



agriculture,
forestry & fisheries

Department:
Agriculture, forestry & fisheries
REPUBLIC OF SOUTH AFRICA

DRAFT BUSINESS PLAN

***REVITALIZATION OF IRRIGATION
SCHEMES***

PART 1

IRRIGATION INFRASTRUCTURE

September 2012 Version 4

TABLE OF CONTENTS

Page

1. Introduction	1
1.1 Policy framework	2
1.2 Definition of concepts and terms	3
2. Problem statement	3
3. Background	5
3.1 The History of Irrigation Development in South Africa	5
3.1.1. History of Irrigation Development – Commercial Sector	5
3.1.2. History of Smallholder Irrigation Schemes (SIS)	7
3.2 Lessons learnt from revitalization initiatives of the recent past	9
4. Intervention Measures	10
5. Financial Implications	17
5.1 Capital costs	17
5.2 Operational costs	17
5.3 Existing funding	17
5.4 Funding Requirements	18
6. Risks	19
6.1. EIAs and other legislative requirements	19
6.2 Capacity of farmers	19
6.3. Water allocation lost	20
6.4 Theft and vandalism	20
6.5 Water licenses	21
6.6 Social dynamics	22

6.7 Change of land and water use to other sectors	23
6.8 Water quality	23
6.9 Degradation of soils	23
6.10 Climate change	24
7. Conclusions	25
8. References.....	26

1. Introduction

In South Africa, approximately 1,5 million hectares (ha) is under irrigation (i.e. 1,5% of the total agricultural land) of which about 50 000 ha are smallholder irrigation schemes (i.e. 3.3% of the total irrigated area). Unfortunately a large number of smallholder irrigation schemes have collapsed while the rest are suffering reduced efficiency due to various reasons. However, due to the importance of these schemes, their effective revitalization is extremely important.

Informed by the Election Manifesto, Government have adopted the Medium Term Strategic Framework (MTSF) for the mandate period 2009-2014 in July 2009. The MTSF translated the Election Manifesto into a Government strategic framework and identified the 10 Strategic Priorities that serve as the basis for determining the Government Implementation Plans for the period to 2014.

The Department of Agriculture, Forestry and Fisheries (DAFF) finds its role in addressing issues relating to the following outcomes on the MTSF document:

- Outcome 4: *“Decent Employment Through Inclusive Economic Growth”*
- Outcome 7: *“Vibrant, Equitable, Sustainable Rural Communities Contributing Towards Food Security for All”*
- Outcome 10: *“Protect and Enhance our Environmental Assets and Natural Resources”*

The revitalisation of smallholder irrigation schemes comprises an integral part of the land and agrarian reform and food security objective of DAFF, thus it is imperative that it links up with programmes and initiatives such as the Comprehensive Rural Development Strategy, the War on Poverty and other such initiatives. Initially, DAFF set a target to revitalise 2% of small-scale government irrigation schemes that amounts to a total of 1 000 ha as its contribution to Outcome 7, where it was envisaged that 250 ha would be

revitalised every year between 2009-2014. Recently it was felt that this initiative was not addressing the huge undertaking that was required and in line with the Presidential State of the Nation Address of 2012, it was felt that more effort and resources would be required to bring the smallholder irrigation schemes to full production.

1.1 Policy framework

Policies and strategies which refer to agricultural water are well developed in South Africa at National level. These include documents developed by DAFF, namely:

- The draft National Agriculture Development Strategy
- The Integrated Growth and Development Plan for Agriculture, Forestry and Fisheries
- The draft Irrigation Strategy for South Africa
- The draft Policy Framework on Irrigation for South Africa – focus on revitalization of irrigation
- The draft strategy document entitled “National guidelines for integrated management of agricultural water use – an integrated approach to upliftment and local economic development through the transformation of State support for agricultural water use”

Those developed by the Department of Water Affairs includes the following:

- The National Water Act, Act 36 of 1998,
- The National Water Resources Strategy, 1st Edition
- The Water for Growth and Development Framework,
- The draft position paper for water allocation reform in South Africa: Towards a framework for water allocation planning

Other Government policy documents and programmes includes the

- Medium Term Strategic Framework
- The Comprehensive Rural Development Strategy
- War on Poverty

1.2 Definition of concepts and terms

It is important at this juncture to distinguish between the terms “rehabilitation” and “revitalization” as these terms differentiate between the engineering-centered approach and a people/systems/market-centered approach.

“Rehabilitation” – this concept is engineering-centered reconstruction of dilapidated infrastructure to ensure repairing of water supply and irrigation distribution systems and re-design of systems.

“Revitalization” – this philosophy encompasses a broad range of concepts alongside the repair and re-design of existing infrastructure and includes engagement with the organizational and social dynamics of water apportionment, the agricultural production system, human capital development and empowerment, finances, business strategy development and marketing.

2. Problem statement

Smallholder irrigation schemes have the potential to make a significant local socio-economic impact by contributing to improved food security, poverty alleviation and increased employment. Indeed, in many instances, they are the main economic activities in their areas. Unfortunately, a large number of smallholder irrigation schemes have collapsed while the rest are suffering reduced efficiency due to various reasons. Due to the importance of these schemes, their effective revitalization is extremely important.

