The Potchefstroom Campus of the North-West University

# A practical assessment of Spatial Development Frameworks in terms of water resources for development

by

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# Abstract

There is no single resource so essential to sustaining life and livelihoods than water (UNDP, 2005). Water is furthermore a strategic resource that not only gives life, but is also a catalyst for development; therefore water has to and must be at the centre of all development plans (Buyelwa, 2009). Water can be the limiting factor for economic growth, upliftment and social development due to its scarcity and uneven distribution.

Strategic spatial interface and relationship with water resource planning and management is fundamental to development and realisation of spatial potential. Strategic spatial planning has many components of which the Spatial Development Framework forms the key regulation to guide development and inform investment opportunities.

The goal of this study is to determine the degree to which water resource management and planning is incorporated in Spatial Development Frameworks in context of strategic spatial planning. Concurrently international strategic spatial planning procedures and water resource management principles are investigated to correlate the local situation with international trends.

A Goal Achievement Matrix (GAM) with ten assessment principles is developed as a tool for evaluation of strategic spatial planning and water resource management documents in terms of the local municipal level. This GAM may be used and implemented as a comparative evaluation tool to compare the degree of integration and implementation of water resource management and strategic spatial planning of local municipal authorities internationally. The percentage score as achieved in evaluation of the GAM indicates the degree of integration of water resource management and planning with strategic spatial planning.

The cumulative result of the GAM scored 68% which can be used as a degree of comparison in future studies with other local municipalities, even on an international level. Measured in terms of the different authority levels the local level performed the worst with a 50% GAM score whilst the national level has a high GAM score of 86%. The low local level score indicates that exceptional legislation and policies on national level are not sufficient to eradicate poverty, provide water for all and provide for long-term sustainability if the implementation at local level falters. The low local level score may also be attributed to a lack of institutional capacity and lack of appropriate skills.

It is concluded that Spatial Development Frameworks (as a component of strategic spatial planning) and water resource management and planning on a local level are not effectively integrated and it is recommended that water resources and planned future development

must be effectively managed and integrated in order to ensure sustainable communities at local level. As a planning recommendation, the Guidelines for the Development of Spatial Development Frameworks developed by the Department of Rural Development and Land Reform must be extended to incorporate the integrative approach between strategic spatial planning and water resource management as a fundamental aspect.

The effective integration of water resource management and planning in strategic spatial planning is key to sustainable, equitable and viable communities.

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*Key words: Strategic Spatial Planning; Water Resource Management and Planning; Sustainability; Spatial Development Frameworks; Goal Achievement Matrix.*

# Opsomming

Daar is geen enkele hulpbron wat so noodsaaklik is vir die voortsetting van lewe en ‘n volhoubare lewensbestaan as water nie (UNDP, 2005). Verder is water 'n strategiese hulpbron wat nie net lewe gee nie, maar is ook 'n katalisator is vir ontwikkeling, dus moet water sentraal in alle ontwikkelingsplanne staan (Buyelwa, 2009). Te danke aan die skaarsheid en ongelyke verspreiding van water, kan dit die beperkende faktor vir ekonomiese groei, opheffing en sosiale ontwikkeling wees.

‘n Strategiese ruimtelike koppelvlak en verhouding van waterhulpbron beplanning en bestuur is fundamenteel tot die ontwikkeling en die verwesenliking van ruimtelike potensiaal. Strategiese ruimtelike beplanning het baie komponente waarvan die Ruimtelike Ontwikkelingsraamwerk deel vorm ten einde ontwikkeling te rig en beleggingsgeleenthede in te lig

Die doel van hierdie studie is om die mate waarin water hulpbronbestuur en -beplanning in Ruimtelike Ontwikkelingsraamwerke, in die konteks van strategiese ruimtelike beplanning, ingesluit word, te bepaal. Terselfdetyd is internasionale strategiese ruimtelike beplanning prosedures en waterhulpbronbestuur beginsels ondersoek om die plaaslike situasie te korreleer met internasionale tendense.

'n Doelwit Bereikings Matriks (Goal Achievement Matrix) met tien assesseringsbeginsels is ontwikkel as 'n hulpmiddel vir die evaluering van strategiese ruimtelike beplanning en water hulpbronbestuur dokumente in terme van die plaaslike munisipale vlak. Hierdie GAM mag gebruik en geïmplementeer word as 'n vergelykende evalueringsinstrument om die graad van integrasie en implementering van waterhulpbronbestuur en strategiese ruimtelike beplanning van die plaaslike munisipale owerhede internasionaal te vergelyk. Die persentasie-telling soos behaal in die GAM evaluering, dui op die graad van integrasie van waterhulpbronbestuur en -beplanning met strategiese ruimtelike beplanning.

Die kumulatiewe resultaat van die GAM behaal 68% wat as 'n mate van vergelyking in toekomstige studies met ander plaaslike munisipaliteite, selfs op 'n internasionale vlak, gebruik kan word. Gemeet in terme van die verskillende autoriteitsvlakke, behaal die plaaslike vlak die laagste met 'n 50% GAM telling, terwyl die nasionale vlak 'n hoë GAM telling van 86% het. Die lae plaaslike vlak telling dui daarop dat uitsonderlike wetgewing en beleide op nasionale vlak nie voldoende is om armoede uit te wis, water aan almal te voorsien en vir langtermyn-volhoubaarheid as die implementering op plaaslike vlak struikel nie. Die lae plaaslike vlak telling kan ook toegeskryf word aan 'n gebrek aan institusionele kapasiteit asook die nodige vaardighede.

Daar is tot die gevolgtrekking gekom dat die Ruimtelike Ontwikkelingsraamwerke (as 'n komponent van strategiese ruimtelike beplanning) en waterhulpbronbestuur en -beplanning nie effektief geïntegreer word op 'n plaaslike vlak nie en dit word aanbeveel dat water hulpbronne en toekomstige beplande ontwikkeling effektief bestuur en geïntegreer moet word ten einde tevolhoubare gemeenskappe op plaaslike vlak te verseker. As 'n beplannings-aanbeveling moet die riglyne vir die ontwikkeling van die Ruimtelike Ontwikkelingsraamwerke, ontwikkel deur die Departement van Landelike Ontwikkeling en Grondhervorming, uitgebrei word om die geïntegreerde benadering tussen strategiese ruimtelike beplanning en bestuur van water hulpbronne in te sluit as 'n fundamentele aspek.

Doeltreffende integrasie van waterhulpbronbestuur en -beplanning in strategiese ruimtelike beplanning is ten slotte die sleutel tot volhoubare, gelyke en lewensvatbare gemeenskappe.

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*Sleutelwoorde: Strategiese Ruimtelike Beplanning; Water Hulpbronbestuur en –beplanning; Volhoubaarheid; Ruimtelike Ontwikkelingsraamwerke, Doelwit Bereikings Matriks.*

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All of my life

In every season

You are still God

I have a reason to sing

I have a reason to worship

~*from the Desert Song* (Hillsong, 2009)

# LIST OF ACRONYMS

| | | |
|---|---|---|
| AGES | - | Africa Geo-Environmental Engineering and Sciences |
| CDS | - | City Development Strategy |
| CEIMP | - | Consolidated Environmental Implementation and Management Plan |
| CMA | - | Catchment Management Agency |
| CSIR | - | Council for Scientific and Industrial Research |
| DBSA | - | Development Bank of Southern Africa |
| DFA | - | Development Facilitation Act |
| DRDLR | - | Department of Rural Development and Land Reform |
| DWA | - | Department Of Water Affairs |
| DWAF | - | Department Of Water Affairs and Forestry |
| EIA | - | Environmental Impact Assessment |
| EM | - | Environmental Mainstreaming |
| EMF | - | Environmental Management Framework |
| GAM | - | Goal Achievement Matrix |
| GIS | - | Geographic Information System |
| IDP | - | Integrated Development Plan |
| IIED | - | International Institute for Environment and Development |
| IISD | - | International Institute for Sustainable Development |
| IPDM | - | Integrated Planning and Development Modelling |
| IS | - | Information System |
| IUCN | - | International Union for Conservation of Nature |
| IWRM | - | Integrated Water Resource Management |
| LIMCOM | - | Limpopo Watercourse Commission |
| LM | - | Local Municipality |
| LUMS | - | Land Use Management System |
| MCA | - | Multi Criteria Analysis |

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|---|---|---|
| MDGs | - | Millennium Development Goals |
| Ml/annum | - | Megalitre per annum |
| MLL | - | Medium Living Level |
| MSA | - | Municipal Systems Act |
| Mtpa | - | Million tonnes per annum |
| MTSF | - | Medium Term Strategic Framework |
| NEMA | - | National Environmental Management Act |
| NSDP | - | National Spatial Development Perspective |
| RDP | - | Reconstruction and Development Plan |
| SACN | - | South African Cities Network |
| SADC | - | Southern African Development Community |
| SDF | - | Spatial Development Framework |
| SEA | - | Strategic Environmental Assessment |
| SoE | - | State of the Environment |
| SPLUMB | - | Spatial Planning and Land Use Management Bill |
| SSP | - | Strategic Spatial Planning |
| UN | - | United Nations |
| UNCED | - | United Nations Conference on Environment and Development |
| UNDP | - | United Nations Development Programme |
| UNCHE | - | United Nations Conference on the Human Environment |
| VDM | - | Vhembe District Municipality |
| WARMS | - | Water-use Authorisation and Registration Management System |
| WCDM | - | Water Conservation Demand Management Plan |
| WCED | - | World Commission on Environment and Development |
| WMA | - | Water Management Area |
| WSAs | - | Water Service Authorities |
| WSDP | - | Water Services Development Plan |
| WSSD | - | World Summit on Sustainable Development |

# GLOSSARY

| Word | Definition |
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| Agenda 21 | Agenda 21 is an international program, adopted by more than 178 governments, to put sustainable development into practice around the world. It emerged from the United Nations Conference on Environment and Development (UNCED) held in Rio de Janeiro in 1992. |
| Catchment | A catchment means the area from which any rainfall will drain into the watercourse or watercourses or part of a watercourse, through surface flow to a common point or points. |
| Conservation | The management of human use of the biosphere to yield the greatest benefit to present generations while maintaining the potential to meet the needs and aspirations of future generations. Conservation thus includes sustainable use, protection, maintenance, rehabilitation, restoration, and enhancement of the natural and cultural environment. Conservation in relation to a water resource means the efficient use and saving of water, achieved through measures such as water-saving devices, water efficient processes, water demand management and water rationing. |
| Credible SDF | A credible SDF is one which has adequately analysed the state of the municipality and details the drivers for change and effectively gives direction for the future growth and development of the municipality in alignment with government policies. It should also be equipped with a thorough implementation plan; comprising of costs, responsible persons, and lists of actions from a short to long term period. |
| Development | Land development means the construction of buildings or structures on land, or the change of use of land, including the subdivision or consolidation of land or any deviation from the land use or uses permitted in terms of an applicable Land Use Scheme. |
| Basic water supply facility | The infrastructure necessary to supply 25 litres of potable water per person per day supplied within 200 metres of a household and with a minimum flow of 10 litres per minute (in the case of communal water |

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| | points) or 6 000 litres of potable water supplied per formal connection per month (in the case of yard or house connections). |
| Basic water supply service | The provision of a basic water supply facility, the sustainable operation of the facility (available for at least 350 days per year and not interrupted for more than 48 consecutive hours per incident) and the communication of good water-use, hygiene and related practices. |
| Basic sanitation facility | The infrastructure necessary to provide a sanitation facility which is safe, reliable, private, protected from the weather and ventilated, keeps smells to the minimum, is easy to keep clean, minimises the risk of the spread of sanitation-related diseases by facilitating the appropriate control of disease carrying flies and pests, and enables safe and appropriate treatment and/or removal of human waste and waste water in an environmentally sound manner. |
| Basic sanitation service | The provision of a basic sanitation facility which is easily accessible to a household, the sustainable operation of the facility, including the safe removal of human waste and wastewater from the premises where this is appropriate and necessary, and the communication of good sanitation, hygiene and related practices. |
| Environment | The surroundings within which humans exist and that are made up of:<br>a) the land, water and atmosphere of the earth;<br>b) micro-organisms, plant and animal life;<br>c) any part or combination of (a) and (b) and the interrelationships among and<br>between them; and<br>d) the physical, chemical, aesthetic and cultural properties and conditions of the foregoing that influence human health and well-being. |
| Environmental Management Framework | An EMF provides a study of the biophysical and socio-cultural systems of a geographically defined area to reveal where specific land uses may best be practiced and to offer performance standards for maintaining appropriate use of such land. |
| Geographical Information System | GIS is a system of hardware and software used for storage, retrieval, mapping, and analysis of geographic data. |

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| Integrated Development Plan | The Strategic Municipal Development Plan, reviewed on an annual basis, required by the MSA (Act 32 of 2000) which guides municipal decisions and budgets as well as the development programs of SoE's and the private sector. |
| Medium Living Level | MLM is the minimum monthly income needed to sustain a household. This numerical indicator varies according to household size, i.e. the larger the household the larger the income required to keep its members out of poverty. It includes the following items: food, clothing, and compulsory payments to local authorities in respect of rent, miscellaneous services, water and electricity, fuel and energy for lighting and heating, washing and cleaning materials, education, transport, contributions to medical funds and medical and dental expenses, replacement of household equipment, taxes, and support of relatives.<br>MLL provides the absolute number of people living below this line, which is very useful for planning purposes. |
| Millennium Development Goals | The set of development goals as contained in the Millennium Declaration of 2000 which are intended to guide actions for development globally. |
| RDP Level of water supply | There are 5 criteria for the minimum RDP requirement:<br>(1) Quality: 4 water quality classes to qualify the potability of water (e.g. classes 0 and 1 are ideal, class 2 is for short term use only and class 3 is unacceptable for domestic use);<br>(2) Quantity: a minimum quantity of 25 litre per person per day;<br>(3) Distance: water must be within a distance of 200m from the dwelling/house;<br>(4) Reliability: access to the water resource for at least 98% of the time (1 in 50 year resource reliability); and<br>(5) Flow: the availability or flow of water at a communal tap should at least be equal to 10 litres per minute. |
| Reserve | Reserve means the quantity and quality of water required to (a) satisfy the basic human needs by securing a basic water supply, as prescribed under the Water Services Act (108 of 1997) for people who are now or who will, in the reasonably near future, be relying upon; taking water from; or being supplied from, the relevant water resource |

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| | and (b) to protect aquatic ecosystems in order to secure ecologically sustainable development and use of the relevant water resource. |
| Settlement | A settlement is small community, village or a group of houses in a thinly populated area. |
| Spatial Planning | Planning of the way in which different activities, land uses and buildings are located in relation to each other, in terms of distance between them, proximity to each other and the way in which spatial considerations influence and are influenced by economic, social, political, infrastructural and environmental considerations. |
| Spatial Development Framework | A Spatial Development Framework (SDF) is a core component of a Municipality's economic, sectorial, spatial, social, institutional, environmental vision. It is a tool to achieve the desired spatial form of the Municipality. Furthermore, it is a framework that seeks to guide overall spatial distribution of current and desirable land uses within a municipality in order to give effect to the vision, goals and objectives of the municipal IDP. The aims of a spatial development framework are to promote sustainable functional and integrated human settlements, maximise resource efficiency, and enhance regional identity and unique character of a place. |
| Sustainable Development | Sustainable Development requires the integration of social, economic and environmental factors in the planning, implementation and evaluation of decisions to ensure that development serves present and future generations. |
| Urban Areas and Urban Development | Urban areas can be defined as places where population densities are greater than 150 people / km²<br>- dwelling unit densities greater than 1du/ha<br>- settlement contained within an Urban Edge<br>- services provided on a grid reticulation system<br>- some primary; urban agriculture, building materials, resource extraction but mainly secondary and tertiary economic activity. |
| Village | A village is a clustered human settlement, larger than a hamlet and usually smaller than a town, with the population ranging from a few hundred; often located in the rural areas. |
| Watercourse | watercourse means- |

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| | • a river or spring:<br>• a natural channel in which water flows regularly or intermittently:<br>• a wetland, lake or dam into which, or from which, water flows: und<br>• any collection of water which the Minister may, by notice in the Gazette, declare to be a watercourse,<br>• and a reference to a watercourse includes, where relevant, its bed and banks |
| Water Resource | A water resource includes a watercourse, surface water, estuary, or aquifer |
| Water Management Area | An area established as a management unit in the National Water Resource Strategy within which a catchment management agency will conduct the protection, use, development, conservation, management and control of water resources. |
| Water Security | Water security is the reliable availability of an acceptable quantity and quality of water for health, livelihoods and production, coupled with an acceptable level of water-related risks. |
| Water Services Authority | A water services authority is any municipality that has the executive authority to provide water services within its area of jurisdiction in terms of the Municipal Structures Act 118 of 1998 or the ministerial authorisations made in terms of this Act. There can only be one water services authority in any specific area and water services authority area boundaries cannot overlap. Water services authorities are metropolitan municipalities, district municipalities4 and authorised local municipalities. |
| Water services development plan | A plan for water and sanitation services in terms of the Water Services Act (108 of 1997), Section 12b (i).<br>A WSDP focuses on water services, the supply thereof and sanitation. The focus of a WSDP is to provide effective water services to the consumers in accordance with the aims of the Government. It is also a tool to ensure effective, sustainable and economical water services that is managed as a business. |

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# 1 INTRODUCTION

## 1.1 INTRODUCTION AND BACKGROUND

According to the National Water Resource Strategy (DWAF, $2004_d$), water is one of the key, most fundamental and indispensable natural resources. It is fundamental to life, the environment, food production, hygiene, industry, and power generation. There is no single resource so essential to sustaining life and livelihoods than water (UNDP, 2005). In terms of a United Nations definition, South Africa is water stressed, bordering on water scarce, with a water availability of only 1 100 m3/person/annum (Department of Environmental Affairs and Tourism, 2006:144).

The Department of Water Affairs (DWA) is committed to honour the statement of President Jacob Zuma: "We shall not falter until each and every community in our nation has clean potable water because our water supply forms a strong backbone to all social and economic development initiatives" (DWA, $2010_a$:i). According to the Minister of Water Affairs, water is a strategic resource that not only gives life, but is also a catalyst for development; therefore water has to and must be at the centre of all development plans. She furthermore states that water availability and management must feature very strongly in the development strategies of all sectors (Buyelwa, 2009).

With water being a relatively scarce resource that is distributed unevenly both geographically, through time as well as socio-politically, it can be the limiting factor when it comes to economic growth and social development. According to the Development Bank of South Africa (2009:5) development must be energy and water efficient

Strategic spatial planning is as much about the process, institutional design and mobilization as about development of substantial theories (Albrechts, 2001) and is a place-shaping and space-mediating mechanism (CUPS, 2004).

As part of the expression of strategic spatial planning in South Africa, Spatial Development Frameworks (SDFs) informs decision making in municipalities and is a tool with which to manage and guide development. It has however been determined that many SDFs in the past were not credible.

Spatial interface and relationship with water resource planning and management is fundamental to development and realisation of spatial potential. There is however an anticipated possibility that water resource management and strategic spatial planning are not optimally integrated to the extent that is required and this should be investigated in terms of the what, where and when.

Among the many things I learnt as a president, was the centrality of water in the social, political and economic affairs of the country, the continent and the world

~ Nelson Mandela (2002)

## 1.2 PROBLEM STATEMENT

According to the Development Bank of South Africa (2009:1), environmental resources are rapidly declining in both quality and quantity. Water can be the limiting factor for economic growth, upliftment and social development due to its scarcity and uneven distribution. Internationally, unclean water and poor sanitation have claimed more lives over the past century than any other cause (UNDP, 2006:21) and we are entering a world water crisis.

A high-level analysis by the Department of Water Affairs showed that in the year 2000, 10 of the 19 water management areas in the country were facing a water deficit. South Africa is a water-scarce country and our average annual rainfall is a little more than half of the world average, and much of our country is semi-arid. Our water resources are limited and it is essential that we use them efficiently and in the best interests of all our people (DWAF, $2004_d$:2). In South Africa, out of its 120 rivers, 82% were indicated to be threatened with 44% being critically endangered. There are eight times as many people in South Africa trying to survive on the same amount of natural capital-such as land, water and air, as there were a century ago. The large economy and the subsequent increase in resource demand resulted in unsustainable levels of consumption (DBSA, 2009:13).

On the other hand, spatial development frameworks (SDFs) are prepared on local to provincial level as a component of strategic spatial planning. The future development proposals indicated by SDFs require water resources and the availability of water will ultimately influence the locality and feasibility of future planned developments.

According to the Development Bank of Southern Africa (2009:14) a lack of institutional capacity and lack of appropriate skills and holistic thinking makes it difficult to implement tools such as Strategic Environmental or Sustainability Assessments (SEAs) and Environmental Management Frameworks (EMFs), Spatial Development Frameworks, Integrated Development Plans (IDPs), Land Use Management Plans (LUMPs) and Growth and Development Strategies.

Currently, the lack of integrated water resource management hampers future residential development as proposed and planned in a SDF. Effective and integrative strategic planning

in close cooperation with the IDP and water resource management of the municipality is key in ensuring that new developments will have access to water.

Thomas Arnolds stated that water is a “complex social good,” with “meanings as varied and complex as the uses to which […it] is put.”

## 1.3 HYPOTHESIS

Water is life and is key to fundamental aspects of our human existence. It plays an integral part of a development on local scale as well as an area’s regional development.

Spatial Development Frameworks (as a component of strategic spatial planning) and water resource management and planning on a local level are not effectively integrated and it is recommended that water resources and planned future development must be effectively managed and integrated in order to ensure sustainable communities at local level.

## 1.4 OBJECTIVES

The study aims to achieve the following objectives will be:

- To define and formulate Strategic Spatial Planning in South Africa and broadly correlate it internationally;
- To define and formulate the role of Water Resource Management in South Africa with a broad international correlation;
- To depict the aim and process of a SDF and IDP and their interface with other sectoral plans;
- To investigate the current legislation and policies on all levels relating to strategic spatial planning and water resource management;
- To develop a Goal Achievement Matrix with assessment principles which can be used as tool in other local municipalities;
- To critically evaluate the current interaction of strategic spatial planning such as SDFs, IDPs with water resource management as in the WSDPs by means of the GAM method based on a local level;
- To determine how and at what level water resources and strategic spatial planning should be integrated.

## 1.5 STRUCTURE OF THE DOCUMENT

Figure 1 illustrates the layout of this document graphically. The diagram represents the various chapters, the concepts to be investigated as well as the way of thought in conducting the study.

**Chapter 1 - Introduction and Setting the Scene**

This chapter forms the basis for this dissertation where the research problem is defined, the research objectives are clearly formulated and a hypothesis is developed.

**Chapter 2 – Strategic Spatial Planning**

The concepts and application of strategic spatial planning in South Africa as well as an international perspective are addressed. SDFs and IDPs forms part of strategic spatial planning and will be discussed in relevant detail.

**Chapter 3 – Water Resource Planning and Management**

The concept and application of water resource planning and management is discussed in South Africa and internationally.

**Chapter 4 – Evaluation Criteria**

This chapter is dedicated to the integration of strategic spatial planning and water resource management through legislation and policies as well as the key findings from the previous two chapters. Evaluation criteria are derived from these two sides through using the GAM (Goal Achievement Matrix) method.

**Chapter 5 – Application of Evaluation Criteria**

The evaluation criteria developed in Chapter 4 will be applied to the case study through a GAM. The case study entails the pre-feasibility study for water supply to an eco-industrial park in Limpopo Province. The applicable SDFs, IDPs and WSDP is be evaluated in terms of the criteria and a final cumulative GAM with prioritization is a result.

**Chapter 6 – Conclusions and Recommendations**

Conclusions are derived and potential future research is identified and the relevant information summarised.

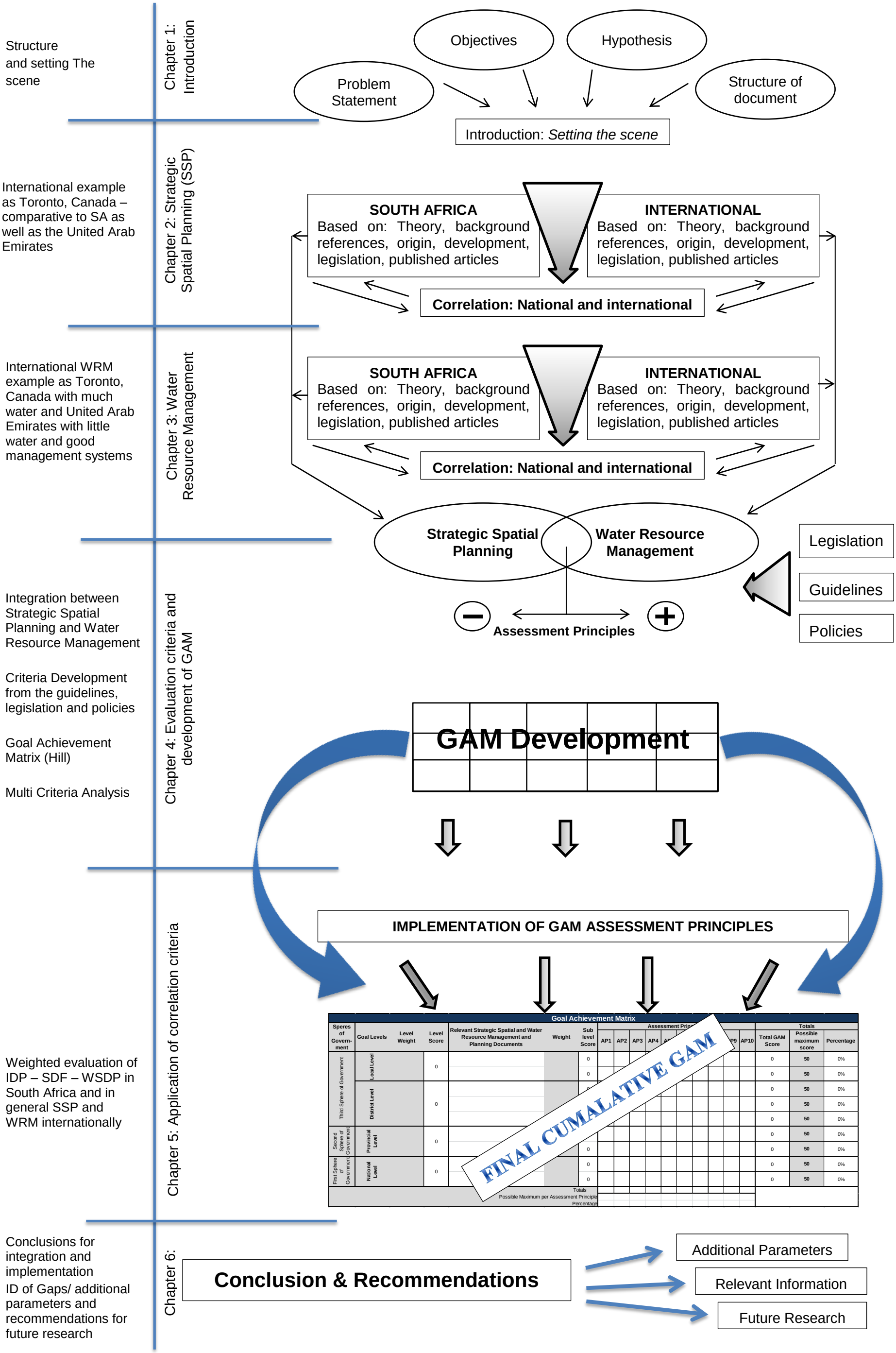



**Figure 1: Layout of the Document (Source: Own Construction, 2012)**

# 2 STRATEGIC SPATIAL PLANNING

## 2.1 STRATEGIC SPATIAL PLANNING IN CONTEXT

Strategic (spatial) planning is not a single concept, procedure or tool. It is a set of concepts, procedures and tools that must be tailored to whatever situation is at hand if desirable outcomes are to be achieved. Strategic plan making is as much about the process, institutional design and mobilization as about development of substantial theories (Albrechts, 2001). According to the Centre for Urban Policy Studies (CUPS, 2004), spatial planning is a place-shaping and space-mediating mechanism which aims to intervene in order to shape the development outcomes affecting a specific area, whether it is a region or a neighbourhood. It involves making decisions relating to the location and distribution of land use activities. The role that spatial planning play is ultimately to create the conditions for an enhanced quality of life, to fulfil the aims of efficiency and democracy through public participation and to meet the challenge of sustainable development (Government of Jamaica, 2012).

