this. Bembridge & Sebotja (1992) give clear comparisons in this regard and even state: "High political and social costs are involved when farmers play only a passive role on irrigation projects".

In contrast, where farmers on schemes have been empowered with decision-making powers and freedom of choice in regard to crop selection, irrigation and production practices and marketing, there is a high degree of personal satisfaction and a sense of belonging. It has been shown that a much larger number of male farmers are found full-time on such schemes, with a much smaller percentage engaged in additional off-farm employment. These schemes rate much higher positive ratings in regard to socio-economic parameters and socio- psychological variables than top-down managed schemes. They do not rate as well in regard to technical aspects due to lack of adequate support and advisory services, something that should be corrected by the state.

It is acknowledged that there are certain types of projects, e.g. plantation projects such as tea, which should rather be centrally managed. In such cases, people should be employed as labourers instead of creating false impressions that they are farmers.

D 2. WHAT NEEDS TO BE IN PLACE TO ASSESS A LICENSE APPLICATION

In assessing a license application of a small-scale irrigation scheme, there are specific issues that had to be addressed before a water license is applied for. In the following chapter some of these issues are brought up so that a water license application can be assessed according to what is in place and what still need to be done.

However, the specific procedures to follow and the how to is not specific to this writing and the reader is invited to obtain copies of the following research material:

- *A REVIEW OF PLANNING AND DESIGN PROCEDURES APPLICABLE TO SMALL-SCALE IRRIGATION PROJECTS, WRC Report No. 578/2/00*
- *DEVLOPING SUSTAINABLE SMALL-SCALE FARMER IRRIGATION IN POOR RURAL COOMUNITIES, WRC Report No 774/1/00*

Both these documents will give the reader a very knowledgeable background to issues at stake in setting up a rural development project and what needs to be done to ensure a sustainable project.

2.1 TRAINING NEEDS

There is a great need for hands-on, on-farm practical training of small-scale irrigation farmers. This should meet the localised day-to-day training needs of farmers. Farmers and their organisations should be involved in developing training content and strategies for these programmes. Farmers stressed the need for technical advisors "trained right here, under our conditions".

Thus in assessing a license application, training programs for the water users should be in place or should be planned, to ensure that the water users are in the process of being trained for the use of the water that they are applying for.

However, the question can be asked if this function should lay with DWAF. In the case of training farmers, the function should lay with the farmers themselves, but from research it is clear that most of the rural poor do not know how to start where to find help and who pays for it. The issue is not clear-cut and for the interim the function for training must come from extension services developed by provincial and national department of Agriculture.

2.2 Pre-feasibility and Feasibility Studies

2.2.1 Pre-feasibility Studies

Pre-feasibility studies are the essential, concise, first screening, the 'go/no-go' phase, while technical and economic detail is more at home in the feasibility study phase. In the case of irrigation projects, the findings of the pre-feasibility study are usually reported to the senior management of the organisation that will fund further investigations. The investigation should concentrate on establishing the essential issues that have a major bearing on the decision that has to be made. Therefore, although there is always a temptation to gather as much information as possible, in the belief that this will enable senior management to reach a decision, this should be avoided. Decision-makers will ask for more information if they want it.

It is up to the practitioner in the field, even if relatively junior, to assess the situation and present it to seniors fairly, without hiding information. This is because senior management is too far removed from day-to-day practice and has no time to undertake the chore of interpreting information and synthesising an evaluation of the position. Management want to know what is going on, what is behind it, and whether to go ahead or not. It should therefore always be quite clear whether the data that practitioner in the field presents is true and reliable beyond all shadow of doubt, or is an intelligent assumption based on experience, or whether it is not possible to come up with valid recommendations.

The pre-feasibility study is not only a technical exercise, but also a crucial instrument in 'selling' the idea to the decision-makers. No project should be turned down simply because of poor advocacy. It is therefore important to present the report convincingly and thoroughly, without being verbose. Too much detail may bore and confuse, while too little may cause scepticism.

The purpose of the pre-feasibility study is to:

- Make a first-hand assessment of irrigation potential,
- Identify farmers' objectives, requirements and capabilities,
- Provide background for informed decisions
- Identify stakeholders, determine their roles and interests, highlight potential conflicts and strengths and,
- Use existing data and findings to indicate preliminary feasibility.