A number of irrigation revitalization initiatives have previously, and are currently, being undertaken in South Africa. These initiatives range from rehabilitation initiatives to the more broad-based initiatives, with multi-disciplinary teams tackling the wide-ranging issues linked to agriculture production in smallholder irrigation schemes. However, the main intervention practiced currently in South Africa at present, has focused on the rehabilitation of infrastructure and not on the more holistic development philosophy of revitalization. In some instances, after rehabilitation interventions were undertaken, black farmers were encouraged to enter into joint ventures and 'strategic partnerships' as a means of promoting entry into an agricultural commercial enterprise. However, this has rendered many beneficiary farmers to become landowners who only collect rent.

The literature review on experiences from both local and international initiatives has shown that infrastructure-centered intervention alone, or as a dominant part of the intervention, are highly unlikely to succeed. Farmers in smallholder schemes need support systems that go far beyond just the irrigation system if they are to improve their livelihoods significantly. Irrigation farming is a highly complex mix of social, agricultural, market and technical parameters, which are in a state of influx and interconnectedness. Thus, it is imperative that the multi-sectoral interests and dynamics are integrated into the planning of each revitalization project.

The main issue at stake is how to change deeply-rooted agricultural development philosophies, many which stick to modernist paradigms (infrastructure and mainstream agricultural production approaches) and to consider the merits of other ways of addressing the complexity of the revitalization of small holder irrigation schemes. The challenge lies in finding strategies that can steer the systems to implement the multi-sectoral revitalization programs and resist the pressure to drive the easy, but almost certain, road to failure of infrastructure-centered projects.

3. Background

3.1 The History of Irrigation Development in South Africa

The development of irrigation schemes is distinctly separated by the Water Research Commission (WRC) (2008) into that of the commercial sector and that of the smallholder irrigation schemes (SIS) that will be discussed in this section.

In 1876, the number of ostriches were 22 000 and as the increase in ostrich feathers increased, this number increased to 726 000 by 1911. By 1909, the export of feathers increased to £ 2.1 million, and as a result, the need to grow feed for the burgeoning number of ostriches also increased. The need to grow lucerne resulted in a spurt in the growth of irrigation. However, between 1913 and 1914, there was a significant drop in the ostrich feather market that was mainly due to the fact that the 1st World War broke out in 1914. This resulted in the stagnation of irrigation development. In addition, the Cape Province suffered a drought between 1914 and 1916 that saw the first shift from flood irrigation to more conservation-based techniques (WRC report 2008).

During the great depression in the 1930s, there was a tremendous loss of jobs and money, thus creating a problem where “whites” migrated into towns in search of employment. In an effort to reverse this trend, and to address poverty in this sector of the population, the then government of the day decided to establish a number of government irrigation economy schemes where white farmers could be settled. This era saw the establishment of the Vaalharts and the Loskop Irrigation Schemes which remains the two largest government irrigation schemes in the country (WRC 2008).

3.1.1. History of Irrigation Development – Commercial Sector

The WRC (2008) quotes the South African National Committee on Irrigation and Drainage (SANCID) (undated) that describes the three phases of irrigation development in the commercial sector. These include the following:

Phase 1 – Agriculture Phase

According to the WRC (2008), up until 1875, government did not provide any assistance to water resource development. Water abstraction occurred where natural circumstances permitted. This phase was characterized by a subsistence economy where markets were often a long distance away from where the agricultural crops were grown. There was little incentive for capital investment.

Phase 2 – Agricultural - Mining Phase

The Cape Colony was the first to initiate a policy in 1877. This was undertaken to promote irrigation, using a strategy of collaboration between producers, combined with unsubsidized loans for individuals or co-operative weir diversion and flood irrigation. Initially the co-operative flood scheme development was slow, but quickly gained momentum after 1906 with the demand for ostrich feathers, together with the development of Lucerne pastures that were grown under irrigation. As mentioned previously, on the onset of the drought between 1914 and 1916, more water conservative methods and practices were used in those areas.

Phase 3 – Agriculture – Mining – Industrial Phase

This phase was characterized by the development of public storage schemes which were due to the unreliable rains and the variable rain flows that necessitated the storage of water. During this phase the number of the existing population in the irrigation schemes were few and subsequently more settlers were brought in, in order to establish cooperative developments. The crops that were targeted in this phase included tobacco, cotton, citrus, etc. The financial strategy was also revised where loans were written off with partial subsidization of private and cooperative schemes, as well as the introduction of complete subsidized public schemes.

3.1.2. History of Smallholder Irrigation Schemes (SIS)

The WRC (2008) quote Van Averbeké & Mohammed (undated) who distinguished four eras on the history of the development of smallholder irrigation schemes.

19th Century: Peasant and Mission Diversion Scheme Era

This era was characterized by the development of river diversion technologies by private individuals or groups of individuals. A majority of these developments were rendered non-functional by the end of the 19th century.

