Training material for extension advisors in irrigation water management

Volume 2: Technical Learner Guide
Part 6: Irrigation legislative context

JB Stevens, F van der Merwe & MC Laker

TT 540/6/12

WATER RESEARCH COMMISSION

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Report to the

Water Research Commission

NQF Level 5

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Volume 1: Main report
Volume 2: Technical learner guide
Volume 3: Extension learner guide

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Before we start.....

Dear Learner .....this learner Guide contains information to acquire the basic knowledge and skills leading to the unit standard:

Title: Apply broadly in order to source information and support around key environment issue and risk

US No: 13637 **NQF Level: 5**

Title: Plan and maintain environmentally sound agricultural processes

US No: 116305 **NQF Level: 4**

The full unit standards are available and can be cited on the SAQA website. Read the unit standards at your own time and if there are any questions or aspects that you do not understand, discuss it with your facilitator.

The unit standards are some of the building blocks in the qualification listed below:

Title	ID no	NQF Level	Credits
National Certificate: Land Care Production	49626	5	120
National Certificate: Plant Production	49009	4	120

Assessment……

You will be assessed during the course of the study (formative assessment) through the expected activities that you are expected to do during the course of the study. At the completion of the unit standard, you will be assessed again (summative assessment).

Assessment therefore takes place at different intervals of the learning process and includes various activities – some will be done before commencement of the program, others during the delivery of the program and others after completion of the program.

How to attend to the activities……

The activities included in the module should be handed in from time to time on request of the facilitator for the following purposes:

- The activities that are included are designed to help gain the necessary skills, knowledge and attitudes that you as the learner needs in order to become competent in this learning module.
- It is important that you complete all the activities and worksheets, as directed in the learner guide and at the time indicated by the facilitator.
- It is important that you ask questions and participate as much as possible in order to be actively involved in the learning experience.
- When you have completed the activities and worksheets, hand it in so that the assessor can mark it and guide you in areas where additional learning might be required.
- Please do not move to the next activity or step in the assessment process until you have received feedback from the assessor.
- The facilitator will identify from time to time additional information to complete. Please complete these activities.
- Important is that all activities, tasks, worksheets which were assessed must be kept as it becomes part of your Portfolio of Evidence for final assessment.

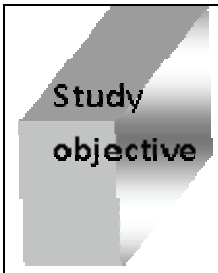
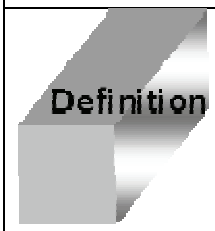
Check your progress.....

Use the following checklist to determine your competency regarding this specific learning module.

Confidence level	**I am sure.**	**Still unsure**	**Do not understand and need help**	**Motivate your answer**
Can you identify problems and troubleshoot correctly?				
Are you able to work well in a team?				
Are you able to collect the correct and appropriate information required for decision making?				
Will you be able to perform the observation expected in an organised and systematic way while performing your task as an extensionist?				
Are you able to communicate the information and newly gained knowledge well to experts?				
Can you base your tasks and answers on scientific knowledge that you have learned?				
Are you able to show and perform the activities required in this learning module correctly				
Are you able to link the knowledge, skills and competencies you have learned in this module of learning to specific duties in your job?				

How to use this guide .....

Throughout the learner Guide you will come across certain re-occurring notifications. These notifications each presents a certain aspect of the learning process, containing information, which would help you with the identification and understanding of these aspects. The following will be found in the learning material:

	What are the study objectives for a specific module? This provides an idea of the knowledge, skills and competencies that are envisaged to be
	You will be requested to complete activities, which could either be group or individual activities. Please remember that the completion of these activities is important for the facilitator to assess, as it will become part of your ***Portfolio of Evidence.***
	What does it mean? Each learning field is characterised by unique terminology and concepts. Definitions help to understand these terminology and concepts and to use it correctly. These terminology and concepts are highlighted throughout the learner guide in this manner.

My notes.....

You can use this box to jot down some questions or notes you might have, concepts or words you do not understand, explanations by facilitators or any other remark that will help you to understand the work better.

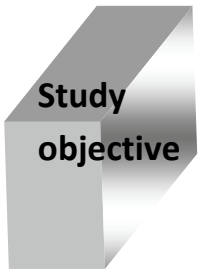
What are we going to learn?

For each of the learning modules included in this learning area specific learning outcomes were set, which you need to be able to demonstrate a basic knowledge and understanding of.

Contents

Module 1

Agricultural Policy and legislation



After completion of this module, the learner should be able to have a basic understanding of:

- Why we need a proper planned Agricultural Policy
- Importance of irrigated agriculture for food security
- Strategic Plan for South Africa
- Additional legislation that impacts on irrigation farming

This module will focus on the importance of the agricultural sector to the economic growth of South Africa and important characteristics of the agricultural policy for South Africa, the main characteristics of the Strategic Plan for South African Agriculture (2001) and a brief overview of the legislation context that addresses key areas that promote sustainable agricultural production, ensure food security and sustainable resource management.

Table of contents

1. Rationale for an Agricultural Policy (1995)[1,2,3,5,7)]

The reason for this very brief discussion on the agricultural policy environment of South Africa is to understand the major role that agriculture (and irrigated agriculture) plays in the economy of the country. It is central to the development and food security of the country, while striving to ensure the sustainable use of its natural resources.

"As early as 1969, Dr Simon Brand observed that if agricultural exports cannot claim to have been south Africa's engine of growth during the twentieth century, it at least helped to provide the lubrication without which the engine might have grounded to a halt – this situation appears to be changing if one considers the trade balance in 2007"

To ensure that agriculture in South Africa meets its formidable challenges and responsibilities, a clear agriculture policy that creates an enabling environment for agriculture to prosper and grow in an open and competitive market environment, as well as addressing disparities and transformation in the sector, is required. This coherent policy should include a thorough understanding of the international and national agriculture and food environment. South Africa's agriculture sector is dualistic, where a developed commercial farming sector (approximately 40 000 commercial farmers) co-exists with a large number (approximately 5 800 000) small scale farmers involved in food security production and small scale farming.

Box 1: Importance of irrigation agriculture for food security in South Africa

Food security is essential for social and political stability in a country. Food security required at a regional, national, community and household level require both the production of staple foods and foods that ensure a healthy diet.

It is generally accepted that South Africa has only 14 million ha (13%) arable land, which includes only 3% high potential land. If the international norm that 0.4 ha is needed to produce the food required per person is applied, it means that South Africa has the potential to feed 35 million people. Some never figures indicate 16 million ha of arable land for South Africa, which implies that 40 million people could be fed. This is still less than the current estimation of 51 million people living in South Africa. Most concerning is the fact that between 1991 and 2007 field crop production decreases by 19%, while during the same period production in horticulture sector increased by 52%, but these are mainly export crops and not food crops for local population.

During 1965-1967 the average contribution of agriculture (including forestry, hunting and fishing) to South Africa's GDP was 9.6%. During the same period the contribution of mining and quarrying was nearly the same (10.1%), while manufacturing contributed 22.3%. The contribution of agriculture steadily declined to just over 4.5% to GDP (2009/2010) but

accounts for 11% of total reported formal employment. Agriculture provides employment (including seasonal and contract employment) for about 700 000 workers [1,7]. The large scale farming units provide employment to 315 000 workers (143 000 seasonal workers and 172 000 permanent workers) or 40.7% of the total farm employment[9].Irrigated agriculture use to create more jobs per R1 million invested than other economic sectors. Although agriculture and especially irrigated agriculture requires large amounts of water, the number of jobs created by 1 million m^3 of water is of the same order as that created in mining[12].

Table 1. Arable land resources of African countries[15]

Extent of arable land	**Population pressure on arable land (ha available per capita)**			
	Very high (<0.15)	**High (0.16-0.39)**	**Medium (0.39-0.45)**	**Low (>0.45)**
Very extensive (>30 million ha)		Nigeria		
Extensive (10-29.9 million ha)		Ethiopia	**South Africa** Sudan	
Moderate (5.0-9.9 million ha)		Algeria Democratic Republic of Congo	Morocco Uganda	Cameroon Zambia
Limited (1.0-4.9 million ha)	Egypt Tanzania	Burundi Madagascar Ghana Kenya Malawi Mali Mozambique Rwanda Senegal Zimbabwe	Angola Benin Burkina Faso Libya Niger Togo Tunisia	Central African Republic Chad
Very limited (< 1million ha)	Congo (Brazzaville) Sierra Leone	Mauritius Namibia	Botswana Guinea Bissau	Gabon

Irrigation is practiced on about 1.5% of the agricultural land (included both cultivated land and range land), or 10% of the cultivated area, but it contributes to over 30% of the gross value of the country's crop production[10]. Irrigation is essential for the fruit and wine industry of South Africa, which rank amongst the country's' most important export commodities. Vegetables are mainly being produced for the local market (90%) and are therefore essential for national food security[11].

In 2000 the South African Agriculture exported about R16billion worth of export products, or nearly 10% of South Africa's total exports. Agriculture is well diversified with field crops,

livestock and horticulture the main sectors. Wine and fruit production has seen the most dynamic development in the past ten years with a large share of total output exported, mainly to Europe and Asia. The conditions for agricultural production are not favourable in most regions due to poor soil quality, highly variable climatic conditions and scarce water[1,7)]. Over the last decade the global agricultural environment has changed significantly, even drastically.

The Strategic Plan for South African Agriculture (2001) as well as the recommendation emanating from the review process (2008), together with the White Paper for South Africa Agriculture Policy (1998), provides fundamental principles for agricultural growth and rural development. The 2009 Manifesto Policy Framework of the ANC also includes as one of its five priority areas, a clear focus on Rural Development, Food Security and Land Reform. These policy frameworks are reflected in the current agricultural policy and strategy.

The agricultural policy for South Africa has as its objectives:

- Food security
- Economic growth, poverty alleviation, job creation and rural development
- Stability and predictability in the agricultural sector and rural environment
- Sustainable use of natural resources
- Creating increased entrepreneurial opportunities for agriculture to play its multiplier role in the broader economy
- Enhancement and support of the multi-functionality role it plays for the society at large.

The following factors are increasingly impacting on production, processing, markets and consumption of agricultural products:

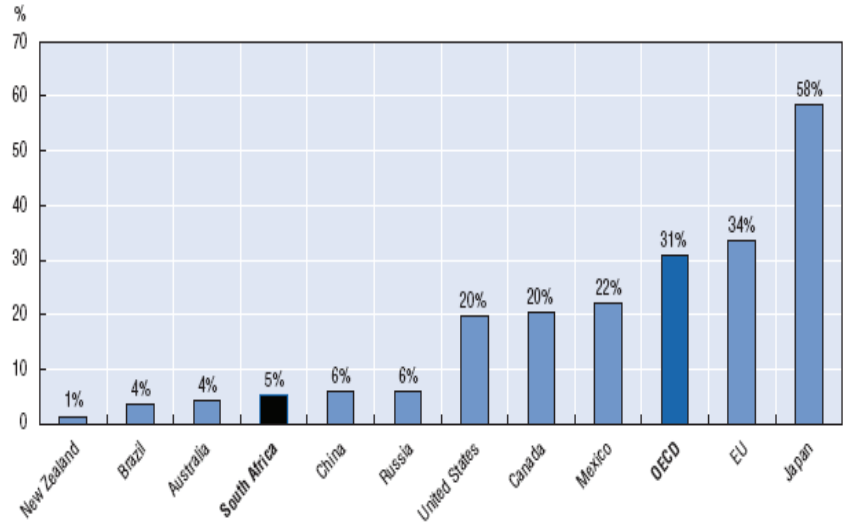
- climate change
- globalization
- high energy costs and energy security
- biotechnology
- food safety
- economic growth
- changing consumer patterns
- urbanization

This rapid changing global context should be merged with realities of the South African Agriculture environment, including the *dualistic nature of the sector*, together with its own natural and market characterization and realities through an appropriate agricultural policy and strategy. Changes in South African agriculture in the past two decades have been shaped by substantial macroeconomic and social reforms implemented from the mid 1990s,

but reforms of agricultural policies were also initiated. The most important policy initiatives taken subsequent to 1994 included deregulation of the marketing of agricultural products; abolishing certain tax concessions favouring the sector; reductions in the support and budgetary expenditure on the sector; land reform; institutional restructuring in the public sector, promulgation of new legislation including the National Water Act and Marketing of Agricultural Products Act, and deregulation and liberalization of agricultural trade: Table 2 portrays some of the major changes to agricultural policies these last two decades.

Table 2. Major changes to agricultural policies the last two decades [2,4,5.3.7]

TRADE POLICY	The main developments in trade policies were the replacement of direct controls over imports by tariffs, which were set below the rates bound in the WTO (World Trade Organization), and the elimination of state controls over exports. One-third between 1994 and 1999 lowered the average import tariff level. South Africa has established a number of preferential trade arrangements with countries inside and outside the Southern African Development Community (SADC) region. These new trade arrangements improved access to foreign markets for farmers but also introduced greater exposure to external competition.
MARKETING POLICY	Until early 1998 the marketing of most agricultural products in South Africa was extensively regulated by statute, largely under the 22 marketing schemes introduced from 1931, although some products like sugar, wine and ostriches, were regulated by those industry's own institutions under separate legislation. The marketing of Agricultural Products Act, No 47 of 1996, changed the way in which agricultural marketing policy was managed in South Africa, by opening the sector to world market influences. The extensive liberalization of agriculture in South Africa has led to an increase in the number of new agricultural companies registered per annum. The fastest growth was experienced since 1994, with new registrations increasing from 895 per annum in 1993 to as many as 1897 in 1997- an increase of 209% over the number in 1993 [3).]
LAND REFORM	An important share of public financial resources has been devoted to Land Reform. The Land Reform Programme consists of three main components: restitution of land unjustly taken from people and communities; land redistribution; and land tenure reform. Under the programme, grants are given to the black disadvantaged population to acquire land or for other forms of on-farm participation. Beneficiaries can access a range of grants depending on the amount of their own contribution in labour and/or cash. The net effect of the programme has been limited for various reasons.

INSTITUTIONAL RESTRUCTURING OF THE PUBLIC SECTOR	The main feature of the agricultural policy changes in the 1990's was the extent of institutional restructuring that took place with regard to institutions like the Development Bank of South Africa (DBSA), the Landbank, Agricultural research council (ARC), Development Corporations in the former homelands and the provincialisation of, the public sector agencies supporting the agricultural sector [3)].
LABOUR MARKET POLICY	Until 1980, farm workers experience little legal protection of their rights to organize and to basic conditions of employment. The Agricultural Labour Act, No 147 of 1993 addressed this shortcoming to certain extent, and farm worker rights were brought in line with workers of other economical spheres. The four major labour laws in South Africa namely, Labour relations Act (1995), Basic conditions of Employment Act (1997), The Skills Development Act (1998) and the Employment Equity Act (1998) also applied to the agricultural sector.
STATE SUPPORT TO AGRICULTURE	The State spending on the farming sector, measured as budgeted amounts for the National Department of Agriculture plus the agricultural budgets for the nine provinces, amounted to R3.65 billion in 2010. The decline in the state spending in agriculture is illustrated by policy transfers to South African agricultural producers, as measured by the OECD (Organisation for Economic and Development) Producer Support Estimate (PSE) which equaled 5% of gross farm receipts on average in 2000-03. This is well below the average level of support for OECD countries (31%) and similar to farm support in other non-OECD economies such as Brazil, China and Russia (Figure 1) [5)].  **Figure 1. PSE by country, European Union and OECD averages (2003)** This low level of support indicates a relatively moderate degree of policy interventions at the agricultural producer level and the overall trend shows some reduction of support since 1994. Currently government invests only 1.04% of agriculture's contribution to the Gross National Product (GNP) on agricultural research, education and extension in comparison to the international benchmark of 3% of agricultural GNP [4)].

The effective implementation of the agricultural policy requires government, civil society and the private sector to engage constructively to ensure that trust and confidence are build in the agricultural sector. There is significant potential for increasing the contribution of agriculture to economic growth in South Africa. This could be achieved by the following:

- Increasing production of areas with medium to high dryland cropping potential.
- Bringing previously highly productive land that has gone out of production after being transferred under land reform program back into full production again.
- Appropriate and successful rehabilitation of small scale farmer irrigation schemes that have collapsed since 1994
- Development of new areas under irrigation by making such water as is practically and economically possible available to areas with irrigable soils.

The brief overview of the Strategic Plan for South African Agriculture (2001) provides insight into some of the principles and aspects that this policy framework stipulates for agricultural growth and rural development.

2. Strategic Plan for South African Agriculture (2001)[4)]

The strategic sector plan for South African Agriculture contributes towards the well being of all South Africans as illustrated above. It is important for irrigation extensionists to have a workable knowledge of the content of the strategic plan and the implications it may have on the decisions irrigation farmers need to make. Key strategic partners, namely the National African Farmers' Union, Agri SA and the Department of Agriculture drafted it in consultation with a wide range of stakeholders [4)].

Purpose and objectives with strategic plan for agriculture……..