The main reasons for practicing spatial planning is to support a shared understanding, joint visioning, coordinated prioritisation, resource allocation and implementation. The degree of effectiveness of spatial planning has a relationship with the realisation on livelihoods and constitutional rights. It further impacts on economic growth and development, affects social development outcomes and has environmental impacts (IDPM, 2011).

Maxim Planning Solutions (2008:6) describes strategic spatial planning as the identification of spatial constraints and opportunities from various sectoral and geographical perspectives, the formulation of guidelines for spatial planning within a certain study area, as well as the formulation of a spatial framework to help guide the future developments of a region.

Strategic spatial planning can therefore be cumulatively defined as:

An interdisciplinary process which involves decision making to guide development in the aim to enhance the quality of life through a joint vision, coordinated prioritisation resource allocation and effective implementation.

## 2.2 STRATEGIC SPATIAL PLANNING IN SOUTH AFRICA

The Department of Rural Development and Land Reform (DRDLR, 2011) indicates spatial planning to be a planning process that is inherently integrative and strategic, takes into account a wide range of factors and concerns and addresses how those aspects should be arranged on the land. The Spatial Planning and Land Use Management Bill (2012) states the following principles which apply to spatial planning:

- Spatial Justice;
- Spatial Sustainability;
- Efficiency;
- Spatial Resilience;
- Good Administration.

### *2.2.1 Origin of Strategic Spatial Planning in South Africa*

In essence, spatial segregation began in 1652 when colonialism shaped our human settlements. The Apartheid Era was introduced in 1948 and had a tremendous spatial implication in the form of the Group Areas Act of 1950 where your race determined where you lived (Laverty, 2007) and thus the spatial distribution of development in our country. Apartheid further had a dominant blueprint planning approach with catastrophic disintegrative spatial consequence's (South Africa, $2001_b$). An official form of long term planning commenced in the 1960's in the form of the Decentralisation Policy focussing on economic development. This was followed by the National Physical Development Plan of 1975. The Good Hope Plan developed in 1981 with the Regional Industrial Development Programme following in 1991. The Regional Industrial Development Programme focussed on the development of an integrated South Africa as well as the promotion of regional development (Drewes, 2010:3).

Due to the historic nature of strategic planning, South African development faces enormous challenges. The problem of achieving of social and spatial equity (one of the main principles in spatial planning) was enhanced by Apartheid which led to the dual nature of our cities (CSIR, 2005:5).

In reaction to our past outdated and inappropriate way of planning, various negotiating forums conceived the notion of integrated development planning during the early 1990's. In 992, the ANC Policy Guidelines for a Democratic South Africa proposed under more that a new system of municipal planning should be aimed at ensuring integrated and sustainable development with focus on delivery (Department of Provincial and Local Government (Guide Pack 1/7):11). After democracy of 1994, the Reconstruction and Development Programme (RDP) developed in 1995 which was a policy framework for integrated and coherent socio-economic progress with the Development Facilitation Act (67 of 1995) also aiming at speeding up the implementation of the RDP programmes and projects. The National Spatial Development Perspective developed between 1999 and 2003 to provide the central organising concept for facilitating alignment and serve as the indicative tool for development

planning in government. As successor of the 2003 NSDP, the 2006 NSDP provides a framework for a far more focused intervention by the State in equitable and sustainable development. The NSDP recommends mechanisms to bring about optimum alignment between infrastructure investment (South Africa, 2006:i).

### *2.2.2 Development of Strategic Spatial Planning*

Strategically, long term planning is a requirement as supported by various legal documents. Through which all government programmes and activities find expression in space (South Africa, 2006:4). According to Andrew Borainne (2004) chairperson of the South African Cities Network, both short-term operational plans and long term strategic plans are needed. Furthermore, the integration and alignment of sector policies and plans are highlighted and he proposes an outcome-based mechanism for integration of sector plans where the focus must shift to outcomes than the inputs and outputs.

According to Chapter 5 of the Municipal Systems Act (MSA) (32 of 2000), strategic spatial planning (SSP) in South Africa must be developmentally oriented as to ensure that it strives to achieve the goals set apart for it in the Constitution of South Africa. It must also contribute to the progressive realisation of the fundamental rights contained in the Constitution of South Africa. The Municipal Systems Act also stipulates the importance of the alignment and complementation of any planning by the municipality with development plans and policies of other municipalities and their organs of state.

Strategic spatial planning in South Africa has been applied and implemented in various policies and frameworks and forms an integral component in different legislation.

According to Schoeman (2012:17) some planning instruments as part of strategic planning are:

- Integrated Development Plans;
- Spatial Development Frameworks;
- Environmental Development Frameworks;
- Integrated Transport Plans;
- Precinct Plans;
- Sustainable Human Settlement Plans;
- Strategic Planning;
- Project Management (Schoeman, 2012:17).

Two specific processes in which strategic spatial planning takes the most evident form in South Africa, namely the Integrated Development Plan and the Spatial Development Framework will be further investigated. Due to the lack of an EMF in the concerned study area, the role and integration with the EMF will not be discussed in further detail

Different sets of guidelines have been developed for strategic spatial planning such as the IDP Guide Pack and the most current Guidelines for the Development of Spatial Development Frameworks by the Department of Rural Development and Land Reform (2011) which guides the development of these frameworks.

## 2.3 APPLICATION OF STRATEGIC SPATIAL PLANNING IN SOUTH AFRICA

### *2.3.1 Sustainable Development and Strategic Spatial Planning*

Sustainable development is the integration of social, economic and environmental factors in planning, implementation and decision-making in order to ensure that development serves present and future generations. It can be both a principle for planning as well as a deliverable. There are two aspects which need to be considered in the planning process:

(1) The use of resources in meeting the current need whilst ensuring the reserve for future generations;

(2) The social, economic and natural environment should be considered when planning.

During the United Nations Conference on Environment and Development, Agenda 21, it was stated that many problems and solutions have their roots in local activities (Department of Provincial and Local Government (Guide Pack V/7): 14), thus action on ensuring sustainable development should take place at local government level. Here planning decisions can contribute to achieving sustainability and financial and institutional considerations need to be taking into account during the planning process. The role of local government to achieve sustainability is emphasised by the definition of developmental local government in the White Paper on Local Government (1998): "local government committed to working with citizens and groups within the community to find sustainable ways to meet their social, economic, and material needs, and improve the quality of their lives".

### *2.3.2 Integrated Development Planning*

The Local Government Transition Act Second Amendment (97 of 1996) made Integrated Development Plans a legal requirement. The White Paper on Local Government (1998) contains elements and methodology to an IDP. Furthermore, a sound contextual justification of integrated development planning is a tool for local government in terms of objective-

oriented resource allocation, institutional transformation, integration between different spheres of government and transparent interaction between municipalities and residents. According to Section 25 of the Municipal Systems Act (32 of 2000), all municipalities need to undertake an integrated development planning process to produce an integrated development plan (IDP). Integrated development planning is defined as one of the municipalities' core functions and the minimum content and process is defined in Section 26 of the MSA. Integrated development planning is a process through which municipalities prepare a strategic development plan for a five year period. An IDP is a product of the integrated planning process (Department of Provincial and Local Government (Guide Pack 0/7):6). Even though the adoption of an IDP is a legal requirement, an IDP must be envisioned by the municipal council to improve the quality of life for all its citizens by guiding and informing all planning, budgeting, management and decision-making within the municipality. Integrated development planning is therefore the most important and actual strategic planning process within the responsibilities of the South African Government at municipal level

The IDP Guide Pack (Department of Provincial and Local Government (Guide Pack 0/7)) lists the following important reasons for implementing an IDP:

- Increases effective use of scarse resources;
- Speeds up delivery;
- Helps attract additional funds;
- Helps strengthen democracy;
- Fights Apartheid through integration;
- Promotes intergovernmental coordination.

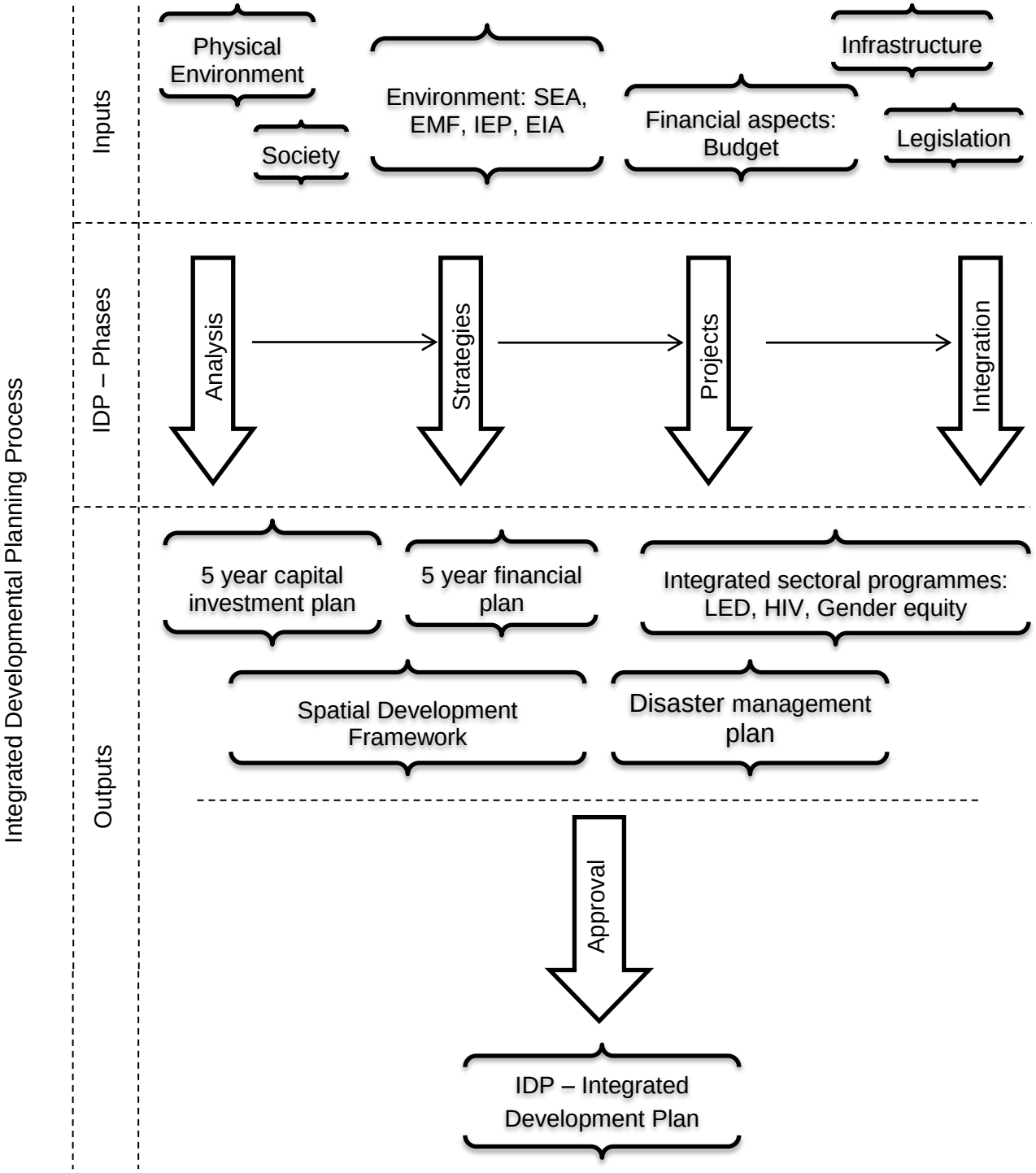



**Figure 2: Process and Phases from and IDP**

**Source: Own Construction (2012) as derived from the IDP Guide Pack III**

The methodology of an IDP consists of the following core development phases:

**Phase 1:** **The Analysis**

This phase entails the analysis of the needs and issues from the perspective of the public within the existing situation. The affected people must be involved in determining what the problems are and what the extent thereof its. Of critical importance are not only the problems and the symptoms, but also the causes or root of the problem.

The important deliverables in phase 1 are: An assessment of existing level of development, prioritization of issues, causes of the prioritised issues and information on available resources (Department of Provincial and Local Government (Guide Pack 0/7):17).

**Phase 2:** **Development Strategies**

This is the phase in which the municipality formulates the solutions to address the issues that were identified in the previous phase. This includes a long-term vision formulation, development objectives, development strategies and project identification (Department of Provincial and Local Government (Guide Pack 0/7):18).

**Phase 3:** **Projects**

Phase 3 entails the design and specification of projects for implementation. It is essential that the identification of the projects must happen in accordance with the priority issues and objectives that were identified in the previous phases. Outcomes of phase 3 are performance indicators, project outputs, targets, locality, activities and time schedules and costing and budget estimates.

**Phase 4:** **Integration**

The specific projects that have been identified need to be integrated with specific strategies, objectives and the resource framework and should comply with the legal requirements. An operational strategy which includes a 5 year financial plan, a 5 year capital investment programme, an integrated SDF, integrated sectoral plans, a consolidated monitoring or performance management system, disaster management plan, institutional plan with reference to sector plans.

**Phase 5:** **Approval**

This takes place when the IDP has been completed and is submitted to the municipal council for consideration and approval. Before approval, an opportunity for public comment must be given and amendments made. The approved IDP for the municipality results from Phase 5 (Department of Provincial and Local Government (Guide Pack 0/7):19).

IDPs are the local response to ensure sustainability through the planning process (Department of Provincial and Local Government (Guide Pack V/7):14). The implementation of decisions in the IDP process is achieved by drawing on resource comprised of the municipal budget, the commitment of the provincial and national departments, and other funding sources. The focus of the economic dimension of the IDP is called local economic development, which is economic development at local level. The main aim of this development is the issue of poverty alleviation.

The entire integrated developmental planning process is stimulated by social interaction at all levels, so social sustainability is essential in the development of an IDP. The general focus of the social dimension of the IDP is on gender equality and poverty alleviation. Environmental sustainability is of such a high priority that it needs to be incorporated in all of the different phases in the IDP development process (Department of Provincial and Local Government (Guide Pack V/7):15).

According to the Municipal Planning and Performance Management Regulations (South Africa, $2001_b$), a municipality's integrated development plan must at least identify an organogram, required for the implementation of the IDP. It must identify any investment and development initiatives in the municipality, including infrastructure, physical, social, economic and institutional development; all known projects, plans and programs to be implemented within the municipality by any organ of state; and the key performance indicators set by the municipality. The budget, financial resources for capital expenditure projects and a financial strategy should be included.

### *2.3.3 Spatial Development Frameworks*

According to the Municipality Systems Act (32 of 2000), an Integrated Development Plan (IDP) is required to include a Spatial Development Framework (SDF) also comprising guidelines for a land use management system. It can therefore be said that the IDP uses the SDF as a framework for development of land uses in the various area. A SDF is regarded as a crucial part of the integration component of an IDP, which is a principle strategic planning instrument which guides and informs all planning, budgeting, managing and decision making, as required by Section 26 of the Municipal Systems Act (32 of 2000).

A SDF is a long-term strategic planning mechanism ensuring better designed, more efficient, more sustainable and more equitable spaces in cities a single municipality, region or country as a whole. It must show what should develop where and how much of it should be developed when (IPDM, 2011).

The main aim of a SDF is to promote sustainable functional and integrated human settlements, maximise resource efficiency, and enhance regional identity and unique character of a place (DRDLR, 2011).

A SDF is a core component of a Municipality's economic, sectoral, spatial, social, institutional and environmental vision. It is a tool to achieve the desired spatial structure of the Municipality. Furthermore, it is a framework that seeks to guide overall spatial distribution of current and desirable land uses within a municipality in order to give effect to vision, goals and objectives of the municipal IDP (DRDLR, 2011:7). A SDF sets out the approach of development in the area of jurisdiction and is a spatial logic guiding public sector investment. It furthermore ensures sustainability of the area and indicates places where private partnerships are a possibility (South Africa, $2001_a$).

A credible SDF is one which has adequately analysed the state of the municipality and details the drivers for change and effectively gives direction for the future growth and development of the municipality in alignment with government policies and must be equipped with a thorough implementation plan.

The SDF must guide all current and future land related decisions. The decisions can include land use changes, where and how public funds must be spent as well as guide investors and developers for ideal locations (DRDLR, 2011:7). It further coordinates interventions of various role players in line with development vision (MP Toolkit, 2010:9). A SDF must be indicative (South Africa, $2001_a$), and not an area-covering determination of land-use zones but specific and precise in cases where it wants to enforce or prevent certain types of land use (IDP Guide III).

Guidelines and requirements as in the Municipal Systems Act (32 of 2000), White Paper on Spatial Planning and Land Use Management (South Africa: $2001_a$) and Land Use Management Bill Requirements (South Africa, 2008) form the basis of the development of SDFs. A toolkit for preparation and implementation of SDFs in Mpumalanga was developed in 2010. Integration with other policies and municipalities however continued to be a problem and the implementation was often disappointing.

After an evaluation by the Department of Rural Development in 2008, it was determined that many SDFs were not credible, comprehensive or purposeful. Spatial frameworks have been too broad, too utopian, and have been contradicted by both national policy and property

market trends. They were neglected in site level development decision-making, and did not link sufficiently to land use management or infrastructure planning. Due to this and other identified shortcomings, the DRDLR compiled Guidelines for the Development of Spatial Development Frameworks in order to promote the development of credible SDFs (DRDLR, 2011:i). The key components of the different guidelines and requirements will be discussed in the sections to follow.

#### *2.3.3.1 Guiding Principles for the Formulation of SDFs*

According to the White Paper on Spatial Planning and Land Use Management (South Africa, $2001_a$) every municipality should have an indicative plan or in other words a Spatial Development Framework). The spatial development framework guides and informs all decisions of the municipality relating to the use, development and planning of land. The timing of the process of compiling the spatial development framework must correspond with that of the IDP. The Municipal Systems Act (32 of 2000) states that an IDP must reflect a spatial development framework which must include the provision of basic guidelines for a land use management system for the municipality. Land Use Management Bill Requirements (South Africa 2008) sets out principles and norms and standards to which a SDF should comply.

In 2010, the Toolkit for Preparation and Implementation of SDFs in Mpumalanga, was developed to guide the formulation of SDFs. The SDF influences the municipal budget departmental planning, land use management and the IDP (Figure 3).

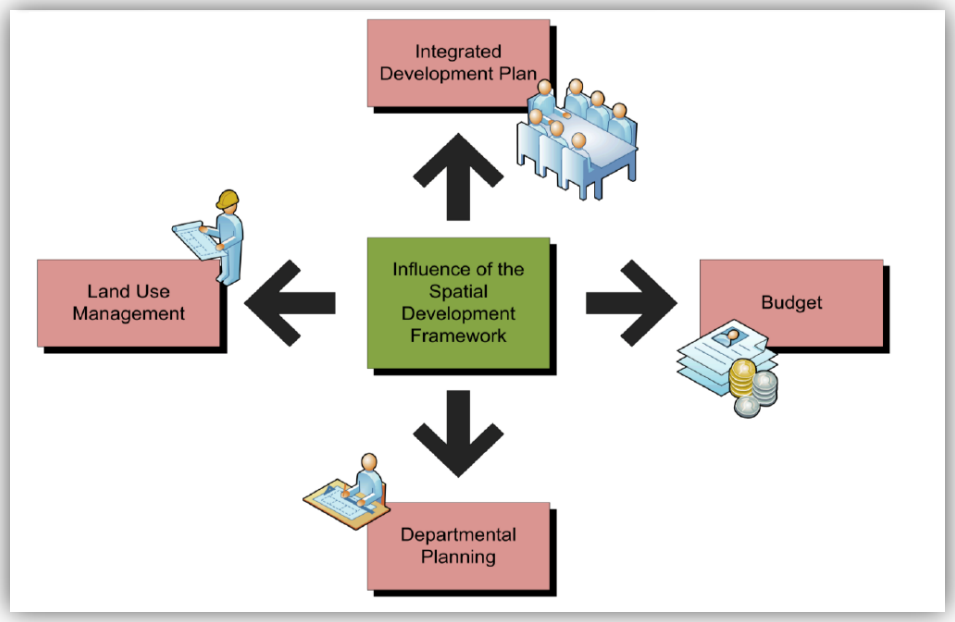



**Figure 3: Influence sphere of a SDF**

**Source: Anon (2010:56)**

*2.3.3.2 Department of Rural Development and Land Reform Guidelines of a SDF*

For the purpose of this study, focus will be given to the most recent guidelines for SDFs. The Department of Rural Development and Land Reform (DRDLR, 2011) developed the Guidelines for the Formulation of Spatial Development Frameworks. There are 7 phases to compile a SDF as indicated in Figure 4.

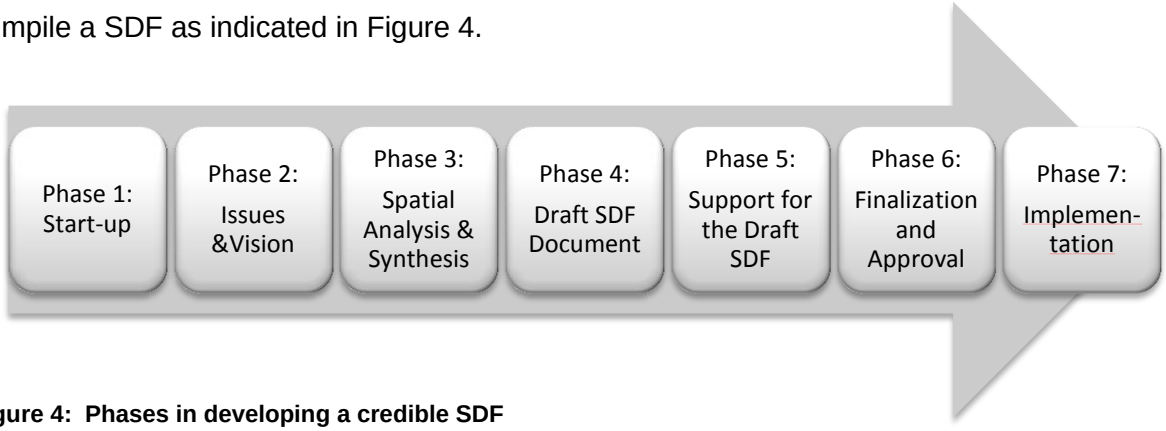



**Figure 4: Phases in developing a credible SDF**

**Source: AGES (2012) as derived from the SDF Guidelines (DRDLR, 2011)**

A Spatial Development Framework is regarded as a crucial part of the integration component of an Integrated Development Plan (IDP) which is in principle a strategic planning instrument guiding and informing all planning, budgeting, managing and decision making, as required by Section 26 of the Municipal Systems Act (32 of 2000).

The main goal of the SDF must be to achieve the desired spatial structure of the municipality based on their vision for development, the Development Facilitation Act (DFA) principles, government policies, financial, environmental and land resources and the socio-economical context of the municipality whilst maintaining an international link with the IDP (DRDLR, 2011:i). To achieve this, the SDF must be a guide to all municipal decisions involving land or planning for future use and development thereof. It must also guide developers and investors in terms of location and structure of developments.

A credible SDF is one that adequately analyses the state of the municipality and details the drivers of growth and development in alignment with government policies. It is furthermore:

- Based on an agreed vision and planning principles that promote equity and sustainability; for example:
    - assisting with restructuring spatially inefficient settlements
    - promoting sustainable use of land and water resources
    - channelling resources to areas of greatest need (social investment) and development potential (economic investment) and

- stimulating economic opportunities in rural and urban areas (South Africa, $2001_a$)

- Aligned with relevant national and provincial policy;
- Reflects a clear understanding of the reality of the municipal spatial environmental, social and economic systems, particularly with regard to urban infra-structure needs and capacity;
- Provides sufficient detail to inform Council decisions that have a spatial dimension;
- Includes an implementation plan, with measurable targets;
- Realistic in terms of growth prospects and the financial and institutional capacity of the municipality to implement the proposals;
- Aligned with the municipal Environmental Management Framework (EMF);
- Aligned with any applicable bio-regional plan, a copy of which must be inserted in the relevant section;
- Provides guidance for sector plans and development initiatives from all government agencies, e.g. land reform programmes, and private sector projects that will contribute towards the municipality‘s vision;
- Enjoys a high level of buy-in from all stakeholders (i.e. the process of formulation is as important as the product);
- Provides guidance for the Municipality‘s LUMS; and,
- Is clear, succinct and accessible to a wide audience (DRDLR, 2011:ii).

As it is not the aim of this study to evaluate the guidelines, more detail in terms of the methodology in preparing a credible SDF is available in Annexure A with a comprehensive summary of the Guidelines for the Development of a Spatial Development Framework by the DRDLR (2011).

### *2.3.4 Interface between IDP and SDF*

Integration of the SDF with the IDP should take place where the importance of initial alignment of the process cycles will be required.

The main interface between many sectors and frameworks is sustainable development (Schoeman, 2012). The principles of sustainability namely economic efficiency, environmental integrity and human well-being form the golden thread through which the different frameworks should be integrated. There is a delicate balance between environment, human, economic, institutional, spatial and transportation planning and

development.

The DFA (108 of 1995) highlights the importance of both integrated developmental planning and sustainability. The Spatial Planning and Land Use Management Bill (SPLUMB) (South Africa, 2012) indicates that it is part of the good administration principle that all spheres of government are responsible to ensure an integrated approach in terms of land use and land development that is guided by the spatial planning and land use management systems. The principle of integration according to the Land Use Management Bill (South Africa, 2008) promotes efficient and optimally functional and integrated settlement patterns.

IDPs and SDFs have some correlating principles and norms in terms of the set objectives, stakeholder participation and land use management.

**Objectives**

Correlating outcomes (South Africa, $2001_a$:8):

- Restructure spatially inefficient settlements;
- Promote the sustainable use of land resources in the country;
- Channel resources to areas of greatest need and development potential;
- Takes into account the fiscal, institutional and administrative capacities of role players, the needs of communities and the environment;
- Stimulates economic development opportunities in rural and urban areas;
- Support an equitable protection of rights to and in land.

**Public participation**

Both IDPs and SDFs first two phases focus on the consideration of social issues through stakeholder or public participation prior to the spatial analysis. These public issues are then used to determine the objectives and vision of the area.

**Integrated functionality**

The functionality of SDFs and IDPs are bound to be integrated with one another. The IDP requires the development of a SDF and a SDF feeds back into the IDP cycle and spatially informs the IDP.

**Land Uses**

Land uses regulate development by establishing or implementing a measure to regulate the use or a change in the form or function of land (South Africa, 2008).

Land use management can be seen as the implementation framework for IDPs and SDFs as

they regulate and determine the land uses in accordance with land development objectives.