1930 – 1960: The Smallholder Canal Scheme Era

The majority of these canals were constructed after the 2nd World War and the main objective of this development was to provide black families in the “Bantustans” with a livelihood. By 1955, an estimated 122 small irrigation schemes were developed that covered 11 406 ha, which comprised of 7 538 plots ranging from 1.28 ha to 1.71 ha, that were comparatively small compared to the sizes of that developed for white irrigation schemes which ranged from 8 – 20 ha.

1970 – 1990: The Independent Homeland Era

All homelands were characterized by poverty, low development and a largely rural resource base. The government of the day funded the development of additional irrigation schemes in these homelands. Sixty-four smallholder irrigation schemes were developed that covered 13 000 ha during this era and included the Keiskammahoek, Tyefu, Xonxa and Ncora irrigation schemes. The use of modern technology distinguished this era where pressurized overhead irrigation schemes were used. Parastatals were established to ensure the centralization and diversification of management.

However, problems soon arose that included social unrest, high maintenance costs, management problems (due to the centralized nature thereof) and resulted in the parastatals being withdrawn from the homeland. This, in turn, resulted in many of these schemes becoming unproductive as they could not be sustained.

1990 - The Irrigation Management Transfer and Revitalization Era

The development of smallholder irrigation schemes in this era was based on improving the lives among the previously disadvantaged populations in the rural areas and in the formal settlements. The focus was on poverty alleviation and food security at community level. Sixty-two schemes covering 2 400 ha were developed where the main irrigation technology included the use of mechanical pumps and sprinkler technology.

When a lot of these smallholder irrigation schemes collapsed due to various reasons, the new South African government undertook a programme to revitalize the smallholder irrigation schemes in the late 1990s. At this stage the smallholder irrigation schemes included those located in the former homelands and those that were located in commercial farming areas where white farmers were settled previously.

The Limpopo Province undertook to revitalize the smallholder irrigation schemes under firstly the Revitalization of Smallholder Irrigation Schemes (RESIS) Programme between 2001–2004 and subsequently the RESIS–Recharge Programme from 2005-2007. The RESIS programme focused on infrastructure rehabilitation and ‘joint ventures’ as a means to rebuilding and ensuring the upliftment of communities in the irrigation schemes, through the stimulation of profitable agribusiness through a comprehensive programme that would include the training and capacity building of farmers to run their businesses profitably and sustainably. The RESIS–Recharge Programme focused on infrastructure development and strategic partnerships.

In the recent Eastern Cape Infrastructure-Centered Interventions, the familiar pattern of rehabilitation, degradation and the inability of scheme institutions to maintain recently funded repair initiatives, are discussed in Denison and Manona (2008). Another major

issue is the fact that no substantive planning or soil suitability tests were undertaken and the concern is that the soils are completely unsuitable to some types of irrigation technology, e.g. centre pivots.

3.2 Lessons learnt from revitalization initiatives of the recent past

Successful revitalization requires that all relevant stakeholders be identified and their roles and responsibilities must be clearly spelled out. A key requirement is to involve beneficiary participation in the planning of revitalization for their specific scheme. This is essential to ensure sustainability and to avoid conflict.

The familiarity of farmers with different crops and different irrigation systems and the preferences of farmers with regard to selection of both crops and irrigation systems are important factors to consider. Great flexibility in this regard is required by those who drive the revitalization process.

Also with regard to the models used for farmer settlement there must be great flexibility, enabling selection of the most appropriate model for each case. For achieving sustainable success, the preferences of the farmers must again be the main guiding principle. Although the provincial departments of agriculture are the initiators and drivers of the revitalization process, they must never try to enforce any model, process or technology that is not acceptable to the specific farmers. That would be a trigger for conflict between the provincial department and the farmers and a guarantee for failure.

The ideal is to have individual independent farmers. *“Diversity in livelihood and farming among plot holders should _ _ not be resisted politically. Instead, policy content and practice should aim at optimizing institutional flexibility on smallholder irrigation schemes in order to create the necessary social room for plot holders to pursue their particular farming objectives.”(Van Averbeké & Mohamed, 2006)*

Where, for some reason, the involvement of a strategic partner is considered, both the partner and the envisaged enterprise and technologies must be acceptable to and formally

accepted by the farmers. The provincial department must also take the responsibility to ensure that the farmers are involved as decision-makers and that the strategic partner does not move into a position of decision-making monopoly. If the latter happens, the farmers become no more than “glorified labourers” and have no control over the profitability of their farming enterprises. Current measures of including training and skills transfer with the strategic partner should be supported and should include an annual monitoring and evaluation process on these measures.

The latter type of situation often leads to conflict between the farmers and the strategic partner. Since a Provincial Department of Agriculture would have been the body that negotiated the partnership, they should assume the responsibility of mediator to resolve any such conflict.