A good pre-feasibility study report therefore amounts to good journalism, including a critical analysis, and good briefing.

The impact of the scheme

There will need to be a paradigm shift in the approach to developing small-scale irrigation schemes and this should be reflected in the approach to their feasibility studies. The practice in the past has been to analyse each irrigation project as an entity, with the emphasis on the well being of the irrigation farmers themselves.

This situation has changed and the National Water Act (No. 36 of 1998) leaves no room for doubt that the contribution an irrigation project can make to its socio-economic hinterland must be a main concern of a pre-feasibility study.
The objective of managing the quantities, quality and reliability of the nation's water resource is to achieve optimum, long-term, environmentally sustainable, social and economic benefit for society from their use. There are three obvious ways in which irrigation can help achieve optimum, long-term, environmentally sustainable, social and economic benefit for society.

- The first is by being a source of products for which there is a demand in the immediate surroundings, particularly if this means that foodstuffs can be made available at a reasonable, affordable price, where they would otherwise be unobtainable. This could raise the local nutritional levels by providing a more satisfactory and varied diet, while promoting an informal and semi-formal marketing chain.
- Another contribution could be in the production of specialist, high-value crops, possibly requiring packaging and processing, which would, in effect, be a new industry for the area. An example of this is sultana raisin production in Turkey, which is almost totally concentrated in the hands of small farmers and their co-operatives that undertake the necessary processing. Alternatively, if large commercial pack houses or processing plants are close by, serving existing commercial farmers, an outgrow programme, similar to those developed by the South African sugar industry, can be advantageous.
- Last, but by no means least, is the issue of food security. This can be provided in many forms, ranging from home gardens, community gardens and food plots through to full- and part-time farming on one- to two-hectare plots, or even on larger holdings. It is particularly in this area of food security that the role of women is important, although they play a role in all the categories of farmers.

Circumstances may dictate extensive and expensive redevelopment, aimed at a new commodity enterprise, or the low-cost conversion to a community garden of a scheme with water limitations. Conventional engineering design norms and specifications should not be accepted without detailed consideration of what is appropriate for the circumstances. The community, and particularly the women, should be in the picture throughout and should be involved, from design, through construction, to implementation.

It is not only the rehabilitation of existing schemes that requires new and innovative approaches. The opening up of irrigation farming to communities and individuals that were previously deprived of access to water requires a new look at pre-feasibility studies. Projects can vary from land settlement schemes involving people with little knowledge of crop production and irrigation, to farmer communities that purchase irrigation farms as a going concern, through to community gardens.

What is important is that the new procedures conform to the now-established principles of participatory development.

These principles are:

- A well-balanced process of bottom-up and top-down planning is required. A thorough bottom-up process should be non-negotiable to decide the nature and

detail of the development. The top-down process should create an enabling environment and support this approach to development.

- Develop with an exit plan ensuring that sufficient capacity is created within the community to ensure sustainability. This can best be achieved by creating opportunities for "beneficiaries" to do things for themselves under guidance of a facilitator, instead of developers doing things on their behalf and trying to transfer the skills and know-how later.
- Facilitate the community to establish their own priorities. If they cannot agree on achievable first steps, it is probably best not to go ahead at all.
- Incremental development as appose to the "big bang" is required. Thus build on what there is, especially human resources and skills. Find innovative ways to start small and progress steadily.

2.2.2 Feasibility studies

There are international guidelines for feasibility studies in developing countries, published by such organisations as the World Bank and the European Commission. Possibly the most appropriate guideline is that published by the Food and Agricultural Organisation of the United Nations. However these international guidelines deal with principles. All procedures and checklists will tend to be situation-specific and, to some extent, subjective. This is inevitable because, while principles can be reduced to generalities, specifics cannot.

However, experience has shown that guidelines are necessary to facilitate the evaluation and reporting on the rehabilitation of small-scale farmer irrigation schemes. This is an unfamiliar field to most planners and consultants and important aspects may be overlooked at the planning phase.

As is the case for a pre feasibility report, the report from a feasibility investigation should supply a license application evaluator with all the answers he/she requires to assess the application.