- Create a common vision for key stakeholders
- Design and implement a strategic framework to guide policy and implementation in the future
- Address issues undermining investor confidence and the building of better understanding and good social relations
- Ensure increased access and participation in the sector through well-designed empowerment processes and programmes
- Combine, share and optimise the resources and benefits among the partners
- Foster global competitiveness, growth and profitability in the sector in order to attract new investment
- Ensure sustainable development
- Build lasting partnerships among public, private and community stakeholders and NGOs

Vision for South African Agriculture

The vision for the agricultural sector is: "***A united and prosperous agricultural sector***"

This implies sustained profitable participation in the South African agricultural economy by all stakeholders, recognizing the need to maintain and increase commercial production, to build international competitiveness and to address the historical legacies and biases that resulted in skewed access and representation. This vision defines a single policy framework designed to bridge the inherent dualism and to maximize the contribution of the sector to economic growth and development.

2.1 Main challenges for the implementation of the strategy

The main challenges to successful implementation of this strategy is the vast untapped potential that lies in its people and material resources, and the low profitability and competitiveness that constrain the participation of a full spectrum of people and economic entities. The following hindrances provide each its own challenges (Table 3).

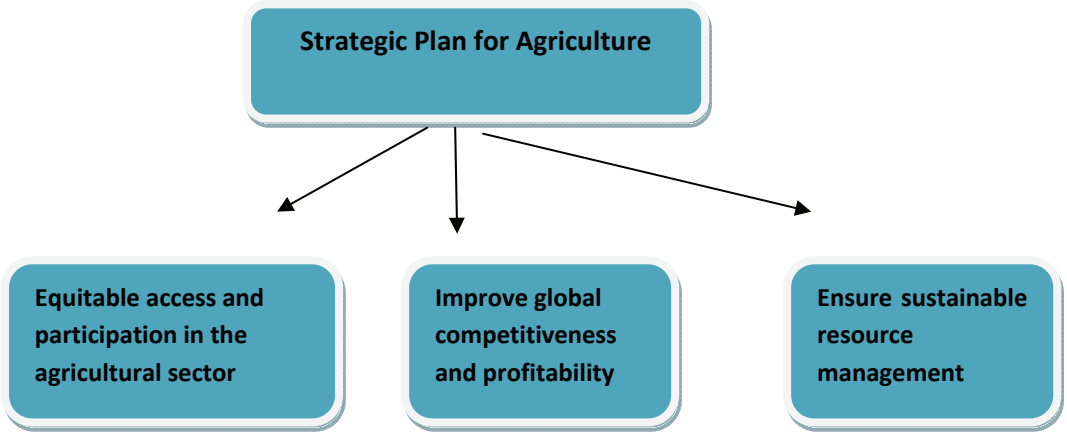
Table 3. Main challenges that impede the implementation of the strategic goal and vision for agriculture in South Africa

Constrained competitiveness and low profitability	Indications are that the South African agricultural sector is responding positively to the challenge for increased competitiveness. However, there is also evidence that some sub sectors of agriculture and value-adding activities are uncompetitive in the local and international market. This has various causes, including high input costs combined with low labour productivity, poor business strategies and inefficiencies, and unfair trade practices by our competitors, etc. The lack of international competitiveness also leads to low profitability and below normal returns in the sector, which is again responsible for low investment in certain industries. This is possibly the major challenge that needs to be addressed to put agriculture on the high growth path that is envisaged.
Skewed participation	Because of the legacy of exclusion and discrimination in South African agriculture, the challenge is now to identify programs that will encourage new entrants to enter the sector.
Low investor confidence in agriculture	Poor investor confidence in agriculture is caused by the low returns as well as definitive and hard-core economic and social problems impacting on investment and production such as the high percentage of farm murders, evictions and illegal occupations. Investor confidence is necessary to achieve a vibrant and growing agricultural sector.

Inadequate, ineffective and inefficient support and delivery systems	The lack of delivery and implementation of a wide range of government measures, regulations and programs as well as ineffective support systems – all of which are critical to ensure an enabling environment for agriculture – constitute a major concern and a challenge to all state agencies supporting the agricultural sector. Aspects that contribute to this problem are the fragmentation of certain services, inadequate resources, weak governance as well as poor executive decisions and often long delays in taking decisions.
Poor and unsustainable management of natural resources	Unused land of high and medium potential is not abundant in South Africa, and there is a limit to the horizontal expansion of agricultural production. In addition, the infrastructure and services to support sustainable land use are inadequate. Government programs (i.e. Land Care and Working for Water) aimed at protecting the resource base are successful but insufficient. Land degradation remains a problem in the country. With increasing pressure on agriculture to increase output per unit of land, it is a major challenge to ensure that this does not take place to the detriment of our natural resource base.

2.2 Strategic Plan for South African Agriculture[4)]

In addressing these challenges and achieving the vision, the strategic plan consists of *three core strategies*:



a) Equitable access and participation in the agricultural sector: The objectives of this strategy are to enhance equitable access and participation to agricultural opportunities; to deracialise land and enterprise ownership; and to unlock the full entrepreneurial potential in the sector. Its focus is on land reform, start-up support packages for new entrants to farming, partnership and promotion of the sector.

b) Improve global competitiveness and profitability: The aim of this strategy is to *enhance profitability through sustained global competitiveness in the agriculture sector's input supply, primary production, agro-processing, and agri-tourism industries*.

Six factors determine and shape the environment in which the sector competes and promote the creation of competitive advantage:

- *Factor conditions*: refer to factors of production, availability, quality of natural resources, level of input prices like labour, diesel, pesticides, etc. which, are necessary for the sector to be globally competitive and profitable.
- *Demand conditions:* The size, growth and composition of the domestic market play an important role in the making of the industry globally competitive.
- *Related and supporting industries:* the presence of supplier industries that are globally competitive such as input industries, financial institutions, research institutions, transport companies, suppliers of packaging material and suppliers of electricity and water have an impact of the competitiveness of the agricultural sector.
- *Firm strategy, structure and supply chain performance:* The conditions that govern how farms and agribusiness are created, organized and managed have a significant effect on the competitiveness of agricultural sector. A sound competitive environment in the sector through effective support of government policy, good business management skills must be ensured.
- *Government attitude and policy:* Government influence can either be positive or negative, depending on its policies, programs and operational systems. The inadequacy and fragmentation of certain services, weak governance and accountability of executive decisions are matters that will require special attention.
- *Risk management:* Agriculture is an industry that is confronted with risk in the form of climate variation, pests, diseases and price risks as well as natural disasters such as droughts and floods. An effective risk management strategy is critical in the promotion of risk management tools such as crop insurance products, asset protect and agricultural futures market. Another component of the risk management strategy includes an early warning system that includes adequate access to and utilization of timely, accurate, relevant and free information about the weather.
- *International trade:* Increasing competitiveness is often underpinned by the necessity to sustain the integration of the sector with the global economy and it is reflected by its ability to sell its products on world markets. Government actions to support trade opportunities are important but will require addressing excessive support and protection to world agriculture, markets and trade diplomacy to level the international playing field for South African agriculture.

c) Ensure sustainable resource management: The objective with this strategy is to enhance farmers' capacities to use resources in a sustainable manner and to ensure wise use of natural resources.

2.3 Supporting strategies for implementation of core strategies

The following essential supporting and enabling strategies, which are crosscutting to the core strategies, have been identified:

- *Good governance:* A key component will be to foster partnerships- public-private and public-NGOs to give effect to core elements of the sector strategy
- *Integrated and sustainable rural development:* The strategic intent is to transform rural South Africa into an economically viable, socially stable and harmonious sector that makes a significant contribution to the nation's GDP.
- *Knowledge and innovation:* The world is rapidly transformed into a knowledge and network economy. Cutting edge innovation and knowledge is crucial for sustained competitiveness and profitability.
- Intern*ational cooperation:* Globalisation has brought with it a revolution of readily available information and technology, increased movement of goods, services and increased wealth, but can also unfortunate widening the gap between rich and poor. International cooperation in the field of agriculture is determined by political, trade, technical and training imperatives that are important in supporting the Strategic Plan for agriculture sector.
- *Safety and security:* Threatens of rural crime will eventually constrain investment and ultimately economic growth in rural areas. A comprehensive and committed strategy is required to combat the high rate of violence, crime, social suspicion and tension.

These complementary strategic objectives are vital because they provide the critical foundation without which the strategic goal of a competitive, inclusive and sustainable agriculture will not be realize.

2.4 How will the Strategic Plan be implemented?

The following priority programs and actions were identified for the implementation of the strategic plan:

- Implementing the broad-based safety and security strategy for good job and social stability, trust and confidence
- Fostering a shared vision on agriculture, good governance and social partnerships
- Fast tracking the program of land redistribution for agricultural development and processes of empowerment for targeted groups
- Transforming agricultural research, transfer of technology, education and extension to be more responsive to markets

- Redefining the mandate of agriculture marketing and international trade in the post-control board era against greater global competition and demands for market access, infrastructure and information
- Building credible agricultural statistical and economic analysis systems that will be accessible to all farmers and enterprises
- Establishing the integrated rural financial services system outlined by the Strauss Commission Report
- Developing effective an integrated risk management system for plant and animal health systems, price and income systems and natural disasters
- Targeting investment in rural development nodes to provide livelihoods, infrastructure, irrigation, electricity, telecommunications, transportation, training and skills development
- Establishing an agricultural cooperation program for Africa to spearhead the New Africa Initiative in agriculture
- Lowering the overall cost of production, including a further reduction in the taxes and duties on diesel and other inputs.

Activity

Activity 1

Small group activity

1. Why do you think we need a proper agricultural policy for the development of agriculture?

   ……
   ……
   ……
   ……
   ……
   ……

2. How effective do you think is the current agricultural policy for the development of new irrigation agriculture development?

   ……
   ……
   ……

3. Irrigation Agriculture and applicable legislation

Irrigated agriculture comprises of the following sub sectors:

1. *Commercial irrigation agriculture*

These are divided into two groups namely:

- Schemes under control of institutional organizations: comprising of former government water schemes as well as other schemes under the control of water user associations and irrigation boards. Cover 41% of the area under irrigation

- Private irrigation farmers/schemes; comprising about 59% of the area under irrigation. Here the water users are in their private capacity responsible for the construction and maintenance of the water supply infrastructure (dams, weirs, canals and pipelines)

This area is approximately 1.3 million ha[13,14)].It is not possible to divide between large and small scale commercial irrigation farming in terms of the size of the farm. It differs too much between areas and crops produced.

2. *Small scale irrigation agriculture*

Small scale irrigation agriculture schemes include the former homelands (approximately 47 000 ha) and food plot growers. Most schemes have both commercial farmers and food plot holders, in different ratios, but several only have commercial farmers or only food plot holders.

Commercial farmers typically farm on plots of 1 to 3 ha in size. In a few cases the plot sizes were substantially bigger, e.g. Middle Letaba where the averages plot size was nearly 12 ha. Plots smaller than 1 ha are usually classified as food plots, e.g. not as a viable unit to make a living from agriculture. Most of these schemes ere established during the 1970s and 1980s- e.g. during the period of 'self governing" status to former homelands and "independence' for some.

In 1998 there were 8 433 small scale commercial irrigation farmers on schemes in Limpopo Province, compared with only 1 439 in the Eastern Cape and 1 034 in KwaZulu-Natal. Conversely, of the 11 499 food plot holders in these provinces, 4 910 were in the Eastern Cape, 4 822 in KwaZulu-Natal and only 1 717 in Limpopo.

Since water is essential for all life and human endeavours, there are many other policies and legislation, administered by a number of departments in all spheres of government, which impact on irrigation water management. It is therefore important that water resource managers and farmers should at least have a workable knowledge and understanding of important legislation.

The South African Constitution is the supreme and the highest law of the country and clearly sets out the functional areas for which each sphere of government is responsible. The following functional areas relevant to water management are:

- **National Government functional areas relevant to water management include: water resource management, minerals and land affairs, and national parks**
  The recent development and thinking of government have shown a move towards taking many National Government functions to local level. Water resources management will eventually become the responsibility of the Catchment Management Agencies (CMAs), while water services functions will rest with the municipalities. The Department of Land Affairs in its White Paper on Institutional Arrangements clearly pointed out that the implementation of land affairs should be at municipality level.

- **Provincial Government functional areas relevant to water management are: agriculture, environmental health, housing, nature conservation, pollution control, regional planning and development, urban and rural development and soil conservation.**
  Provincial departments of agriculture has as relevant functions the support of farmers with regard to farming skills, optimal use of natural resources, markets, farming systems, credit availability and more. Local Government functional areas relevant to water management are mainly municipal planning, storm water management, water and sanitation services – limited to potable water supply systems, domestic wastewater and sewage disposal systems – cleansing, refuse removal, refuse dumps management, solid waste disposal, municipal roads, building regulations, municipal parks and air pollution control.

- **National Water Act, 1998 (No. 36 of 1998)** which derives directly from the principles and objectives for a White Paper on a National Policy of South Africa is the principal legal instrument relating to water resources management in South Africa and contains comprehensive provisions for the protection, use, development, conservation, management and control of South Africa's water resources. The National Water Act (1998) is not, however, the only instrument through which the objectives of the White Paper could be achieved.

A brief overview of the most important legislation for irrigation farming and extension delivery is portrayed in Table 4.

Table 4. Additional legislation that impacts on irrigation farming and extension delivery

YEAR	ACT:	SUMMARISED PURPOSE AND/OR OBJECTIVE
1996	Constitution of the Republic of South Africa Act 108 of 1996.	This is the supreme law of the Republic, which embraces the human rights principles and sets forth the right of access to water as part of a lengthy list of social and economic rights. These include, *inter alia*, the right to a healthy environment, housing, health care, food, social security, education and culture (RSA, 1996).
1997	White Paper on Transforming Public Service Delivery (better known as the *Batho Pele* White Paper).	This seeks to introduce a fresh approach to service delivery: an approach which puts pressure on systems, procedures, attitudes and behaviour within the Public Service and reorients them in the customer's favour, an approach which puts the people first (RSA, 1997[a]).
AGRICULTURE PRODUCTION AND CONSERVATION LEGISLATION		
1983	Conservation of Agricultural Resources Act 43 of 1983. (CARA)	Most important Act responsible for the holistic management of the agricultural sector. Aim of this document is to ensure that agricultural land is used for agriculture and not exploited for urban or industrial use (RSA, 1983). Control over the utilisation of the natural resources of South Africa in order to promote conservation of the soil, the water resources and the vegetation and the combating of weeds and invader plants.
1997	Genetically modified Organisms Act 15 of 1997	Provides measure to promote responsible development, production, use and application of genetically modified organisms
1947	Fertilisers, Farm Feeds, Agricultural remedies and Stock Remedies Act 36 of 1947	Registration and regulation of fertilisers, farm feeds, agricultural remedies, stock remedies, sterilising plants and pest control operators
1983	Agricultural Pests Act 36 of 1983	Provides measures to control importation of any plant, pathogen, insect, exotic animal, growth medium, infectious thing, honey, beeswax or used apiary equipment. This also describes the compulsory notification to the nearest officer of the department or an authorized person if flying locusts or voetgangers have appeared on the land concerned or if flying locusts have deposited eggs thereon or roosting or breeding swarms of red-billed quelea are present thereon, describe to him as accurately as possible where on such land the flying locusts ("voetgangers"), eggs or red-billed quelea occur, and give him such further relevant information as he may request.

1996	Plant Improvement Act No 53, 1976 (Amended, 1996)	To provide for the registration of premises under which the sale of propagating material may be undertaken; prescribe the conditions subject to which plants or propagating material may be sold for the purpose of cultivation, provide for the recognition of certain varieties of plants; for a system of certification of plants and propagating material with the object of maintaining quality of certain plants and propagating material, and ensuring the usefulness of the product thereof for agricultural and industrial purposes, and the control of import and export of certain plants and propagating material, and to provide for incidental matters.
2005	Co-operative Act 14, 2005	To promote the development of sustainable co-operatives that comply with co-operative principles, thereby increasing the number and variety of economic enterprises operating in the formal economy; encourage persons and groups who subscribe to values of self-reliance and self-help, enable such co-operative enterprises to register and acquire a legal status separate from their members; to register co-operatives in terms of this Act;
1998	National Veld and Forest Fire Act 101 of 1998.	To prevent and combat veld, forest and mountain fires throughout the Republic. The Act provides for a variety of institutions, methods and practices for achieving the purpose (RSA, 1998[e]).
1998	National Water Act (Act 36 of 1998)	The National Water Act (NWA) outlines the framework for the utilization, development and protection of the country's water resources. The NWA provides for the establishment of institutions to ensure the implementation of integrated water resources management and to facilitate the involvement of stakeholders within water management areas. It also provides for financial assistance to historically disadvantaged irrigation farmers for the following services: Bulk infrastructure, acquisition of water entitlements, socio-economic feasibility studies, operation and maintenance costs, training in efficient water management and household tanks for rain water harvesting.