Studies on a few small-farmer irrigation schemes in Limpopo and KwaZulu-Natal showed that farmers prefer that conflicts between farmers on a scheme should be resolved internally through community structures. The most difficult conflict to resolve is one that develops between a farming community on a scheme and a Provincial Department of Agriculture – especially where the farming community resists a system being imposed on them by the department. This type of conflict has led to at least one farming community instituting a high court case against a Provincial Department of Agriculture already. The question is who should assume the role of mediator in such a case to first try to resolve the conflict without the unhappy party having to resort to legal action.

4. Intervention Measures

It has been found that the following are needed for the successful revitalization of small-farmer irrigation schemes in South Africa:

- Conflict resolution
- Farmer training
- Greater farmer participation

- Improved training of extension workers
- Security of land tenure
- Profitability
- Improved markets
- Comprehensive system approach
- Operational capital
- Incubation (using mentors)
- Increased/ profitability assessment/ economic viability
- Upgrading of infrastructure and equipment

There are many lessons to be learned from the review of successful and failed schemes in South Africa and abroad. A list of factors that provide context and depth to how irrigation revitalization planning can proceed is summarized below.

(i) Whole scheme and farm systems plans

In instances where the focus and intervention is mainly on the fixing and development of infrastructure, it is shown that these projects are highly unlikely to succeed. Farmers in smallholder schemes need support systems that go far beyond just the irrigation system if they are to improve their livelihoods.

Interventions based on holistic and comprehensive strategies addressing the complexity of activities that takes all aspects regarding the irrigation enterprise into consideration, are most likely to succeed. These include aspects such as markets, finance, inputs, infrastructure, capacity and institution-building and crop-production information, among other things.

Equal attention should be given to infrastructure, as well as to the social and institutional systems of the water user organization and community. The South African experience shows this to be close to a 50/50 split where intensive support to the community is provided at the initial stages of the project, which is extended to support them over a period of 3-5 years. Experience has shown that failure to invest a large portion of the

budget in the social and institutional components, will lead to failure of the project in the long term.

Access to reliable water is essential, although it has not been proven to be the main factor for sustainable improvement in irrigated agriculture. Productive use depends on irrigation technology, but will only be successful when market development and information supply to farmers are made a core priority in the overall intervention design.

Insecure land tenure and the related issue of irrigation holding size also needs to be addressed. Most successful irrigation farmers derive a major portion of their income from irrigated farming. Full-time farming is an incentive to engage in the management and operation of the scheme. Farmers who work small plots are forced to pursue a number of income and livelihood behaviors of which irrigation may be a small part and therefore resulting in the farmer losing commitment and interest in the agriculture venture. Insecure tenure limits incentive to make investments and provides no room for land-leasing market.

(ii) Planning considerations and livelihoods

Experience from various international and South African studies indicate that the total project cost in revitalization relating to infrastructure component must only comprise an estimated 33% of the total project cost. The cost attributed to human capital development (farmer training, institutional building, negotiation skills development, marketing support, mentoring, planning, etc.) and production input costs must comprise 67% of the total budget for the venture to be a success where it is recommended that capital development be the major budget item. This is only a guideline and would very much depend on the specific situation at hand.

Planners must adopt realistic yield projections. Pricing structures must be based on smallholder realities of production and marketing so that the financial evaluation results on which investment decisions are based are realistic. Engineers and economists need to temper undue project optimism with the socio-economic and agricultural production realities. The impact of isolated sites, difficult communication and poor supporting infrastructure will result in lower production than average commercial sector scenarios.

The economic and financial cost of sustainable self-management must be an acceptable small proportion of the improved income and the proposed organization design must have low transaction cost. The intervention process in general must hold out the promise of significant net improvement in the life situation for a significant proportion of members and the irrigation system must be the central resource in creating an improvement in farmers' life situations.

Participation, ownership and appreciation of diversity at scheme level needs to be integrated with livelihood strategies outside the irrigated context. This means taking into account the multiple water needs for personal use, livestock, fishing, laundry and other small businesses using water in addition to irrigation.

Irrigation-related interventions needs to be made with full appreciation of the broader river basin requirements and regional water allocation demands. Participation at local level is likely, in most cases to be subdued by the powerful and vested interests linked to water allocation at catchment level and this disempowering reality must be consciously addressed and mitigated against in both the process and the institutional design. The Water Allocation Reform Programme now underway, nationally, will be significant in the smallholder irrigation content.

(iii) Participation and ownership

Ownership is rooted in the information transfer and decision-making process.

It is useful and important to learn from building on pre-existing institutions and practices for managing the irrigation system. New institutions demand additional time and cost to operate and alter or undermine delicate local power balances for decision-making and access to limited resources.

Ensuring ownership of new and rehabilitated infrastructure through central involvement of farmers in all aspects of decision-making is critical. In general, the overall performance of

interventions in irrigation systems in a demand-driven mode, with a high level of farmers' involvement in irrigation projects, has been better than those provided with support in supply-driven mode with moderate or low levels of farmer participation.

Furthermore, plot sizes must be large enough to enable a farming family to make a living from farming, i.e. it must conform with the concept of "economic units". Running cost play a significant part in the gross margin evaluation and the scheme technology, size and condition is likely to split farmers into subsistence, small-scale and commercial farmers fairly clearly, which in turn will lead to optional land and production support strategies.