2.3 QUESTION PRE FEASIBILITY STUDIES SHOULD ANSWER

As indicated, for a water licence application, the information from a pre feasibility study should be adequate to answer all questions raised by the evaluator to grant or refuse an application. Thus for this study, the data needed to compile a pre – feasibility report is listed below:

2.3.1 Description of the Scheme

This applies to the pre-feasibility study. This is the document that would be required in the first instance by the Irrigation Action Committee. What is needed is a simple narrative, not a report or plan, but it should cover all the points that have been found to be important.

If some information called for is not available, an indication should be given as to how this information can be obtained. If it is not possible to recreate historic data, state this. Data and information should not be included simply because it is available. The purpose of this scheme description is to give the reader an overall picture of the scheme and its situation.

The information in this section stems from available literature and a scoping or Rapid Rural Appraisal-type field investigation. This approach avoids unnecessarily raising expectations before the preliminary indications of feasibility have been established.

Where is the scheme?
The way to find the scheme is best indicated by marking the route on a photocopy of a road plan.

Locality
It should normally be possible to locate the scheme with some degree of accuracy and to provide detail of the surroundings and the topography on a photocopy of a section of a 1:50 000 topographic map. The scheme should be outlined on this map.

Layout of the scheme
It is essential that there be some kind of plan of the scheme if the description is to be meaningful. If orthophotos are available, the scheme can be marked on these and explanatory notes can be either pasted or written on the photograph. This annotation method is very effective in presenting the basic principles to the reader. If orthophotos are not available, a sketch plan should be developed.

Notes
Notes should augment the layout plan of the scheme as follows:

- Water source: In addition to identifying the nature of the water source, river, canal, borehole, dam – give an indication as to whether there is an allocation from the Department of Water Affairs and Forestry etc, as well as the reliability of the supply in the various seasons.
- Water supply: Provide an overall picture of the way in which the water is supplied. Whether it is pumped into a rising main and distributed by pipeline, or diverted into a canal, etc, at this stage, it is not necessary to go into details of design dimensions, etc.
- Irrigation plots and methods: The size and arrangement of the irrigation plots and method of irrigation should briefly be described as well as an indication of the total area irrigated.
- Residential areas: The size and location of residential areas are important in that the village may be directly associated with the irrigation development. If the farmers live on residential plots located at a considerable distance from the scheme itself management and control can become difficult. On the other hand the irrigation scheme may be adjacent to a large town that could have an influence on the scheme. This influence can be positive in that there could be a ready market for fresh produce as well as the availability of basic amenities but could be negative in that security may be a problem.

2.3.2 History and development

It is valuable to have an understanding as to how the scheme originated and was managed and the role that it played in the early years of its development and subsequently. The past shaped the present and can influence the future.

- Date and circumstances of the founding of the scheme: Try and obtain information on when the scheme was established and the responsible organisations concerned. The land acquisition procedures and agreements reached with traditional authorities and participants may be important if the scheme is to be handed over to participants in the near future.
- Development history: Outline the developments that have taken place up until the present time. This should include improvements in infrastructure and irrigation methods and extensions to the scheme. Unfortunately many schemes have deteriorated and the pattern of this decline should be documented.
- Crop production history: Down the years major changes will have taken place. The changes should be identified and explained as they provide insights into the possibilities for future development.
- Scheme 'ownership' and management: Virtually all schemes are located on communal land, in many cases the land was purchased specifically for the purposes of creating the scheme for a group or a tribe.

In some cases the land was trust land and management was undertaken by the Department of Bantu affairs with 'ownership' and responsibility for infrastructure and the provision of services. With the introduction of the homelands the responsibility was largely concentrated in the agricultural development parastatals. Later when the provincial departments of agriculture were established there was another shift in responsibility.
With the impending transfer of schemes to participants it is important that the past and present legal agreements and arrangements are established.

2.3.2 Present situation

In this initial description of the scheme it is not expected that the situation on the scheme be dealt with in detail. This will be a major part of the exercise if it is decided to progress further. What is required is a general impression of the situation and identification of those areas that require more detailed investigation.

- General level of prosperity/poverty: Give an assessment as to whether or not the community is managing to keep head above water or if poverty prevails. Are there funds for farming inputs?
- Sources of income: There are very few schemes where agriculture is the main source of income. It is quite usual for the community to be dependent on pensions, government salaries or wages earned by migrant labour. It is never easy to obtain hard statistics, but it is important to establish the relevant financial importance of farming and food security to the communities on the schemes.
- Support services: These can range from mechanisation inputs and the supply of seed and fertiliser to the operation and maintenance of the scheme as a whole. What is the position?