2000	Municipal Systems Act (Act 32 of 2000)	The Municipal Systems Act gives effect to the country's vision of developing local government. It defines the core principles and the mechanisms and processes that are necessary to enable the municipalities to move progressively towards the social and economic upliftment of the communities and ensure universal access to quality services affordable to all. The most important sections in support of IWRM are those relating to integrated development planning, performance management, public participation and cooperative governance aspects.
1997	Water Services Act (Act 108 of 1997)	The Water Services Act (WSA) gives substance to constitutional requirements with respect to access, national norms and standards and the institutional framework for the provision of water services. This Act defines water services institutions as: a water services authority, a water services provider, a water board or a water services committee.
1998	National Environmental Management Act 107 of 1998. (NEMA)	To provide for co-operative, environmental governance by establishing principles for decision-making on matters affecting the environment, institutions that will promote co-operative governance and procedures for coordinating environmental functions exercised by organs of state. NEMA also promotes certainty with regard to decision-making, public participation in environmental governance and enforcement of environmental laws by civil society.
2003	Environment Conservation Act, No 73 of 1989 (ECA) (Amended, 2003)	The National Environmental Management Act (NEMA) has largely superseded this Act but important sections remain. The ECA is of a framework nature and the minister is empowered to make regulations pertaining to most aspects of environmental conservation. The interaction between DWA, with a conservation and development role mandated to implement the NWA, and the Department of Environmental Affairs, with a protection and conservation role and mandated to implement ECA and NEMA, is a key element of water resource management.

LAND REFORM LEGISLATION		
1994	Restitution of Land Rights, Act 22 of 1994	This Act provides a community or individual the right to put a claim for restitution of property they lost due to forcibly removal from the property after June 1913.
1997	Extension of Security, Act 62, 1997 (ESTA)	Provide measures with state assistance to facilitate long-term security of land tenure and to regulate the conditions of residence on certain land. It also regulate the conditions and circumstances under which the right of persons to reside on land may be terminated, and conditions under which persons whose right of residence has been terminated may be evicted.
1996	Labour Tenants Act No 3 of 1996 (LTA)	This land reform Act provides for a labour tenant who qualifies as such under the Act to apply for acquisition of the land on which he/she resides or on which he/she was residing before evicted. The state would provide the means to purchase such land for the tenant form the current owner. This particular mechanism for redistribution was only intended to be operative for five years.
EMPLOYMENT LEGISLATION		
2008	Skills Development Act, Act 97, 1998. (Amended 2008)	Provide an institutional framework to devise and implement national, sector and workplace strategies to develop and improve skills of the South African workforce, to integrate those strategies within the National Qualification Framework contemplated in the SA Qualification Authority Act, 1995. This Act provides for learner ships that lead to recognise occupational qualifications, provide for their financing of skills development by means of a levy-grant scheme and a National skills Fund, to provide for and regulate employment services.
1995	Labour Relations Act, Act 66, 1995	To give effect to section 27 of the Constitution by regulating the organisational rights of trade unions, promote and facilitate collective bargaining at the workplace and sectorial level, to regulate the right to strike and the recourse to lock-out in conformity with the Constitution.
2001	Unemployment Insurance Act, 2001	To establish the Unemployment Insurance Fund; to provide for the payment from the Fund of unemployment benefits to certain employees, and for the payment of illness, maternity, adoption and dependant's benefits related to the unemployment of such employees; to provide for the establishment of the Unemployment Insurance Board, the functions of the Board and the designation of the Unemployment Insurance Commissioner; and to provide for matters connected therewith.

1997	Basic Conditions of Employment Act, Act 75 of 1997	To give effect to the right to fair labour practices referred to in section 23(1) of the constitution by establishing and making provision for the regulation of basic conditions of employment, and thereby to comply with the obligations of the Republic as a member state of the international Labour Organisation.
1998	Employment Equity Act, Act 55, 1998	To promote equity in the working pace by promoting equal opportunity and fair treatment in employment through the elimination of unfair discrimination, and the implementing of affirmative action measures to redress the disadvantages in employment experienced by designated groups, and to ensure representation in all occupational categories and levels of the workforce.
1993	Occupational Health and Safety Act, Act 85, 1993	To provide for the health and safety of persons at work and for the health and safety of persons in connection with the use of plant and machinery; the protection of persons other than persons at work against hazards to health and safety arising out of or in connection with the activities of persons at work; to establish an advisory council for occupational health and safety; and to provide for matters connected therewith.

Activity 2

Small group activity

1. Why do you think we need a thorough workable knowledge of the legislation that impact on agriculture?

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2. Which of the legislation mentioned in Table 3 is of great importance for the irrigation agriculture sector?

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3 How effective do you think is the implementation (control) of the applicable legislation in the irrigation agriculture sector?

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My notes.....

Authenticator:

Mr F vd Merwe

Module 2

National Water Policy and Act

Study objective

At the end of learning modules the student should be able to demonstrate a basic knowledge and understanding of:

- Water situation in South Africa
- National Water Policy
- National Water Act, 1998 (No 36)
- Registration process of water users and licensing
- Water use charges

Water in our lives

Everyone has the right to have access to sufficient water. (Bill of Rights, Constitution of South Africa, Section 27 (1)(b)).

The dictionary describes water as colourless, tasteless and odourless – it's most important property being its ability to dissolve other substances. We in South Africa do not see water that way. For us water is a basic human right, water is the origin of all things – the giver of life. The poet Mazisi Kunene has said: "From water is born all people on the earth".

Where is the water within us, let there be water with us? Water never rests. When flowing above, it causes rain and dew. When flowing below it forms streams and rivers. If a way is made for it, it flows along that path[1]. We want the water of this country to flow into a network reaching every individual saying: here is the water, for you. Take it; cherish it a affirming your human dignity; nourish your humanity. With water we will wash away the past, we will from now on ever be bounded by the blessing of water.

Water has many forms and many voices. Unhonoured, keeping its seasons and rages, its rhythms and trickles, water is there in the nursery bedroom, water is there in the apricot tree shading the backyard, water is the smell of grapes on an autumn plate, water is there in the small white intimacy of washing underwear. Water – gathered and sorted since the beginning of time in layers of granite and rock, in the embrace of dams, the ribbons of rivers – will one day, unheralded modesty, easily, simply flow out to every South African who turns a tap. That is my dream.
Antjie Krog, 1997

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1. Water situation in South Africa

South Africa is a semi-arid country in which the average rainfall of 500 mm is well below the world average of about 860 mm per year. As a result, South Africa's water resources are in global terms scarce and limited. Only a very small region along the south-eastern coastline receives good rainfall, while the greater part of the interior and western part of the country is arid or semi-arid. Sixty five percent of the country receives less than 500 mm per year, which is usually regarded as the minimum for dry land farming, while 21% of the country receives less than 200 mm per annum[3].

The natural availability of water across the country is uneven and this is compounded by a strong season-ability of rainfall. The stream flow in South African rivers is at a relatively low level for most of the time, which limits the proportion of stream flow that can be relied upon for use. Only 9% of the rainfall reaches the rivers, compared to a world average of 31%[3]. Rainfall variability also has implications for water related disasters such as floods and droughts. Many urban and industrial

developments, as well as some dense rural settlements have been established in remote locations at a distance from adequate reliable water sources. These factors contribute to the situation where the requirements for water already far exceed the natural availability of water in several river basins and therefore necessitate large-scale transfers of water across catchments like the Lesotho Highlands Scheme.

Groundwater also plays an important role in rural water supplies, but fewer groundwater aquifers exist that can be utilized on a large scale due to high salinity in most parts of the country. It is estimated that 5 400 million cubic meters of water a year could be obtained from underground water sources[3].

The total average annual available surface water in South Africa is 49 200 x 10^6 m^3 (which include the inflow from Lesotho and Swaziland). Of this 13 911 x 10^6 m^3 can be economically harnessed as usable yield (this includes usable return flow) (Table 1).

Table 1. Available yield in year 2000[3]

Source	Million m^3/s
Surface Water	10 928
Groundwater	1 042
Usable return flow	1 941
Total	**13 911**

The total amount of water required in 2000 was 13 280 x $10^6 m^3$, a figure close the availability limits[3]. Agriculture is by far the largest user of water, as shown in Figure 1, while urban and rural requirements make up 25% and 4% respectively.

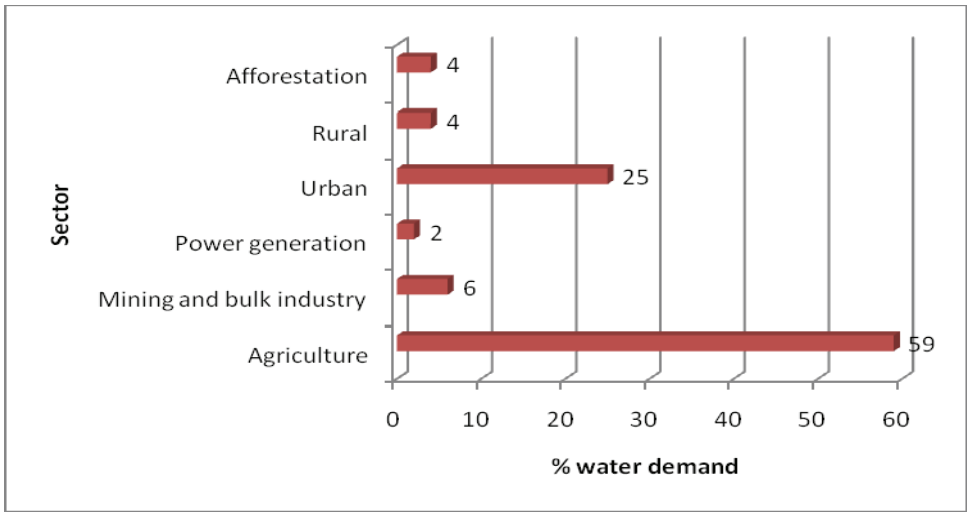
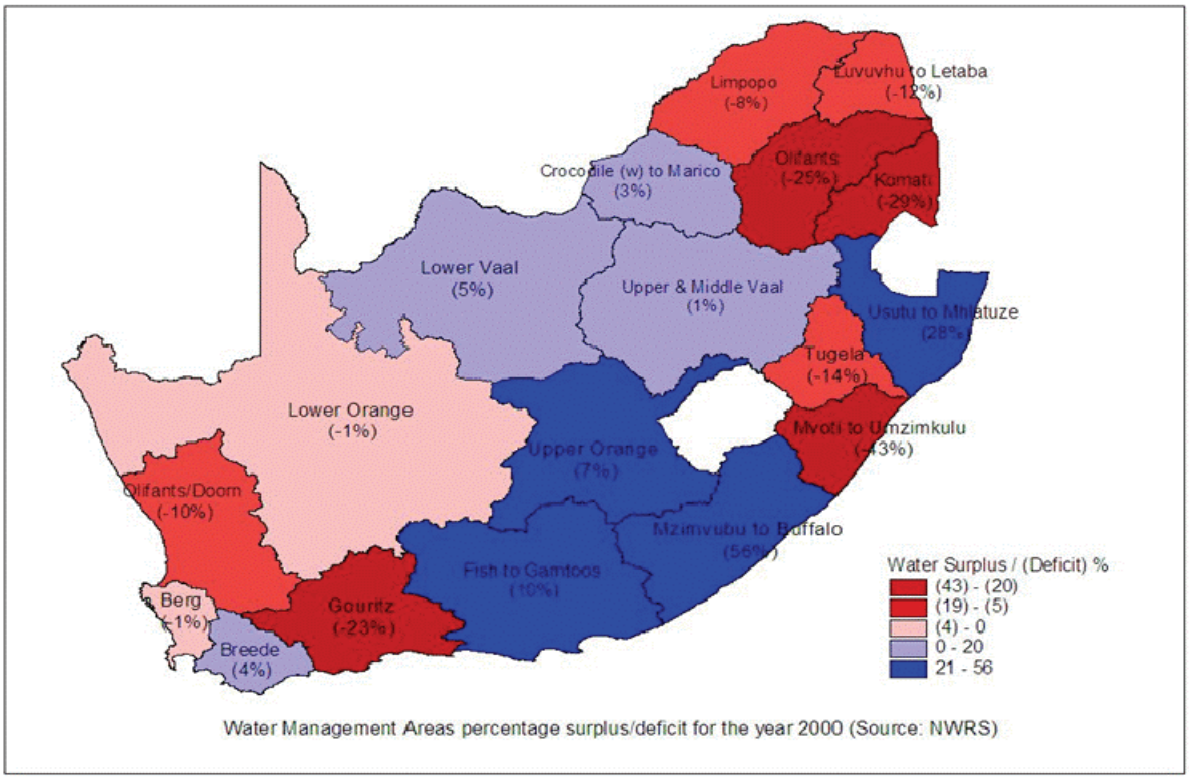


Figure 1. Water demand for 2000 per sector[3]

In order to facilitate the management of water resources, the country has been divided into 19 w**ater management areas (WMA)**, and each area is managed by a c**atchment management agency (CMA)** (Figure 2).



Water Management Areas percentage surplus/deficit for the year 2000 (Source: NWRS)

Figure 2. Water management areas in South Africa[3]

South Africa depends mainly on surface water resources for most of its urban, industrial and irrigation requirements. In general, surface water resources are highly developed over most of the country. About 320 major dams, each with a full supply capacity exceeding 1 million cubic meters, have a total capacity of more than 32 400 million cubic meters (see Table 2.2), equivalent to 66 per cent of the total mean annual runoff.

Groundwater, while also extensively utilised, particularly in the rural and more arid area, is limited due to the geology of the country, much of which is hard rock. Large porous aquifers occur only in a few areas[3].

In the northern parts of the country (water management areas 1 to 5 and 8 to 10) both the surface and groundwater resources are nearly fully developed and utilised. Over-exploitation occurs in some localised areas. The reversed applies to the well-watered south-eastern region of the country (water management area 11, 12 and 13) where there are still significant undeveloped and little-used resources[3].

There is a large variation in water requirement across the country due to the different water use sectors and their requirements with respect to quantity, quality, distribution in time and assurance of supply:

- Rural requirements, mainly domestic use and stock watering in rural areas.
- Urban requirements, which include all water, used in urban areas such as domestic, industrial, parks and communal.
- Mining and bulk users, with the latter essentially representing large industrial users outside urban areas.
- Power generation.
- Irrigation for agricultural production.
- Afforestation as a formally declared stream flow reduction activity.
- Transfers of water out of a particular area, which constitutes a requirement for water from that area.

Four major rivers in South Africa namely the Limpopo, Inkomati, Pongola and Orange (Senque) drain about two thirds of the land area and therefore contribute significantly to the total surface run off. In order to meet the water requirements of South Africa, water resources are highly developed and utilized. The general expectation is that industrialization of the economy and urbanization of the population will significantly affect the use of the country's rivers, unless appropriate corrective measures are taken. The aim of the National Water Resource Strategy (NWRS) is to enhance sustainable use of South Africa's water resources (This strategy will be explained in more detail later in Module 3).

2. National Water Policy and Act

The South African water policy is regarded as the most progressive in the world. The new water policy culminated with the acceptance of the National Water Act (Act 36, 1998) with the Department of Water Affairs as custodian of the water resources and responsible for formulating and implementing the policy.

Three fundamental objectives for the managing of south African water resources, which are firmly grounded in the provisions of the Bill of Rights of the Constitution of South Africa, 1996 (No 108, 1996) arise from 28 fundamental principles and objectives identified for the National Water Act:

- To achieve equitable access to water: access to water services, the use of water resources and to the benefits from the use of water resources.
- To achieve sustainable use of water: by making progressive adjustments to water use with the objective of striking a balance between availability and legitimate water requirements.
- To achieve efficient and effective water use for optimum social and economic benefit.

Water law in South Africa is neither simple nor straight-forward. After 12 years with the 'new' National Water Act (Act 36 of 1998) (NWA) there is still an enormous amount of uncertainty amongst water users of what their rights and obligations are in terms of this act and how it will affect their future plans for further development.

As the competition for water is constantly on the increase and resources become even more stressed, while the quality of the available water is progressively deteriorating, appropriate laws and the strict

but fair implementation of such laws are needed in order to manage this limited water resource to the best benefit of the whole country.

2.1 History of water law in SA

In the pre-colonial era, African customary rule governed the use of water, which means that water rights only came up when a group felt that another group was unfairly encroaching onto its water resources.

During the 17th and 18th centuries, first the Dutch East India Company governed parts of the current South Africa, and introduced water management principles based on Roman-Dutch civil law. It was followed by the British occupation of South Africa during the 19th century with a further change in the emphasis of water law.

In 1910, independence from the British was obtained, and new legislation was a combination of English common law and Roman-Dutch civil law but also included aspects of customary law. The Irrigation and Conservation of Waters Act (Act 8 of 1912) first made a distinction between “normal flow” and “surplus flow” as well as between "public water" and "private water". This act mainly dealt with use of water for irrigation.

It was followed by the Water Act (Act 54 of 1956) in which the distinction between the public and private water from the 1912 Act was further refined. The 1956 Act entrenched and refined riparian rights but partially brought back *dominus fluminis* from the Roman-Dutch civil law, meaning that the State has the power to control the usage of water in the rivers, through the power of the Minister to declare government water control areas where water could also be allocated to non-riparian land.