To achieve successful revitalization and avoid mistakes in terms of both approaches used and practical implementation of revitalization, all the factors above must be taken into consideration. The suitability of different soils and climates for different crops and different irrigation systems must be taken into account and yield and income projections must be realistic. Over-optimistic projections must at all costs be avoided and expectations must not be created that cannot be met. Also in this regard, it is critically important to consider alternatives and to be flexible in the selection of enterprises and technologies.

The inherent qualities of the natural resources (water, climate, soil, topography, etc.) of schemes should guide the drawing up of priorities for revitalization. Schemes with the highest inherent potential should be at the top of the list. Such schemes have the best potential to succeed, give the highest water use efficiencies and contribute most to economic growth. It is vitally important that good land suitability evaluation and land use planning principles must be employed in the revitalization of irrigation schemes. The original planning of some of the schemes were wrong and such schemes require re-planning.

Unfortunately, the revitalization that has been done so far seems to be fraught with mistakes in terms of both approaches used. This could have serious negative impacts. Generally there seems to be a lack of understanding of the need to be flexible. When failure occurs, the suitability of different soils for different irrigation systems and/or the familiarity of farmers with different irrigation systems, as well as the preferences of farmers

should be taken into account. Constitutionally revitalization of irrigation schemes falls under the domain of the provincial departments of agriculture.

DAFF could potentially indirectly influence the approach followed in some revitalization cases and the implementation thereof. The strongest possibility could be by means of the judicious conditional provision of funding. Ideally this should be backed up by a core of expertise in DAFF, who can determine the correct approaches to be followed and the implementation thereof.

The allocation of grants will be based on economic viability and financial feasibility, taking into account the objectives of the farmers. Government requires that schemes are self financing in terms of covering all their running cost in the medium and long term. This means that on many pumped schemes these costs are significant. Business planning approaches and profitability considerations must therefore form part of the whole intervention if policy objectives relating to funding decisions are to be met.

Studies indicated that if economic viability is a principle that must be adhered to as is currently demanded by the National Agricultural Water Use Policy, then there is little choice but to drive a commercialized cropping agenda with medium to high value crops. This is the only way in which investment in the irrigation schemes could give rates of return that will be economically viable.

In practical terms, this means that high operational and maintenance costs forces greater engagement with a cash based production system to cover monthly pumping and operational cost, whereas lower running costs associated mainly with the gravity and flood schemes can accommodate a range of production approaches, i.e. when using profitability as determinant.

As the irrigation revitalization investment cost is so high, the necessary high return per hectare leaves little but explicit commercialization agendas in most cases.

The polarizing effect that high investment cost have on farming styles in the irrigation

revitalization context means that future planning strategies and approaches have great difficulty in avoiding a dualistic separation of intervention strategy. The first is the targeting of higher-risk commercial outcomes and the second is engagement with lower risk farming styles, more geared to diversified livelihoods and food/animal fodder production. The exception to this general thrust is where low-cost infrastructure interventions are made on existing gravity and flood schemes targeting investment mainly in improving crop-production methods through training, provision of finance and access to limiting input and output markets.

This polarization of commercial and subsistence strategies dictated by the financial and economic reality of expected returns demanded from policy, needs to be considered in parallel to another line of thinking, that of social and individual process of development from a subsistence framework to a commercialized one.

Bulk water infrastructure + Infield irrigation equipment + land tenure +finance + markets

Revitalization = Facilitation + human capital development + aftercare + entrepreneurship

Table 1: Summary Data on Small-holder Irrigation Schemes in South Africa
(Summarized from Annexure A)

Province	No. of Schemes	Extent of irrigation area (ha)
Eastern Cape	8	8 362
Free State	3	150
Gauteng	Information is attached as Annexure B	
KwaZulu-Natal	3	4 235
Limpopo	28	22 909
Mpumalanga	40	2 530 8 609 (sugar cane - main crop) 11 139 (Total)
Northern Cape	8	44 658 (includes the Vaalharts irrigation scheme)
North West	9	20 042 (includes the Hartbeespoort irrigation scheme)
Western Cape	1	257
Total		111 752 ha

5. Financial Implications

5.1 Capital costs

The capital costs for the revitalisation of irrigation schemes depends on different situations (based on current industry norms ranging from R 80 000.00 to about R200 000.00 per ha). This will include the following: bulk water infrastructure, infield irrigation systems, drainage, fencing, consultancy fees, facilitation and human capital development.

5.2 Operational costs

Using a very conservative maintenance cost of 10% per year as replacement cost for pumping and distribution infrastructure, and 2,5% per year as replacement cost for canals, irrigation schemes requires an absolute minimum budget in the order of R10 000.00 - R12 500.00 per hectare to adequately maintain the irrigation schemes (Makhathini Integrated Master Development Plan 2008).

5.3 Existing funding

This has been the greatest challenge both in the efforts to revitalise irrigation schemes and the initiation of new developments for irrigation projects. These projects are mid (3-5 year) to long (5–10 year) term projects and should be budgeted for as such, but the current practise is that they are given funding on an *ad hoc* basis (e.g. with the Letsema/ Illima and CASP funding) and this practise is not conducive for the completion of the project.