Both IDPs and SDFs promote the effective and sustainable land use. This is inspired by considerations regarding the responsibility *society and the state* has to preserve the earth's natural assets for present and future generations in a sustainable and economic way (South Africa, $2001_a$:8). Another relation between SDF, IDP and LUMS is that an SDF gives an indication of where development or particular land-uses should be discouraged or restricted, as to ensure long term sustainability (South Africa, 2008:14). Figure 5 indicates the integration between IDPs and sectoral planning.

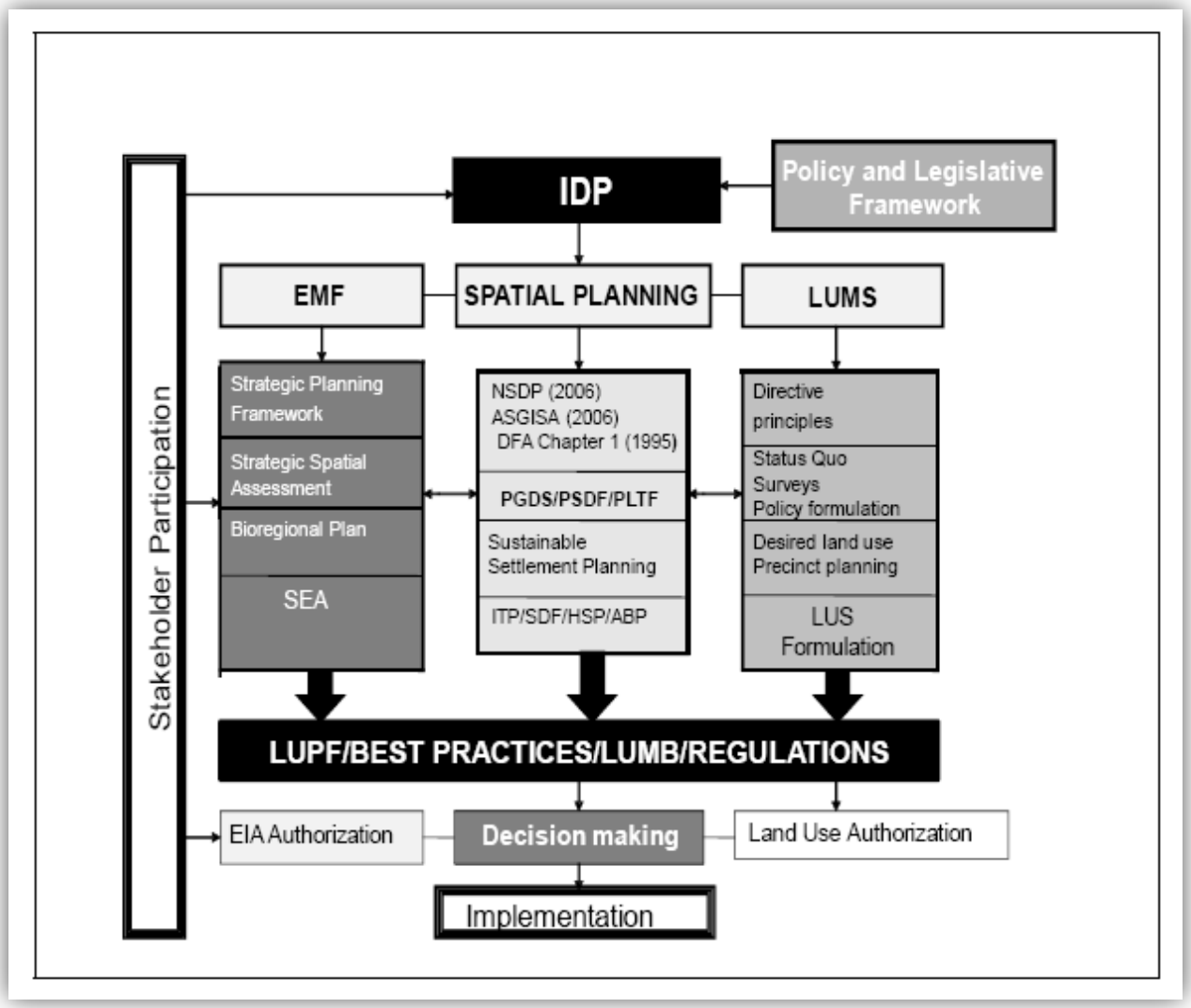



**Figure 5: IDP-SDF Interface**

**Source: NWU (2012:17)**

According to Glazewski (2000:240) some very important guidelines with the implementation of an IDP are to align spatial planning and budgeting, to integrate planning time frames between the sectors, to link integrated development plans and to develop inter-sectoral planning processes.

## 2.4 INTERNATIONAL APPLICATION OF STRATEGIC SPATIAL PLANNING

Whilst attempting to achieve sustainable development together with the fact that urban areas have a huge impact on social, economic and natural environments, there is a need for a strategic (referring to choices and priorities) and long term solution to this complex situation. In a review of international case studies in metropolitan strategic planning conducted by the CSIR in 2005 to examine this phenomenon, the strategic planning processes of various areas were investigated. Toronto (Canada), as the most compatible to South Africa, will be further used as the international example.

According to the CSIR (2005:4) the concept of a City Development Strategy (CDS) has become a preferred way of dealing with the increased complexities that local and international cities have to face. The CDS process entails to identify a long-term vision, taking the socio-economic and environmental context into account, identifying competitive advantage, look at critical issues, establish an integrated strategy for the urban reality creates flexibility of decision-making, is action oriented and oriented towards a new culture of urban management.

Some of the major strategic planning challenges towards a long-term city development strategy are the strengthening of the comparative advantage of cities in the global economy which includes investments in assets like infrastructure and the promotion of modern and dynamic industry networks. Furthermore the achievement of social and spatial equity is an international challenge. In order to ensure long-term environmental sustainability three critical factors play a role: economic development and job creation, access to land and housing, and access to infrastructure. The last challenge is to change from the traditional forms of urban government towards an interactive approach by working together to enhance a city's competitiveness (CSIR, 2005:6).

Three themes for consideration in strategic planning have been determined with important aspects to be considered in preparing a strategic spatial plan listed under each theme.

**(1) Institutional Aspect**

- A committed leader with continuity is needed for initiation and implementation of a long-term strategy process;
- The place in the organisation where the strategic planning process is led, coordinated and managed is essential;
- Roles must be clearly determined and a relationship with key stakeholders is important ;
- Intergovernmental cooperation and alignment with neighbouring municipalities and the

establishment of institutional mechanisms needs to be facilitated;

- The institutional context / political economy will determine the process, content and outcome of the strategic strategy depending on the stage of development, the problem and size of the city or the needs driving the development (CSIR, 2005:9-12).

**(2) Process Aspect**

- The process outcomes is much more than a strategy document – it can have the character of stakeholder participation, improvement of capacities and capabilities, strategic thinking and addressing realities in a coordinated strategic approach by public, private and community sectors;
- The use of a hierarchy of plans according to time horizon and level of detail as planning instruments. A general strategic direction is set by longer-term strategic plans (30-50 years), a detailed indication and implementation as medium-term plans (5 years) with annual operational plans and budgets being the official control instruments to guide yearly implementation;
- A long term planning process entails the following steps:
    - Formal initiation and approval of the process
    - Information gathering and analysis
    - Formulation of vision and strategies
    - Formulation of implementation mechanisms and projects
    - Adoption or approval of plan
    - Budgeting and implementation
    - Monitoring and evaluation (CSIR, 2005:17)
- Public participation (a form of democracy) during SWOT analyses and proposal formulation forms part of the preparation of the strategy and will vary according to the political ideology and culture. For the formulation and implementation, alliances to address the issues form the backbone of the city strategy. Measures of participation are the width and the depth of participation which refers to the number of participants and the degree of involvement (CSIR, 2005:20);
- There are statutory links between the long-term and detailed/medium-term plans where the higher level plans (statutory documents in terms of provincial and national legislation) informs the lower-level plans;
- Implementation of the strategic planning process can be ensured by political will and

continuity, linked to the availability of funding and stakeholder buy-in (CSIR, 2005:21);

- Spatial and or sector plans are informed and bound by higher level planning;
- Budgeting holds various challenges as the link between strategic planning and annual budgeting of municipalities is vague (CSIR, 2005:24);
- Performance management, monitoring and evaluation are usually the weak points of a city strategy.

**(3) Content Aspect**

- Long-term strategies' content includes a long-term vision, long-term development strategies and more policies to address these strategies with reference to detail plans or implementation plans;
- General issues like sustainability, economic prosperity, urban management and infrastructure development are addressed in long-term strategic development plans, but unique issues as relevant to the area will also be a focus point (CSIR, 2005:26).

### *2.4.1 Strategic Planning in Toronto, Canada*

Strategic Planning in Toronto, Canada can be effectively compared to strategic planning in South Africa, as the Metropolitan government closely resembles that of South Africa. The City of Toronto formed in 1998 after amalgamation of independent municipalities (CSIR, 2005:2). The process of strategic planning as set out above will be briefly discussed and assessed in terms of their Official Plan – the Toronto Plan of 2002.

**(1) Institutional**

- The Council of Toronto performed a catalytic and leadership role in defining and shaping the city. Furthermore to guide the process, a Council Reference Group (political representatives) was established and the Strategic Corporate Policy Division coordinated the process with the assistance of a cross corporate staff group;
- The Official Plan identified campaigns to implement the objectives which refer to partnership building to locate new resources for key areas of city development. The "Campaign to make Housing Happen" was an initiative to provide rental housing. A report was compiled by the City's Urban Development Roundtable which sets out an action plan by assigning roles to the different levels of government.

**(2) Process**

- As a long-term planning instrument, the Toronto Plan of 2002 is a legally binding document in terms of Ontario's Planning Act. It is a policy to guide decisions in terms of

growth, change and development while outlining the vision. The nature of link to the medium instruments entails that detailed plans must be drafted in terms of this plan, and the Plan also contains secondary plans;

  - For the medium-term/ more detailed instrument, land use designations, local planning policies, secondary plans and site and area specific policies are contained in the Plan. The link from medium to short-term instruments is that by-laws must be developed conforming to the Plan. Further, decisions and actions of Council, including public investment in services, service delivery and infrastructure will guide this Plan.

- Short term instruments are mostly statutory land-use mechanisms like zoning by-laws and are directly informed by long-term and secondary plans (CSIR, 2005:17);
- The following process was in developing the long-term strategic planning document or the Toronto Plan of 2002:
  - Council decision to prepare new official plan
  - Adoption of framework by council
  - Launch process by sponsoring major forum on future of city
  - Conduct research analyses
  - Release discussion paper to public input (an Official Plan website was used for public participation as this is a society with high literacy levels and access to information)
  - Public discussions
  - Draft plan
  - Public consultations on draft plan
  - Consideration and approval of plan by council
  - Forward plan to Minister of Municipal Affairs and Housing for Provincial approval (CSIR, 2005:19)
- For a link between long-term planning and implementation, the Toronto Plan recommends three mechanisms: Secondary Plans, Development Permits and Community Improvement Plans:
  - Further implementation plans and strategies like a municipal housing strategy or transportation strategy are needed to bring the Plan to life. Other Plans like the Water Efficiency Plan and Tourism Strategy must implement the vision of Council's

Strategic Plan and are vital in implementing the Official Plan.

**(3) Content Issues**

- The Toronto Plan contains a vision and principles, the urban structure and strategy, policies and guidelines for decision–making, land use designations and maps, approach to implementation plans as well as policies to guide local planning and lastly secondary plans and site specific policies (CSIR, 2005:26).

During the planning and implementation phase, soft issues like leadership and the organisational culture are key success factors for the strategic planning (CSIR, 2005:13). For implementation, other plans should be developed. These plans and strategies inform and support one another.

## 2.5 SUMMARY

Based on section 2.2 to 2.4, a definite correlation between South African and International strategic spatial planning can be drawn.

There are correlations between key aspects in strategic spatial planning in South Africa and on International level. This is represented in Table 1 through a simple SWOT analyses which has external and internal factors.

Internal Factors:

- Strengths / Weaknesses

External Factors

- Opportunities / Threats

**Table 1: SWOT analysis of Strategic Spatial Planning on National and International Level**

| Strengths | | | Weaknesses | | |
|---|---|---|---|---|---|
| | **South Africa** | **International** | | **South Africa** | **International** |
| **1** | **Long-term Vision** | **Long- term Vision for strategic plan** | **1** | **Equity and Spatial Segregation due to Apartheid** | **Social and Spatial Equity is a challenge in terms of wealth distribution** |
| **2** | **Strategy based on good legislation and policies**<br>**Identifies investment development initiatives for infrastructure** | **Strategy to address investment in assets like infrastructure** | **2** | **Prioritisation in budget allocation is a challenge** | **Budget allocation is vague** |
| **3** | **Encourage and aim for sustainable development** | **Addresses sustainability, economic prosperity and urban management** | **3** | **Leadership is often problematic** | **A champion or community leader is needed to initiate the process – not always possible** |

| | | | | | |
|---|---|---|---|---|---|
| 4 | Guide and manage decision making | Policies and guidelines for decision making | 4 | Implementaion often fails | Needs further plans for implementation<br>Failure to implement strategy successfully and sustainably |
| **Opportunities** | | | 5 | Monitoring the performance of the plan neglected | Systems for performance management, monitoring and evaluation not in place |
| 1 | Communicative channel between governing body, stakeholders, councillors and public enhances sustainability | Inputs from public, council and other stakeholder buy-in adds value | **Threats** | | |
| 2 | Aims to integrate LUMS and vice versa | Informs short-term statutory land-use mechanisms | 1 | Involvement of all three government spheres lacks | Alignment and Institutional Mechanisms problematic |
| 3 | The strategy is a flexibility tool | Long-term strategies set the general indication and medium and short term instruments are more flexible | 2 | Political will and buy-in plays a key role which may compromise the independent credibility of the strategy | With social inclusion, the planning process may become a political process |

**Source: Own Construction (2012)**

It is evident that the methodology of the Toronto Plan strongly corresponds with the formulation of a spatial development framework in South Africa and even with the integrated development plan process. The process in developing a long-term planning document for Toronto relates to the new Version 8 Guidelines for the Formulation of a SDF by the DRDLR (2011). A comparison between the three strategic planning processes was made and is indicated in Figure 6. The SDF and international strategic plan both have a separate initiation or start-up phase where the process must be approved by the managing authority. During the analysis phase of the IDP, issues and vision are identified which correlates with

phase 2 and 3 of the SDF and phase 2 of the international strategic spatial planning (SSP). Phase 2 of the IDP develops strategies to reach its objectives of phase 1 whereas the SDF develops proposals and strategies in phase 4 and phase 3 of the international strategic spatial planning also formulates strategies in response to the issues and vision. Phase 3 & 4 of the IDP correlates with phase 4 of the international SSP as the projects and its implementation are defined and form the key of these strategic plans. Some aspects of the SDF phase 4 also corresponds with these phases as the IDP projects should be prioritised and spatially presented in the SDF. Integration between the IDP, SDF and other sector plans takes place in phase 4 of the IDP. Phase 5 of the IDP, 5 &6 of the SDF and 5 of the international SSP entails final submission and approval. During phase 7 of the SDF and 6 & 7 of the international SSP, implementation and monitoring takes place. Although the IDP projects are part of implementation, there exists a gap in having no specified procedures for monitoring in the execution and deliverable of identified and funded IDP projects.

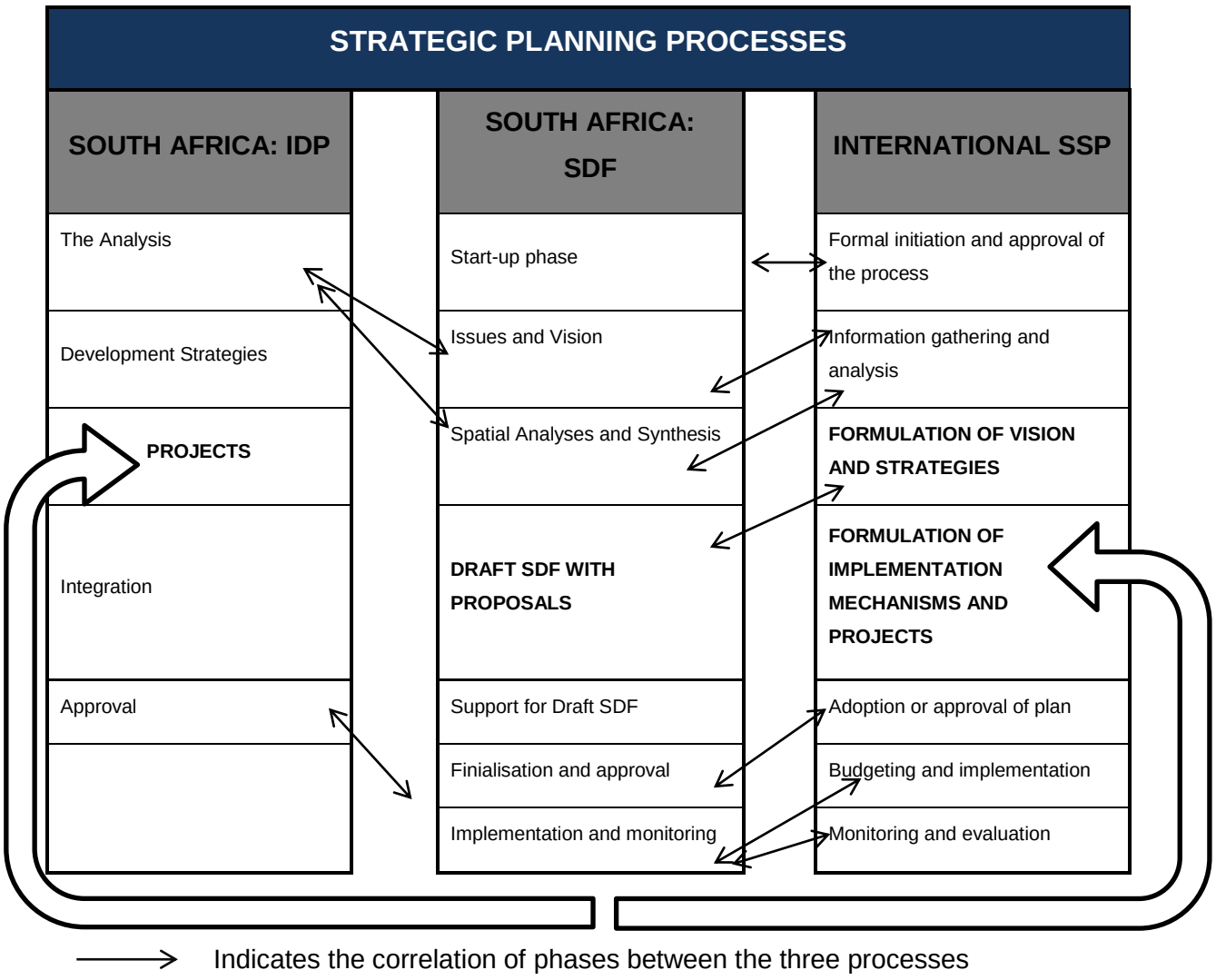



**Figure 6: Comparison between South African and International SSP Processes**

**Source: Own Construction (2012)**

# 3 WATER RESOURCE PLANNING AND MANAGEMENT

## 3.1 WATER RESOURCE PLANNING AND MANAGEMENT IN CONTEXT

According to the Status Quo of Integrated Water Resource Planning in South Africa conducted by the Department of Water Affairs (DWA), water has diverse roles in:

- bringing food security
- providing for domestic and social needs
- supporting the development that will bring about economic growth
- maintaining the environment (with domestic and social objectives)
- improving overall quality of life (DWA, $2010_c$)

Recognising that water does not drive development, but is the resource that underpins most, if not all, it is a government's or department's duty to be in a position to respond to the expected growth, and to ensure, where economically viable, that water is available when and where it is required. The planning for water resources must be done far in advance of the actual need and a long-term vision is required (Van Rooyen *et al.*, 2009:5).

Water supply requires long-term planning, and strategies to source and supply water must be aligned to national development goals (DWA, $2010_b$:1)

## 3.2 WATER RESOURCE PLANNING AND MANAGEMENT IN SOUTH AFRICA

In order for us to understand water resource planning and management in South Africa, the background to water and the management thereof will be briefly discussed.

### *3.2.1 Status Quo in South Africa*

#### *3.2.1.1 The Current Water Situation in South Africa*

The concept of water resources refers to all water, including rivers, streams, wetlands, estuaries and groundwater. Surface water refers to water accumulated above the ground surface whilst groundwater refers to water that is underground (for example in aquifers). These two water areas are related to each other by means of the saturated zone (Pretorius, 2012). According to Bahri (2009:6) the concept of resources management generally does not include municipal and industrial wastewaters. In many Water Management Areas, surface water resources are now fully utilised and almost the only opportunity left for further development lies in the exploitation of groundwater (DWAF, $2004_a$:1-13).

The quantity of water available for direct human use or to support aquatic ecosystems depends on the availability and sustainability of the resource. One of the principles in the National Water Resource Strategy is to ensure an adequate supply of water to support the prosperity of the country and the well-being of its population. Rainfall, surface flows, and groundwater recharge are intimately linked in the hydrological cycle needs to be taken into account in water management. Rivers and dams (surface water) provide in most of South Africa's water requirements. The 320 major dams have a capacity of 32 400 million $m^3$. Where surface water is inadequate, groundwater is used, but is limited due to underlying hard rock geology (Department of Environmental Affairs and Tourism, 2006:145). The estimated groundwater available for use between 10 000 million to16 000 million $m^3$/annum are available for use in an average rainfall year. According to estimates of undeveloped resource potential, the yield from surface water can be increased by about 5 400 million $m^3$/annum through further resource development. Such estimates exclude possible developments that are unlikely to have economic viability or sustainability (Department of Environmental Affairs and Tourism, 2006:147).

#### *3.2.1.2 Water Services*

The term water services mean water supply services and/or sanitation services or any part thereof. Water services are provided to domestic consumers, institutions, businesses and industries by water service authorities (DWAF, 2003:2).

Water supply services means the abstraction from a water resource, conveyance, treatment, storage and distribution of potable water, water intended to be converted to potable water and water for industrial or other use, to consumers or other water services providers. This includes all the organisational arrangements necessary to ensure the provision of water supply services including, amongst others, appropriate health, hygiene and water-related awareness, the measurement of consumption and the associated billing, collection of revenue and consumer care. Water services authorities have a right but not an obligation to provide industrial water to industries within their area of jurisdiction (DWAF, 2003:69).

The primary determinants of future water requirements are population growth and economic growth, which also relates to socio-economic standards (DWAF, $2004_b$: 26).

#### *3.2.1.3 Development and Water Resources*

It is essential to ensure that the supply of water and protection of water resources do not unduly restrict the economic development of the country (DWAF, $2004_a$: 2). In her opening statement at the National Water Summit, the Minister of Water Affairs (2008), Mrs LB Hendrics, stated:

*"Lack of access to safe water is poverty. Lack of access to safe sanitation is poverty. We cannot claim to have won the war against poverty until all people have access to safe water and sanitation systems."*

Where catchment areas have previous homeland areas, poverty eradication is a high priority for the Department of Water Affairs and they take opportunities to implement or support poverty eradication initiatives. Water supply and sanitation projects as well as surplus water supply to poor emerging farmers are all ways for poverty relief and rural development (DWAF, $2004_a$: 2).

According to research by the Department of Environmental Affairs and Tourism (2008:64) water requirements will exceed availability by 2025. The growth in water requirements will essentially be in the urban domestic and industrial sectors. This highlights the connection between economic growth, poverty eradication and sustainable development.

The conservative view of growth suggests that where people live will be increasingly dominated by the availability of water and the cost of that water (Van Rooyen *et al.*, 2009:7). With effective and integrative water resource management, this however is not deemed to be the situation.

In order to ensure water resource planning and management, the National Water Act (36 of 1998) directs the way that the water resource must be protected, used, developed, conserved, managed and controlled in an integrated manner and this is the responsibility of national government. The Water Services Act (108 of 1997) in turn manages and directs water services or potable water and sanitation services by the municipalities to the water users (DWAF, s.a.$_a$:8).

*Water – gathered and stored since the beginning of time in layers of granite and rock, in the embrace of dams, the ribbons of rivers – will one day, unheralded, modestly, easily, simply flow out to every South African who turns a tap. That is my dream.*

*Antjie Krog*

#### *3.2.1.4 Towards Water Resource Planning*

Due to the fact that almost all readily available water already being put to use, water resource planning can no longer simply propose the development of new schemes to supply demand, but must work towards the careful management and optimisation of existing uses (Van Rooyen *et al.*, 2009:4). Water resource planning is structured but flexible, with the Department being guided by national policies, plans and programmes. Flexible reconciliation

strategies have been developed and will ensure water for the large metropolitan areas if implemented in time (Van Rooyen *et al.*, 2009:7)

The Department of Water Affairs is expected to ensure that water is available for growth centres, whilst also ensuring that industrial and agricultural requirements at regional and national scale are met (DWA, $2010_c$:5) and thus water resource information is necessary for effective water planning. Water resource planning must account for ecological imperatives (maintaining or improving river ecosystems), international obligations, and human needs at local level.

The water demand and status of the water availability necessitates effective management and allocation as well as close alignment with local government. For the purpose of this study, water resource planning and management will be further investigated.

### *3.2.2 Origin of Water Resource Planning and Management*

Water resource planning and management in South Africa has evolved from a community resource to an undemocratic, private approach towards a democratic right of water for all in terms of legislation.

Before 1652 with the arrival of the Dutch and British, water rights under African ordinary law were unwritten and were seen as a community resource. It was only considered as essential when a community came under threat from another encroaching tribe. Between 1652 until 1810, the Dutch Rule was practiced where water is a public commodity under complete state control. The British rule, between 1810 and 1952, treated water as a public commodity and introduced the riparian system. This was further revived by Afrikaner Nationalists in the absolute ownership rule. Post 1994, the democratic government changed the methodology and aimed at providing the societal need to provide water to all and the need to use this scarce resource efficiently (Tewari, 2009:705).

Water resource planning was contained in the National Water Act (1956) where water was in private ownership and based on Riparian rights (DWAF, s.a.$_a$:9). The riparian doctrine was derived from the English common law which was borrowed in part from the Roman civil law. Under the riparian doctrine the right to the use of water resides in the ownership of riparian lands – property that borders the water body (Tewari, 2009:693). The 1956 Act ensured that water was mostly used by the dominant group who had access to land and economic power. The basic human right of access to water was neither practised nor recognised. There was no focus in the Water Act on the protection or conservation and demand management of water (DWAF, s.a.$_a$:9).

After democracy in 1994, the White Paper on National Water Policy (South Africa, $1997_a$)

was compiled and indicated that 35% of South Africans were without safe drinking water and 50% were without adequate sanitation (Kidd, 2009). The Reconstruction and Development Programme was developed where the new water law – for its people- was formulated.

In 1998, the National Water Act (36 of 1998) brought about a fundamental change to management of water and water use rights. Water is now a public right, a permit (licensing) system has been established designed to allocate water equitably in order to establish beneficial use (Smithers & Frezghi, 2011). The state is the trustee or custodian of the water. This law system is based on the Roman-Dutch law and is also the public –trust doctrine as the rivers were seen as resources belonging to the nation as a whole and were available for common use by all citizens, but which were managed and controlled by the state (Tewari, 2009:702)

Furthermore, the National Water Act (36 of 1998) aims to protect, use, develop, conserve, manage and control water resources as a whole. According to Tewari (2009:693), the success in management depends on the institutional effectiveness.