2.2 International priorities

In 1992, the Dublin Principles were adopted by the United Nations in Dublin, Ireland. These stated that:

- Principle 1: Fresh water is a finite and vulnerable resource, essential to sustain life, development and the environment.
- Principle 2: Water development and management should be based on a participatory approach, involving users, planners and policy-makers at all levels.
- Principle 3: Women play a central part in the provision, management and safeguarding of water.
- Principle 4: Water has an economic value in all its competing uses and should be recognized as an economic good.

The emphasis of Principle 4 of the Dublin Principles on *the economic value* of water rather than water as *a universal right,* has been and still is highly contested in many circles. Water legislation that has been introduced by different countries since 1992 has mostly adopted a compromise between the two viewpoints, like in SA.

3. National Water Act, 1998 (No 36 of 1998)

The National Water Act, 1998 (No. 36 of 1998 – *the Act*) (NWA) derives directly from the Fundamental Principles and Objectives for a New South African Water Law and the NWP's proposals for managing water resources. The Act is the principal legal instrument relating to water resources management in South Africa and contains comprehensive provisions for the protection, use, development, conservation, management and control of South Africa's water resources. The NWA was introduced in South Africa on 1 October 1998.

The purpose of the NWA (according to section 2) is to ensure that the nation's water resources are protected, used, developed, conserved, managed and controlled in ways which take into account the following:

- Meeting the basic needs of present and future generations
- Promoting equitable access to water
- Redressing the results of past racial and gender discrimination
- Promoting the efficient, sustainable and beneficial use of water in the public interest
- Facilitating social and economic development
- Providing for growing demand for water use
- Protecting aquatic and associated ecosystems and their biological diversity
- Reducing and preventing pollution and degradation of water resources
- Meeting international obligations
- Promoting dam safety,
- Managing floods and droughts.

In Chapter 4 of the National Water Act (NWA) the basis of regulating water use in South Africa is provided and the legal requirements of water use authorization are described in detail. Some of the important deviations from the 1956 Water Act which are applicable to the irrigation sector are as follows:

- No permanent right to use water exists anymore and all water use authorisations have a limited duration, except for the Reserve, which is a permanent allocation to sustain the environment at water resources and to provide for basic human needs.
- Eleven separate water uses have been identified which need specific authorisation.
- The concept of 'private water' has been abolished and surface water and groundwater has the same status everywhere.
- Nobody may use water unless it is exercised
    - as a Schedule 1 water use (taking water for reasonable domestic use in the person's household, for small gardening not for commercial purposes and for watering of animals grazing on the land);

- as an existing lawful water use (water use allowed to proceed under the same conditions and obligations as in the past – before 1998 – until compulsory licensing will be announced in a catchment-by catchment manner);
- in terms of a general authorisation (for specific relatively small uses within the limitations provided in Government Gazette Notice 398 of 26 March 2004, extended to 30 June 2012); or
- according to a license issued for that use (if none of the first three cases apply).

A core concept of the new approach to water management is the decentralisation of management. The success of water resources management depends on co-operation among various spheres of government, the active involvement of water users, organisations and the stakeholders.

The key objectives of the new water resource management are:

- Social development;
- Economic growth;
- Ecological integrity; and
- Equal access to water

4. Defining of water use under the Act (Section 21 of NWA)

The NWA define water use in section 21, which is very broad in the sense that it relates to the consumption of water as well as to activities that may affect water quality and the condition of the resource itself. At least five of the eleven water uses as defined by section 21 are normally exercised in agriculture:

- Taking water from a water resource;
- Storing water;
- All aspects of disposing of waste in ways that could impact negatively on water resources, including the discharging of waste of water containing waste into water resources;
- Removing, discharging or disposing of water found underground if it is necessary for efficient continuation of an activity of for the safety of people;
- Making changes to the characteristics of water courses like the altering of banks, course or characteristics of watercourse.

This broad definition of water use applies equally to both surface water and groundwater where the section 21 definition is applicable.

Section 21(a): Taking water from a water resource

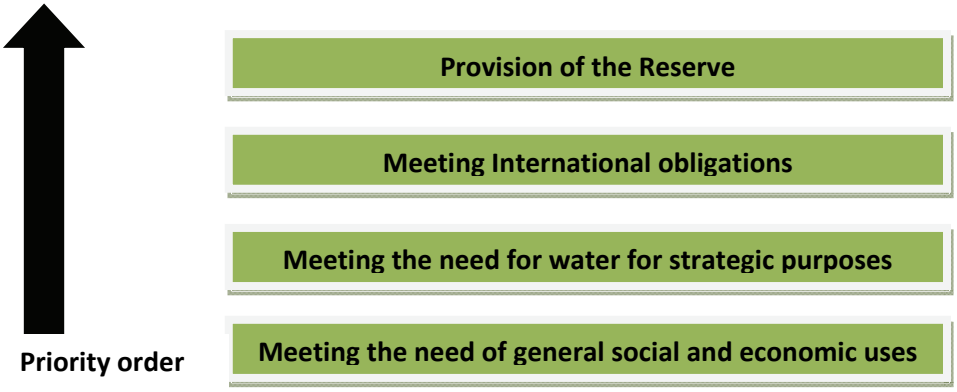
- A water resource includes among others a river, stream, dam, weir, lake, pan, spring, aquifer, wetland or any surface run-off.

- Canals, pipelines or off-channel dams having no catchments are not water resources, but the water must have been taken from a water resource in the first place, and that

taking of water from the water resource need to be authorised through the NWA before the water may be taken.

- In the case of taking water from a water resource, the "water use" takes place at the point where the water is taken from the resource and not where it is utilised for a specific purpose, like irrigation.

Priorities for the allocating of water, in order of importance



Example

Case study 1

A person bought a farm in an area outside of any irrigation scheme, where no irrigation was exercised during the last few years, but he was told that 12 ha of cash crops have been irrigated for many years under sprinkler irrigation until around 2003. The new owner intends to plant 16 ha of citrus under drip irrigation. How would he know whether his irrigation will be lawful or whether he must apply for a license?

The first possibility that he may investigate is whether the 12 ha sprinkler irrigation did in fact qualify as 'existing lawful water use' as defined in the NWA, and in order to do that he needs to apply the rule provided in section 32, which requires that the irrigation should have taken place during the period 1 October 1997 and 30 September 1999 and it was lawful under the 1956 Water Act or other authorisation. If it qualifies as existing lawful water use, the new farm owner may carry on using the volume of water per year that was used during that period for the 12 ha sprinkler irrigation. If that volume is enough to irrigate his intended 16 ha citrus under drip irrigation, he may proceed without any further approval from the Department. If that volume is not enough, he needs to check whether the existing general authorisation (contained in Government Gazette Notice 398 of 26 March 2004, as extended to 30 June 2012) does allow him to take the additional amount, and if not, he must apply for a license for this additional amount.

Section 21(b): Storing water

- The storage of water should be authorised from a water use perspective and the storage facility from a Dam Safety perspectives. Any dam with a wall more than 5 metres high, and which is capable of storing more than 50 000 m^3, may pose a dam safety risk, needs to be classified and may need a Dam Safety licence to construct and to impound, in addition to the water use license.

Example

Case study 2

A person has an entitlement to pump 150 000 m^3/year for irrigation from a river flowing through his farm, but he considers it to build a dam in order to increase his assurance of supply. He determined that a dam that stores 50% of his allocation will be adequate to ensure that he would then not need to pump from the river during the low-flow period.

After he discussed his request with the Department's Regional Office, he decides to apply for a section 21(b) water use licence for an off-channel dam for 80 000 m^3. He is also told that he must apply for a section 21(i) water use licence, namely for altering the bed, banks and characteristics of a watercourse by building a dam. He must then also approach the Dam Safety Office of the Department in order to find out whether he will need a dam safety licence apart from the section 21(b) water use licence. Together with his water use licence application, he must supply the Department with prove of the lawfulness of his taking of 150 000 m^3/year from the river. For that he will normally be required to apply in terms of section 35 of the NWA for the verification of his existing lawful water use. After verification has been done, any relevant conditions that exist in terms of the taking of the water (like a possible limitation on pumping during certain months), may be included as conditions in the draft licence for the storing of the water. In considering the approval of the application, the Minister should also consider all other relevant factors as required in section 27(1) of the NWA. The Dam Safety Office will also not approve the relevant dam safety licence to construct the dam before the section 21(b) water use licence has been issued. He will therefore need licences for section 21(b) and (i) water uses, as well as a dam safety licence before he may proceed.

Section 21(c): Impeding or diverting the flow of water in a watercourse

- Causing an obstruction to the flow of water in a watercourse or diverting some or all of the flow from a watercourse are water uses which may require a license. In order to find out whether a license is needed, the relevant regional office must be contacted. Any diverted water must eventually be returned to the watercourse; otherwise it is regarded as a section 21(a) water use for which a license must also be acquired. This activity is normally performed to enable mining or the construction of roads, bridges or pipelines across or within in a watercourse.

Section 21(f): Discharging waste or water containing waste into a water resource through a pipe, canal, sewer or other conduit

- This water use entails the discharge of wastewater directly or indirectly into a water resource. Common examples of this water use is water containing waste which is released into a river or dam at a discharge point from factories, food processing plants, run-off from feedlots or treated wastewater from treatment plants. Waste discharged into a municipal sewer is not part of this water use, and does not need separate authorisation.
- Common examples of this water use are waste released into a stream, river or dam at a discharge point, such as wastewater from food processing or factories, or run-off from feedlots.

Section 21(i): Altering the bed, banks and characteristics of a watercourse

- This water use refers to physical changes that are made to a watercourse or to any of its characteristics, like in the case of construction and infrastructure development near or across a river. Sand and peat mining are other common examples of this water use. Further, any activity within a radius of 500 meters from the boundaries of a wetland also requires a licence for this water use. The specific factors that must be assessed before a license is considered for this use are among others the expected changes to the water quality, the flow regime, the biota and the riparian habitat as a result of the activity. A watercourse is defined as the area limited by either the outer edge of the riparian habitat or the 1:100 year flood line, whichever is the greatest.

5. Regulating water use in the agricultural sector

Historically the major management activity of government or Department of Water Affairs has been the development of systems to store and transport water. The construction of dams, system of weirs, tunnels, pump stations, canals and pipelines has symbolized for many the business of water management. As the use of water has become more intense, the nature of water management business has changed and became more holistically. Today the application of legislation, economics, natural resource management approaches and the science of organizations, reinforced with the skills and knowledge of management and communication are increasingly important for sustainable management of water resources.

In many areas, mostly readily available and reliable water resources were being used under the old system of riparian rights (as was stipulated in the Water Act No 54 of 1956). This resulted in the idea that a river from which all-adjacent landowners could take their share. In addition, because of the extremes of water levels in South African rivers the idea of “normal” flow (which would be divided between the landowners) and “surplus” flow (where in flood times, riparian owners would take as much “surplus” as they were able to use beneficially) were introduced.

This however excluded water users (urban and industrial) who did not have access to land ownership. These water users could only get access through a Water Court application (with the limitation that they meet their needs without affecting the allocations of the riparian owners) or by buying land with access to water. These problems were addressed in the past by the establishment of Government Water Control Areas in which, in certain circumstances the Minister could override riparian allocations.

The new water management policy provides the right to use water, most of whom have to be registered and licensed and should pay for this right. After providing for the Reserve and the international obligations, the basis for granting licenses for water use in a specific area will be by taking into account all relevant factors, including –

- existing lawful water uses;
- the need to redress the results of past racial and gender discrimination;
- efficient and beneficial use of water in the public interest;
- the socio-economic impact;
- the likely effect of the water use on the water resource and other water users;
- investments already made and to be made;
- the quality of water in the water resource; and
- the probable duration of the undertaking.

Water regulation falls into three categories namely Reserve, Schedule 1, General authorisations and Licensing.

a. *Reserve*

- The Reserve is the only right to water in the law. It is not a water use right *per se*. It has priority over all water uses and that requirement of the Reserve must be allowed for before any use is licensed. Authorization of all water uses in terms of a license in therefore conditional on a *Reserve determination* being carried out and the requirements of the Reserve being taken into account when determining the water available for allocations.

- It consists of two parts, namely:
    - **The ecological reserve:** specifies the quantity and quality of water that must be present in a given water resource, according to the hydrological, ecological and demographic features.
    - **The basic human need reserve:** specifies the quality and quantity of water required for drinking, food preparation and personal hygiene.

b. *Schedule 1 use*

- Schedule 1 uses of water have minimal or insignificant impact on water resources.
- Permits the use of water (relatively small quantities) mainly for domestic purposes (including non-commercial gardening and domestic stock watering).
- Users should have lawful access to resource in order to exercise Schedule 1 entitlement.
- No formal requirement for users to register Schedule 1 use – but catchments management agencies may impose limits on them where necessary in certain areas.

NWRS states that*..." water use under schedule 1 supports subsistence activities but does not allow water for commercial purposes".* The NWA does not specify any generally applied numerical upper limits for any Schedule 1 use, as long as it complies with the limitations provided in Schedule 1 of the Act.

c. General authorisations

General authorization is an authorization granted to use water without a license, with certain limitations and conditions. The limits on water use under general authorisation depend on the type of use and the capacity of the resource to accommodate the use without significant degradation. It is drafted and finalised after inviting comments from the public and is published in the Government Gazette for general information. The different water uses described in section 21 of the Act may be separately or in combination with others generally authorised, and for that reason care must be taken to ensure the applicable and valid general authorisation is followed.

A general authorisation is valid for a specified period and must be revised and replaced before the expiry date. Water users do not need any further approval to use water within the specified limitations, because the general authorisation as published in the Government Gazette is a complete authorisation.

- A general authorisation may be applicable to a specific water use, exercised in the whole country;
- in a specific water resource;
- in a quaternary catchment;
- in any area specified in the notice; or
- by any category of persons that it may be applicable to.

Example

General authorisation for the taking and storing of water:
Licensing of water use

According to NWRS any water use that is not a Schedule 1 use, exceeds the limits of general authorisations and is not an existing lawful water use, must be authorised by license.

- A license is an entitlement to use water under the conditions and for the period as stipulated in the licence. May be reviewed by the responsible authority at an interval as stipulated in the licence, which should be at least every five years.
- It does not guarantee water availability of quality to the licensed users.
- It may be surrendered, withdrawn, transferred totally or partially, temporarily or permanently.
- It may be inherited by the successor of the title to the licensed water user.
- Transfer of licensed is possible as a form of water trade (water right's market).
- A Reserve must be determined for a water resource before any license can be issued.

The NWA permits water use that was lawfully exercised under preceding laws, termed "existing lawful water use" to continue until it is formally licensed. DWA may call for compulsory licensing of water use (i.e. decide on license allocation, terms and conditions for all prospective users) in stressed resource areas where there may be problems experienced from over utilization, competing water users, or very inequitable allocations. Such calls for compulsory licensing will apply to all water users and rights, including general authorization and existing lawful uses.
(More detail about licensing later in this module)

Figure 2 indicated that licensing and regulatory requirements become more imperative as the risk of impact on the environment and society increases. The mechanisms to regulate water use are based on the likely risk, nature and extent of potential impact on a water resource.