- Agricultural production levels: Most schemes are characterised by extremely low production levels and this is one of the reasons why sustainability has not been achieved. Provide estimates of present yields both for field crops and vegetables grown for own consumption and sale. The reasons for low yields should be discussed.
- Land utilisation levels: The permission to occupy an irrigation plot provides a family with a degree of security and there is naturally reluctance to any changes that may lead to them losing this privilege. Unfortunately in many cases the plot occupiers either do not have the means or the will to utilise the land other than on a hobby-basis. Give an indication of who are farming and the intensity of land use.
- Farmer attitudes, skills and experience: Farmer knowledge and ability in respect of crop production and irrigation can differ widely from one scheme to another and within schemes. What are the general strengths and weaknesses of scheme participants?

2.3.5 Infrastructure

The major concern when handing over the management and ownership of the scheme is infrastructure and its condition. Communities are reluctant to accept infrastructure that has deteriorated and needs considerable repair and upgrading to be effective.

- Physical condition: Generally the infrastructure on the schemes will have been well constructed originally, but is in most cases in need of considerable repair. Give a summary of the present physical condition and what rehabilitation could entail
- Management: The management of pump stations and supply canals is of great importance if the scheme is to be fully effective. In many cases this is deficient. What has not always been appreciated is that the design and layout of infrastructure may be such that it is practically unmanageable. Is this the case on this scheme?

2.3.6 Potential for development

As a general rule it can be accepted that irrigation farming can only be sustainable if good yields of crops are achieved. There may be circumstances when from the point of view of food security where water is readily and cheaply available that subsistence farming under irrigation can be tolerated. This implies that the potential for significant production must be there and this is dependent on the climate, soil, water and the general circumstances of the irrigation scheme. In the initial stages of evaluation this must be a matter for overall judgement using available clues. Ultimately in-depth investigations will be required.

- Climate, soils and water: These factors will determine what is possible and what is not possible. Outline what appears to be possible. There is no point in quoting statistics and data that are not capable of simple interpretation and evaluation. Indicate sources of information.
- Commercial farmer precedents: It is of value to identify commercial farmers in the area that farm under similar circumstances and to learn from their successes and failures. It is a plus factor if the scheme is located in an area where there is a

successful pattern of farming and sufficient evidence to show that the results achieved there are transferable to the scheme itself.

- Markets and potential markets: Marketing is a major hurdle for small farmers. Their products can lack quality and they may have difficulty in ensuring supply. Review the present status of marketing and realistic possibilities for the future.

2.3.7 Future utilisation and development alternatives

In the case of the rehabilitation of existing schemes there would appear to be four options.
Restore present infrastructure and layout;
Improve and/or modify the existing infrastructure and possible the layout;
Down-size the scheme possible to food plot level; and
Abandon all irrigation attempts on the scheme.

- Restore present infrastructure: This has tended to be the approach in the past, but is must be recognised that as virtually none of the schemes were successful and it is unlikely that this will be enough. Should this, however, be the way to go explain why.
- Improve and/or modify infrastructure: Modifications can vary from being relatively minor to major changes in the whole layout and design of the irrigation system. The dominant factor is likely to be management both of the main canal and of water at farmer-level. In addition the elimination of large pumping units requires serious consideration. Outline the suggested changes.
- 'Downsize' scheme: There can be many reasons for this being a viable option. One is that there is just no longer adequate water available but there may still be a case for concentration on food plots.

2.3.8 Time frame of development

Development needs to be evolutionary and should be in-step with the provision of other services and the overall development of the farmers and their markets. The desirable stages of development of the scheme over time should be discussed.

2.3.9 Role of the scheme in region and province

The scheme should not be seen in isolation and nor should the assumption be made that it is only the people who presently have the right to occupy the irrigation plots, that should be concerned in the future. The community as a whole should be directly involved in the project in order to obtain general support for development. If the scheme is seen to be an island of prosperity in a sea of poverty, the implications are obvious. Explain how the community as a whole can benefit from the re-development of the project.
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