In terms of water resource management, the historic ways will need to change drastically. In the past, water supply by engineers was managed through the principle of capturing and storing surface water in developing dams and schemes: pipe it; pump it; move it; and use it. We can however no longer afford this thinking paradigm. It is now time for the complex optimisation of various distributed sources and savings (Van Rooyen *et al.*, 2009:8).

### *3.2.3 Development of Water Resource Planning and Management*

Recent strategies and tools have been developed to serve all levels of decision-making. These entail:

(1) The National Water Resource Strategy

In this strategy, the overall state of the country's water resources as in 2000, with projections up to 2025 were provided. It was determined that catchments are under stress, with water requirements and existing allocations to users exceeding the available supply. By 2025 the situation is expected to worsen considerably. The NWRS (DWAF, $2004_d$) however stated that

*"In general, sufficient water can be made available at all significant urban and industrial growth points in the country for water not to be a limiting factor to economic development."* To achieve this, a number of reconciliation interventions were listed under which water management is one of them:

- Demand management;

- Water resource management;
- Managing groundwater resources;
- Reuse of water;
- Control of invasive alien vegetation;
- Reallocation of water;
- Development of surface water resources;
- Inter-catchment transfers.

(2) Development of the Department's Internal Strategic Perspectives, addressing each of the nineteen Water Management Areas

The ISPs were prepared for each of the 19 WMAs in more detail that the NWRS. It indicated the need for water reconciliation strategies in South Africa's metropolitan areas

(3) Intensive reconciliation studies for the major metropolitan areas

An intensive study was required in these areas as the metropolitan areas are the recognised engines of growth in South Africa's economy. Important conclusions were that water efficiency measures must be urgently implemented, water reuse should be encouraged (like return flows from Gauteng being identified as the best resource for coalfield developments near Lephalale, Limpopo Province), groundwater resources as well as surface water resources should be further developed

(4) Reconciliation studies focused on all other towns and villages across the country, with the intention of having a holistic water resource picture and plan for the country. This study aims to present a thorough status quo for all towns in South Africa, especially were water resources are scarse. Infrastructure management and capacity problems will be incorporated and multi-facetted strategies will be required (Van Rooyen *et al.*, 2009:6).

## 3.3 APPLICATION OF WATER RESOURCE PLANNING AND MANAGEMENT IN SOUTH AFRICA

Strategic water resource planning takes place within the Department of Water Affairs. To ensure sufficient water resources for the country, strategic planning is the responsibility of Directorate of National Water Resource Planning, within the Chief Directorate: Integrated Water Resource Planning (Van Rooyen *et al.*, 2009:5). It is of critical importance that all responsible water management authorities understand the constraints that would be imposed by a lack of water so that they too can work towards a convergence of need and supply in their own planning and development initiatives.

### *3.3.1 Sustainability of Water Resources*

Sound water resource management is one of the key components of sustainable development as advocated by Agenda 21. The National Water Act demands that the environmental standards of rivers be upheld to secure the sustainability of water resources. This water requirement must therefore be factored into all water resource planning and development initiatives (DWA: $2010_c$:15). There are social, economic, and ecological implications in this and implementing the Reserve is going to be an increasingly difficult socio-economic balancing act. Adaptive planning is essential and DWA is guided by national policies, plans and programmes. Rapid growth, and particularly urbanisation, has required rapid adaptation to secure supplies to a mixed and growing economy and meeting the needs of all people. In order to ensure the sustainable supply of water resources, adaptable reconciliation strategies have been developed. If implemented in time, this will ensure water for the large metropolitan areas.

### *3.3.2 Integrated Water Resource Management (IWRM) in South Africa*

Integrated Water Resource Management (IWRM) is a process that aims to promote the coordinated development and management of water, land and related resources in order to maximize the resultant economic and social welfare in an equitable manner without compromising the sustainability of vital ecosystems (GWP, 2000). It can also be described as a concept or principle aiming to meet the needs for use of the water resource, as expressed by the stakeholders (water users), in such a way as to ensure the equitable, beneficial and sustainable use of the water resource (DWAF, $2004_c$:1).

The Integrated Water Resource Management (IWRM) includes initiatives to:

- Develop and implement national/ regional strategies, plans and programmes with regard to integrated river basin, watershed and ground water management;
- Programmes for mitigating the effects of extreme water-related events;
- Diffusion of technology and capacity-building for non-conventional water resources and conservation technologies to developing countries and regions facing water scarcity;
- Programmes for energy-efficient sustainable and cost-effective desalination of sea-water, water recycling and water harvesting;
- Establishment of public-private partnerships and other forms of partnerships that give priority to the needs of the poor; and
- Support regional, sub-regional and capacities for data collection and processing and for

planning, research, monitoring, assessment and enforcement (Department of Environmental Affairs and Tourism, 2008:65).

As represented in Figure 7, it is projected that in 2025 large areas in South Africa will have a water demand deficit.

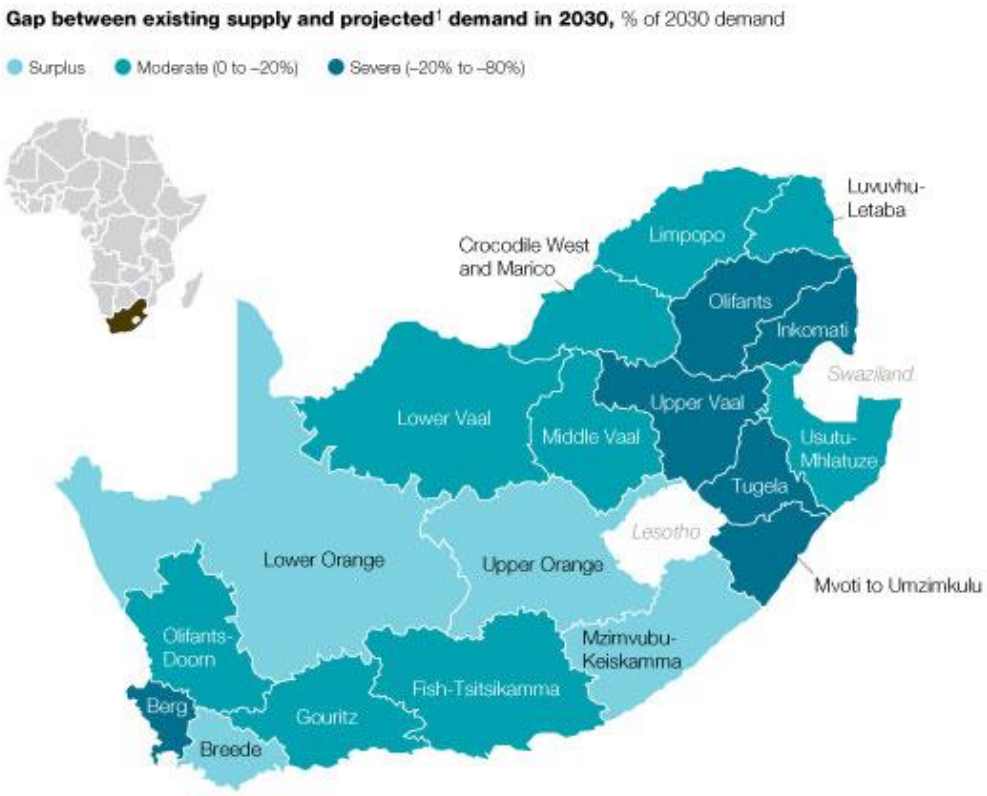



**Figure 7: Gap between existing suply and projected demand in 2030**

**Source: Smithers & Frezghi (2011) from Boccaletti, Stuchtey, and van Olst (2010)**

DWA is striving towards an Integrated Water Resource Management (IWRM). The ultimate aim of this IWRM process is to arrive at:

- an allocation schedule that meets the requirements of the National Water Act (36 of 1998);
- water resources yield and other models that are representative of the flow regime of the river systems in the area;
- management class scenarios for the river (i.e. Reserve and Resource Quality Objectives set);
- a Catchment Management Strategy.

These deliverables can only be finalised once the Catchment Management Agencies (CMA) assume responsibility for managing the water resources of their respective Water Management Areas (DWAF, $2004_b$:i)

### *3.3.3 Institutional Management*

The objective of managing the quantity, quality and reliability of the nation's water resources is to achieve optimum, long-term, environmentally sustainable social and economic benefit for society from their use.

The main water resource institutions are the Minister of Department of Water Affairs and the Department of Water Affairs, followed by Catchment Management Agencies and the Water User Associations. The level of responsibility is illustrated in Figure 8.

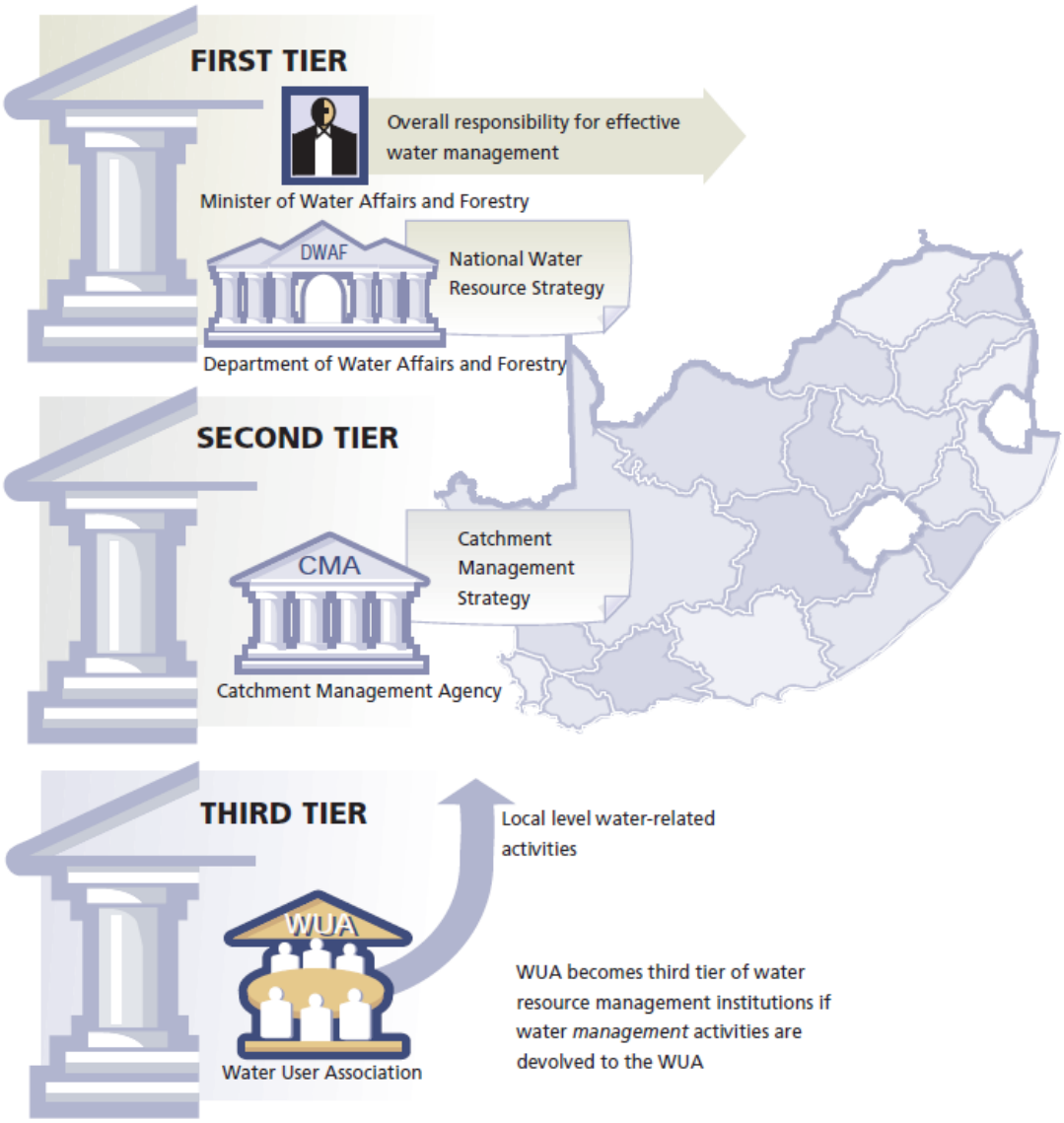



**Figure 8: Framework of Institutional Water Management**

**Source: DWAF (s.a.$_b$:6)**

The institutional responsibilities for water management between different role players according to the National Water Resource Strategy (DWAF, $2004_d$:91), are as follows:

(1) Minister of the Department of Water Affairs:

- public trustee and custodian of water resources with the responsibility to ensure that:
    - water resources are protected, used, developed, conserved, managed and controlled in a sustainable and equitable manner, for the benefit of all persons
    - and water is allocated equitably and used beneficially in the public interest, while promoting environmental values (DWAF, $s.a._b$:7)
- The National Water Act allows for delegation of powers and duties (DWAF, $2004_d$:92) and the minister has delegated many of her powers to relevant water management institutions as discussed below (Department of Environmental Affairs and Tourism, 2006:156).

(2) Department of Water Affairs and Forestry

- Administration of aspects on behalf of the Minister;
- The development and implementation of strategies and internal policies, plans and procedures, and regulatory instruments relating to the Act;
- Planning, developing, operating and maintaining State-owned water resources management infrastructure, and for overseeing the activities of all water management Institutions;
- The role will however, progressively change as regional and local water management institutions are established and the responsibility and authority for water resources management are delegated and assigned to them;
- The Department's eventual role will mainly be:
    - to provide the national policy and regulatory framework within which other institutions will directly manage water resources, and to maintain general oversight of the activities and performance of these institutions
    - to manage South Africa's international relationships and activities in water matters, although some aspects of this may eventually also be handled through institutions established with neighbouring countries (DWAF, $2004_d$:92)

(3) **Water management institutions** and responsible authorities

- Can be defined as a **catchment management agency**, a water user association, a body responsible for international water management, or any person who fulfils the functions of

a water management institution in terms of the National Water Act;

- General water resource management;
- It is important to note that only the Minister, or a catchment management agency to which the appropriate powers and duties have been assigned (but which may also be limited) may authorise the use of water. Other water management institutions may not authorise water use;
- The Minister retains responsibility for authorising certain uses at national level and a catchment management agency may not issue a licence to itself without the Minister's consent (DWAF, $2004_d$:93).

(4) Water Management Areas

Our water resources are allocated to 19 Water Management Areas (WMA). Due to the uneven distribution of water resources, water transfers are taking place between WMAs, nationally and internationally (Department of Environmental Affairs and Tourism, 2006:145).

- The water management areas covering the entire country were established in October 1999 by Government Notice No. 1160. The boundaries of the water management areas (that is, those boundaries that are not defined by international boundaries or South Africa's coastline) lie mostly along the divides between surface water catchments (DWAF, $2004_d$:94);
- An ISP report is prepared per water management area for the management of the water resource. An ISP is intended to act as DWAFs perspective on how the WMA's water resources should be managed. It is planned that the ISP should be updated and amended until the Catchment Management Agency is technically functional and a Catchment Management Strategy is developed (DWAF, $2004_a$:ix).

**(5) Catchment Management Agencies**

- CMAs will be established in all water management areas and will be responsible for water resource planning at the catchment level and most water resources management activities in these areas, such as the licensing of water use and discharges where delegated by DWAF, monitoring abstractions and discharges, collecting abstraction and discharge fees, monitoring water quality, and overseeing land-use activities as this affects water management. DWAF will fulfil the role of the CMA where these are not yet established (DWAF, 2003:8);
- CMAs will manage water resources and co-ordinate the water-related activities of water users and other water management institutions within their areas of jurisdiction;

- Develop a catchment management strategy;
- Financial and administrative responsibilities of setting and collecting water use charges, the technical water resources management functions based on the issues identified in the catchment management strategy, and the responsible authority functions relating to the authorisation of water use;
- An agency may, with the Minister's written consent, delegate powers to another statutory body, but it may not delegate the power to delegate;
- Stakeholder participation is essential;
- In areas where agencies have not yet been established, or where they are not yet fully functional, all powers and duties vest in the Minister, and the Department will undertake the agencies' functions on the Minister's behalf;
- Close cooperation will be needed between DWAF and CMAs during the transition period and the Department will later only be responsible only for on-going oversight and general support of the agencies (DWAF, $2004_d$:95-96).

(6) Water User Associations

- Can be a Water Management Institution with a geographical and objective constraint in comparison to CMAs;
- An association may receive delegated powers and duties from, or be contracted by, the catchment management agency to undertake activities that are within its capacity to perform (DWAF, $2004_d$:96).

(7) Advisory Committee

- Advisory committees are responsible to the Minister, who may make regulations concerning their terms of reference, membership, powers, duties and operation;
- An advisory committee is to make recommendations on the composition of the governing board of a catchment management agency and must consult widely in the water management area to ensure that its nominations represent all relevant interests (DWAF, $2004_d$:97).

(8) Forums

- Voluntary bodies are of great value in initiatives leading to the creation of catchment management agencies, and in addressing local water management issues;
- Forums provide essential local knowledge, expertise and information (DWAF, $2004_d$:97).

(9) Institutions for infrastructure development and management

- Water resource schemes including dams and related infrastructure have been developed, owned and maintained by DWAF;
- The responsibility for operating and maintaining schemes that are of local importance, or mainly serve one user sector, are being transferred to the appropriate water user associations and water services institutions;
- In the case of Schemes of national water resource infrastructure (which includes transfers between national or water management area boundaries), the most appropriate institutional arrangement for their development and management should be determined (DWAF, $2004_d$:98).

(10) Institutions for international water management

- Internationally shared water basins have internationally shared bodies or structures for management of water resources in these basins (DWAF, $2004_d$:99). Several bilateral and multilateral commissions are taking place within the SADC Protocol on Shared Water Courses.

(11) Monitoring institutional performance

- Business plans and annual reports (also to update) should be prepared by Catchment management agencies and water user associations
- In the case of an international agreement, the institution for international water management must submit a report to the Minister (DWAF, $2004_d$:100)

(12) Water Tribunal

- Is an independent body with a mandate to hear and adjudicate appeals (DWAF, $2004_d$:100).

Water resource management is best implemented at local level, thus, as it is supported by South Africa's National Water Act (NWA), which provides for the establishment of Catchment Management Agencies (CMAs) to perform a range of water resource management activities within the framework of a national water resource strategy. However, since the NWA was passed in 1998, only two of the proposed nineteen CMAs have been established.

Due to the non-existence of Catchment Management Agencies, there exists a huge gap in this institutional management as water resource management is currently mainly managed on a national level while the management of water services takes place on a local governmental level. Integration and alignment is required between these two processes to ensure effective and sustainable implementation.

### *3.3.4 Water Services Development Plans*

Water Services Authorities (WSAs) have the constitutional responsibility for ensuring access, planning and regulating provision of water services within their area of jurisdiction. They may provide water services themselves and/or contract external water services providers to undertake the provision function on their behalf. Water services authorities are responsible for securing water from DWAF (or CMAs where established and where this function is delegated) licences to abstract water from, and to discharge wastewater to, the water resource. Regional water services providers secure licences directly from DWAF or CMAs. Water services authorities may regulate the provision of water services within their local area through by-laws and contracts (DWAF, 2003:8)

Water Service Authorities may be designated metropolitan or district municipalities or authorised local municipalities (DWAF, $2004_d$:142). According to the Municipal Structures Amendment Act (33 of 2000) Metropolitan (Category A) and District Municipalities (Category C) are responsible for the potable water systems and domestic sewer and waste water, while the Act also makes provision for Local Municipalities (Category B) to be authorised to perform the WSA function. As indicated in Table 2, there are 21 district municipalities, 123 local municipalities and 8 metropolitan municipalities with the responsibility of Water Services Authorities. Each WSA must prepare a Water Service Development Plan in terms of the Water Services Act (108 of 1997).

**Table 2: WSA Summary Information**

| WSA Type | Number of WSA's |
|---|---|
| **District Municipalities (Category C)** | 21 |
| **Local Municipalities (Category B)** | 123 |
| **Metropolitan Municipalities (Category A)** | 8 |
| Total | **152** |

**Source: [web] http://www.dwaf.gov.za/dir_ws/wsdp/AltDefault.aspx**

A water services development plan is a legal requirement and will be a responsible authority's principal source of information for determining water allocations to a municipality and issuing a licence. The plan's requirements must be accounted for in the responsible authority's catchment management strategy. Some of the data in water services

development plans will be incorporated into the national water resources information system and will therefore contribute to national water resources planning. The plans should also contain details of water demand management and conservation measures and contingency plans for water-related disasters (DWAF, $2004_d$:143). A WSDP is a plan and management tool to ensure efficient, affordable, economical and sustainable access to water services and is a sectoral plan which deals with socio-economic, technical, financial, institutional and environmental issues as they pertain to water services (DWAF, 2001:7)

With a total of 153 WSDPs only 9 Water Service Authority's has adopted WSDPs with 133 being in draft (DWA, $2012_b$). Although a WSDP is a legal requirement, the real value of a WSDP lies in the need to plan for water services whereby key targets are set in a Master Plan for each topic over a five year period. A WSDP is a mechanism towards addressing water service priorities in terms of the following:

- Basic Water Services;
- High Level of Services;
- Water Resources;
- Environment;
- Effective Management;
- Transfers (DWA, $2012_a$:2).

**Table 3: WSDP Summary**

| WSDP Status | Number of WSDP's |
|---|---|
| **Adopted** | 9 |
| **Annual Reviewed** | 1 |
| **Draft** | 133 |
| **Interim** | 8 |
| **Not Submitted** | 2 |
| **Total** | 153 |

**Source: [web] http://www.dwaf.gov.za/dir_ws/wsdp/AltDefault.aspx**

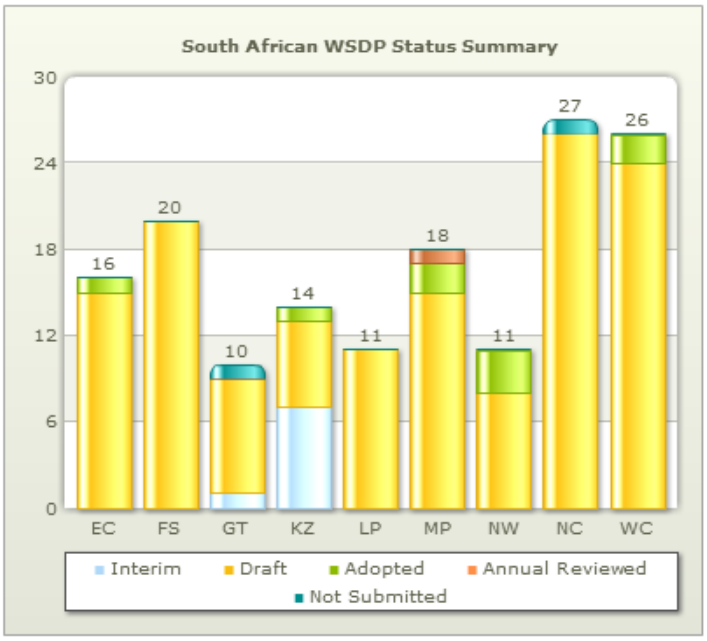



**Figure 9: WSDP Summary Graph**

**Source: [web] http://www.dwaf.gov.za/dir_ws/wsdp/AltDefault.aspx**

Water has a special status within public policy and planning for integrated development as it is a critical natural resource that is essential to socio-economic development activities and to human life and health in general. The IDP Guide Pack highlights the need for water sector planning and integration with the IDP process (DWAF, 2001:10). The IDP directly impacts on water and sanitation projects and must be cross-referenced to the WSDP. The WSDP must include detail information from the IDP as part of a specific master plan. Water underpins almost all socio-economic development planning. In this regard, the water balance component of the WSDP needs to inform integrated development planning processes and objectives. The water balance component of the WSDP is a point of reference for what is possible or not possible in terms of integrated development planning which impacts upon water resources. Ideally, the WSDP and IDP should be prepared simultaneously as the public participation and status quo of water resources impact on both processes while the IDP plays an integrating and facilitating function (DWAF, 2001:15). The same four phased strategic planning methodology as in the IDP guide pack is proposed for the development of WSDPs.