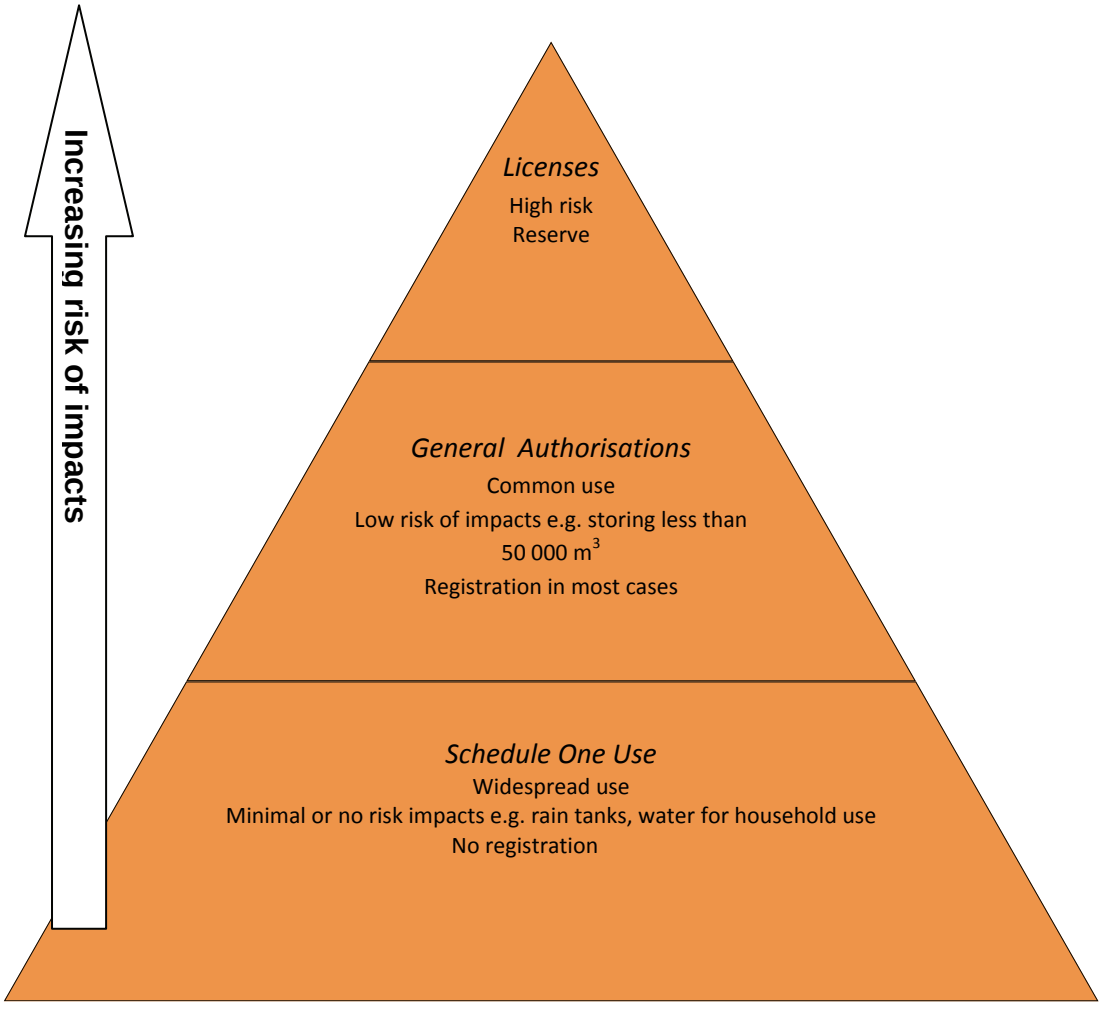


Figure 2. Risk based approach to water authorisation

6. Registration of an existing water use – Section 26(1) (c) of NWA

Under the NWA water users have to apply for registration of their water use and these applications will be examined and after justification converted into a water user license. Registration is the process through which the water user officially notifies the department of water use. A water registration certificate is then issued. *But it is important to remember, that a registration certificate issued by the Department is not proof of an entitlement or an authorization to use water it is merely an*

acknowledgement that you have notified the Department of your water use. Only after verification has positively confirmed the existing water use, can it be regarded as an entitlement.

The following water users must register their water use:

All water users, who do not receive their water from a service provider, local authority, water board, irrigation board, government water scheme or other bulk supplier and who are using water for:

- *Irrigation;*
- *Mining purposes;*
- *Industrial use;*
- *Feedlots; or*
- *In terms of General Authorisation*

Water use must be registered (section 26)

- Diversion of rivers and streams
- Discharges of waste or water containing waste
- Storage – Any person or body storing water for any purpose (including irrigation, domestic supply, industrial use, mining, aqua culture, fishing, water sport, aesthetic value, gardening, landscaping, golfing, etc.) from surface runoff, groundwater or fountain flow in excess of 10 000 cubic meters or where the water area at full supply level exceeds 1 hectare in total on land owned or occupied by that person or body and not in possession of a permit or permission.
- Stream flow reduction activities (Afforestation). All forestation (tree planting) for commercial purposes, including communal forestry for commercial gain, that took place prior to 1972, must be registered. Forest owners who have permits issued under the Forestry Act need not register.
- Local authorities and other bulk suppliers with their own water sources and purification works.
- Controlled activities, such as irrigating with waste, power generation with water, atmospheric modification or recharging an aquifer.

7. Verification of existing lawful use: Section 35 of NWA

The majority of lawful entitlements that is applicable to irrigation water uses, even 12 years after the NWA has been promulgated, are still exercised as existing lawful use. As stated above, the only way that you could provide proof of an existing lawful use, is by verifying it according to section 35 of the NWA. Verification takes place by addressing the two crucial questions for existing lawful use, namely:

1. Did the water use actually take place during the qualifying period, namely 1 Oct 1997 to 30 Sept 1999?
   Satellite imagery or any other relevant means could be provided as proof.
2. Was it lawful at that time, according to relevant legislation?
   Where relevant, works permits or other authorisation from the previous Water Act could be provided as proof.

Water users, who want to verify an existing lawful use, can at any stage apply for verification as prescribed in section 35 of the NWA. The application should be submitted at the relevant DWA regional office. The Department may require the applicant, at the applicant's expense, to obtain and provide all necessary information, in order to take a decision on the application to verify a use.

8. Transfer of water use entitlements: Section 25 of NWA

Transfer in this context means the transfer of water from one property to another. A license is necessary even if the two properties belong to the same person. In case of the change of ownership of a property with a water use entitlement, the new owner however does not need to apply for a new license, but only needs to inform the Department of the change of ownership, as long as the water is to be used for the same purpose.

An entitlement could under certain conditions be transferred to another property on *a temporary basis (for a maximum period of two years)* according to section 25 (1), for which a license is not necessary, but the relevant regional office should be approached for authorisation.

The process to follow in case of a proposed *permanent transfer* is described in section 25 (2) of the NWA, which specifies that an entitlement to use water may be surrendered in writing by the present holder of the entitlement in order to facilitate a particular licence application from another person. An application for a license should be submitted by the proposed new user of the water at the relevant Water Affairs regional office. The said written surrender only becomes effective if and when such application for a license is granted. If a licence is not granted, the seller retains the water use entitlement even if he/she have received the money. The same rule applies where a water user wants to transfer an entitlement from one of his own properties to another one of his own properties.

Numerous problems occur where proposed new users struggle to get licences approved for the transfers of water use entitlements. They should remember that together with all the other normal requirements, the BBEE requirements are applicable even when both properties belong to the same person.

Case study 3

The following case occurred recently: Five years ago, a farmer paid a substantial amount of money to buy a water use entitlement from a neighbour without realising that he needs a licence before he could transfer the water use to his own property. Now, five years later, after the farmer from which he has bought the water has sold his farm and left the area, the farmer who has bought the entitlement now has a nasty problem.

Because of the fact that a licence has never been issued for the transfer of the entitlement, *the water could only be lawfully used on the original property*. The problem is that the farmer has paid for a water use entitlement which he now does not have, and he needs to go through a lengthy licensing process, with no guarantee that he will eventually get a licence for the

transfer. The moral of the story is, please understand that the transfer only takes place when the licence for the transfer is signed. Even with an interim temporary transfer (as described above) you should remember that you are not sure that the licence will eventually be issued.

9. Procedure for a water use license application Section 41of NWA

A person, who wishes to obtain a licence to use water, must apply to the relevant regional office of the Department. Additional information may be required from the applicant before a decision is taken. The applicant may also be required to give notice of the application in the media to allow objections against the application if any other person feels that they may be adversely affected. A specific process in accordance with Chapter 4 of the NWA will be followed by the Minister in considering the license application and in taking a decision. The applicant or anybody who lodged a written objection may appeal to the Water Tribunal against the decision of the Minister and even after such an appeal, if an appellant is not satisfied with the Water Tribunal's judgment, he/she may further appeal to the High Court.

Case study 4

A person in the Kwazulu-Natal Midlands wanted to extend his dairy, for which he needs to extend the area of his pastures under irrigation. Since the regional office in Durban told him that no additional water is available from the stream running through his farm, his only choice is to buy a water use entitlement in the vicinity. He found that his neighbour who claims that his taking of water qualifies as existing lawful use, is willing to sell. How should he go about and what were the requirements that he needed to comply with before a new license for the taking of water was issued to him?

When applying for the license for the taking of the additional amount of water at the regional office in Durban, the Department told the farmer that for the water to be transferred to his property, he needs to follow the section 25(2) process. He firstly needs a letter of surrender from the existing entitlement holder. But since the existing entitlement is claimed to be an existing lawful use, he must also apply for verification with the regional office that is to verify that the water use is in fact a lawful entitlement. In order to supply the office with the necessary information to verify the use, he needed to appoint and pay a competent consultant with the necessary experience. After the verification has been approved in the regional office, he was requested to motivate the factors given in section 27(1) of the NWA, in order to support his application for the additional water.

One factor to consider according to section 27(1)(b) before a license could be issued, is "the need to redress the results of past racial and gender discrimination". Apart from his motivation towards the other factors, he was requested in a letter from the Department to supply stronger motivation that, if the license is approved, his taking of additional water will adequately give effect to this specific requirement. After a number of discussions, he undertook to make 30% of this additional water available to historically disadvantaged individuals, in the form of a binding agreement with a trust with some of his farm workers as beneficiaries. The license was eventually approved, with conditions addressing the continuous compliance with this agreement. The license was issued for 20 years.

A water license gives existing of prospective water user's formal authorization to use water for productive or beneficial purposes. A license for use of water may only be issued by a *"responsible authority",* to which a respective user must apply[3].

10. Protection of groundwater

Groundwater resources differ from surface water resources in that they are not confined to distinct, visible channels, move very slow and are less prone to rapid temporal variations than surface water. This is particularly of great importance in the more arid provinces like Northwest and the Northern Cape. As the rehabilitation of polluted or impacted aquifers is technically very difficult, lengthy and costly, a careful approach to groundwater protection is required. Because of these technical differences between surface and groundwater, the management of groundwater has to be considered in its own right.

10.1 The Groundwater Reserve

Because of the contribution of groundwater to surface water flow in certain circumstances, the volume of groundwater to contribute to the surface water Reserve has to be determined. This is done by determining the recharge to a particular groundwater resource, accessing the groundwater contribution to flow of a surface water resource and calculating the basic human need to be met from the groundwater supplies. The approach is not to make any formal allocations where there is clear evidence that groundwater abstraction impacting negatively on other water users and the environment.

10.2 Particular aspects regarding groundwater use

Certain local government rules and regulations may override allowances under the NWA like for instance:

- Centurion bylaws prohibit drilling of new boreholes for water supply, while no authorisation through the NWA is necessary to drill a borehole, but only to abstract any water from such borehole; and
- Johannesburg bylaws require certain procedures to be followed when a residential owner wants to drill a borehole for water supply. Again no authorisation through the NWA is necessary to drill a borehole, but only to abstract any water from such borehole.

11. Water pricing policy and charges

In South Africa, the Department of Water Affairs provides financial assistance to historically disadvantaged individuals towards water related expenditure for irrigation purposes under the following:

- The establishment of bulk water storage and water distribution infrastructure for irrigation schemes;
- The operation and maintenance costs at a diminishing rate over six years;
- The acquisition of water use entitlements;
- Socio-economic feasibility studies for new or existing irrigation schemes;
- The training of the management committees of water user associations in effective management and operation of bulk water distribution infrastructure; and
- Rainwater harvesting tanks for household food production.

In the Chokwe irrigation scheme, in Mozambique, the price of irrigation water has been heavily subsidized, which has led to over-use of water, allocations to relatively low value crops and to less production systems[1]. In Namibia, water is provided at a subsidy rate of 70% and therefore, farmers perceived little economic incentive for changing their current practices[2].

The Raw Water Pricing Strategy specifies the determination of the costs incurred to make water from a water resource available to users. *[Joe, that was always the idea, but in reality it is only cost recovery]*

The NWA empower the Minister, in the constitution with the Ministry of Finance, after consultation with the public, to establish a pricing strategy for any use of water described in section 21. The costs included in making water available to users include the following elements:

- Cost of operation and maintenance of publicly provided schemes;
- Capital costs, comparing a return of paid-up assets, repayment of loans and in some cases, contributions to fund a new scheme to make sure that this does not necessitate a sudden tariff increase;
- Overheads such as the administration and support required to operate such schemes;
- Allowance to provide for the depreciation, replacement of refurbishment of state owned infrastructure;
- Catchment management costs; and
- (Social and environmental costs.)[I do not know about this]

11.1 Water use charges

The pricing strategy, which relates to charges for any water use, is established in terms of the process described in section 56 of the Act. The full pricing strategy applies to the use of water described in section 21 of NWA, this taking water from a resource, discharging waste into the resource, storing water and other uses such as the recreational use of water. It also addresses the setting of tariffs by the Department and water management institutions established in terms of the Act. It does not deal with treated water supplied in bulk by for instance, water boards and distributed to household *via* water service authorities, as this is dealt with in the Water Service Act.

All water use charges are specific to each of the four end-use sectors, namely:

- Municipal (water service authorities);
- Industry, mining and energy;
- Agriculture; and
- Stream flow reduction activities.

The 19 Water Management Areas (WMA) in South Africa with respective catchment agencies (Catchment Management Agencies or CMA's of which only a few have been established) for each of these management areas are responsible for management responsibilities, including the setting of charges and the collection of revenue for water use in its jurisdiction. Depending on the infrastructure involved, the cost of managing it, the socio-economic circumstances and demographic characteristics of each area, charges (cent/m^3) may differ between the water management areas.

The objective of water use charges is to allow for:

- Recovering the real cost of water resource management;
- Recovering the real cost of water resource development and use of waterworks; and
- Achieving the equitable and efficient allocation of water.

Water allocations per hectare have been calculated according to the following:

- In government water schemes, water user association schemes and irrigation board schemes: Water quotas in cubic metres per hectare have historically been determined and were as such taken up in every water use entitlement; and
- For private irrigation outside of such schemes, the average annual crop water requirement of the likely crop mix in that specific area is determined with SAPWAT, taking local conditions and climate into account.

Water resource management charges are calculated from the actual costs of water resource management activities within the catchment per unit of water (cubic meter) that is used. Charges are based on recovering the costs of managing the total volume of water that is allocated for use in each water management area. This is determined by deducting the requirement of the Reserve, water required used by downstream water management areas and by any specific water reserved for transfer *via* water works to neighbouring areas from the total volume of water available in the area. For billing purposes these unit charges will be applied to the annual water use registered by or license to each user.

The commercial agriculture attract all charges, while the emerging farmers using government water schemes, received subsidized rates for 5 years at a progressively decreasing rate since inception of the subsidy on a specific scheme. Depreciation charge will be phased in over the sixth year.

The price of water varies according to location and is calculated on a system, catchment or sub-catchment basis. It included operation, maintenance and capital costs and where appropriates also resources management levy and a resource conservation charge. Water charges are invoiced monthly according to a farm's water allocation, regardless of the amount of water that was used during that specific time.

The 2009/10 water management charges for all WMA's in South Africa given in Table 2.

Table 2. Water charges for 2009/10

WATER MANAGEMENT AREA		SECTORAL UNIT COST IN CENT/M³		
No	**Water Management Area**	**Domestic/Industrial**	**Agriculture: Irrigation and livestock**	**Forestry**
1	Limpopo	0.92	0.58	0.54
2	Levuvhu & Letaba	1.33	0.78	0.70
3	Crocodile (West) & Marico	0.82	0.63	0.61
4	Olifants	0.89	0.75	0.70
5	Inkomati	0.85	0.63	0.57
6	Usutu – Mhlatuze	0.30	0.30	0.28
7	Thukela	0.33	0.33	0.78
8	Upper Vaal	0.96	0.78	0.78
9	Middle Vaal	1.07	1.07	N/A
10	Lower Vaal	0.59	0.50	N/A
11	Mvoti to Umzimkulu	0.81	0.78	0.74
12	Mzimvubu – Keiskamma	0.85	0.67	0.56
13	Upper Orange	0.38	0.38	N/A
14	Lower Orange	0.49	0.40	N/A
15	Fish to Tsitsikamma	0.89	0.50	0.27
16	Gouritz	2.36	0.67	0.47
17	Olifants/Doorn	1.77	0.65	0.51
18	Breede	2.23	0.58	0.39
19	Berg	3.16	0.70	0.54
	Average	**1.11**	**0.61**	**0.42**

Source: www.dwaf.gov.za

12. Strategies to balance the supply and demand

The National Water Resource Strategy (NWRS) and the National Irrigation Strategy (NIS) are two important strategies set out ways in which the DWA aims to achieve integrated water resource management in South Africa. These two strategies will be discussed in more detail in Modules 3 and 4 of this Chapter.

Additional information

Most of the information regarding the implementation of the Act is available on the website (http://www.deaf.gov)

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My notes.....

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Authenticator: Mr F vd Merwe, DWA

Module 3

National Water resource Strategy

Study objective

After completion of this module, the learner should be able to have a basic understanding of:

- Purpose and objectives of NWRS
- Integrated water management
- Hydrological cycle
- International obligations to neighbouring countries
- Water requirements as per WMA for the various sectors
- Strategies to apply integrated water management
- "Green" and "blue" water for agriculture purposes
- Groundwater as a water resource
- Water Conservation and Water Demand Strategy (WC/WDM) principles and objectives
- Strategies to increase water use by the irrigation sector

Table of contents

The focus of the NWRS is to ensure sustainable use of the country's water resources. The National Water Resource Strategy (NWRS) provides an implementation framework for the National Water Act, 1998 (No 36 of 1998) (the Act or NWA). The foundation of NWRS is the National Water Policy (1997) and the National Water Act.

1. Purpose of the NWRS

"Water gives life. It waters the fields of farmers, it nurtures the crops and stock of rural communities; it provides recreation for our children, our friends, our families; it supports power generation, our mines our industry, and the plants and animals that make up the ecosystems. Water is the key to development and a good quality of life in South Africa. South Africa's water belongs to its people, it is the task of the South African Government to care for this water, to seek its fair distribution, and to facilitate its wise use for, amongst other things, social and economic development".