The revitalisation of irrigation schemes forms an integral part of the land and agrarian reform and food security objective of the MTSF and should thus be linked to the programmes and initiatives such as the Comprehensive Rural Development Strategy, the War on Poverty and other such initiatives.

5.4 Funding Requirements

On 3 July 2012, DAFF had a meeting with officials from the Provincial Departments of Agriculture responsible for water use and irrigation. They were informed that DAFF was in the process of developing a business plan to obtain funding either from government and/or the private sector to fund the revitalization of smallholder irrigation schemes. The provinces' contribution included a list of smallholder irrigation schemes to be considered for funding as summarized in Table 2 below, the details are attached as Annexure A. The list included the following items:

- Professional fees
- Canals (kms)
- Drainage systems
- Dams
- Electrical requirements
- Irrigation systems
- Fences, roads etc

Table 2: Funding requirement for revitalization of smallholder irrigation schemes

Province	Extent of irrigation area	Budget requested (ZAR)
Eastern Cape	8 362	1 257 050 000.00
Free State	150	11 000 000.00
Gauteng	This costing for Gauteng is mainly on household food security, farmer settlement and Land reform projects	75 446 980.00
KwaZulu-Natal	4 235	317 439 675.00
Limpopo	22 909	4 664 010 000.00
Mpumalanga	11 139	892 756 800.00
Northern Cape	(Includes the Vaalharts/Taung) 44 658	5 002 654 864.00
North West	(Includes the Hartbeespoort) 20 042	2 817 080 000.00
Western Cape	257	50 050 000.00
Total	111 752	15 087 488 319.00

6. Risks

6.1. EIAs and other legislative requirements

Development initiatives require compliance with South Africa's environmental laws and regulations. This is also applied to irrigation initiatives.

One of the most important attributes of the National Water Act (Act 36 of 1998) is that it recognizes the environment as a legitimate water user. The requirements of the environment, as well as the water set aside to meet basic human needs, are called the Reserve. The Reserve is recognized as the constitutional right with regard to water use. Once the Reserve has been allocated, the water requirements of other sectors can then be allocated. This is also a lengthy process that requires time which can delay the progress on irrigation initiatives.

6.2 Capacity of farmers

Irrigated agriculture is of a complex and high-input nature. Thus, irrigation farmers need strong, efficient support from expert specialist irrigation extension and advisory services.

On the other hand, management skills will need to be imparted on irrigation farmers as they deal with decision making and implementation of these decisions in all aspects related to farming, including procurement, financing, production, labour management and marketing. Other training identified for the farmers include the following:

- land preparation and cultivation
- effective soil fertility management
- effective disease, pest and weed control
- irrigation management
- knowledge on different crops and different irrigation systems
- general farm management

- national and international agricultural issues including i.e. local commodity prices and competition on international markets

Proper training for irrigation farmers cannot be achieved by means of quick fix courses. However, farmer training should be undertaken at the various agricultural colleges situated in various parts of the country. This was an important practice used to develop white commercial farmers in the past that will need to be undertaken to develop black commercial and emerging farmers.

6.3. Water allocation lost

Land reform often does not translate to water allocation reform. There is a need to ensure that water is allocated where irrigation development is identified. This could be addressed in various institutional structures and arrangements.

There is a need for correct water allocation data, especially for the revitalization of irrigation schemes. Water allocations by the Department of Water Affairs do not reflect the current need for water. While the allocation for water for primary use in towns and settlements is rising, there is several instances where over-allocation of water from a source is evident. DAFF and the Provincial Departments of Agriculture needs accurate information about the current (and projected future) allocations to ensure that commercial viable irrigation can be supported. Such schemes are judged to have 70% assurance of supply.

6.4 Theft and vandalism

Theft and vandalism is a recurring threat in irrigation schemes. There is a need to ensure that institutional arrangements within the community are as such that they take responsibility for security within the irrigation schemes, or that they at least ensure that provision is made to provide security within the irrigation schemes. An asset or inventory control register should be used in order to determine when an asset is removed, moved or

maintained.

6.5 Water licenses

There are 5 water allocation entitlements recognized by the National Water Act (Act 36 of 1998) as depicted in Table 3.

Table 3. Types of water allocation entitlements (after WRC 2008)

Level of water use	Description	Notes
Reserve	This is water required to meet basic human needs, as well as that required by the environment.	This is the only right that is constitutionally recognized.
Schedule 1 use	These are limited quantities of water with a low potential for negative impact on water resources, including that required for household use, water for stock, rain water harvesting, etc.	No license or authorization is required.
General authorizations	Requirements for larger quantities of water which has a potential for negative impact on water resources. Authorization can be given for a specific type of water use and/or any category of user. It is generally issued in an area with relatively sufficient water. General authorizations are valid for 3–5 years and may be reviewed every 2 years.	Water Allocation Reform is targeted on these three levels.
Licensed water use	Larger volumes of water uses of water that have to be authorized through a license issued under the National Water Act. Licenses are granted for a period of 40 years maximum where terms and conditions may be reviewed and amended every 5 years.	
Existing lawful use	Water use that was lawfully carried out (i.e. under the 1956 Act) in the 2 years (i.e. 1996) before the National Water Act took effect.	