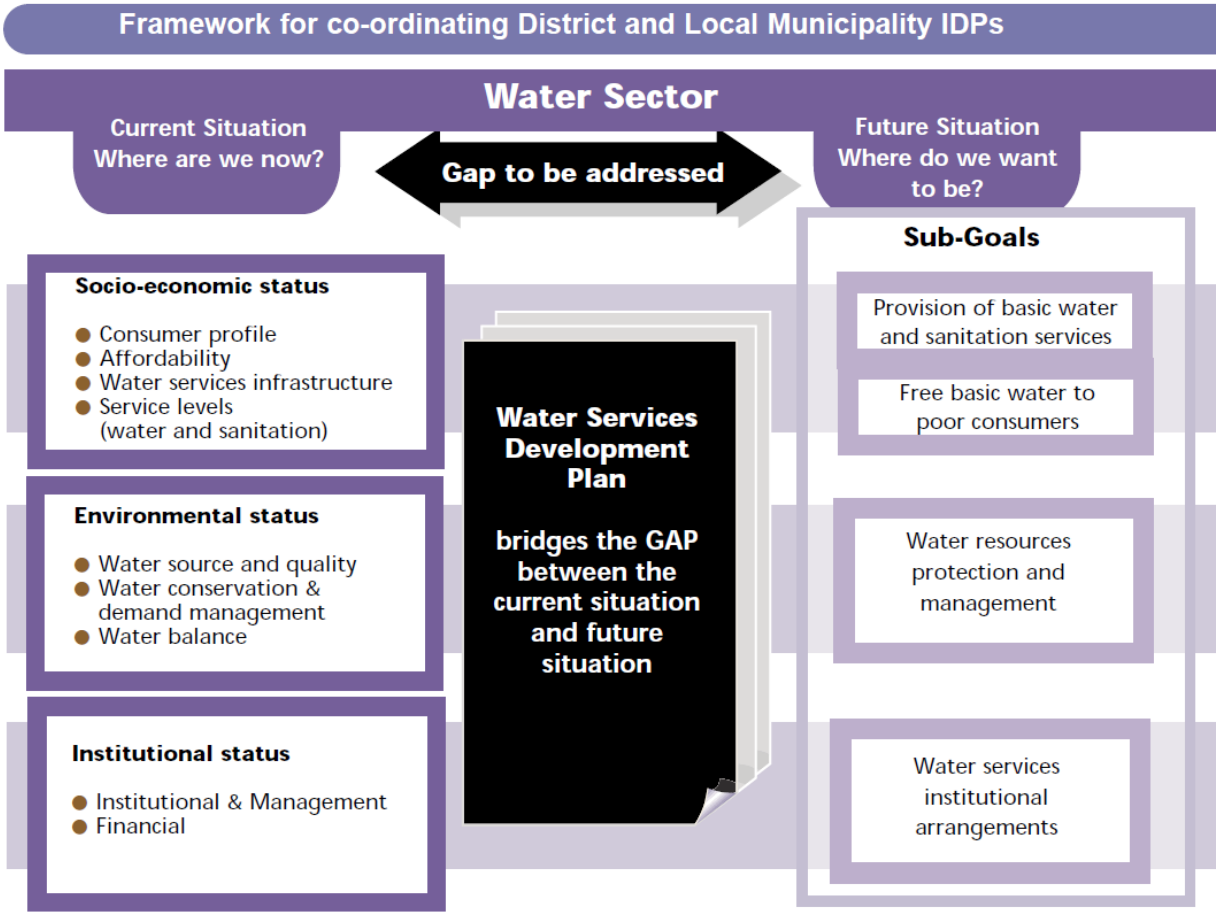



**Figure 10: Water Services Development Plan and Integrated Strategic Planning**

**Source: DWAF (2001:7)**

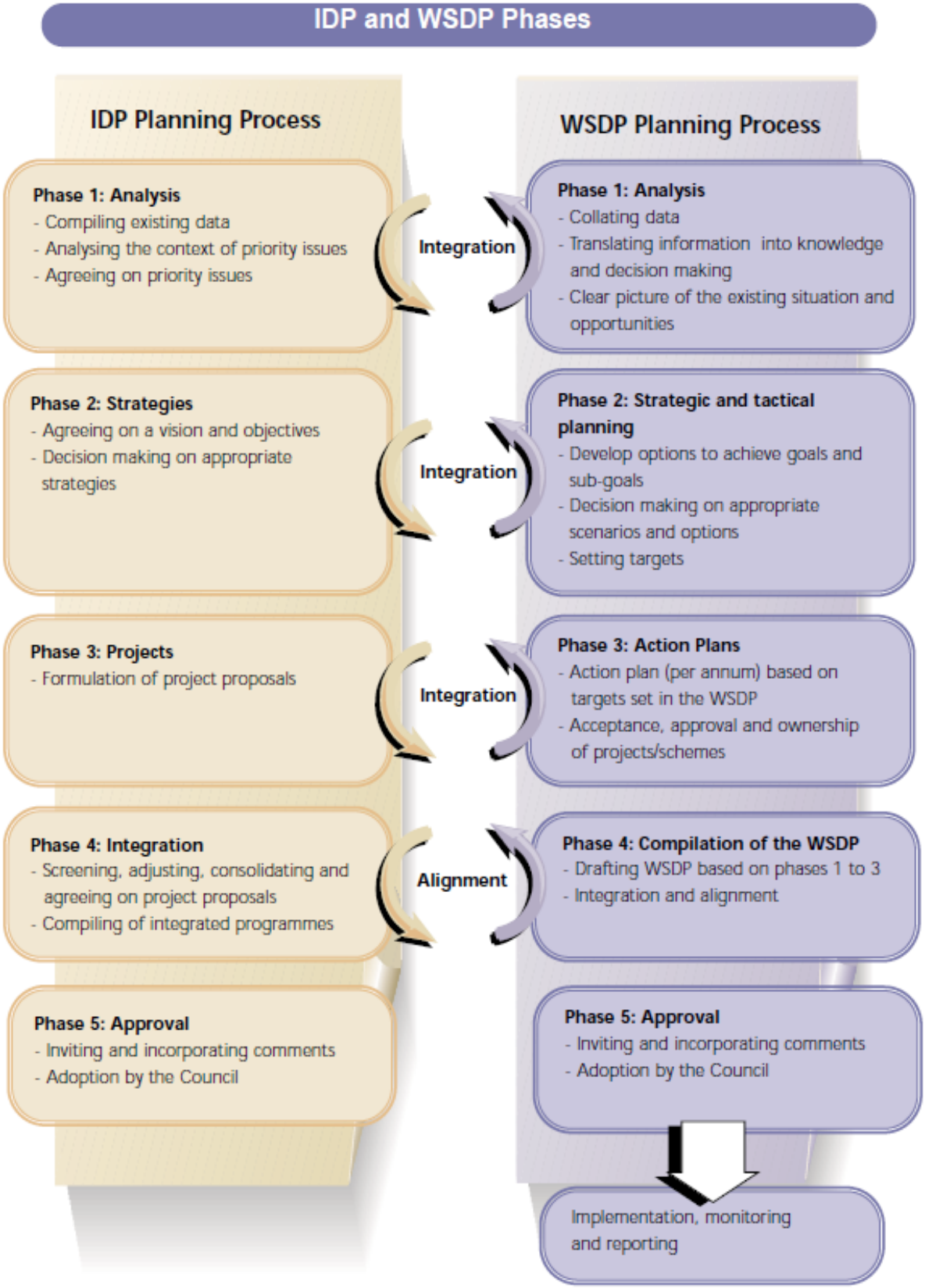



**Figure 11: Phases of IDP and WSDP process**

**Source: DWAF (2001:22)**

Water services development planning needs to be addressed within a strategic framework, which embraces water resource management as part of environmental protection and sustainable development. Water Services Authorities need to ensure that water resources are used in a way that takes the following into account:

- meeting basic human needs;
- promoting equitable access to water;
- redressing the results of past racial and gender discrimination;
- promoting the efficient, sustainable and beneficial use of water;
- facilitating social and economic development;
- providing for growing demand for water use;
- protecting water resources;
- reducing and preventing pollution and degradation of water resources (DWAF, 2001:6).

A WSDP is about strategic planning to ensure efficient, affordable, economical and sustainable access to water services. It includes data and information through a knowledge base and assist in financial as well as conservation and protection decision making. Water services development planning occurs within a framework for integrated management if resources with linkages to catchment management strategies (DWAF, 2001:10). Water is a strategic national asset and needs to be effectively managed and regulated across the different competing sectors. Water related activities also take place within various sectors and government departments on all levels and water management can get lost between sectoral priorities and interests. Water resources must be considered holistically and requires proper planning to balance the water demand with the available resources (DWAF, 2001:12).

DWA has developed Guidelines consisting of four modules to assist WSAs to prepare WSDP and that illustrate the linkages and coordination between the IDP and WSDP processes.

In an overall assessment of WSDPs (as indicated in Table 4), it is indicated that there is a lack of knowledge, information and strategies in local government with regard to Water Service Delivery. Take cognisance of the low WSDP average of Limpopo Province. Due to the fact that there are no strategic plans in place to address the burning issue relating to service delivery, the only logical approach to enhance strategic master planning is to ensure co-ordination and integration of all activities related to planning into the WSDP (DWA, $2012_a$:3).

**Table 4: WSDP Assessment Average**

| PROVINCE | WSDP ASSESSMENT AVERAGE |
|---|---|
| Eastern Cape | 42% |
| Western Cape | 72% |
| Northern Cape | 43% |
| Limpopo | 29% |
| Mpumalanga | 44% |
| North West | 36% |
| Gauteng | 36% |
| Free State | 31% |
| KwaZulu Natal | 31% |

**Source: DWA ($2012_a$:3)**

### *3.3.5 Water Resource Reconciliation Strategy*

District and Local Municipalities are responsible for the preparation of IDPs. As previously stated, the WSDP is an important part of every IDP, and the Department of Water Affairs' Regional Offices provide support for developing both the IDPs and WSDPs. There is however a gap in most IDP planning and it is one of the objectives of the Department of Water Affairs to put information and strategies in place that can be integrated into IDPs to address this gap. Currently, the water resource reconciliation strategies for large systems and metropolitan areas and for all other towns should go a long way towards achieving this (DWA, $2010_c$:6). The "All Towns Reconciliation Strategy Study" commenced in 2008 to assess the water availability of every town, village or cluster of villages where direction in terms of the best sources of water supply and development of implementation plans are given. Furthermore, elements like water requirements, resource management options, source development options and approaches to reconciling water requirements with supply are addressed. This is essential for water resource planning and must be integrated in the WSDPs and IDPs (DWA, $2010_c$:11).

## 3.4 INTERNATIONAL APPLICATION OF WATER RESOURCE MANAGEMENT

### *3.4.1 International Status of Water Resources*

Throughout history human progress has depended on access to clean water and on the ability of societies to harness the potential of water as a productive resource. Water for life in the household and water for livelihoods through production are two of the foundations for human development. Yet for a large section of humanity these foundations are not in place. It is further stated that globally, the world is facing a water crisis that, left unchecked, will derail progress towards the Millennium Development Goals and hold back human development. Shocking statistics indicate that more than 1 billion people are denied the right to clean water and 2.6 billion people lack access to adequate sanitation. The roots of the crisis in water can be traced to poverty, inequality and unequal power relationships, as well as flawed water management policies that intensify scarcity (UNDP, 2006:V).

The population-water equation indicates water scarcity. 1,700 cubic metres per person is the national threshold for meeting water requirements for agriculture, industry, energy and the environment. Availability below 1,000 cubic metres is held to represent a state of "water scarcity" and below 500 cubic metres, "absolute scarcity" (UNDP, 2006:135). The increasing trend in water scarcity and water stress projected towards 2025 in South Asia, Sub-Saharan Africa and Arab States is alarming (refer to Figure 12).

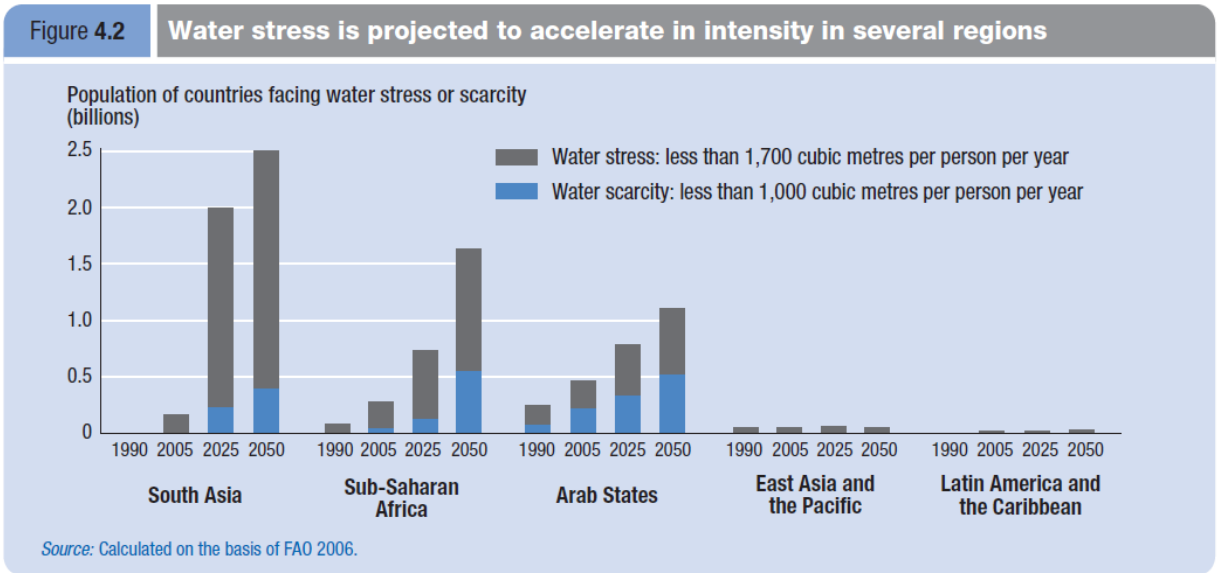



**Figure 12: Projected Water Stress in several regions**

**Source: UNDP (2006:136)**

Scarcity has been induced by policy and management failures. When it comes to water management, the world has been a reckless and unsustainable. Countries have been using far more water than they have, as defined by the rate of replenishment. The result: a large water-based ecological debt that will be transferred to future generations (UNDP, 2006:20).

The recommended measures to be taken entail mainly improvement of water management systems. The most important are to develop integrated water resources management strategies that set national water use levels within the limits of ecological sustainability and provide a coherent planning framework for all water resources, putting equity and the interests of the poor at the centre of integrated water resources management and making water management an integral part of national poverty reduction strategies (UNDP, 2006:16).

Due to the complex nature of water and water resource management, a comprehensive correlation needs to be done between the various international water resource management agencies and bodies, both governmental and other controlling and regulating bodies. In this section various international institutions and governing bodies' perspective on water resource management will be discussed. These examples will be chosen in such a way that the best possible correlations may be identified to be correlated and integrated with the South African methods.

An American Native saying states

"The frog does not drink up the pond in which he lives"

### *3.4.2 A Historic case study of water resource planning and management*

Water management is at once a story of human ingenuity and human frailty. From the aqueducts of ancient Rome to the great public works of 19th century Europe and the United States, the provision of clean water for life has been made possible through innovative technologies. Since the dawn of civilization in the Indus Valley and Mesopotamia the management of water as a productive resource has been marked by ingenious infrastructure systems that have sought to harness the productive potential of water while limiting its potential for destruction (UNDP, 2006:21).

Since historical times, water has often been the reason for development and settlement of communities. The Egyptians developed parallel to the Nile River and utilised the floodplains for agriculture to live from and produce. In Mesopotamia, the Tigris and Euphrates played a key role in the regional development. In London the Thames River runs right through the city

and it has supported human activity from its source to its mouth for thousands of years providing habitation, water power, food and drink. It also acted as a major highway through the Port of London for international trade, internally along its length and by its connection to the British canal system. It has been a physical and political boundary over the centuries and generated a range of river crossings.

According to Lewis Mumford (1961:55) Egypt and Mesopotamia are the two great civilizations in which the city first probably took shape. They both had common pre-conditions of geographic existence (Mumford, 1961:57). These two civilizations do however not represent the generalised picture of the origin of the city, as various differences in urban evolution exist. The city is compared to a special organ of civilization and seems to have sprung up in a few great river valleys like the Nile, the Tigris-Euphrates, the Indus and the Hwang Ho. Villages existed wherever there were possibilities of primary farming and cattle-raising. With swamps drained and the water level regulated, the land of these valleys was exceptionally fertile producing crops almost hundred times the original seeds (Mumford, 1961:56).

Mesopotamia, or known as a part of modern Iraq, developed between the Tigris and Euphrates Rivers 3000 B.C with fertile alluvial floodplains. Mesopotamia is from the Greek word “mesos” meaning “middle” and “potamos” meaning “river”, thus the “land between the rivers” (Anon, 2012). The ancient Mesopotamians were highly inventive people who invented the seeder plow, developed writing, irrigation and sanitation techniques, the "Pythagorean theorem," and other inventions. They furthermore revolutionized transportation around 3500 BC by inventing the wheel and were among the first to harness the wind as an energy source by using the sail.

Mesopotamia is an ideal model on how the city originally developed due to water availability for agriculture and how the management of the water had an influence on the form of the city. The Mesopotamians managed and used the water to their advantage and enhanced their quality of life.

With the further invention of boats, rivers were the first highroads which were moving belts of water connecting Mesopotamia to other civilizations. These connections formed a spinal transportation system and led to the development of a network of canals and irrigation works for sudden floods and inundations) between the probably isolated villages in Mesopotamia (Mumford, 1961:56).

Social interaction, co-operation and long-term planning were necessary to construct embankments, canals and irrigation systems. The very conditions that made large urban settlements a physical possibility also made them a social necessity (Mumford, 1961:57).

The management of water was required for communal survival as there was always a threat of water shortage or floods. The agricultural productivity rested on unceasing vigilance and collective effort. There was also a local authority of Council of Elders to manage the communal manpower under competent leadership. This paved the way for a centralised authority to handle and manage a larger area (Mumford, 1961:58).

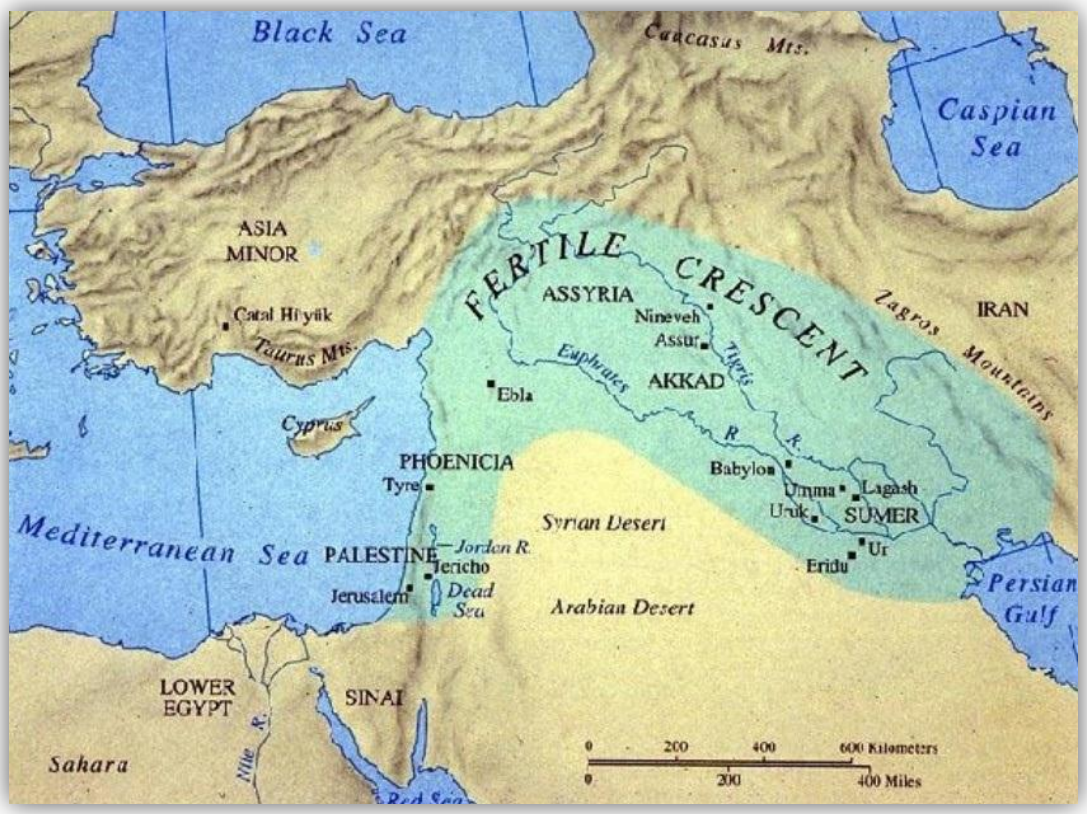



**Figure 13: Locality of Mesopotamia**

**Source: [Web] www.slideshare.com**

### *3.4.3 Integrated Water Resource Management (IWRM) and Sustainability Internationally*

At the World Summit on Sustainable Development in 2002 in Johannesburg, governments embraced integrated water resources management as the model for the future. The objective of IWRM is coordinated development and management of water, land and related resources, in order to maximise the resultant economic and social welfare in an equitable manner without compromising the sustainability of vital ecosystems.

This approach emphasizes managing water allocations within the ecological limits of availability, with a premium on the three E's: equity, efficiency and environmental sustainability (UNDP, 2006:153). The central question in water resource management is powerfully addressed by Sandra Postel and Brian Richter:

*"It would make us stop asking how we can further manipulate rivers, lakes, and streams to meet our insatiable demands, and instead ask how we can best satisfy human needs while accommodating the ecological requirements of healthy water systems. And it would inevitably lead us to deeper questions of human values—in particular, how to narrow the unacceptably wide gap between the haves and the have nots" (UNDP, 2006:153)*

The Johannesburg Summit called on all countries to draw up integrated water resources management plans within five years, an unrealistic target since revised in the face of capacity constraints. At the end of 2005 only 20 of 95 countries surveyed by the Global Water Partnership had produced such a plan or had plans well under way (UNDP, 2006:155).

Mahmoud Abu-Zeid, the chairman of the Arab Water Council Founding Committee, stated in the 2005 Status of IWRM Plans in the Arab Region that IWRMs are methods for urging people to think collectively with all stakeholders involved, prioritize issues and assessing of all available water resources involved in the management process (AWC/ UNDP/ CEDARE, 2005). In order to achieve fully IWRM, the impacts of all water related issues needs to be integrated with economic development, human health, the environment and social conditions. In this process, the effect that each of the individual users has, or may have on the entire water balance is considered.

At the World Summit on Sustainable Development (WSSD), the following principles were identified (Jonch-Clausen, 2004):

- All countries must translate principles of the IWRM into a specific plan;
- Countries must have completed IWRM Plans by a firm target date – 2005;
- All countries should have a Plan – whether they are rich or poor, whether they have plentiful water or scarce water resources;
- Developing countries must be supported in the process of preparing their Plans; and,
- The content of these Plans must be wide-ranging, covering institutional, financial and technological change.

IWRM addresses decision making on development and management of water resources for various dynamic uses taking the needs and desires of different stakeholders into account. This is in aim to maximise the economic and social welfare in an equitable manner while maintaining and improving the ecosystem. In preparation of a national IWRM efficiency plan,

the following aspects must be covered:

- Current approaches to water resource planning, development and management;
- Future approaches to water resource planning, development and management;
- A transition plan or methodology to change from current to future approaches.

The preparation of IWRM plans involves multi-disciplinary coordination requiring numerous considerations to provide better management. An IWRM can be summarised as a road map to guide the changes needed to move from a fragmented to integrated ways of developing, managing and using a country's water resources and to accelerate towards those ends. The following aspects might be addressed in the IWRM plan:

- Interfaces between macro-economic and water resource decision-making;
- Efficiency of water infrastructure;
- Mitigation of the effects of floods and droughts;
- Non-conventional water resources and conservation technologies;
- Water quality and broader environmental issues;
- Eco-hydrological issues;
- Data collection systems with access to information by users;
- The role of the state and the potential for public private partnerships;
- Processing for reconciling water quantity and quality needs of all water users;
- Mechanisms for consultation and public participation;
- Interfaces between river basins and adjacent coastal and marine environments;
- The roles of woman in the provision, management and safeguarding of water;
- Capacity building;
- Management agencies;
- Mechanisms to achieve financial sustainability (UNDP, 2005:13).

### *3.4.4 International Application of Water Resource Management*

As indicated in Section 3.4.1, the increasing trend in water scarcity and water stress projected towards 2025 in South Asia, Sub-Saharan Africa and Arab States is alarming (refer to Figure 12). Due to this international phenomenon, an example from South Asia and the Arab states is investigated (additional to South Africa) in order to determine their application

of water resource management and planning.

### *3.4.4.1 Water Resource Management in Vietnam, South Asia*

A study was conducted in 2008 by Dr S. Schuster and Prof Dr H. Stolpe on behalf of Vietnam IWRM (Schuster & Stolpe, 2008) for three provinces in Vietnam, Southeast Asia. The objective of this study was the development of a Decision Support System (DSS) for Integrated Water Resource Management in three provinces in Vietnam. The focus of this study was on evaluating the relation between the socio-economic situation, the water and land use and the water resources. The statistical water resource estimations for this project was conducted based on calculations and simulations of the future water demand and waste water discharges. The current and future water resource management principles are based on (1) sustainable groundwater yield, (2) sustainable surface water yield and (3) access to the water resources. This was combined with a vulnerability evaluation that includes vulnerability of surface water resources, groundwater resources, point source waste water discharge and all other potential point and non-point pollution sources. Monitoring systems, training and support were established to enhance water resource management (Schuster & Stolpe, 2008). In Vietnam Water resource management, takes place on the following levels:

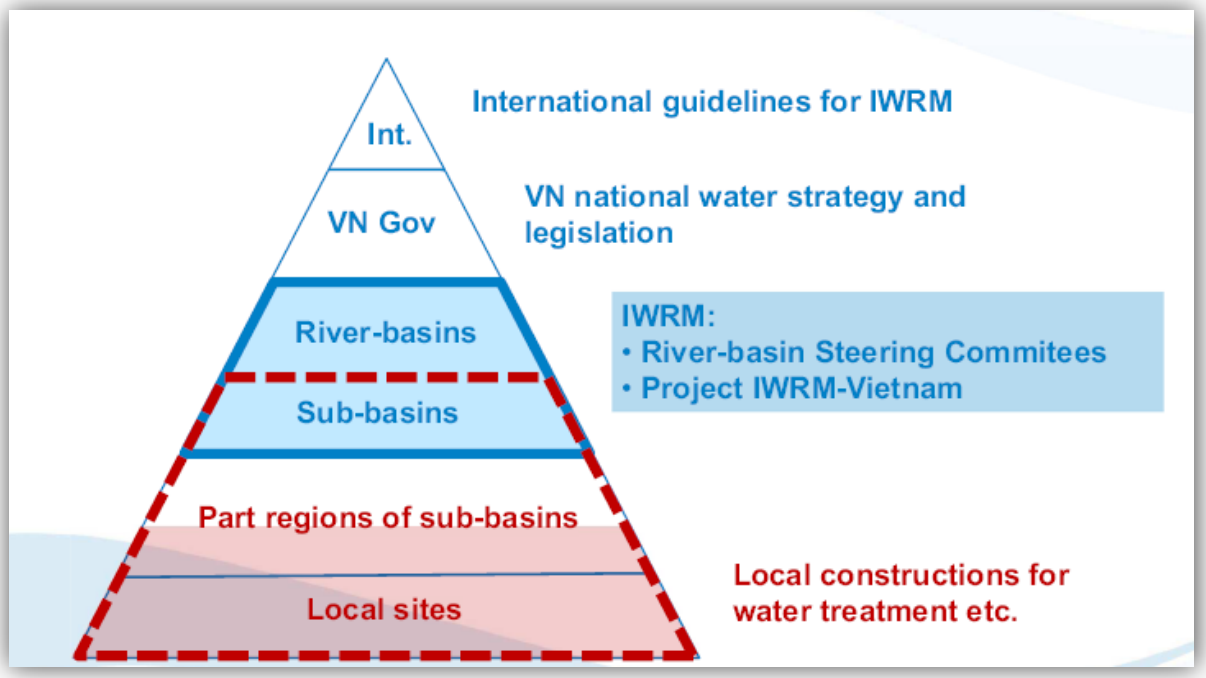



**Figure 14: Water Resource Management Planning Levels in Vietnam**

**Source: Schuster & Stolpe (2008:25)**

As part of IWRM research projects, a water-related Information System (IS) has been

designed in the Mekong Delta, southern Vietnam. The project – WISDOM IS, combines data from a variety of disciplines like hydrology, sociology, geography, ecology, modelling, and information technology and earth observation or remote sensing. Emphasis is placed on the continuous integration of existing and newly generated data from the different disciples to enable a user-oriented analysis to support sustainable solutions in resource management. Some applications include information on land cover and land use and other related spatial changes, urban sprawl, surface sealing and infrastructure development and the optimization of groundwater and surface water modelling (Ibisch *et al*, 2011:32)


**Figure 15: Locality Map of Vietnam**

**Source: [web] http://wwp.greenwichmeantime.com/time-zone/asia/vietnam/hanoi/map-hanoi/index.htm**

### *3.4.4.2 Water Resource Management in the United Arab Emirates*

The United Arab Emirates (UAE) is considered one of the most water stressed regions in the world as there is an increasing scarcity of usable water resources. The total area of the UAE is approximately 83 600km$^2$ with an average annual groundwater estimated at 120 million m$^3$. Groundwater depletion occurs as the total groundwater extraction exceeds the groundwater natural recharge. This has led the country to fossil groundwater exploration and sea water desalination.

At this stage, there is no Integrated Water Resource Management Plan, but the UAE has a National Environmental Strategy – National Water Strategy (2000) that will have a great impact on their IWRM plan.


**Figure 16: Locality of United Arab Emirates**

**Source: [web] http://www.google.co.za/imgres?imgurl=http://www.proudlyarabian.com**

Institutionally, UAE's government is a constitutionally-based federal system with intricately connected governing bodies. The UAE consists of seven emirates with each its own local government and the relationship between the federal and local governments is established in their Constitution (Mulla, 2011). On a national level, the Ministry of Electricity and Water is responsible for drinking water supply, well drilling, desalinisation plants, water supply and planning while the Ministry of Agriculture and Fisheries is responsible for the development and management of agricultural water supply. For the regulation of water pollution issues, the Federal Environmental agency takes control. More recently, a Ministry of Energy was created to handle water resource responsibility (UNDP, 2005:38).