..... Ronnie Kasrils, 2002

The NWA specifies that government, as the public trustee of the nation's water resources, must ensure that water is protected, used, developed, conserved, managed and controlled in an equitable and sustainable manner for the benefit of all people. This required that the Department of Water Affairs provided a National Water Resource Strategy as framework for the management of water resources in South Africa.

As been discussed in Module 2, South Africa is semi-arid country with relative low annual rainfall, well below the world average. Our rivers are small in comparison with other countries. The Orange River carries about 105 of the volume of water flowing annually down the Zambezi river, and about 1% of the flow in the Congo river. Furthermore, many of the larger rivers, such as the Orange/Senqu and the Limpopo are shared with other countries. Eleven of the 19 water management areas in the country are facing water deficits, where the water requirements exceed its availability.

Furthermore is not all the water of a good quality. Across the country, on a daily basis, organizations and individuals impact on water quality in our rivers and streams, groundwater and wetlands. Major water quality problems in South Africa include high salt and nutrient

loads, sediments caused by erosion, contamination by bacteria, acid waters and the presence of toxic substances.

The purpose of the NWRS is……

- To provide information about ways which water resources will be managed and institutions established.
- Secondly it provides quantitative information about present and future availability and requirements of the 19 Water Management Areas and how these interventions should be reconciled.
- Thirdly the NWRS quantifies the proportion of available water in each of the water management areas that falls directly under the control of the Minister. These objectives of the NWRS set out ways in which an integrated water management strategy is followed to implement the NWA.

2. Water Policy, Water Law and Water Resource Management

The National Water Resource Strategy (NWRS) provides an implementation framework for the National Water Act (NWA). The foundation for the NWRS are the National Water Policy (1997) and the NWA (No 36 of 1998)

The NWRS has four main objectives:

- *To establish the national framework for managing water resources*

Section 5(3) of the Act states that South Africa's water resources must be protected, used, developed, conserved, managed and controlled in accordance with the NWRS. The NWRS is legally binding. It is intended to be an enduring description of ways in which water resources will be managed, but may be amended to suit changing circumstances through a review process that must occur at least every five years, in consultation with stakeholders

- *To establish the framework for the preparation of catchment management strategies*

A catchment management strategy is the framework for water resources management in a water management area. The NWRS provides a framework within which all catchment management strategies will be prepared and implemented in a nationally consistent way. A catchment management strategy may not be in conflict with the NWRS.

- *To provide information*

The Act requires that the Minister ensure that all aspects of the water resources management, which will affect other organs of state, water users and the public, in general, are brought to their attention. The intention of the NWRS is to strategically direct the management of water resources from a natural perspective. The NWRS is therefore the "vehicle' by which the SA society is informed of the mister's intentions concerning water resource management.

- *To identify development opportunities and constraints*

The NWRS also identifies areas of the country, in which limited water resources are a constraint for development, as well as areas in which water resources are available to support social and economic development initiatives.

3. Integrated water resources management

The Act recognizes the necessity to achieve the objectives of sustainability, equity and efficiency; water resources need to be managed in an integrated manner.

Definition

Integrated water resource management evolves an iterative process for the coordinated planning and management of water, land, and environmental management. It is based on the concept that different water resources (rivers, wetlands, reservoirs, and groundwater) are linked by the *hydrological cycle* to each other, to the surrounding environment and to human activities that influence them.

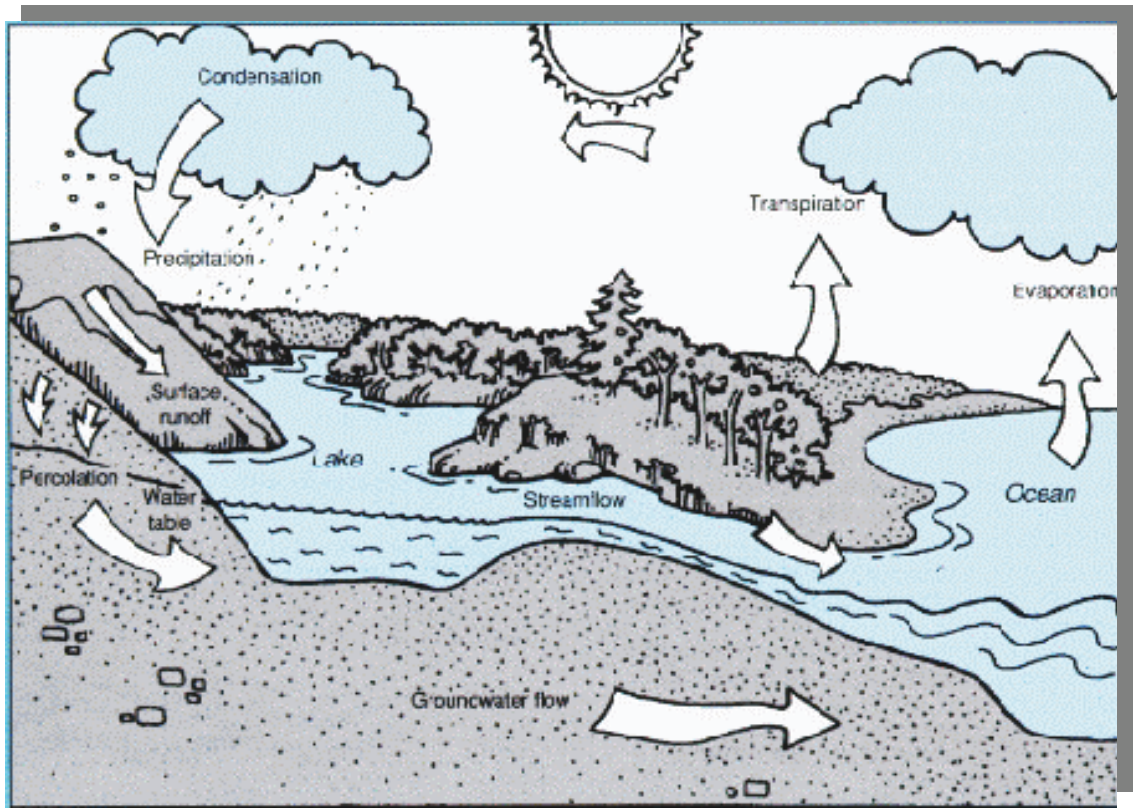

Figure 1. Hydrological cycle[3]

NWRS is based on integrated water resource management, taking into account the availability of surface and groundwater, general water use, quality of ground and surface water, and environmental and social considerations. Surface and ground water are considered as an integrated whole.

To facilitate the management of water resources, the country has been divided into 19 catchment based water management areas. Of these 19 water management areas, only Keiskamma and Mzimvubu water management areas is currently not linked to another water management area through intercatchment transfers. Eleven of the water management areas share international rivers. The location and boundaries of the different water management areas are shown in Figure 2.

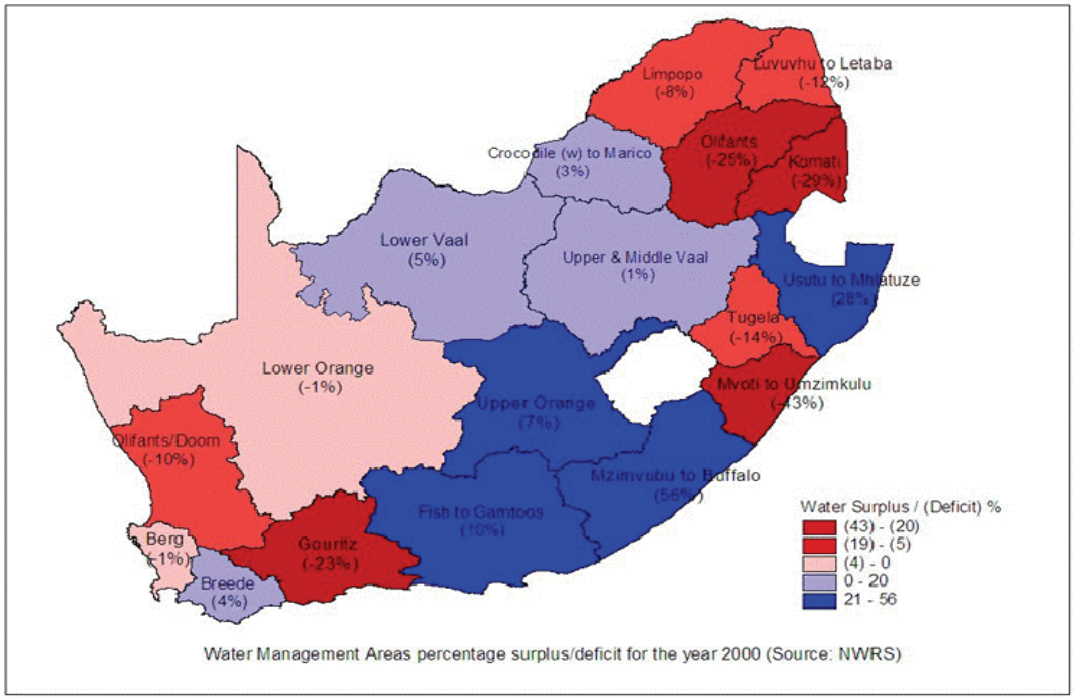

Figure 2. Location of water management areas and inter water management transfers [6]

3.1 International obligations

Reconciliation of the available water and total requirements for the year 2000, including the transfer between water management areas and to the neighbouring countries revealed interesting challenges (Table 1).

Table 1. Reconciliation of water requirements and availability for the year 2000 (million m^3/a)[2,6)]

Water Management Area		Irrigation	Urban (1)	Rural (1)	Mining and bulk industrial (2)	Power generation (3)	Afforestation (4)	Total local requirements
1	Limpopo	238	34	28	14	7	1	322
2	Levuvhu/Letaba	248	10	31	1	0	43	333
3	Crocodile West and Marico	445	547	37	127	28	0	1 184
4	Olifants	557	88	44	94	181	3	967
5	Inkomati	593	63	26	24	0	138	844
6	Usutu to Mhlatuze	432	50	40	91	0	104	717
7	Thukela	204	52	31	46	1	0	334
8	Upper Vaal	114	635	43	173	80	0	1 045
9	Middle Vaal	159	93	32	85	0	0	369
10	Lower Vaal	525	68	44	6	0	0	643
11	Mvoti to Umzimkulu	207	408	44	74	0	65	798
12	Mzimvubu to Keiskamma	190	99	39	0	0	46	374
13	Upper Orange	780	126	60	2	0	0	968
14	Lower Orange	977	25	17	9	0	0	1 028
15	Fish to Tsitsikamma	763	112	16	0	0	7	898
16	Gouritz	254	52	11	6	0	14	337
17	Olifants/Doring	356	7	6	3	0	1	373
18	Breede	577	39	11	0	0	6	633
19	Berg	301	389	14	0	0	0	704
Total for Country		**7 920**	**2 897**	**574**	**755**	**297**	**428**	**12 871**

1. Includes the component of the Reserve for basic human needs at 25 litres/person/day.
2. Mining and bulk industrial that are not part of urban systems.
3. Includes water for thermal power generation only, since water for hydropower, which represents a small portion of power generation in South Africa, is generally also available for other uses. (For ease of direct comparison with Eskom these numbers have not been adjusted for assurance of supply; the quantitative impact of which is not large).
4. Quantities given refer to impact on yield only. The incremental water use in excess of that of natural vegetation is estimated at 1 460 million m^3/a.

The transfer of 124 million m^3 per year out of South Africa relates to the water from the Crocodile West and Marico water management are to Gaborone in Botswana (7 million m^3 per annum), the present minimum flow (a reserved figure as negotiated with Mozambique) released from the Inkomati water management area to Mozambique (63 million m^3 per annum) and abstractions from the yield of the Orange River to Namibia (54 million m^3 per annum). More than 50% of the water management areas are in deficit, although a surplus exists for the country as a whole. This demonstrates the regional differences in the country. Often it is not economically viable or practical to transfer water from areas of surplus to areas of deficit. Therefore imbalances within water management areas would be addressed by relevant catchment management strategies when they are developed.

Activity

Activity 1

Individual activity

1. What is the purpose of the NWRS? Why id this official document required for water resource management?

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2. What do you understand under the concept “Integrated Water Resource Management?

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3. Explain in your own words what you understand under the concept “hydrological cycle”? Use an example of your own choice to illustrate this concept.

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4. South Africa's water situation and strategies to balance supply and demand

There are many factors that influence the requirements for water in the country, namely climate, nature of economy (e.g. irrigated agriculture, industrialization) and standard of living. Population growth and economic growth, which also relates to socio-economic standards of living, are important determinants with respect to future water requirements.

Water resource developments in South Africa have continuously evolved to meet the socio-economic needs of the country, within the constraints imposed by nature. From demographic projections, which reflect the economic driving forces in the country, it is expected that future growth in water requirements will largely be in the main metropolitan centres. Together with the catchments already under pressure, the Department of Water Affair will give particular attention to ensure adequate future water supplies to the following areas:

- Crocodile West and Marico water management area: large water transfers to Pretoria – Johannesburg area, in the upper Crocodile catchment will be required in future.
- Olifants water management area: The addressing of deficits will result from the implementation of the Reserve and future water supplies for electricity generation and mining. This will also impact on transfers to Mozambique.
- Inkomati water management area: Current deficits and impacts associated with the implementation of the Reserve need to be addressed, with joint management of the Komati River being of specific importance.
- Upper Vaal water management area: This management area should be adequately supplied until 2025, given the projections. The existing surplus transfer capacity would be reserved for industrial, urban and mining developments, and not for irrigation.
- Mvoti to Umzimkulu water management area: The aim would be to ensure adequate water supplies for Durban and Pietermaritzburg.
- Berg water management area: Provision of water to meet the future requirements of Cape Town area.

Agriculture uses about 74% of the rain that falls in South Africa, subdivided as follows[5]:

- ***Natural rangelands and forests: 60%***
- ***Dryland cropping: 12%***
- ***Irrigation: 2.5%***

Rangelands, drylands and forests use only *"green water",* e.g. water which is stored in the soil (not underground water) and can be utilized by only green plants growing in the soil. Irrigated agriculture on the other hand uses both *"green water"* and *"blue water"* (e.g. water from rivers and aquifers) applied by means of irrigation. According to the NWRS[3)], irrigated agriculture annually used 7 900 million m^3 runoff water in 2000. This is about 62% of the 12 900 million m^3 runoff that was used by all sectors at that stage [3)], or nearly 40% of their estimated exploitable runoff yield potential of 20 000 million m^3 per annum.

It is estimated that about 5 400 million m^3 groundwater can be extracted economically per annum in South Africa [6,7)]. The use of groundwater grew significantly during the last 30 years. In 1980 about 2% of the available groundwater was used for irrigation, by 1996 it had increased to 30% [8)].

In order to meet the water requirements of South Africa, water resources are highly developed and utilized in most of the country. As a result of the many control structures (dams, weirs), abstractions of water, return flows to rivers, as well as the impacts of land use, the flow regime in many rivers has been significantly altered. The expectations are that the trend towards industrialization and urbanization of the population are likely to continue, and this will severally impact on the country's rivers unless appropriate corrective measures are taken. The NWRS aim is to focus on the substantially improved the efficiency of water use in the country, and extensive programs for water conservation and water demand were developed as an important part of the implementation of the NWRS.

Specific strategic opportunities for further resource development in Levuvhu/Letaba, Thukela, Mvoti to Umzimkulu, Mzimvubu to Keiskamma and Upper Orange water management areas were identified as part of the NWRS. In addition to the support of urban, industrial and mining growth the following opportunities for increased water use by irrigated agriculture exists:

- Possible expansion of irrigation in Lower Orange and the Fish to Tsitsikamma water management areas with water from the Upper Orange water management area
- Expansion of irrigation below the Pongola dam in the Usutu to Mhlathuze water management area
- Refurbishment of irrigation schemes and additional development in the Mzimvubu to Keiskamma water management area, as well as some limited hydropower generation.
- Expanded forestry development in some catchments in the Usutu to Mhlathuze, Thukela, Mvoti to Umzimkulu and Mzimvubu to Keiskamma water management areas
- Expansion of irrigation in the north-eastern part of the Limpopo Province (from Nandoni dam to Levuvhu river)

To balance the supply and demand a range of possible solutions can be considered:

- On the demand side promote the efficient use of irrigation water and increase water availability

- Reconciliation of the total available water requirements for the year 2000 included also to revisit the transfer agreements between South Africa and its neighbouring countries (124 million m^3)
- Re-allocation of water, including the possibility to move water from lower to higher benefit users through the trading of water use authorization
- Construction of new dams and related infrastructure

Estimates of still undeveloped resource potential show that the yield form surface water can be increased by about 5 600 million m^3 per year [3]. In addition substantial quantities can be made available through increased re-use of return flows, with special attention to coastal cities, where waste water is discharged to the sea. Potential also exist for further groundwater development, although on a smaller scale.

Desalination of seawater offers opportunities for coastal users which will be investigated. The process is however expensive, but the trend will become more competitive as there are continued advances in technology.