Licenses are not issued in perpetuity, but are granted for a fix period with an option to review the license depending on the conditions under which they are granted.

The challenges in the water allocation reform and issuing of water licenses are due to various reasons. This ranging from the fact that there is a lack of alignment in the interpretation of policies that are in place, as the National Water Act is not explicit about implementation and instead leaves a lot to be interpreted during implementation, to the poor understanding of the needs of smallholder farmers, because of their very nature of being fragmented and of having been marginalized by previous processes and everything in between.

The Department of Water Affairs is undertaking a process of Verification and Validation of the current water allocation and thus may not be in a position to allocate water formally until their Verification and Validation processes are concluded. Such delays in confirmation will thus impact on development initiatives such as the revitalization of irrigation schemes.

6.6 Social dynamics

The UN Committee on Economic, Social and Cultural Rights has recognized the human right to water. The human right to water is implicit in rights for food, survival, adequate standard of living and in the people's right to manage their own resources. Social conflicts around water is inevitable due to the multiple functions of water that ranges from the fact that it is a basic human need, the foundation for livelihoods, the lifeblood of critical ecosystems and a marketable commodity. Conflict is increasing over water as development of water resources and the transformation of freshwater ecosystems have intensified.

Social conflicts over water often arise at local level as experienced in many of the irrigation schemes. The types of conflict include the following:

- between upstream and downstream users
- between groups and individuals

- between irrigation water users and non-users
- between irrigation users and government, socio-professionals, farming partners, etc.

The causes of conflict ranges from ineffective or inadequate communication channels, ineffective or lack of regulations on water abstraction, inefficient irrigation techniques, illegal and excessive water abstraction, etc.

6.7 Change of land and water use to other sectors

Land that was previously used for agriculture is currently being lost to other sectors, including urban development, mining and tourism. With the change of land use, comes the concurrent loss of water that was previously allocated for agriculture.

6.8 Water quality

There is a concern about the declining quality of water in rivers and dams as a result of pollution and poor land use management. Agriculture uses raw water or minimally treated water as water is often obtained directly from water resources. There is a concern on the high concentration of microbial pollution and the impact of other sectors, including mining, on water used to irrigate agricultural products. Agricultural produce minimally processed and consumed could affect food safety and the health of consumers, as well as have the potential to impact on trade in agricultural products.

6.9 Degradation of soils

Soil quality relates to the chemical, physical and biological properties of the soil and how these are distributed throughout the soil profile (Coxhead & Øygard, 2008). Soil structure and texture are critical to good water use efficiency, as well as key determinants of the following:

- water infiltration rates
- the amount of readily available water within the soil
- the resultant root growth as well as the
- root function

Agricultural practices fundamentally influence soil characteristics over time through improving soil nutrient levels by adding manure and fertilizers, reducing acidity by adding lime and optimizing water availability through irrigation and drainage for example. The impacts of such activities could include the following:

- Soil erosion – which results in the loss of topsoil
- Soil compaction and crusting
- Nutrient depletion or nutrient mining and depletion of soil organic matter
- Salinization
- Water logging
- Acidification or alkalization of soils

Soils vary in their resilience to these types of degradation, depending on various characteristics that includes slope, soil texture, climate and cropping patterns. Mitigation measures required will need to include analysis of the soils to determine whether they are irrigable; design and construction of run-off protection structures, including drainage infrastructure; development of appropriate training and tools for the management of irrigation for farmers and extension officials.

6.10 Climate change

Scientific evidence suggests that South Africa has been getting warmer over the past four decades. The temperature has increased on average by 0.13°C since 1960. Projections by the UN suggests that temperature in South Africa may increase by between 1 and 3°C, whilst rainfall is projected to decrease by 5-10%. These increases in temperature, together with the reduction in rainfall, as well as an increase in the already high evaporation rates,

could have serious implications for the country's already stretched water resources and thus the irrigation potential.

7. Conclusions

In the overall context of the revitalization of schemes, it is very important to identify and study successful small-farmer irrigation schemes of the past and model the revitalization on these experiences. A case in point is the Middle Letaba scheme, where the farmers rejected the government recommendations of the time and designed their own highly successful diverse farming systems. Apart from diversifying on crops, they also developed cropping patterns that provided work for their labourers year round; planted crops out of season to generate higher income due to higher prices during periods of scarcity; made efficient marketing arrangements for their produce – including arrangements with large commercial farmers to transport their surplus produce to distant markets; etc. Also presently there are outstandingly successful individual farmers on schemes like Dzindi that could be used as models on whom to base revitalization.