In the State of Water Report for the UAE, indicates a number of initiatives to enhance its water security level of which a National Water Conservation Strategy forms part (Mulla, 2011). The UAE Water Conservation Strategy is a major tool towards securing sustainable water resource development and management.

Abu Dhabi is the capital and the largest of the seven member emirates in the United Arab Emirates with one of the highest water consumption per capita rates in the world with water availability per capita as among the lowest. A Vision Statement has been compiled which summarises the objectives and proposed policy programme of Environment Vision 2030: "to preserve and enhance Abu Dhabi's natural heritage, while acting as a regional leader in efficient use of resources and contributing to a better quality of life for all" (Environment

Agency, s.a.).

The Environmental Agency for Abu Dhabi developed an Abu Dhabi Emirate Sustainable Water Resource Management Policy which includes the conservation of water resources using new water saving technologies. A Water Master Plan has also been compiled to analyse the status of present and future water use, to conserve the water use and to allocate the water resources to various development sectors. Furthermore the Environmental Agency has also established two projects for strategic water reserve for emergency conditions (Environmental Agency, 2008:16). In the Sustainable Water Management Assessment report by the Columbian University, School of International and Public Affairs, Master of Public Administration in Environmental Science and Policy Workshop in Applied Earth Systems in 2010, it is recommended that the Urban Planning Council pursue a sustainable water management campaign in order to ensure the quality of life and economic prosperity of the Abu Dhabi city and Emirate. The following four aspects have been identified as the main reasons for over-consumption of water in Abu Dhabi:

(1) A non-integrated approach to water resources management across agencies and governing bodies in Abu Dhabi; coupled with,

(2) Inconsistent and unreliable data to properly quantify and understand the issue of water resources, consumption and waste; leading to,

(3) A general absence of awareness about the need for and desirability to reduce consumption as an essential component in water sustainability; linked to,

(4) The absence of a price for water in Abu Dhabi. While water may have a high normative value among the populace, consumption needs to be informed by both economic and environmental valuation.

In terms of institutional capacity, sustainable water management is recommended to be promoted through the following four key actions:

(1) Creating a unified vision and governance

(2) Developing a data management and communication system

(3) Improving the water monitoring system

(4) Establishing incentives for sustainable water use (Columbia University, 2010:25)

As indicated in the Water Resource Master Plan of Abu Dhabi (Environment Agency, 2009), there are many ways in managing the future water demands and the solution entails an inter-mixed need for changes in both the demand and supply management to adapt the need for the next 20 years.

## 3.5 SUMMARY

Water has diverse roles with one being to support the development that will bring about economic growth. Due to South Africa's history in water rights and water allocation, there is an unequal distribution of access to water services. In terms of the old Water Act of 1956 water resource planning was based on the riparian system which changed to a system of equality in the more recent National Water Act of 1998. Water supply and sanitation projects are currently ways for poverty relief and rural development.

There is a correlation between South African and International water resource management principles as well as procedures especially with the international concept of Integrated Water Resource Management (IWRM). In South Africa, the IWRM includes the development and implementation of national/ regional strategies, plans and programmes with regard to integrated river basin, watershed and ground water management. On an international level the IWRM emphasizes managing water allocations within the ecological limits of availability, with a premium on the three E's: equity, efficiency and environmental sustainability. The plan further may consist of non-conventional water resources and conservation technologies.

In many case across the globe, the scenario plays out that countries with plentiful water resources do not place high importance on the management thereof. With regards to their water resources, they seem to have the mind-set of: "it has always been there, so it will always be there." This can clearly be seen from the instance in Vietnam, where no water management policies were in place. Vietnam has however started to implement research projects in terms of the IWRM, with principles like sustainable groundwater yield, sustainable surface water yield, access to water resources, vulnerability evaluation and pollution potential playing a role.

Due to the lack of management, the water resources in certain areas are becoming depleted. The counterpart is also true when considering countries such as the United Arab Emirates, where various alternative and innovative water management methods are considered and in some cases utilised.

With effective management and innovative technologies, South Africa and the world can prevent the (global) water crisis.

# 4 ASSESSMENT CRITERIA DEVELOPMENT

## 4.1 ASSESSMENT METHODOLOGIES

### *4.1.1 Multi Criteria Analysis (MCA)*

Multi Criteria Analysis serves as an instrument to horizontally measure the performance of a range of multi-criteria projects against goals and objectives which can include quantitative and qualitative factors (CWG, 2010:10). It relies heavily on the assigned weightings. Multi criteria analysis is a semi-quantitative means of trading off the effects of implementing any given scheme, that is, the relative desirability of achieving a given set of goals and objectives and the degree to which this target system is fulfilled, are combined to give a measure of how far each scheme will go in meeting all or any of the goals and objectives, and so provides the answer to the question of effectiveness of the scheme. The distinguishing feature of utility analysis is that it can handle financial, quantitative and qualitative effects simultaneously. Consequently, all of the impacts or effects of a project which can be envisaged can be included in the analysis (CWG: 2010:9).

MCA is also referred to as generalised utility analysis model methodology. The benefits of MCA are that it provides a structured input for the decision-maker, it provides an indication of the overall effectiveness with which alternatives will satisfy the complex target system and it allows the decision-makers to measure the sensitivity of the various analysis parameters as part of the evaluation process. The model is best represented by a statistical tree where multiplication of weights and percentages takes place from right to left in the so-called tree “branches” (CWG: 2010:9).

There are eight steps to conduct a multi criteria analysis:

(1) Establish the decision context. What are the aims of the MCA, and who are the decision makers and other key players?

(2) Identify the options;

(3) Identify the objectives and criteria that reflect the value associated with the consequences of each option;

(4) Describe the expected performance of each option against the criteria;

(5) Assign weights for each of the criteria to reflect their relative importance to the decision;

(6) Combine the weights and scores for each of the options to derive and overall value;

(7) Examine and interpret the results;

(8) Conduct a sensitivity analysis of the results to changes in scores or weights.

### *4.1.2 Goal Achievement Matrix*

Hill (1968) presents the goals achievement matrix (GAM) as a tool for structuring complex decisions where the decision maker wishes to apply multiple, non-commensurable evaluation criteria. The key to plan evaluation by means of goals-achievement analysis is the weighting of objectives, activities, locations, groups, or sectors in urban areas (Hill, 1986:27). Relative weights are established for an explicit set of goals, and objectives are defined in operational terms. The product of the analysis is presented in a summary table for each alternative, and the summation of the evaluation of several alternatives can be presented in weighted Goals-Achievement index.

GAM involves the following activities:

(1) explicit formulation of a set of objectives (as reflected in development plans) which should be broken down into measurable indicators that will serve as evaluation criteria;

(2) ranking or rating of alternative strategies against each individual objective;

(3) weighting of objectives for their relative importance to particular sections of the community; and

(4) combining of scores to obtain relative measures of goals achievement for each alternative.

This method can be highly participatory as it can allow various sectors of the community to express their bias through the weighting of each objective according to their perception of its relative importance to their sector. The rating of each alternative strategy according to its perceived contribution to the achievement of each objective is determined by choosing an ordinal number within a given range. Finally, the aggregate of sectoral total scores is taken, and though the sectoral scores reflect biases, the grand total of scores shown in the summary table amounts to the social consensus. The highest scoring alternative would be the preferred one (Lomovasky & Hill, 1984).

As applied in the National Transport Master Plan (2010), the Goal Achievement Matrix utilises internationally accepted Multi-criteria Analysis methodologies for assessment and analysis. Goals and objectives form the foundation of selection criteria and performance measures that will ultimately ensure that a project can be successfully analysed and prioritised (CWG, 2010:7). The sum total of its contribution is viewed as its conformation weight and is referred to as the “GAM Score” (Malepa, 2010:2)

An assessment framework is developed through which the applied strategic water resource

management principles' implementation within spatial development frameworks will be assessed. Each identified principle or requirement will be weighted in accordance with the goal achievement matrix. The spatial development frameworks will be assessed in terms of how well it addresses and / or incorporates water resource management and planning.

In order to determine the assessment principles, the legislative and policy framework giving form to strategic spatial planning and guiding water resource management first needs to be defined, elaborated and the applicable principles selected.

## 4.2 LEGISLATION AND POLICY FRAMEWORK

The requirements as set out in the relevant legislation, policies and guidelines for strategic planning as well as water resource planning and management will be critically investigated in preparation of the assessment principles.

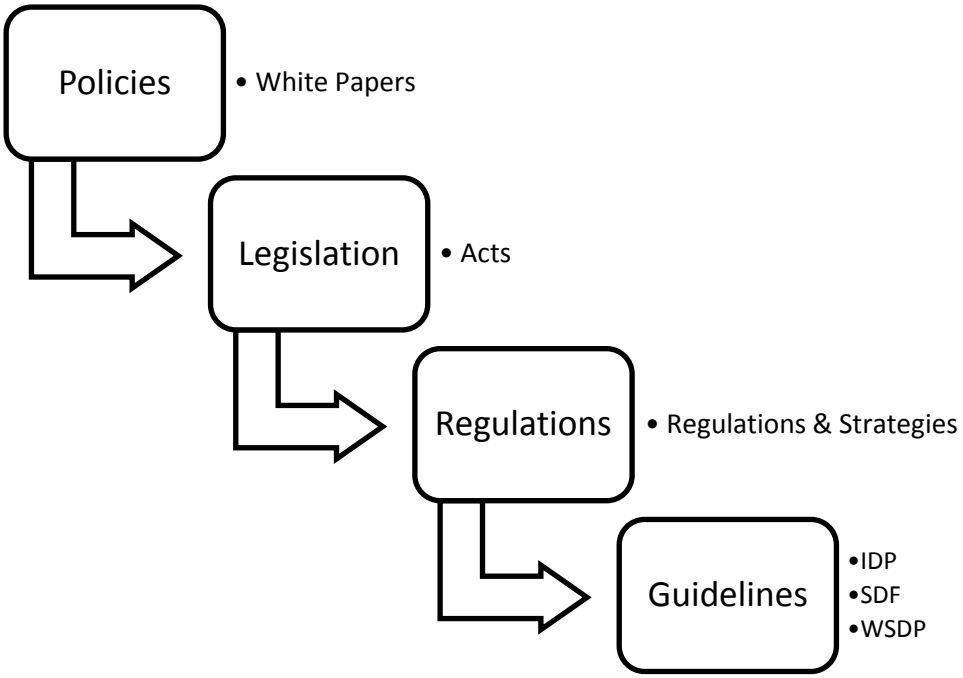



**Figure 17: Components of the framework**

**Source: Own Construction (2012)**

### *4.2.1 General Framework*

Internationally and on national level, certain documents forms the basis for strategic spatial planning and the planning and management of water resources. It is essential to look at the general guiding framework as this informs the other documentation which will be discussed in the next sections.

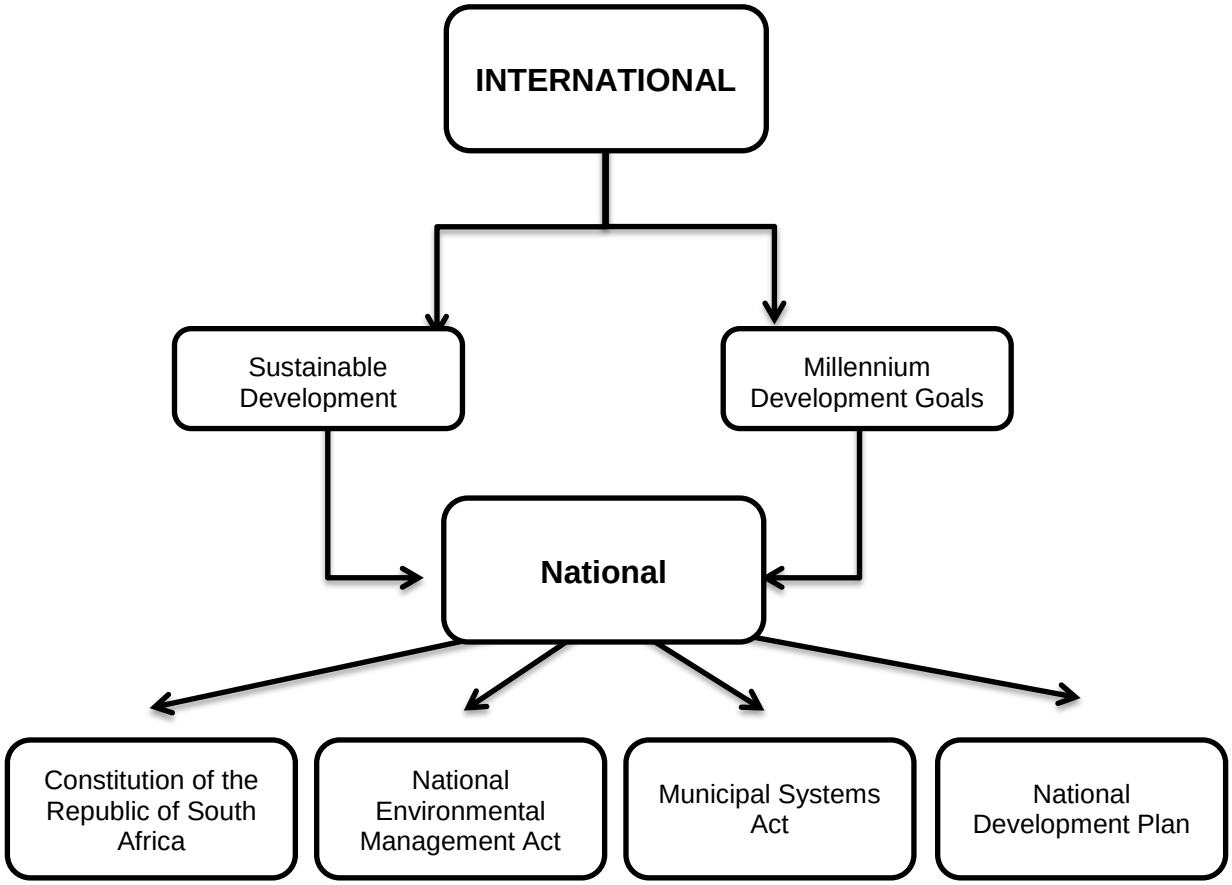



**Figure 18: General Framework**

**Source: Own Construction (2012)**

#### *4.2.1.1 International Framework in General*

#### *4.2.1.2 Sustainable Development*

The progress and development of international environmental thinking can be traced back to the 1950s and 1960s, when the tensions between development and conservation began to manifest themselves. In 1972 in Stockholm, at the United Nations Conference on the Human Environment (UNCHE) scientists and technical experts reported on the global environmental crisis. First presented in The World Conservation Strategy in 1980, the idea of sustainable development was popularized following its publication in the Brundtland Commission's report, Our Common Future, in 1987. Recognizing that sustainable development is a 'process of change', the Commission defined it as "development that meets the needs of the present without compromising the ability of future generations to meet their own needs". At the 1992 United Nations Conference on Environment and Development (UNCED) in Rio de Janeiro Agenda 21, the global plan of action for achieving sustainable development in the

21st century, was released (Department of Environmental Affairs, 2006:4)

According to the International Institute for Sustainable Development, sustainable development occurs at the intersection of the following three global imperatives:

- Environmental integrity (refers to the 'wholeness' of the environment);
- Human well-being and (being refers to material and spiritual well-being);
- Economic efficiency (refers to making the best use of available resources, including human resources, funds, land, and infrastructure).

The interactive model of sustainability illustrates that sustainable development occurs where the three imperatives interact within an 'interactive zone' and development outside this 'interactive zone' will not be sustainable (Dennis Moss Partnership, 2011:9)


**Figure 19: The interactive model of sustainability**

**Source: Dennis Moss Partnership (2011:10)**

The preamble of the Habitat Agenda (2003:1) states that:

'...There is a sense of great opportunity and hope that a new world can be built, in which economic development, social development and environmental protection as interdependent and mutually reinforcing components of sustainable development can be realized through solidarity and cooperation within and between countries and through effective partnerships at all levels.'

The UN-Habitat defines a sustainable human settlement as one "where all have adequate shelter, a healthy and safe environment, basic services, and productive and freely chosen employment".

The availability of water for domestic use forms an integral part of human well-being and the sustainable livelihood of a community. Without water for personal hygiene and having to walk kilometres for drinking water, the dignity of people is adversely affected.

Thus in order for strategic spatial planning and development to be sustainable, there must be a balance or interactive zone between access to water for domestic use (human well-being), the water source should be intact and available (environmental integrity) and the water resource should be applied to its best possible use (economic efficiency).

In a study conducted by the Development Bank of South Africa (2009:13), it has been stated that the key cross-cutting issue for sustainable development is the need to build the capacity of all spheres of government but especially local government, and to include environmental opportunities and constraints in all forms of development planning.

#### *4.2.1.3 Millennium Development Goals*

The Millennium Declaration in 2000 was a milestone in international cooperation, inspiring development efforts that have improved the lives of hundreds of millions of people around the world (United Nations, 2010:3).

There are 8 Millennium Development Goals (MDGs) as reported by the United Nations with the target date being 2015. Of specific relevance to this study is the 7$^{th}$ Millennium Development Goal of Environmental Sustainability which has the following 2 applicable targets:

7c) To halve, by 2015, the proportion of the population without sustainable access to safe drinking water and basic sanitation

7d) By 2020, to have achieved a significant improvement in the lives of at least 100 million slum dwellers (United Nations, 2010:52).

With these two targets as part of the Environmental Sustainability Goal, the issue of access to water and urban/rural development on an international scale are highlighted and the severity of these targets are evident. Without the realisation of these 2 targets, environmental sustainability will not be possible and a better world farfetched.

According to a study conducted by the Development Bank of Southern Africa (2009:1) South Africa is not meeting all its targets in terms of the MDGs and it is questionable how sustainable the current development initiatives are.

*We must not fail the billions who look to the international community to fulfil the promise of the Millennium Declaration for a better world. Let us keep the promise."*

*UN Secretary-General Ban Ki-moon*

### *4.2.2 South African Framework in General*

The following legislation and policies are applicable to both strategic planning and water resource management on national level.

#### *4.2.2.1 The Constitution of the Republic of South Africa, 1996*

The Constitution of South Africa is the overarching document supporting both development and access to sufficient water supply. As indicated in Section 24b of the Constitution (1996), everyone has the right:

- to have the environment protected, for the benefit of present and future generations, through reasonable legislative and other measures that-
    - secure ecologically sustainable development and use of natural resources while promoting justifiable economic and social development.

According to Section 26 of the Constitution, everyone has the right to have access to adequate housing which includes an equitable spatial pattern and sustainable human settlements.

Furthermore, everyone has the right to have access to sufficient water. This is addressed in Section 27 of the Constitution (1996) where everyone has the right to have access to:

- Health care, food, water and social security
- The state must take reasonable legislative and other measures, within its available resources, to achieve the progressive realisation of each of these rights.

National government is the custodian of the sources of water such as rivers, groundwater and dams and it is the objectives of local government in as set out in Section 152 of the Constitution (1996), to provide services to communities in a sustainable manner, to promote social and economic development and to encourage the involvement of communities and community organizations in the matters of local government.

South Africa has highly sophisticated human rights and sustainable development policies embedded in its constitution and laws. These however are largely not implemented in practice (DBSA, 2009:2).There is a gap between national planning, management and

provision of water resources and the implementation through water services provision at local level. The alignment and integration between the strategies and implementation is problematic and this leads to a limitation on development. The problem originates from national level, whereas the Constitution guides policies and other legislation, but implementation is often lacking.

According to Section 152(1(b)) of the Constitution of South Africa (108 of 1996) it is the objective of the local government to ensure the provision of services to communities in a sustainable manner which is practically guided in Chapter 5 of the Municipal Systems Act (32 of 2000) by developing an integrated development plan and a spatial development framework. In South Africa, the pursuit of economic growth for short term gains, the declining skills base and brain drain all continue to challenge sustainable development practices (DBSA, 2009:13).

#### *4.2.2.2 National Environmental Management Act, Act 107 of 1998*

According to Chapter 1 of the National Environmental Management Act (107 of 1998), the following principles are important for environmental management and can be applied to sustainable strategic development and water resource management:

- Development must be socially, environmentally and economically sustainable.

Sustainable development requires under more the consideration of all relevant factors such as the use and exploitation of non-renewable natural resources that must be responsible and equitable and should take the consequences of the depletion of the resource into account.

- Environmental management must be integrated, acknowledging that all elements of the environment are linked and interrelated, and it must take into account the effects of decisions on all aspects of the environment and all people in the environment by pursuing the selection of the best practicable environmental option.
- Environmental justice must be pursued so that adverse environmental impacts shall not be distributed in such a manner as to unfairly discriminate against any person, particularly vulnerable and disadvantaged persons.
- Equitable access to environmental resources, benefits and services to meet basic human needs and ensure human wellbeing must be pursued and special measures may be taken to ensure access thereto by categories of persons disadvantaged by unfair discrimination.
- The participation of all interested and affected parties in environmental governance must be promoted, and all people must have the opportunity to develop the understanding,

skills and capacity necessary for achieving equitable and effective participation, and participation by vulnerable and disadvantaged persons must be ensured.

- There must be intergovernmental co-ordination and harmonisation of policies, legislation and actions relating to the environment.
- The environment is held in public trust for the people and the beneficial use of environmental resources must serve the public interest and the environment must be protected as the people's common heritage

#### *4.2.2.3 Municipal Systems Act, Act 32 of 2000*

The obligations and role of local government in terms of water services and strategic planning are stipulated in the Municipal Systems Act (32 of 2000) as follows:

- To ensure municipal services in a financially and environmentally sustainable manner;
- To promoting a safe and healthy environment;
- To prepare an integrated development plan and ensuring to strive to achieve its objectives and fulfilling in the Constitutional duty;
- To align and complement the development plans and strategies with neighbouring municipalities and other organs of state;
- The council must adopt a single, inclusive and strategic plan for the development of the municipality which links, integrates and co-ordinates plans and takes into account proposals for the development of the municipality and aligns the resources and capacity of the municipality with the implementation of the plan.

Furthermore, in terms Section 26 of the Municipal Systems Act (32 of 2000) an IDP must reflect a spatial development framework which must include the provision of basic guidelines for a land use management system for the municipality. The Municipal Planning and Performance Management Regulation (2001) states that the SDF should comply with following:

- Set out objectives(desired spatial form)
- Contain strategies and policies indicating desired patterns of land use; address spatial reconstruction; provide strategic guidance in respect of the location and nature of development
- Set out basic guidelines for a land use management system in the municipality
- Set out a capital investment framework

- Contain a strategic assessment of environmental impact of the spatial development framework
- Identify programs and projects for land development
- Provide a visual representation of the desired spatial form (IPDM, 2011)

#### *4.2.2.4 National Development Plan, 2011*

The National Development Plan was compiled by the National Planning Commission which consists of 26 people appointed by the President to advise on issues impacting on long-term development. In the Diagnostic Report, 9 main challenges in South Africa have been identified of which 2 are applicable in this study:

- Infrastructure is poorly located, under-maintained and insufficient to foster high growth
- Spatial patterns exclude the poor from the fruits of development (National Development Commission, 2011:3)

To make a meaningful, rapid and sustained progress in reducing poverty and inequality over the next two decades, South Africa needs to write a new story. The aim is to develop the capabilities of individuals and of the country and to create opportunities for all South Africans (National Development Commission, 2011:25)

The new approach involves under more creating jobs and livelihoods, expanding infrastructure, transforming urban and rural spaces and transforming society and uniting the nation.

Infrastructure provision that supports human settlements (housing, water, sanitation, roads and parks) is very complicated as the functions is at various levels. The planning function is at local level, the housing function is assigned to provincial level and the responsibility for water and electricity provision is split between those responsible for bulk services and reticulation. Human settlements are thus badly planned and there is little coordination between those installing water reticulation infrastructure and those responsible for providing bulk infrastructure. Responsibility for housing should shift to local municipal level at which planning is executed.

The commission proposes specific investments to be prioritised under which:

- The upgrading of informal settlements
- The development of a number of key new water schemes to supply urban and industrial centres (National Development Commission, 2011:14).

Settlement patterns should meet the needs and preferences of citizens, taking into account

broader social, environmental and economic interests. Strategies proposed by the commission entail the following and can be achieved by good spatial planning frameworks, political will, clear policies, consistent application and sensible financing arrangements:

- Increasing the urban population density, while improving the liveability of cities
- Moving jobs and investment towards dense townships on the margins of cities (National Development Commission, 2011:16).

### *4.2.3 Strategic Planning Framework*

Strategic planning takes place within the following policies and frameworks. The new Spatial Development Land Use Management Bill has recently been approved by Cabinet for introduction to the Parliament and will be the new legal binding document for spatial planning in South Africa.

#### *4.2.3.1 White Paper on Spatial Planning and Land Use Management, 2001*

Every municipality should have an indicative plan or in other words a Spatial Development Framework. The spatial development framework guides and informs all decisions of the municipality relating to the use, development and planning of land. The timing of the process of compiling the spatial development framework must correspond with that of the IDP.

The SDF must guide and inform the following:

- desired patterns of land use;
- directions of growth;
- urban edges;
- special development areas and;
- conservation-worthy areas;
- major movement routes;
- areas in which particular types of land use should be encouraged and others discouraged; and
- areas in which the intensity of land development could be either increased or reduced.

The primary purpose of the spatial development framework is to represent the spatial development goals of a municipality resulting from an integrated consideration and sifting of the spatial implications of different sectoral issues. The plan should be flexible and able to change to reflect changing priorities of the municipality and should influence the contents of

the scheme as and when required. The SDF should be a strategic, indicative and flexible forward planning tool to guide planning and decisions on land development. Furthermore, the link between both the plan and the scheme and the municipality's budget (income and expenditure) and capital expenditure framework is essential as it will indicate planned spending on infrastructure and services (South Africa, $2001_a$). A Spatial Development Framework should have the following four components:

(1) policy for land use and development;

(2) guidelines for land use management;

(3) a capital expenditure framework showing where the municipality intends spending its capital budget; and

(4) a strategic environmental assessment (South Africa, $2001_a$).

#### *4.2.3.2 Land Use Management Bill (2008)*

The LUMB sets out principles and norms and standards

- Land-use schemes;
- Land-use regulators need municipal land-use committees;
- Deals with alignment issues:
    - SDFs of District and Local municipalities
    - Land Use Schemes must give effect to NSDP, PGDS, PSDF
- Provincial role of assisting with preparation, facilitating co-ordination and alignment (IPDM, 2011)

#### *4.2.3.3 National Spatial Development Perspective, 2006*

The National Spatial Development Perspective (NSDP) of 2006 is the successor of the 2003 NSDP and provides a framework for considering the future development of the national space economy and recommends mechanisms for optimum alignment between infrastructure investment and development programmes within localities. The NSDP 2006 is a key instrument in the State's drive towards ensuring greater economic growth, buoyant and sustained job creation and the eradication of poverty (South Africa:i).

The NSDP is the primary spatial lens through which policymakers view socio-economic development in the country as a whole. It presents a wide variety of socio-economic trends emerging in South Africa, and then draws inferences about how that emerging space

economy should affect public investment in the immediate future. The NSDP aims to construct a national spatial-development perspective with the following as purpose (South Africa, 2006:1):

- To provide common principles and mechanisms to guide infrastructure investment and development spending across government;
- To provide a description of the spatial manifestations of the main social, economic and environmental trends which should form the basis for a shared understanding of the national space economy; and
- To provide an interpretation of the spatial realities and the implications for government interventions.