5. Water quality management

The protection of water resources embraces both quality and quantity considerations. Water quality is an essential element of water resource management. In addition to ensure that sufficient quantities of water are available, it is essential to ensure that the quality of water is of an appropriate standard for intended use. All intervention options impact on the water quality in one-way or another. The main activities that determine water quality is mining (acidity and increased metal content); urban development (salinity, nutrients, microbiological residues); industries (chemical toxins) and agriculture (sediments, nutrients, agro-chemicals, salinity through irrigation return flows). The pollution of surface water is generally more common and noticeable than with regard to groundwater.

What is water quality?

A term used to describe the chemical, physical and biological characteristics of water, usually in respect to its suitability for an intended purpose

Table 2 illustrates the water quality status of the 19 water management areas.

Table 2. The water quality status of the 19 catchment management areas [3]

	Water management area	Domestic use								Irrigation use				Recreational Use
		F	TDS	Ca	Mg	SO_4	Cl	Na	K	SAR	EC	pH	Cl	
1	Limpopo													
2	Luvuvhu / Letaba											(+)		
3	Crocodile West & Marico											(+)		X
4	Olifants	X									L	(+)		X
5	Inkomati													
6	Usutu to Mhlatuze						X				L	(+)	L	
7	Thukela													X
8	Upper Vaal					X								X
9	Middle Vaal													X
10	Lower Vaal													X
11	Mvoti to Umzimkulu													X
12	Mzimvubu to Keiskamma											(+)		X
13	Upper Orange		X					X				(+)		
14	Lower Orange		X					X		L	M	(+)	M	X
15	Fish to Tsitsikamma		X	X		X	X	X		L	LMH	(-) (+)	LMH	X
16	Gouritz		X	X	X	X	X	X	X	LM	H	(-)	H	
17	Olifants / Doring													
18	Breede						X				L		L	X
19	Berg													

Box 1: Impact of water quality on irrigated agriculture

Irrigation water quality has a number of effects on water use in irrigated agriculture. Most important is that the leaching requirements increase as the salinity and/or sodicity of the irrigation water increases. The leaching requirement is the amount of water that must be applied over and above the crop requirement to avoid salinisation and /or sodification of the irrigated soil to the point where it has extremely severe negative effects on crop yield and even becomes unfit for crop production. A high leaching requirement means low water use efficiency in terms of the amount of water required to produce a crop.

Water pollution by harmful organisms to humans, mainly from human excreta, or toxic heavy metals, due to acid mine drainage, has very serious implications for production of high-value export crops *MC Laker, 2011*

To address these issues the River Health Program (RHP) was initiated more than a decade ago. This program is one of the flagship programs of DWA, but the success is the result of the active involvement and ownership of various national organizations like the WRC. More detail

about State – of River reports can be obtained from the department of water Affairs or you can download the digital versions of the reports at *dwaf.gov.za/iwqs/rhp/index.html*

Activity

Activity 2

Small group activity

1. What do you understand under the concept "green" and "blue" water used for irrigated agriculture?

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2. There are specific strategies proposed in the NWRS document for irrigated agriculture. Name it and discuss the practicality of implementing these recommendations?

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6. Regulating authorities for the implementation of the National Water Conservation and Water Demand Management Strategy (WC/WDM)[3]

The options for further augmentation of water supply by developing of physical infrastructure are limited, and in future the emphasis will be on the managing of demand for water. Water conservation and water demand management therefore relate to the efficient and effective use of water, and the minimization of water loss or waste of water. The National Water Conservation and Demand Management Strategy (WC/WDM) is based on the assumption that through the change of water user's behaviour and the adoption of water saving technologies, significant reduction in water use and wastage could be achieved.

6.1 Aim with WC/WDM Strategy

The aim with the foundation of the WC/WDM Strategy is the creation of a WC/WDM culture amongst all water users through the following strategy outputs:

- Appropriate measures should be implemented to bring about reduction in water wastage
- Water User Associations and end users should understand and appreciate the need to modernize their irrigation equipment and water conveyance systems
- Water allocations processes should promote equitable and optimum water utilization
- Preventive maintenance programs should be in place
- General sufficient information which is accessible to all stakeholders
- Water management institutions and service providers should implement audits from the water resource to the end user

Fundamental principles for the implementation of WC/WDM

1. Water institutions should strive to supply water efficiently and effectively, minimize water losses and promote WC/WDM among their consumers
2. Water users should not waste water, and should strive to use it effectively WC/WDM should be an integrated part of water resources and water services planning process.
3. In situations where water shortage occurs, the appropriateness and cost effectiveness of the demand side solutions should be considered alongside the supply-side augmentation options.

A proportion of the available water in each water management area is under the control of the Minister, and includes the following:

- *Reserve:* sufficient water of appropriate quality to provide for basic human needs and for safeguarding and sustaining healthy ecosystems
- *Water to meet the international rights and obligations*: to share the international water as negotiated from time to time through the relevant bi-national and multi-lateral forums
- *Water use of strategic importance:* since electricity is of fundamental to the functioning of modern society allocations of significant quantities of water used by ESKOM in the generation of electricity is authorized by the Minister.
- *Contingency to meet projected future water needs:* this may include water reserved for the use outside a water management area of a specific large augmentation projects within it.

6.2 Water Management Institutions[2,4]

The institutional framework adopted is one of the important aspects of integrated water resource management. The Act provides for a fundamental transformation of water resources management and governance, through decentralization of the responsibility and authorization of water resource management to regional and local institutions:

- *Minister of Water Affairs*

  The Minister, as the public trustee of the water resources on behalf of the National Government, has the overall responsibility for all aspect of water management in South Africa. The Minister for practical reasons delegates most of his or her powers and duties to departmental officials, water management institutions, advisory committees and water boards.

  The Minister however retains the responsibility for:

  - Specifying the requirements for the Reserve
  - Specifying water requirements for international rights and obligations
  - Specifying a "contingency" to meet projected future water need
  - Authorizing any transfers of water between water management areas
  - Authorizing other water uses of strategic importance

- *Department of Water Affairs*

  The Department is responsible for administering all aspects of the Act on behalf of the Minister. As the regional and local water management institutions are established and become operational, the Department will delegate their responsibility of water resource management to these institutions. The Department will only be responsible for provision of a national policy and regulatory framework within which other institutions will directly manage water resources.

- *Water management institutions*

  Under the Act, a water management institution may be a Catchment Management Agency (CMA), a Water User Association (WUA), and a body responsible for international water management or any person who fulfills the function of a water management institution. The function of a water management institution relates to water resources management in general. The Act also defines a responsible authority, whose duties relate specifically to water use, and particularly to the authorization of water by general authorization or license.

  a. Catchment Management Agencies (CMAs)[2,3]

  19 Catchment Water Management Areas (CMAs) were established in South Africa in October 1999 by Government Notice No 1160. CMAs are statutory bodies, established by Government Notice, with jurisdiction in defined water management areas. The functions and responsibilities of the CMAs include:

  - Development of a catchment strategy, which may not be in conflict with the NWRS while giving effect to its provisions and requirements.
  - Management of water resources and co-ordination of water related activities of water users and other water management institutions within the water management areas.
  - Additional functions may be delegated or assigned to a CMA by the Minister.

  In areas where CMAs are not fully operational, the powers and duties vest in the Minister, and DWA will undertake these functions on the Minister's behalf.

b. Water User Associations (WUA)[2,3)]

Water User Associations are co-operative associations of individual water users who wish to undertake water-related activities at a local level for their mutual benefit. They operate in terms of formal constitution as set out in guidelines prepared by the Department. Their scope of objectives and geographic extents are thus very narrower than those of CMAs. It is expected of WUAs to be financially self-supporting from water use charges determined and made in terms of the pricing strategy, and payable by members. A WUA falls under the authority of a CMA (Catchment Management Agency) in whose area or jurisdiction it operates, and receives delegated powers and duties from the CMA to undertake.

The purpose for the establishment of WUA may vary, but the majority of WUAs are established to support agricultural water use and to address the need of farmers to exercise their right to the use of water. According to Schedule 5 of the NWA, one of the functions of the WUA can be *" to regulate and supervise the distribution and use of water from the water resource according to the relevant water use entitlements, by erecting and maintaining devices for measuring and dividing, or controlling the diversion of the flow of the water".* Existing irrigation boards, subterranean water control boards, and water boards established for stock watering purposes in terms of 1956 Water Act, must be transformed to become WUAs. New WUAs may be established on the Minister's initiative, or as a result of a proposal, submitted to the Minister, by those wishing to establish the association. The Minister must ensure that the necessary consultation process is undertaken, before establishing of an association or the transforming of an existing board. In 2000, with the draft of the NWRS, 300 existing organizations were identified to be transferred into WUAs and the aim was set to complete the process by 2006. In August 2006, only 68 irrigation Boards were transformed into 38 WUAs, and 23 new WUAs were established [1,4].

c. Advisory Committees

The Act empowers the Minister to establish Advisory Committees for different purposes and functions. Advisory Committees are responsible to the Minister, and are responsible for recommendations on the composition of the Governing Board of a catchment management agency.

d. Forums

Although forums are not statutory bodies, they have made significant contributions to water resource management at a local level, by providing essential local knowledge, expertise and information. In this respect they play an essential role in the operation of catchment management agencies when they are established. The Department support existing forums, and even encourages the creation of new ones.

e. Water Tribunal

The Water Tribunal was established in 1998. This is an independent body with the mandate to hear and adjudicate appeals, mainly against administrative decisions made by the responsible authorities and water management institutions, a wide range of water-related issues specified in the Act. The Tribunal can also adjudicate where a user claims

that the economic viability of his or her water using activity has bee severely prejudiced by the refusal to grant a license, or the reduction in water use on granting or reviewing of a license.

Box 2: Challenges to get the required mechanism for effective water use regulation in place……..

i) There are huge delays and blockages in the processing of license applications and the issuing of water licenses[9,10)]

ii) The establishment of CMAs is very slow[9)].The first CMA, namely Inkomati , was established in 2005, but by 2008 other CMAs were still preparing to follow, waiting to learn from experience and teething problems of the first one.

iii) Some irrigation boards have been transformed to WUAs, but the process is much more complex than anticipated[9)].

iv) Establishment of new WUAs is very slow and is meeting various kinds of conflict[9,10,11)]. A major problem is that groups with conflicting interests and levels of negotiation experience and skills are in some cases "forced' into a specific WUA. Some groups feel they are dominated and intimidated by other groups in the WUA. This is causing conflict and dissatisfaction and negatively affects the willingness of people in other areas to become part of a WUA.

Note: *Important is that the irrigation extensionists collectively with officials from DWA and the irrigation farmers (from water committees) establish WUAs. Extension workers should be prepared to help farmers with a clear understanding of the purpose and operation of the WUAs, by-laws, purpose and interpretation of constitutions and clarifying their respective roles and responsibilities in the WUAs.*

7. Water Pricing and Charges

This part of the NWRS was already discussed in Module 2 (Section 11) and illustrates the importance that water is valued as an economic resource, of which the costs incurred to make the resource available to users should be covered by charges for the use of the right. It is generally accepted that by setting of an appropriate price for a natural resource such as water can be an effect mechanism to achieve its efficient and productive use[4)].

Activity 3

Activity

Small group activity

1. What do you understand under the "Water Conservation and Demand Strategy (WC/WDM)" developed for effective and efficient water use?

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2. What are the specific role of the CMAs and WUAs in this regard?

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3. What role do you perceive the irrigation extensionist to play regarding the establishment and maintenance of WUAs?

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My notes.....

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Authenticator: Mr F vd Merwe, DWA

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Module 4

Irrigation agriculture strategy

Study objective

After completion of this module, the learner should be able to have a basic understanding of:

- The purpose of an Irrigation Strategy for South Africa
- Challenges for irrigated agriculture in the country
- Institutional strategies required for effective irrigated agriculture
- Non-institutional strategies required for effective irrigated agriculture

Table of contents

The National Department of Agriculture, Forestry and Fisheries (DAFF) has identified irrigation development as one of the five priority areas for Accelerated and Shared Growth Initiative for South Africa (AsgiSA). The declaration by the Department that expansion of irrigation by 50% being targeted as the main contribution to AsgiSA has created the need for a proper irrigation Strategy for the country. ***Currently South Africa does not have a national irrigation policy.*** 15 years ago at the 1991 Southern African irrigation symposium it was stated *"There is urgent need for a national irrigation strategy that identifies priorities, allocates responsibilities and ensures co-ordinate effort and realistic funding. Such government initiative would require commitment and the full support of research, educational*

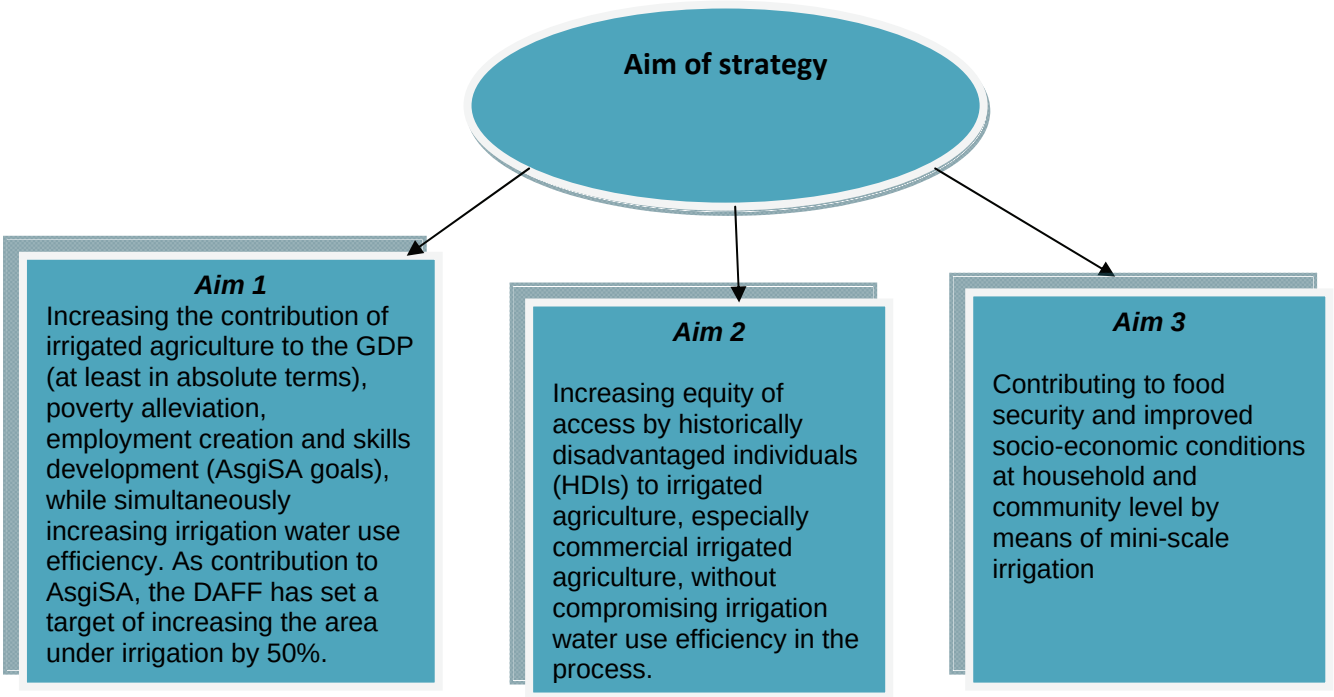
and advisory organizations as well as the farming community" [1]. In 1996 a "Policy proposal for irrigated agriculture in South Africa" was published as a comprehensive "discussion paper" by the WRC[7]. This module looks at the need for an Irrigation Strategy and some of the proposed strategies to be included in such a document.

1. Why does South Africa need an Irrigation Strategy

- Irrigation is by far the biggest single user of runoff water in South Africa and it is, therefore, imperative to optimize irrigation water use efficiency with a view to long-term sustainability of irrigated agriculture.
- In contrast to water use in other sectors, water use in irrigation is a very complex and complicated system; requiring special management skills if high levels of irrigation Water Use Efficiency (WUE) are to be achieved.
- South Africa has very limited crop production potential in general and irrigation potential in particular. In addition the general quality of the resources is poor.
- Although South Africa has limited irrigation potential and its contribution to the Gross Domestic Product (GDP) is small, irrigation has substantial potential to create a significant positive socio-economic and social impact.
- The potential negative influence of climate change on future availability and utilization of water.

2. Purpose of an Irrigation Strategy

No current agricultural policies in South Africa address irrigation explicitly. Consequently implicit indications of objectives with a national irrigation strategy had to be derived from official documents on government initiatives and programmes such as the Accelerated and Shared Growth Initiative for South Africa (AsgiSA), the Comprehensive Agricultural Support Programme (CASP), the National Water Act (Act 36 of 1998), the Water Allocation Reform (WAR) programme and the National Water Resources Strategy.