It is important to note that, due to complex circumstances and diverse comparative advantages, each irrigation scheme requires a local development plan that needs to be developed by the provinces in collaboration with the farmers and sent to national for inputs, approval and consolidation in order for DAFF to best facilitate development for each specific irrigation scheme. Taking the above into consideration, as well as the cost of revitalization, it is important to identify which irrigation schemes will best respond to investment and which do not necessarily warrant investment due to lack of sustainable growth potential, i.e. factors such as water availability, appropriate irrigation techniques and technologies, good soil, moderate climate, nearby markets, environmental and tourist potential may justify more investment than irrigation schemes with no comparative advantage. This is a complex issue and needs to be treated with sensitivity.

8. References

1. BACKEBERG, G. 2003. Water usage and irrigation policy. Chapter 9 in: The challenge of change – Agriculture, land and the South African economy (Eds. L. Nieuwoudt & J. Groenewald). pp. 149-170. Univ. Natal Press, Pietermaritzburg.
2. BACKEBERG, G.R. 1997. Water institutions, markets and decentralised resource management: Prospects for innovative policy reforms in irrigated agriculture. *Agrekon* 36, 350-384.
3. BACKEBERG, G.R., BEMBRIDGE, T.J., BENNIE, A.T.P., GROENEWALD, J.A., HAMMES, P.S., PULLEN, R.A. & THOMPSON, H. 1996. Policy proposal for irrigated agriculture in South Africa. WRC Report No. KV96/96. WRC, Pretoria. 119 pp.
4. BEMBRIDGE, T.J. 2000. Guidelines for rehabilitation of small-scale farmer irrigation schemes in South Africa. WRC Report No. 891/1/00. WRC, Pretoria.
5. COXHEAD, I. & ØYGARD, R. 2008. Land Degradation. Draft paper submitted for the Copenhagen consensus 2008.
6. DENISON, J. 2005. A comparison of South African and international irrigation revitalisation approaches. Progress Report No. 10 for WRC Project K//5/1463/4: Principles, Approaches, and Guidelines for the Participatory Revitalisation of Smallholder Irrigation Schemes. WRC, Pretoria.
7. DENISON, J. & MANONA, S. 2006. Principles, approaches and guidelines for the participatory revitalisation of smallholder irrigation schemes. Vol. 1: A rough guide to irrigation revitalisation. Draft final report for WRC Project K//5/1463/4. WRC, Pretoria.
8. DENISON, J. 2005. RESIS – The Limpopo program for the revitalisation of smallholder irrigation schemes: A description and critique. Progress Report No. 5 for WRC Project K//5/1463/4: WRC, Pretoria.

9. DoA 2008-09. Annual report – DoA, Pretoria.
10. DOA 2007. Draft Irrigation Strategy of South Africa. DoA. Pretoria.
11. DoA 2003. Strategy document: National guidelines for integrated management of agricultural water use – An integrated approach to upliftment and local economic development through the transformation of State support for agricultural water use. DoA, Pretoria.
12. DWAF 2005. A draft position paper for water allocation reform in South Africa: Towards a framework for water allocation planning. Unpublished discussion document. DWAF, Pretoria. 19 pp.
13. DWAF 2004. National Water Resource Strategy: First edition. DWAF, Pretoria.
14. DWAF 1995. Future irrigation in South Africa. Unpublished discussion document. DWAF, Pretoria.
15. GOVERNMENT OF RSA 2006. Accelerated and shared growth initiative for South Africa (AsgiSA). Unpublished draft. Government of RSA, Pretoria. 13 pp.
16. KHUVUTLU, N.I. & LAKER, M.C. 1993. Identifying constraints and opportunities for farmers at Middle Letaba irrigation project using a low cost appraisal approach. SAFSR-E Newsletter 5, 6-16.
17. LAKER, M.C. 2006. Soil productivity in irrigated agriculture, with special reference to South Africa. Paper presented at SARIA workshop, Pretoria, January 2006.
18. LAKER, M.C. 2004. Development of a general strategy for optimizing the efficient use of primary water resources for effective alleviation of rural poverty. WRC Report No. KV149/04. WRC, Pretoria. 187 pp.

19. VAN AVERBEKE, W., M'MARETE, C.K., IGODAN, C.O. & BELETE, I. 1998. An investigation into food plot production at irrigation schemes in the Central Eastern Cape. WRC Report No. 719/1/98. WRC, Pretoria.
20. VAN AVERBEKE, W. & MOHAMED, S.S. 2006. Smallholder irrigation schemes in South Africa: Past, present and future. Paper presented at SANCID congress, Nelspruit, October 2006.
21. VAN AVERBEKE, W. & MOHAMED, S.S. 2006. Smallholder farming styles and development policy in South Africa: The case of Dzindi irrigation scheme. *Agrekon* 45, 136-157.
22. VAN AVERBEKE, W. 2006. Best management practices for small-scale subsistence irrigation farming through participatory adaptive research. 2005/06 Annual Report for WRC Project K5/1464//4. WRC, Pretoria
22. WATER RESEARCH COMMISSION 2008. Draft report – Water allocation reform, Instruments and processes for achieving equity and gender balance: Review of international experiences in water allocation reform. K5/1855. Report prepared by Sinelwati Scientific Research and Management, 8/5/2008.