The National Spatial Development Perspective (South Africa, 2006:5) has the following principles:

(1) Sustained, inclusive and rapid economic growth is a pre-requisite for the achievement of other policy objectives (especially poverty alleviation);

(2) Government has a Constitutional obligation to provide basic services (water, electricity, health and education) to all citizens wherever they reside;

(3) Beyond the Constitutional obligation, government spending on fixed investment should be focused on localities of economic growth and/or economic potential. This would enable it to leverage in private investment, to stimulate sustainable economic activities and to create long-term employment opportunities;

(4) Efforts to address past and current social inequalities should focus on people, not places. In places with low economic potential, government should, beyond the provision of basic services, concentrate mainly on human capital development (through providing education, social grants and poverty-relief programmes). Government should also provide people living in these areas with labour-market information to allow them to migrate to other (higher-potential) localities if they choose to do so;

(5) Future settlement and economic development opportunities should be channelled into activity corridors and nodes that are adjacent to/linked to the main growth centres in the country. Infrastructure investment should primarily support localities that will become major growth nodes in South Africa (South Africa, 2006:6).

These principles are aimed specifically at focusing government action and investment to achieve maximum social and economic impact within the context of limited resources (South Africa, 2006:5).

The NSDP is not a national development plan and does not indicate the where, when and why – it uses the principles, need and potential as framework for investment and decision-making. By combining the NSDP's initial interpretation with local knowledge and research, Provincial Growth and Development strategies (PGDSs) and Integrated Development Plans (IDPs) will need to provide detail assessments of potential. Through a process of interaction and dialogue, these provincial and municipal planning instruments will then define each locality's development potential in terms of the six stated categories of development potential.

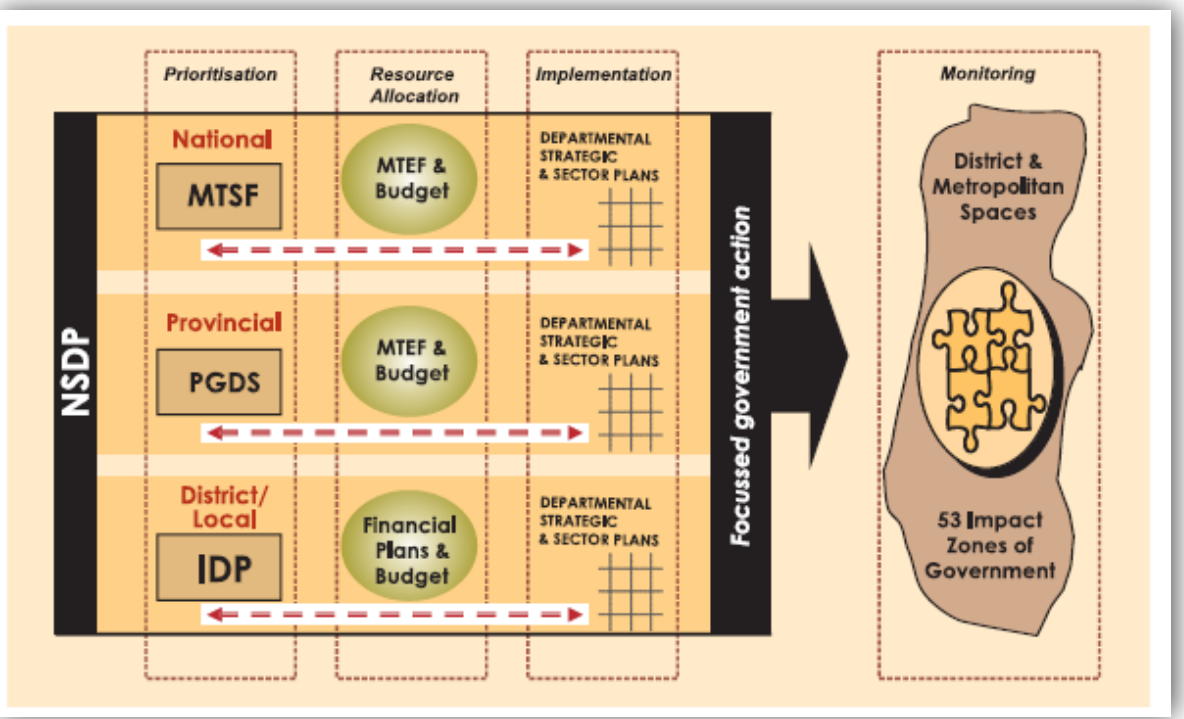



**Figure 20: NSDP alignment**

**Source: South Africa (2006)**

An overarching framework and spatial guidelines clearly spelling out the spatial priorities of government is critical to focus government action and provide the platform for alignment and coordination (South Africa, 2006:145)

#### *4.2.3.4 Medium Term Strategic Framework, 2009*

The basic drive of the Medium Term Strategic Framework 2009 – 2014 (MTSF) is to improve the conditions of life of all South Africans and contribute to building a better Africa and a better world (South Africa, 2009:7). The MTSF base document is meant to **guide planning and resource allocation** across all the spheres of government. National and provincial departments in particular will need immediately to develop their five-year strategic plans and

budget requirements taking into account the medium-term imperatives. Similarly, informed by the MTSF and their 2006 mandates, municipalities are expected to adapt their Integrated Development Plans in line with the national medium-term priorities. Some of the relevant strategic priorities are listed below:

- speed up economic growth and transform the economy to create decent work and sustainable livelihoods;
- massive programme to build economic and social infrastructure;
- build cohesive, caring and sustainable communities;
- **pursue regional development**, African advancement and enhanced international co-operation;
- **sustainable resource management** and use;
- build a developmental state including improvement of public services and (South Africa, 2009:8).

*4.2.3.5 Green Paper: National Strategic Planning, 2009*

- A spatial dimension to planning, critical to reversing the legacies of apartheid's Bantustan policies and fragmented urban areas;
- International best practice -spatial planning instruments increasingly used to pursue and achieve alignment;
- Bring about synergy and complementarities in the spatial effects of government action;
- Aim to maximise social and economic returns on government development spending (IDPM, 2011).

*4.2.3.6 Spatial Planning Land Use Management Bill, 2012*

The role of the Spatial Land Use Management Bill (SPLUMB) is to provide a framework for spatial planning and land use management in the Republic; (South Africa, 2012:2). It was approved by Cabinet on 20 March 2012 for introduction to Parliament.

Section 6 of the SPLUMB indicates the following principles which apply to spatial planning, land use management and land development-

- the principle of spatial sustainability, whereby spatial planning and land use management systems must under more-
    - promote land development that is within the fiscal, institutional and administrative

means of the country;

- consider all the current and future costs to all parties for the provision of infrastructure and social services in land developments;
- promote land development in locations that are sustainable and limit urban sprawl;
- result in communities that are viable (South Africa, 2012:22)

- the principle of efficiency whereby-
  - land development optimises the use of existing resources and infrastructure;
  - decision-making procedures are designed with a view to minimising negative ·financial, social, economic or environmental impacts; and
  - development application procedures are efficient and streamlined and time frames are adhered to by all parties (South Africa, 2012:23)

Section 12 of the Spatial Planning and Land Use Management Bill discuss the preparation of spatial development frameworks on all levels.

- National and provincial spheres of government may and in the case of local government must prepare spatial development frameworks that:
  - Interprets and represents the spatial development vision of the responsible sphere of government and authority;
  - Are informed by a longer term spatial development vision statement and plan;
  - Represents the integration and trade-off of all relevant sector policies and plans;
  - Guide planning and development decisions across all sectors;
  - Guide the relevant department or municipality in taking any decision or exercising any discretion in terms any law dealing with spatial planning and land use management systems;
  - Contributes to a coherent, planned approach to spatial development at all levels;
  - Provides clear and accessible information to the public and private sector and provide direction for investment;
  - Includes previously disadvantaged areas, areas governed by traditional authorities, informal settlements and slums and land holdings of state owned enterprises and government agencies and address their inclusion and integration into the spatial, economic, social and environmental objectives of the province;

- Address historical spatial imbalances in development;
- Identify the long-term risks of particular spatial patterns of growth and development and the policies and strategies necessary to mitigate those risks;
- Provide direction for strategic developments, infrastructure investment, promote efficient, sustainable and planned investments by all sectors and indicate priority areas for investment in land development;
- Promote a rational and predictable land development environment to create trust and stimulate investment in land development projects;
- Comply with applicable environmental legislation or a specific environmental management Act as defined in section 1 of the National Environmental Management Act No. 107 of 1998;
- Give effect to national legislation and policies on sustainable utilisation and protection of agricultural resources;
- Constitute and reflect the outcome of substantial citizen engagement including direct participation in the process through public meetings, public exhibitions, public debates and discourses in the media and any other mechanisms that promote such direct involvement.

- The spatial development frameworks prepared by different spheres of government must be coordinated, aligned and be in harmony with each other and once adopted as provided for in this Act, guide and inform the exercise of any discretion or of any decision taken in terms of this Act or any other law dealing with land use and development of land by that sphere of government.
- The Municipal Spatial Development Frameworks must, in accordance with Chapter 5 of the Municipal Systems Act, contribute to and be part of the Integrated Development Plans and must assist in integrating, coordinating, aligning and expressing development policies and plans originating from the various sectors of the three spheres of government as they apply within the municipal area.
- Provincial Spatial Development Frameworks must contribute to and express provincial development policy as well as integrate and spatially express policies and plans emanating from the various sectors of the provincial and national spheres of government as they apply at the geographic scale of the province.
- The National Spatial Development Framework must contribute to and give spatial expression to national development policy and plans as well as integrate and give spatial

expression to policies and plans emanating from the various sectors of national government and may include any Regional Spatial Development Framework.

- Spatial Development Frameworks must outline specific arrangements for prioritising, mobilising, sequencing and implementing public and private infrastructural and land development investment in the priority spatial structuring areas identified in Spatial Development Frameworks (South Africa, 2012:30).

According to Section 13 (3), the preparation of a national spatial development framework must take policies, plans and programmes of public and private bodies that impact on spatial planning, land development and land use management into account (South Africa, 2012:32). Furthermore the content of a national SDF as stipulated in Section 14 must:

- give effect to relevant national policies, priorities, plans and legislation;
- co-ordinate and integrate provincial and municipal spatial development frameworks;
- enhance spatial co-ordination of land development and land use management activities at a national level;
- indicate desired patterns of land use in the Republic;
- and take cognisance of any environmental management instrument adopted by the relevant environmental management authority (South Africa, 2012:33).

Section 15 (3) of the SPLUMB indicates the requirement for provinces to develop a provincial spatial development framework. The preparation must co-ordinate, integrate and align:

- provincial plans and development strategies with policies of national government;
- the plans, policies and development strategies of provincial departments; and
- the plans, policies and development strategies of municipalities.

Section 16 sets out the required content of Provincial Spatial Development Framework where it is stipulated that it must:

- provide a spatial representation of the land development policies, strategies and objectives of the province, which must include the province's growth and development strategy where applicable;
- indicate the desired and intended pattern of land use development in the province including the delineation of areas in which development in general or development of a

particular type would not be appropriate;

- coordinate and integrate the spatial expression of the sectoral plans of provincial departments;
- provide a framework for coordinating Municipal Spatial Development Frameworks with each other where they are contiguous;
- achieve the coordination of municipal development frameworks with the Provincial Spatial Development Framework and any Regional Spatial Development Frameworks as they apply in the relevant province; and
- incorporate any spatial aspects of relevant national development strategy and programme as they apply in the relevant province (South Africa, 2012:35).

According to Section 19 of the SPLUMB, a **regional** spatial development framework must-

- give effect to the development principles;
- give effect to national policies, priorities, plans and planning legislation;
- reflect the current state of affairs in that area from a spatial and land use of the region;
- indicate desired patterns of land use in that area;
- provide basic guidelines for spatial planning, land development and land use management in that area;
- propose how the framework is to be implemented and funded; and
- be consistent with environmental management legislation (South Africa, 2012: 38).

Section 21 indicates that Municipal Spatial Development Frameworks must have the following content:

- Give effect to the development principles;
- Include a written and spatial representation of a five year spatial development plan for the spatial form for the municipality;
- Include a longer term spatial development vision statement for the municipal area which indicates a desired spatial growth and development pattern for between ten (10) and twenty (20) years into the future;
- Identify current and future significant structuring and restructuring elements of the spatial

form of the municipality, including development corridors, activity spines and economic nodes where public and private investment will be prioritised and facilitated;

- Include population growth estimates over the next five years;
- Include estimates of the demand for housing units across different socio- economic categories and the planned location and densities of future housing developments;
- Include estimates of economic activity and employment trends and locations in the municipal area over the next five years;
- Identify, quantify and provide location requirements of engineering infrastructure and services provision for existing and future development needs over the next five years;
- Identify the designated residential, business, commercial and industrial areas where a national or provincial inclusionary housing policy may be applicable;
- Include a strategic assessment of the environmental pressures and opportunities within the municipal area, including the spatial location of environmental sensitivities, high potential agricultural land and coastal access strips where applicable;
- Identify the designation of areas in the municipality where incremental upgrading approaches to development and regulation will be applicable;
- Identify the designation of areas in which:
    - More detailed local plans must be drawn up; and
    - Where shortened land use development procedures may be applicable and land use schemes may be so amended;
- Provide the spatial expression of the co-ordination, alignment and integration of sectoral policies of all municipal departments;
- Determine a capital expenditure framework for the municipality's development programmes depicted spatially;
- Determine the purpose, desired impact and structure of the land use management scheme to apply in that municipal area; and
- Include an implementation plan comprising:
    - Sectoral requirements including budgets and resources for implementation;
    - Necessary amendments to a Land Use Scheme;
    - Specification of institutional arrangements necessary for implementation;
    - Specification of implementation targets, including dates and monitoring indicators;

- Specification, where necessary, of any arrangements for partnerships in the implementation process (South Africa, 2012:40).

### *4.2.4 Water Resources Planning and Management Framework*

#### *4.2.4.1 International Water Law in General*

There is no "international government" or enforcement body like in domestic law and international agreements must be ratified by participating States, being binding on these States only (SADC, 2009:4). Within this context, national water legislation must reflect international agreements to indicate commitments made regarding trans-boundary waters. For the purpose of the investigation, it is important to note that cooperation with water management authorities will enable South Africa to adhere to the normative principles applicable to trans-boundary waters as evolved over the last 40 years as part of the "international water law".

#### *4.2.4.2 Helsinki Rules*

The Helsinki Rules is the framework for the management of international shared water resources (South Africa, $1997_a$:47). The rules are a committed effort to identify the rights and obligations of States with regard to international waters in a comprehensive manner. It was approved in 1966, but never adopted by the UN General Assembly. These rules were requested to be included in the 1997 UN Convention. In summary, the Helsinki Rules:

- treat international drainage basins (watersheds extending over two or more States) as indivisible hydrologic units to be managed as a single unit to assure the "maximum utilization and development of any portion of its waters". This rule explicitly includes all tributaries (including tributary groundwater) as well as the land area of the basin within the concept of "drainage basin" and thus extends the reach of the rules beyond the international watercourse itself;
- formulate the phrase "equitable utilization" to express the rule of limited territorial sovereignty as applied to fresh waters: "Each basin State is entitled, within its territory, to a reasonable and equitable share in the beneficial uses of the waters of an international drainage basin" for current and future uses (SADC, 2009:4).

#### *4.2.4.3 Berlin Rules*

The Berlin Rules built on the work in the Helsinki Rules and the 1997 International Watercourses Convention and were adopted in 2004. The Berlin rules:

- set out general principles applicable to all waters: the right of public participation, the

obligation to use best efforts to achieve both conjunctive and integrated management of waters, and duties to achieve sustainability and the minimization of environmental harm;

- define the principles applicable solely to international waters and recognize the importance of environmental protection and public participation. The rule of equitable utilization and the rule requiring the avoidance of significant harm have been further developed.
- deal with the rights of persons and communities;
- deal with the protection of the environment, including the protection of ecological integrity of the aquatic environment, the obligation to apply the precautionary approach, and the duty to prevent, eliminate, reduce, or control pollution as appropriate (including a special rule on hazardous substances);
- address the obligation to undertake the assessment of environmental impacts of programs, projects, or activities relating to all waters—national and international;
- set forth obligations for cooperative and separate responses to extreme situations, including highly polluting accidents, floods, and droughts;
- deal with groundwater, including transboundary aquifers (SADC, 2009:6).

#### *4.2.4.4 The Revised SADC Protocol on Shared Watercourses*

The revised Southern African Development Community (SADC) Protocol, which came into force in 2003, is a framework agreement applicable to the management of 15 international watercourses across the SADC region and takes account of key principles of the international water law.

The general principles defined by this protocol are of specific interest sustainable development:

- The unity and coherence of shared watercourses, and to harmonise water uses to support sustainable development in all watercourse States;
- The utilisation of shared watercourses is open to all watercourse States, and without prejudice to their sovereign rights;
- Parties undertake to respect the rules of customary and general international law;
- Parties will maintain a balance between resource development for a higher standard of living and conservation and enhancement of the environment to promote sustainable development;

- Parties will pursue and establish close cooperation on studies and execution of projects;
- Parties will exchange available information and data;
- Parties will utilise the shared watercourse in an equitable and reasonable manner;
- Parties will participate in the use, development and protection of a shared watercourse in a reasonable and equitable manner;
- Parties will take all appropriate measures to prevent causing significant harm;
- Share information on planned measures (SADC, 2009:8).

The Specific Provisions of the Protocol states that notification concerning planned measures with possible adverse effects is essential in the development process. Before a State Party (member of SADC) implements or permits the implementation of planned measures which may have a significant adverse effect upon other Watercourse States (a State Party in whose territory part of a watercourse is situated), it must do the following in order to enable the notified States to evaluate the possible effects of the planned measures:

- Provide those States with timely notification thereof;
- Provide all available technical data and information;
- Give the results of any Environmental Impact Assessment (SADC, 2009:9).

#### *4.2.4.5 Limpopo Watercourse Commission*

As the Limpopo River Basin is shared by four SADC Member States as “Contracting Parties”, the joint management of the water resources between this countries originated from 1986 (Limpopo Basin Permanent Technical Committee) and developed into a multi-lateral agreement to establish Limpopo Watercourse Commission (LIMCOM) in 2003. LIMCOM serves as the forum for the Limpopo basin countries and is responsible for the management of the water resources of the Limpopo River. One of this Commission’s first tasks is the commissioning of a Joint Basin Study of the Limpopo River and the development of a water use agreement for the Limpopo Basin. The main objective of LIMCOM is to advise the Contracting Parties and provide recommendations on the uses of the Limpopo, its tributaries and its waters for purpose and measures of protection, preservation and management of the Limpopo River (LIMCOM, 2003:5). The general principles of the Protocol for the purpose of the agreement are:

- Sustainable development;
- Integration and equity principles;

- Prevention principle;
- Trans-boundary impact assessment principle.

In order to adhere to international agreements due to the international nature of the Limpopo Water Management Area, any development of water resources in the South African section remains under the authority of the Minister of the Department of Water Affairs (AGES, 2011:13).

#### *4.2.4.6 White Paper on National Water Policy, 1997*

**The Constitution and water rights**

Based on the Constitution, every person has the right to access to sufficient water and food and health care services (including clean water for hygiene purposes). It is important that the reform of the water law must make provision so that all South Africans gain access to sufficient water to meet basic domestic needs. Therefore, in order to improve the optimum and equitable use of water, the re-allocation of existing water uses is constitutionally valid (SA, $1997_a$:12).

Constitutionally, the management of water is a national function, and ultimately the role of public trustee of our water resources is a duty imposed on National Government. Chapter 3 of the Constitution describes Government in South Africa as consisting of National, Provincial and Municipal spheres which are not only distinctive but also interdependent and interrelated. It provides that all spheres of Government and all organs of State must cooperate with each other in mutual trust and good faith by co-ordinating their actions and legislation with each other. Thus, co-operative governance and integration are not only policy matters - they are constitutionally mandated. It is also the duty of the national and provincial governments to make sure and to assist that municipalities are effectively performing their functions which include the provision of water supply and sanitation services (South Africa, $1997_a$:12).

It is a high political priority to provide water on micro level as domestic use in order to meet basic needs. Water furthermore contributes to national development like the viability of agriculture. Mining, manufacturing and power generation together use about a quarter as much water as is consumed by irrigated agriculture. Yet, the value they add and the jobs they create per kilolitre of water far outstrip those of agriculture or forestry. This does not mean that manufacturing industry is more important - agriculture plays a vital role in supporting rural communities. It does however suggest that it would not be in the interest of national prosperity to unnecessarily constrain industry's access to water (SA, $1997_a$:13).

The cost of the impact of water uses must be accounted for in assessing the economic

benefits of alternative water uses and developments. To sustain the established uses of water, the natural resource base must be suitably protected. However, within a safeguarded natural environment, the water available to support tourism and recreation also has great potential for job creation (SA, $1997_a$:13)

**The objectives of water policy in South Africa**

According to Principle 7, the objective of managing the quantity, quality and reliability of the nation's water resources is to *achieve optimum*, *long-term*, *environmentally sustainable social* and *economic benefit* for society from their use". (SA, $1997_a$:19)

The loudest cry in South Africa is still for safe, clean and accessible drinking water and sanitation services. Access to water at its source is, in fact, only a small element of access to water services; for these, infrastructure, technical and management skills, and adequate funds are usually the critical elements (SA, $1997_a$:19).

Principle 8 states that the water required *to ensure that all people have access to sufficient water shall be reserved.*

According to Principle 9, the quantity, quality and reliability of water required to maintain the ecological functions on which humans depend *shall be reserved* so that the human use of water does not individually or cumulatively compromise the long term sustainability of aquatic and associated ecosystems.

Principle 10 states that the water required to meet the basic human needs and the needs of the environment shall be identified as *"The Reserve"* and shall enjoy *priority of use by right*. The use of water for all other purposes shall be subject to *authorisation*.

According to Principle 11 international water resources, specifically shared river systems, shall be managed in a manner that optimises the benefits for all parties in a spirit of mutual co-operation. Allocations agreed for downstream countries shall be respected (South Africa, $1997_a$: 60-61).

Three fundamental objectives for managing South Africa's water resources, which are firmly grounded in the provisions of the Bill of Rights of the Constitution of South Africa, 1996 (No. 108 of 1996) arise from the principles. These are the following -

- To achieve equitable access to water, that is, equity of access to water services, to 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 water availability and legitimate water requirements, and by implementing measures to protect water resources.

- To achieve efficient and effective water use for optimum social and economic benefit.

According to Tewari (2009:702) abovementioned principles indicate that the National Government is the custodian of the water resources of the nation (Principle 12). The National Government should meet this mandate by ensuring that the development, apportionment and management of water resources is carried out using the criteria of public interest, sustainability, equity, and efficiency while recognising the basic domestic needs, plus the requirements for meeting environmental and international obligations (Principle 13), and so on. Principles 22 to 24 are to guide the development and functioning of water institutions, while Principles 25 to 28 relate to provisioning of water services to people.

#### *4.2.4.7 Water Services Act, Act 108 of 1997*

The objective of the Water Services Act (108 of 1997) is to provide for the rights of access to basic water supply and basic sanitation by setting national standards and norms. Section 156, read in conjunction with Part B of Schedule 4 of the Constitution of the Republic of South Africa (108 of 1996), vests the executive authority and responsibility in the Minister to support and strengthen the capacity of municipalities to manage their own affairs, to exercise their powers and to perform their functions (DWA, $2010_a$:5).

- The main objects of this Act are to provide for:
    - the right of access to basic water supply and the right to basic sanitation necessary to secure sufficient water and an environment not harmful to human health or well-being
    - the preparation and adoption of water services development plans by water services authorities (South Africa, $1997_b$:11).
- Everyone has a right of access to basic water supply and basic sanitation.
    - Every water services institution must take reasonable measures to realise these rights.
    - Every water services authority must, in its water services development plan, provide for measures to realise these rights.
    - The rights mentioned in this section are subject to the limitations contained in this Act (South Africa, $1997_b$: 12)
- Duty to provide access to water services
    - Every water services authority has a duty to all consumers or potential consumers in its area of jurisdiction to progressively ensure efficient, affordable, economical and sustainable access to water services:

- This duty is subject to
  - the availability of resources;
  - the need for an equitable allocation of resources to all consumers and potential consumers within the authority's area of jurisdiction;
  - the need to regulate access to water services in an equitable way;
  - the duty of consumers to pay reasonable charges, which must be in accordance with any prescribed norms and standards for tariffs for water services;
  - the duty to conserve water resources;
  - the nature, topography, zoning and situation of the land in question; and
  - the right of the relevant water services authority to limit or discontinue the provision of water services if there is a failure to comply with reasonable conditions set for the provision of such services.

- In ensuring access to water services, a water services authority must take into account. among other factors—
  - alternative ways of providing access to water services
  - the need for regional efficiency
  - the need to achieve benefit of scale
  - the need for low costs
  - the requirements of equity and
  - the availability of resources from neighbouring water services authorities
- A water services authority may not unreasonably refuse or fail to give access to water services to a consumer or potential consumer in its area of jurisdiction.
- In emergency situations a water services authority must take reasonable steps to provide basic water supply and basic sanitation services to any person within its area of jurisdiction and may do so at the cost of that authority.
- A water services authority may impose reasonable limitations on the use of water services (South Africa, $1997_b$:20).

According to the Water Services Act (108 of 1997), every water service authority has a duty and responsibility to prepare Water Service Development Plans. Section 12 and 13 stipulated the duty of preparation of a WSDP as well as the required contents:

- Every water services authority must, within one year after the commencement of this

Act—

- as part of the process of preparing any integrated development plan in terms of the Local Government Transition Act, 1993 (209 of 1993); or
- separately, if no process contemplated in paragraph (a) has been initiated prepare—
  - a draft water services development plan for its area of jurisdiction; and
  - a summary of that plan (South Africa, $1997_b$:20).

**Contents of draft water services development plan**

- Every draft water services development plan must contain details-
  - of the physical attributes of the area to which it applies;
  - of the size and distribution of the population within that area:
  - of a time frame for the plan including the implementation programme for the following five years;
  - of existing water services;
  - of existing industrial water use within the area of jurisdiction of the relevant water services authority:
  - of existing industrial effluent disposed of within the area of jurisdiction of the relevant water services authority;
  - of the number and location of persons within the area who are not being provided with a basic water supply and basic sanitation;
  - regarding the future provision of water services and water for industrial use and the future disposal of industrial effluent including—
    - the water services providers which will provide those water services;
    - the contracts and proposed contracts with those water services providers;
    - the proposed infrastructure necessary;
    - the water sources to be used and the quantity of water to be obtained from and discharged into each source;
    - the estimated capital and operating costs of those water services and the financial arrangements for funding those water services, including the tariff structures;
    - any water services institution that will assist the water services authority;
    - the operation, maintenance, repair and replacement of existing and future

infrastructure;

- of the number and location of persons to whom water services cannot be provided within the next five years setting out—
  - the reasons therefor: and
  - the time frame within which it may reasonably be expected that a basic water supply and basic sanitation will be provided to those persons; and
- of existing and proposed water conservation, recycling and environmental protection measures (South Africa, $1997_b$:22)

Ultimately the WSDP must form part of any Integrated Development Plan contemplated in the Local Government Transition Act, 1993 (209 of 1993),

#### *4.2.4.8 National Water Act, Act 36 of 1998*

According to the National Water Act (36 of 1998) the ultimate aim of water resource management is to achieve the sustainable use of water for the benefit of all users.

The purpose of the National Water Act (NWA) is to ensure that the nation's water resources are protected, used, developed, conserved, managed and controlled in ways which take into account amongst other factors:

- meeting the basic human 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;
- and for achieving this purpose to establish suitable institutions and to ensure that they have appropriate community, racial and gender representation.