3. Challenges to irrigated agriculture

It is estimated that approximately 1.5 million hectares are presently under irrigation in South Africa, which amounts to about 1.5% of South Africa's agricultural land. Irrigated agriculture in South Africa is faced with a number of major challenges, such as:

- To improve irrigation water use efficiency.
- To practise irrigation within the boundaries of limited suitable natural resources.
- To operate within the National Water Act.
- To achieve the economic growth requirements of AsgiSA.
- To address the shortage of irrigation specialists in the country.
- To establish competent irrigation farmers, especially amongst small scale irrigation farmers.
- To implement effective revitalization on degraded irrigation schemes and farms.
- To establish effective institutional structures for the coordination of irrigated agriculture

4. Institutional structures and arrangements required for efficient irrigated agriculture

In view of the importance of irrigated agriculture in the South African agricultural economy in terms of contribution to production of high value export crops, as well as its importance in terms of socio-economics, rural economics, food security and poverty alleviation, one would expect the National Department of Agriculture, Forestry and Fisheries (DAFF) to be constitutionally entrusted with the responsibility to guide irrigated agriculture in the country. Unfortunately the fact is that constitutionally DAFF has absolutely *no legal say* in regard to irrigated agriculture. Constitutionally, irrigated agriculture is purely a matter between the Department of Water Affairs (DWA) and the Provincial Departments of Agriculture or in some cases apparently between DWA and district municipalities. The provincial departments of agriculture are autonomous and are therefore not answerable to DAFF regarding decisions that they take, including decisions regarding irrigated agriculture. Against the background of the present situation regarding irrigated agriculture in South Africa, it is evident that effective communication, coordination and cooperation between DAFF and DWA at the highest level are urgently required.

Strategies proposed regarding institutional arrangements

- To establish a high level joint advisory committee with DWA.
- To establish a joint working group between DAFF and DWA
- To involve Water Use and Irrigation Development Directorate (WUID) as a permanent member of all Coordinating Committees for Agricultural Water (CCAWs). DAFF's link with the Provinces will have to be through the existing CCAWs that are currently being revitalised. For effective sustainable irrigated agriculture it is absolutely essential that the WUID of DAFF must be an ex officio member of all CCAWs and senior officers from the Directorate should attend all CCAW meetings.
- To set up advisory committees involving representatives from various stakeholders, as required.

Activity

Activity 1

Small group activity

- Does South Africa need an Irrigation Strategy? Motivate your answer.

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- Currently irrigation agriculture is constitutionally a matter between DWA and the PDAs or between DWA and municipalities. Who do you think should be responsible for the guidance to irrigated agriculture?

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5. Non institutional strategies relating to soil surveys, land suitability and land use planning

Various strategies are recommended with regard to resource surveys, crop soil and climate requirements, irrigation research and extension needs, irrigation infrastructure and management and general education and training of scientist and farmers are proposed in this section.

5.1 Strategies relating to resource surveys, land suitability and land use planning

Successful, efficient farming, especially intensive high input/high value irrigated farming is not possible without high quality land use planning based on correct land suitability evaluation and high quality detailed resource maps and information. High quality land suitability evaluation and land use planning is particularly important in a country like South Africa where water and good quality soils are scarce, soil patterns are complex and climatic conditions are not ideal[2,3].

Strategies proposed regarding resource surveys and land use suitability evaluation and planning

- That for all irrigation development, whether a scheme or a single area on a commercial farm, resource surveys and land suitability evaluations must be done.
- That land use planning for irrigated agriculture should take into consideration the management capabilities and experience of the farmer(s) involved.
- That before any new irrigation development or changes to existing irrigation are permitted a thorough study of its potential environmental impacts, especially off-site, must be made.
- That DAFF should develop guidelines and a data base on resource surveys and land use planning and make this available to all persons involved in land use planning for irrigated agriculture, extension officers, other advisors to farmers, commercial farmers themselves, etc. This data base must be maintained and updated regularly.

5.2 Crop requirements and tolerances

Each crop has specific requirements (conditions ideal for it) and tolerances of specific non-ideal conditions. For example, different deciduous fruit crops (peaches, apricots, apples, pears, etc.) all have very different tolerances for specific soil conditions[2, 4].

Strategies proposed regarding this important element of irrigation management

- DAFF should develop guidelines and a data base on climatic, soil, water quality etc. requirements of crops and make this available to all persons involved in land use planning for irrigated agriculture, extension officers, other advisors to farmers, commercial farmers themselves, etc. This database must be maintained and updated regularly.

5.3 Soil and climatic requirements and tolerances of different irrigation systems

Before the introduction of overhead irrigation systems, land suitability evaluation for irrigation was relative simple. Nowadays suitability evaluation and planning has to be done for a variety of different irrigation systems with widely different requirements and tolerances in terms of factors such as climate, soil and slope. A situation that is highly suitable for one irrigation system may be totally unsuitable for another. Drip irrigation for instance is often regarded as highly efficient water saving irrigation system, yet it is not suitable for all soil conditions.

Strategies proposed regarding climatic requirements and tolerances of different irrigation systems

- Guidelines and a data base, based on South African information, for the evaluation of the environmental suitability (in respect of climate and soils) for all the different types of irrigation systems, including criteria for the adaptation and management of specific systems for specific scenarios. Regular maintenance and updating of the database is important.
- Promotion of awareness of the fact that every irrigation technology is suitable only under certain soil and climatic conditions. That it is imperative to make thorough evaluations to determine the suitability of different systems for each case and then select the most appropriate one. The target should be everyone involved in irrigation planning, irrigation extension officers and advisors, irrigation farmers, etc.

5.4 Assessment of environmental requirements in irrigated agriculture

Assessment of environmental requirements in irrigated agriculture is critically important because irrigated agriculture can have profound off-site environmental impacts, as well as on-site environmental and socio-economic impacts. The most common impact is downstream salinization of water.

Strategies proposed

- That before any irrigation development is approved or implemented, all necessary environmental impact studies must be done and comprehensive mitigation plans put in place as required by the National Water Resources Strategy and the Department of Environmental Affairs and Tourism.

5.5 Irrigation Research

Large amounts of excellent irrigation and irrigation-related research have been done in South Africa over the years. These include research on a variety of aspects, such as irrigation system design and management, irrigation scheduling, soil physical problems in irrigated agriculture (e.g. crusting and compaction), soil fertility aspects in irrigated agriculture, reclamation of saline and sodic soils, land suitability evaluation and land use planning in irrigated agriculture, social and socio-economic aspects of small-scale irrigation, economic aspects related to commercial irrigated agriculture, etc., the challenge for future irrigation –related research is *"to develop an agenda and design projects that address real-life problems".*[5]

Strategies proposed regarding irrigation research

- To determine the real-life research needs and priorities of irrigated agriculture in South Africa.
- To mobilize the funding required for this research.
- To create or promote the creation of adequate numbers of researchers.
- To adopt a policy of preferably employing locally trained South African researchers.
- To appoint suitably qualified young overseas researchers on contract to conduct research under guidance of experienced South African researchers if enough local scientists are not available.
- To create incentives for researchers to do real-life research
- To accept and create awareness that the required research will mainly be expensive and long-term in nature.

5.6 Irrigation extension and advisory services

Because of the complex and high-input nature of irrigated agriculture, irrigation farmers need strong, efficient support from expert specialist irrigation extension and advisory services. Unfortunately persons with this expertise and the required

attributes are virtually non-existent in South Africa[3]. In the few exceptional cases where an efficient advisory service is in place, e.g. at Douglas, it has made major improvements to irrigation water use efficiency and the profitability and stability of irrigated agriculture.

Strategies proposed regarding irrigation extension and advisory services

- To promote the establishment of adequate units of well-trained specialist irrigation extensionists in the provincial departments of agriculture.
- To establish a strong corps of irrigation-related subject matter specialists (agronomists, horticulturalists, climatologists, irrigation engineers, agricultural economists, etc., etc.) within DAFF as back-up to the province-based extensionists, private advisors and top-level farmers.
- To establish and run an effective irrigation information centre in DAFF that will produce and disseminate irrigation-related information via radio, TV, Internet and popular written media, pamphlets, etc.

5.7 Infrastructure for irrigated agriculture

Availability of adequate appropriate infrastructure is a prerequisite for successful, efficient commercial agriculture, especially high-input, high-value irrigated agriculture. Determination of whether the required infrastructure is available or will be provided is an important criterion in the FAO's guidelines for the evaluation of land suitability for irrigated agriculture. Infrastructure includes both physical infrastructure and services[6].

Strategies proposed regarding

- To promote adequate and appropriate attention to infrastructural requirements in irrigated agriculture and promote planning and provision of the required infrastructure.

5.8 Irrigation management

Irrigation revolves around irrigation water application. Thus, achieving high irrigation water use efficiency (WUE) and profitability in irrigated agriculture is to a large extent determined by the efficiency of irrigation water management. Water irrigation management in irrigated agriculture can be divided into two main parts, namely:

- Water supply management
- On-farm irrigation water management

Strategies proposed regarding promotion of efficient water supply systems and in-field irrigation management

- Interaction and collaboration with DWA and the provinces regarding the provision of efficient water supply systems.
- Supporting the development and application of effective on-farm irrigation management.
- Developing and providing back-up knowledge structures between DAFF and DWA.

5.9 General management of irrigation farming

Intensive commercial irrigation farming, especially farming with high value export crops, is probably the most complex and complicated type of enterprise in the world. Management deals with decision-making and implementation of these decisions in all aspects related to farming, i.e. procurement, financing, production and marketing. Decisions must be taken regarding what and how much to produce, when, where and how to produce it and what to do with the product. Thus, intensive commercial irrigated agriculture is also *"management intensive"* [7] and requires farmers with exceptional managerial capabilities and *"far above average technical, supervisory, financial and organisational skills"*[7]. For success they also need strong support from expert, specialized extension and advisory services.

Strategies proposed

- To create awareness amongst decision-makers and prospective farmers regarding the high managerial skills required for successful irrigation farming.
- To lead new irrigation farmers gradually from less intensive farming on a small scale towards more intensive farming.
- To provide adequate high quality expert specialized extension and advisory services to render the necessary support to farmers.

5.10 Education and training of irrigation scientists and farmers

The shortage of suitable irrigation researchers, extensionists and advisors require specific strategies to address the training of irrigation related professionals. The need for the specialized training of these professionals is a high priority for South Africa and it is necessary that DAFF and the provincial departments of agriculture interact through institutional structures and arrangements.

Strategies proposed regarding education and training

- To promote and support the training university education of irrigation scientists, as well as the different types of agricultural specialists required for irrigated agriculture, at South African universities.
- To provide bursaries for students in irrigated agriculture, especially in directions in which scarcities are experienced. In the allocation of bursaries academic merit will be the key criterion.
- To create opportunities for and support post-graduate training in scarce directions.
- That DAFF will prompt provincial departments of agriculture, through institutional structures, to promote appropriate education and training of irrigation extension specialists and provide bursaries for students.

5.11 Revitalization, re-development or upgrading of irrigation schemes and private irrigation farms that have collapsed

Semi-commercial to commercial small-farmer irrigation schemes have the potential to make significant local socio-economic impact, as well as contributing to improved food security, poverty alleviation and increased employment[8]. In several cases they are the main, or the only major, economic activities in their areas. Together they can have significant positive impacts on the national socio-economy[8].

Unfortunately a large number of the small-farmer irrigation schemes have collapsed, mainly since 1994, while the rest are suffering considerably reduced efficiency[11]. Various problems and constraints have contributed to this situation[8]. Because of the importance of these schemes in terms of socio-economy, food security and poverty alleviation, especially at local level, their effective revitalization is extremely important.

Strategies proposed

- To develop, together with Provincial Departments of Agriculture (PDA), guidelines for the revitalization and upgrading of underutilized irrigation schemes to promote water use efficiency and economic growth.
- To support revitalization through CASP funding.

5.12 Redevelopment of commercial irrigation farms that have collapsed after being handed over to Land Reform Programmes

Several former intensive irrigation farms on which high value orchard crops used to be grown, have collapsed after having been bought out and handed over under land reform or homeland consolidation programmes[3, 9]. In view of their importance towards the aims of AsgiSA in terms of economic growth, increasing export earnings, and job creation, as well as for the local economies of their areas, it is imperative to find a way to redevelop these farms on a ***sustainable*** way as soon as possible.

Strategies proposed

- To initiate and play a lead role in developing guidelines for the redevelopment of former productive commercial irrigation farms that has collapsed under land reform, with special emphasis on former high value intensive irrigation farms. These guidelines should be developed in cooperation with the Department of Land Affairs and provincial departments of agriculture.
- To initiate and play a lead role in the developing of guidelines for the settlement of land reform beneficiaries on productive commercial irrigation, with special emphasis on high value intensive irrigation farms. These guidelines should be developed in cooperation with department of Land Affairs and the responsible provincial departments of agriculture.
- To support the redevelopment of LRAD farms through CASP and AsgiSA funding.

5.13 Upgrading of under-utilized commercial irrigation schemes or farms and re-establishment of commercial irrigated agriculture

In some instances commercial irrigated agriculture has been abandoned for reasons that can be overcome. Some areas have not been abandoned, but are greatly under-utilized. In 1995 DWAF estimated that there was scope for upgrading of 66 700 hectares of under-utilized land and water on existing schemes where the necessary infrastructure is in place[10,11].

Strategies proposed regarding under-utilized commercial farms

- To identify all areas (schemes and farms) that used to have successful irrigation farming, but have been abandoned or is underutilized due to constraints that can be overcome.
- To support provincial departments of agriculture in the re-establishment of irrigated crop production on these based on proper land suitability evaluation and land use planning and good management.
- To use judicious conditional allocation of CASP and AsgiSA funding to ensure the re-establishment is done according to appropriate principles and approaches.
- To give priority to areas that used to produce high value crops, and have the capability to do so on a sustainable basis.

5.14 Licensing of meritorious cases of current unlawful irrigation

Substantial areas are presently irrigated unlawfully. Figures are not available, but according to one informer it may apparently amount to a few hundreds of thousands hectares. Satellite imagery is being used by DWA to identify the areas that are being irrigated unlawfully, so as to take steps against the guilty farmers. Where presently unlawful irrigation is using up water that is needed for other purposes or where an underground water source is over-exploited, such irrigation should be terminated.

Likewise, where water is wasted on poor quality soils or due to poor management, such irrigation should be terminated. The latter types of cases can only be identified by means of appropriate resource surveys and land suitability evaluation, together with an evaluation of the farming systems employed and the competency of the farmer. These surveys and evaluations fall in the domain of agriculture. Thus, DAFF should take the initiative to identify such cases and advise DWA accordingly.

Strategies proposed regarding licensing

- To develop guidelines for determining the merit of each case of presently unlawful irrigation, based on the principles outlined above.
- To evaluate each case of unlawful irrigation on merit, according to the guidelines outlined.
- To distinguish between meritorious cases to legalize and wasteful cases to terminate by means of evaluations done by DWA and DAFF in partnership
- To legalize and license those cases that is considered meritorious and is not transgressing according to the guidelines.
- To terminate those cases that is not considered to be meritorious and is transgressing according to the guidelines.

5.15 Development of new commercial irrigated areas

According to several estimates, South Africa's irrigation potential is very limited and the potential for expansion of present irrigation minimal. The estimates indicate that between only about 250 000 ha and 280 000 ha suitable land is available for future expansion of irrigation[10,11]. An *"official"* estimate was that the projected available water could allow expansion of only 178 000 ha[10,11].

Strategies proposed regarding development of new commercial irrigated areas

- To identify the geographic distribution and approximate hectarages of all promising areas with suitable land for irrigation on a broad scale, using the available land type data (DoA responsibility) and all sources of unused surplus water and possible development of additional water sources, using existing reports (DWAF responsibility).
- To match available water with available suitable land (Joint DoA and DWAF responsibility).
- To interact with DWAF to establish a protocol according to which decisions about development of new irrigated areas should be taken by DWAF and DoA in partnership, before DWAF goes ahead with development plans together with a particular provincial authority or district municipality.
- To steer development, where possible, according to appropriate principles and approaches through judicious conditional allocation of CASP and AsgiSA funding.

5.16 Mini-scale irrigated agriculture for household and community level food security

Almost all the former homeland irrigation schemes had a "*food plot*" section, which has been described as the *"social component"* of the schemes[12]. The food plots were the most successful components of these schemes, of which the commercial components almost invariably failed[12]. A few schemes consisted totally or predominantly of food plots[8].

Revitalization of collapsed mini-scale irrigation schemes and the development of new food plot schemes fall under the relevant provincial governments and district municipalities, with DWA making the water available.

Strategies proposed regarding mini scale irrigated agriculture

- To promote revitalization of the food plot components of collapsed former homeland irrigation schemes as food plots.
- To promote inclusion of food plot components in new commercial small-scale farming irrigation schemes.
- To promote provision of water for home garden food production in rural towns and villages and in peri-urban areas.
- To promote rooftop and field runoff water harvesting and storage of such water for home garden food production.
- To promote efficient, water saving irrigation technologies, such as clay pot irrigation.
- To initiate and sponsor research on technologies and other aspects relevant to mini-scale irrigated agriculture.

Activity

Activity 2

Small group activity

1. A number of strategies were proposed for the improvement of irrigation efficiency in South Africa. As irrigation advisor which of these recommended strategies is priority for you to be implemented. Motivate your answer.

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My notes.....

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Authenticator:

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