The Act provides that the National Government, as the public trustee of the nation's water resources and acting through the Minister, has the power to regulate the use, flow and control of all water in the Republic of South Africa (DWA, $2010_a$:5).

The National Water Act has transformed the way water is controlled, from a system of rights based on land ownership (the riparian system) to a system designed to allocate water equitably in the public interest. The progressive reallocation of water to sectors of society that were previously excluded from access to water can help to bridge the divide between the first and second economies, whilst maintaining existing beneficial water uses and encouraging the greater efficiencies needed in our dry country (DWAF, 2004:i).

DWA has divided South Africa into 19 Water Management Areas (WMA's) as outlined in the Water Act and seen in Figure 21. These consist of a single large catchment and a number of smaller sub-catchments. DWA compiled Internal Strategic Perspective (ISP) as forerunner of Catchment Management Strategies as an interim strategy to guide water resource management within catchment areas (DWA, $2009_a$). An ISP is intended to act as DWAFs perspective on how the applicable catchment's water resources should be managed (DWAF, $2004_c$: 2). The Limpopo Water Management Area applicable to the case study and will be discussed as part of the assessment.

In terms of Chapter 7 of the National Water Act (36 of 1998), provision is made for the establishment of Catchment Management Agencies (CMAs) and it states that their purpose is to delegate water resources management to the regional or catchment level and to involve local communities in decision-making processes. CMAs are classified as schedule 3A public entities in terms of the Public Finance Management Act (1 of 1999) which implies that they are supposed to have governing structures in the form of a board and a chief executive officer (CEO). Only two CMAs, namely Inkomati and Breede-Overberg, currently exists and both have governing boards and CEOs. The process of establishing others has been put on hold pending the completion of the institutional realignment which is aimed at reviewing the functioning of most of the statutory institutions reporting to the Department (DWA, $2010_a$:9).

Section 9 of the Act requires catchment management strategies to take account of the development plans prepared in terms of the WSA. All metropolitan and district municipalities, all of which are designated as water services authorities, and any local municipalities authorised to fulfil the role of a water services authority, must prepare water services development plans in terms of the WSA. These plans form part of the Integrated Development Plans that municipalities must prepare in terms of the Municipal Systems Act (No. 32 of 2000) (DWAF, $2004_d$:142)

A water services development plan will be a responsible authority's principal source of

information for determining water allocations to a municipality and issuing a licence. The plan's requirements must be accounted for in the responsible authority's catchment management strategy. Some of the data in water services development plans will be incorporated into the national water resources information system and will therefore contribute to national water resources planning. The plans should also contain details of water demand management and conservation measures and contingency plans for water-related disasters (DWAF, $2004_d$:143).

In preparing its water services development plan, a water services authority must refer to the relevant catchment management strategy for information about the availability of water to support proposed water services targets, the source of the water, and the requirements for the quality of waste water that is to be returned to the water resource after use (DWAF, $2004_d$:143)

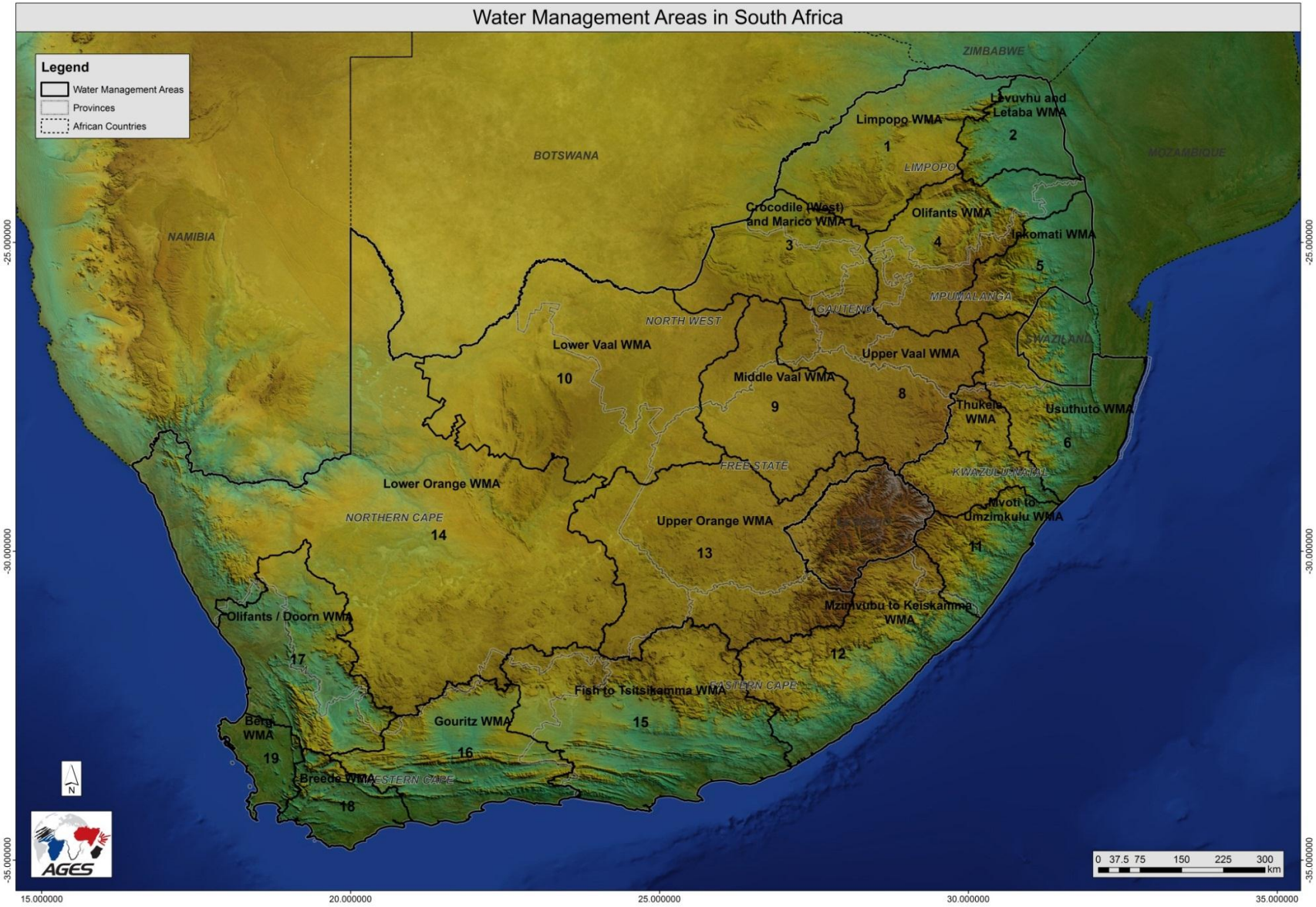



**Figure 21: Water Management Areas in South Africa (Source: AGES, 2012)**

#### *4.2.4.9 Strategic Framework for Water Services, 2003*

This Strategic Framework is the national umbrella framework for the water services sector (water supply and sanitation) as approved by cabinet. The strategic framework will inform the development of detailed strategies to give effect to the framework. The purpose of the Strategic Framework is to put forward a vision for the water services sector in South Africa for the next ten years, and to set out the framework that will enable the sector vision to be achieved (DWAF, 2003:2).

Key changes compared to the 1994 Water Supply and Sanitation Policy White Paper is that the Department of Water Affairs and Forestry will become a sector leader, supporter and regulator (rather than an operator) and water services authorities will be responsible for the delivery of water services. More emphasis will be placed on sustainability, financial viability and efficiency (DWAF, 2003:3).

> *Water is life, Sanitation is dignity.*
>
> *~ Ronnie Kasrils*

The strategic framework sets out the institutional framework as follows:

**Department of Water Affairs and Forestry** is the custodian of the water resource and overall leader of the water sector.

**Catchment management agencies** will be established in all water management areas and will be responsible for water resource planning at the catchment level and most water resources management activities in these areas

**Water services authorities** have the constitutional responsibility for ensuring access, planning and regulating provision of water services within their area of jurisdiction. They may provide water services themselves and/or contract external water services providers to undertake the provision function on their behalf (DWAF, 2003:8).

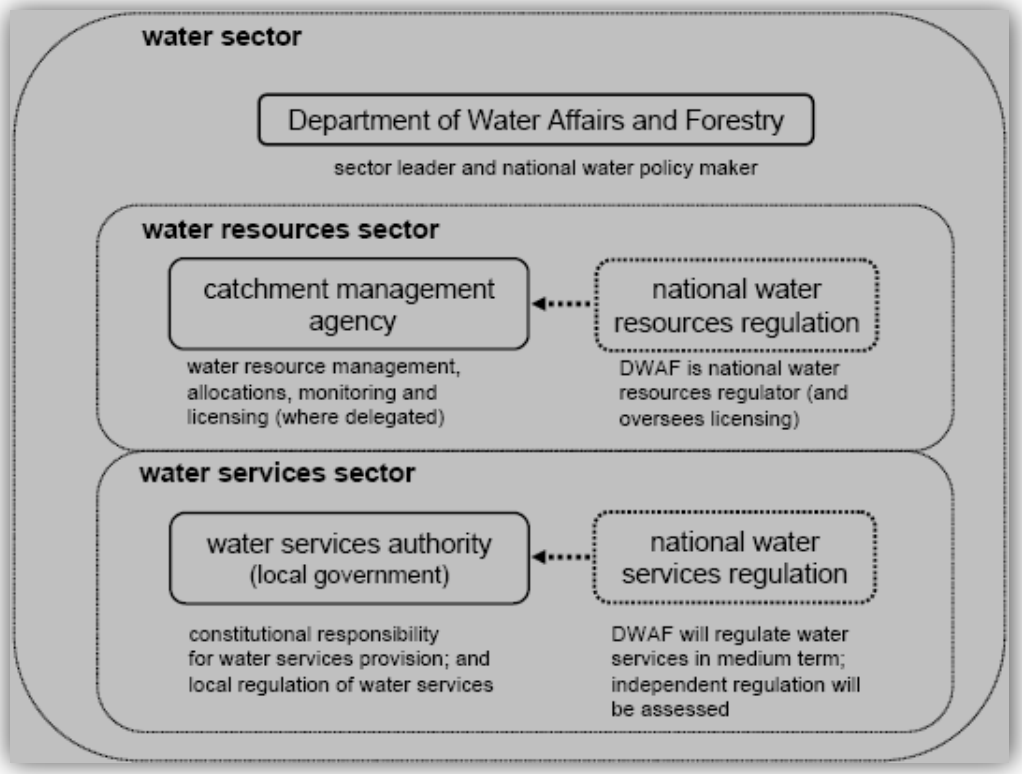



**Figure 22: Institutional Framework of the Water Sector**

**Source: DWAF (2003:8)**

The Constitution of the Republic of South Africa lays down the principles of co-operative government and intergovernmental relations. All three spheres of government must apply these principles with DWAF playing a leading role in ensuring that co-operative government is effective in the water sector

National government has the constitutional responsibility to support and strengthen the capacity of local government in the fulfilment of its functions, and to regulate local government to ensure effective performance of its duties. National government may develop legislation governing the provision of water and sanitation services. A municipality's right to govern the local government affairs of its community is subject to national and provincial legislation, as provided for in the Constitution. National government may intervene where water services authorities fail to plan and implement strategies for the universal provision of basic services

DWAF is the national department responsible for both water resources management and water services provision. Its future role will be in the following areas with respect to water services:

- Policy: DWAF has overall responsibility for the management of water resources and for

water sector policy (water resources and water services).

- Regulation comprising of monitoring sector performance and making regulatory interventions
- Support to water services and related institutions will be undertaken in terms of the Constitution and the principle of co-operative government.
- Information management: DWAF will manage information to be used for support, monitoring, regulation and planning (DWAF, 2003:20).

Provincial government has the constitutional responsibility to support and strengthen the capacity of local government (together with the national government) in the fulfilment of its functions, and to regulate local government to ensure effective performance of its duties. Provincial public works departments may undertake (or oversee) the construction of water and sanitation infrastructure on behalf of other departments in the province. Typically this will include setting design standards for water and sanitation facilities in schools, hospitals and clinics. Nevertheless, client departments remain ultimately responsible for the water supply and sanitation services within their own facilities, including the associated costs of bulk water and sanitation infrastructure where appropriate.

Other national government departments have specific responsibilities with respect to water services.

- National Treasury
- Department of Provincial and Local Government
- Department of Health
- Department of Education
- Department of Housing
- Department of Public Works
- Department of Environment and Tourism (DWAF, 2003:22).

The primary instrument of planning in the water services sector is the water services development plan. The following policies apply to the water services development plan. These policies are set out with the intention of assisting water services authorities to carry out their functions in the most effective manner.

- All water services authorities must develop a water services development plan (WSDP).
- A new plan must be developed every five years and the plan should be updated as

necessary and appropriate in the interim years.

- The WSDP must be integrated with the integrated development plan of the municipality, as required in terms of the Municipal Systems Act.
- The WSDP must integrate water supply planning with sanitation planning.
- The WSDP must integrate technical planning with social, institutional, financial and environmental planning. The planning of capital expenditures must also be integrated with the associated operation and maintenance requirements and expenditures.
- The WSDP must be informed by the business plans developed by water services providers and with the plans of any regional water services providers, as relevant.
- The plan must take into account the impact of HIV/Aids on future water demand.
- The WSDP must integrate with the catchment management strategy.
- The planning process must take into account the views of all important stakeholders, including communities, through a consultative and participatory process. Every effort must be made to ensure the adequate and meaningful participation of women in consultation forums.
- The draft plan must be made available for public and stakeholder comment and all comments made must be considered when preparing the final plan.
- The contents of the WSDP must be communicated to all important stakeholders, including DWAF.
- A water services authority must report annually and in a public way on progress in implementing the plan.

It is essential for housing policies and plans to be consistent with service level policies and plans contained in water services development plans.

The provision of services to people living on land without permission of the owner of the land poses a challenge to water services authorities. Water services authorities should seek to address the security of tenure issues speedily. Interim basic water and sanitation services should be provided as appropriate, affordable, and practical in accordance with a progressive plan that addresses both land tenure and basic services. DWAF will provide best-practice guidelines to assist water services authorities (DWAF, 2003:43).

*4.2.4.10 National Water Resource Strategy, 2004*

The First Edition of the National Water Resource Strategy (NWRS) describes how the water

resources of South Africa will be protected, used, developed, conserved, managed and controlled in accordance with the requirements of the policy and law while the National Water Policy (1997) and the National Water Act (36 of 1998) are founded on Government's vision of a transformed society. The central objective of managing water resources is to ensure that water is used to support equitable and sustainable social and economic transformation and development (DWAF, $2004_d$:i). The purpose of the NWRS is to strategically direct the management of water resources from a national perspective, and the water availability information is therefore relatively coarse. The information is not appropriate, nor is not intended to be used, for planning individual projects. These must be investigated using more detailed information, as well as being the subject of the impact assessments required by environmental legislation (DWAF, $2004_d$:10).

A catchment management strategy is the framework for water resources management in a water management area. The NWRS provides the framework within which all catchment management strategies will be prepared and implemented in a manner that is consistent throughout the country (DWAF, $2004_d$:9).

It is possible to identify the areas of the country in which water resources are available to support social and economic development initiatives, as well as areas in which limited water resources may be a constraint to development through the water availability information presented in the NWRS - for each water management area and for subdivisions of each area. Indications are also given of possible developments for which available water might be used, but only as a guideline. (DWAF, $2004_d$:9).

**Cooperative Planning and Management of Water Resources**

The Department of Water Affairs and Forestry is responsible for water resources management at national level. The Department is in the process of establishing 19 catchment management agencies, each operating in a defined water management area, to manage water resources at a regional level. These agencies will be responsible, among other things, for ensuring that there is consonance between their water-related plans and programmes and the plans and programmes of all other role players in the catchments they manage. The agencies will therefore have to establish co-operative relationships with a range of stakeholders, including other water management institutions, water services institutions, provincial and local government authorities, communities, water users ranging from large industries to individual irrigators, and other interested parties (DWAF, $2004_d$:11).

To facilitate the most beneficial utilisation of water, a general guide on priorities for water use is given below. The priorities are listed in descending order of importance, although the order may vary under particular circumstances.

(1) Provision for the Reserve.

(2) International agreements and obligations.

(3) Water for social needs, such as poverty eradication, primary domestic needs and uses that will contribute to maintaining social stability and achieving greater racial and gender equity.

(4) Water for uses that are strategically important to the national economy.

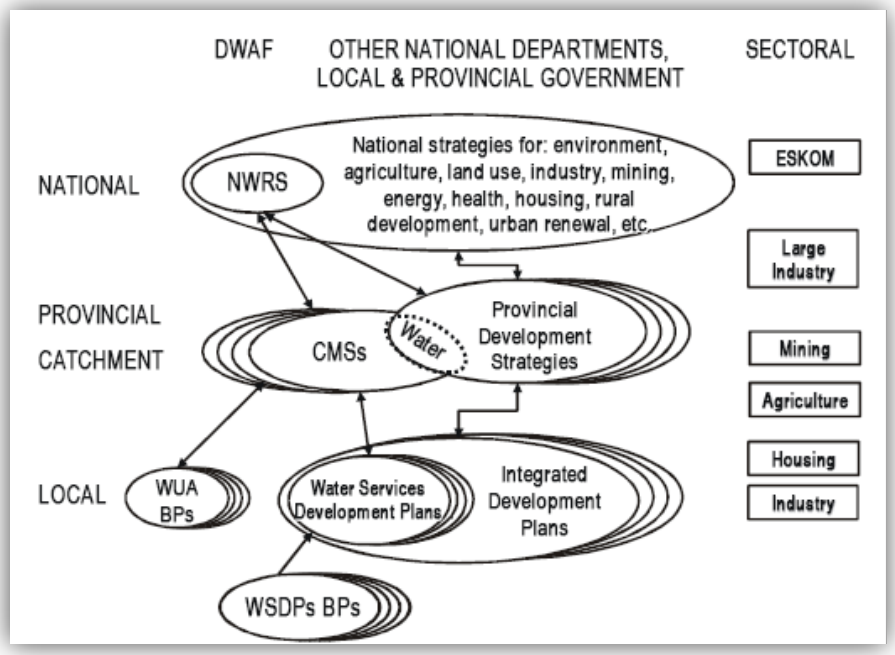
(5) Water for general economic use, which includes commercial irrigation and forestry. In this category, allocation is best dictated by the economic efficiency of use. With the introduction of water trading, demand will automatically adjust over time to reflect the value of water in particular uses.

(6) Uses of water not measurable in economic terms. This may include convenience uses and some private water uses for recreational purposes, which are likely to be of low priority (DWAF, $2004_d$:46).

**Inter-governmental Planning**

- National government provides a framework of common policies and principles, and coordinated and prioritised programmes, within which provincial, municipal and sectoral planning can take place;
- Provincial growth and development strategies provide a more specific framework for the development of projects and programmes on a provincial level, as well as the co-ordination of sectoral and municipal planning; and
- Under the Municipal Systems Act (32 of 2000) district municipalities are required to prepare five year Integrated Development Plans to guide and inform all aspects of planning, implementing and managing service provision in their areas. The plans must be compatible with national policy and legislation and be aligned with provincial strategies and plans (DWAF, $2004_d$:146).

The Figure 23 illustrates in broad terms the links between the strategies and plans for water resources management and water services provision, and the strategies and plans of other national, provincial, municipal and sectoral interests.




CMS - catchment management strategy; WUA - water user association;
WSP - water services provider; BP - business plan.

**Figure 23: Water-related planning in the national planning framework**

**Source: DWAF ($2004_d$:147)**

According to the NWRS, sufficient water can be made available at all significant urban and industrial growth points in the country for water not to be a limiting factor to economic development. However, given the long lead times for developing new supply schemes, co-operative planning will be required between water users and water management institutions to ensure that water can be made available when it is needed (DWAF, $2004_d$:41). This was confirmed by the Strategic Plan of the Department of Water Affairs (2010/11 – 2012/13) in which the performance plan for the main exchequer account states that their first strategic priority is to contribute to economic growth, rural development, food security and land reform (AGES, 2011:15).

As required in the NWRS, industrial users who require a licence to use water may be required to submit a Water Management Plan. The Department of Water Affairs may waive this requirement for those users who have to submit such a plan as part of their Environmental Management Plan. The large industrial or commercial users who draw their water from a municipal supply system and do not have to obtain a water use licence from any water management institution will not have to submit a water management plan unless required to do so by the relevant water service authority or water services provide (DWAF, $2004_d$:80).

*4.2.4.11 DWA Strategic Plan 2010-2013*

The Department has identified the following set of priority areas which are aimed at contributing to the government-wide priorities that are outlined in the Medium Term Strategic Framework document for 2009-2014:

**(1) Contributing to economic growth and social development;**

**(2) Ensuring sustainable and equitable resource management;**

(3) Promoting rural development (DWA, $2010_a$:6);

**(4) Effective support to local government;**

(5) Contributing to global relations

(6) Improving the Department's capacity to deliver services (DWA, $2010_a$:7)

*4.2.4.12 Inter-basin water transfers as part of the National Strategy*

Inter-basin water transfer is the artificial withdrawal of water in one basis and move of water across drainage divides to further the economic development in a water-deficient region. Due to the dis-homogeneity in geology, geomorphology and climate in South Africa, development related to natural resources take place in areas where water is not naturally found in abundance. This gives rise to the development of an extensive system of inter-basin water transfer schemes that play an effective and acceptable part in systems to meet water demands on a reliable and sustainable basis in South Africa (AGES, 2011:16).

As South Africa in general is reaching the limits of what can be achieved to make water available to everyone by traditional methods, managerial and technological innovation is needed to augment water supplies. This may include water from neighbours to the north, desalinisation of sea water and place more emphasis on the development of inter-basin water transfer schemes. Regarding to inter-basin transfers, the National Water Policy specifies that special planning and implementation procedures is required involving the management of all catchments. An appropriate framework of cooperation is needed when a water course shared with another state is involved. If inter-basin water transfer contributes to water supply to the eco-industrial development, the Limpopo River as international waterway is concerned and international cooperation must be established (AGES, 2011:16).

## 4.3 GOAL ACHIEVEMENT MATRIX ASSESSMENT PRINCIPLES

In this section, the concept of assessment principles is used as the foundation of the evaluation framework. These assessment principles are individual principles related to one another and are used to assess the strategic spatial development frameworks and plans in terms of water resource management and planning for development.

The assessment principles are based on the goals and objectives aggregated from the following as most representative for the aim of this study:

**National Legislation**

(1) Policies – White Papers

(2) Legislation – Acts

(3) Regulations – Regulations and strategies

(4) Guidelines – SDF, IDP and WSDP guidelines

**National Application Principles**

(1) Department of Water Affairs – plans, strategies, institutional responsibilities and principles

(2) Integrated Water Resource Management Concept

(3) Catchment Management Agency

**International Application Principles**

(1) Principles from World Summit on Sustainability

(2) International Integrated Water Resource Management Concept

(3) Application of IWRM – Vietnam and United Arab Emirates

(4) Habitat Agenda

(5) Millennium Development Goals

Based on a classification of legislation and policies, the deduced assessment principles is identified and indicated in Table 5. From the list of principles, the following ten assessment principles are selected for application in the Goal Achievement Matrix (GAM):

Assessment Principle 1: Sustainability (related to water resource sustainability and vulnerability; infrastructure sustainability) meeting the current and future needs

Assessment Principle 2: Alignment with relevant policies and legislation in South Africa

Assessment Principle 3: Need assessment for water services and resources

Assessment Principle 4: Public and Stakeholder participation in need determination

Assessment Principle 5: Promote equal access to services and reverse past inequalities related to water

Assessment Principle 6: Degree of guidance related to planning and resource allocation

Assessment Principle 7: Planning for future water infrastructure expansions

Assessment Principle 8: Budget allocation for water infrastructure

Assessment Principle 9: Water to contribute to social development and economic growth

Assessment Principle 10: Spatial representation and integration of water resources and planning

**Table 5: Deduced Assessment Principles for GAM based on a Classification of the Legal and Policy Framework**

| | Legislation/policy/ guideline | Year | Principles/ Objectives |
|---|---|---|---|
| General International Principles | Sustainable Principle | 1992 | Address current and future needs |
| | MDG's | 2000 | Halve the population without access to water |
| | | | Improve lives of slum dwellers |
| | Constitution of RSA | 1996 | Equal right to water |
| | | | Government's responsibility to realise rights |
| General National Principles | NEMA | 1998 | Take all effects into account |
| | | | Equitable Access to water resource |
| | | | Participation of interested and affected parties |
| | | | Inter-governmental integration |
| | MSA | 2000 | Supply of municipal services on local level |
| | | | Align development plans and strategies as well as resources and capacities |
| | | | Requires IDP and SDF development |
| Strategic Spatial Planning | National Development Plan | 2011 | Expanding infrastructure |
| | White Paper on Spatial Planning and Land Use Management | 2001 | SDF should indicate spatial development goals |
| | | | SDFs linkage with budget and capital expenditure is essential |
| | NSDP | 2006 | Government's responsibility to provide basic services |
| | | | Settlement opportunities at nodes and corridors |
| | MTSF | 2009 | Guide planning and resource allocation |
| | | | Improve public services |
| | | | sustainable resource management |
| | Green Paper on National Strategic Planning | 2009 | Aims to reverse past inequalities |
| | | | Pursue alignment |
| | SPLUMB | 2012 | Spatial sustainability |
| | | | Principle of efficiency |
| | | | Integration of sector plans |
| | | | Direction of strategic developments, infrastructure investment |
| | | | Citizen engagement |
| | | | SDF compilation |
| Water Resource Planning and Management | Helsinki Rules | 1995 | Manage international basin as a unit |
| | | | Promote equitable water utilization |
| | Berlin Rules | 1997 | Public Participation |
| | | | Sustainable management |
| | SADC Protocol | 2003 | Notification to affected countries of development |
| | LIMCOM | 2003 | Sustainable development |
| | | | Integration and equity principle |
| | White Paper on National Water Policy | 1997 | Cooperate governance |
| | | | The Reserve maintained for human and ecological need |
| | | | Equitable access to water services |
| | | | Sustainable use of water |
| | | | Efficient and effective water use for social and economic benefit |
| | Water Services Act | 1997 | Right to basic water supply and sanitation |
| | | | Compilation of a WSDP |
| | National Water Act | 1998 | Regulate use flow and control of water |
| | | | Meet the basic human needs of current and future generations |
| | | | Equal access |
| | | | Facilitate social and economic development |
| | Strategic Framework for Water Services | 2003 | Sustainability |
| | | | Fiscal viability |
| | | | Efficiency |
| | | | WSDP function |
| | National Water Resource Strategy | 2004 | Support equitable and sustainable social and economic transformation and development |
| | | | Strategically direct water resource management |
| | DWA Strategic Plan | 2010-2013 | Contributing to economic growth and social development |
| | | | Ensuring sustainable and equitable resource management |

**Integrated Development Plan Principles**

- Assessment of existing level of development - ID communities with no access to water & sanitation
- Vision of municipality as well as the council priorities and objectives and development strategies
- Resource allocation
- Institutional transformation
- Integration between different spheres of government and of plans and policies
- Transparent interaction between municipalities and residents
- Linking planning with the municipal budget

**Spatial Development Framework Principles**

| | |
|---|---|
| NSDP | Indicate desired patterns of land use<br>Give affect to national policies<br>Integrate provincial and municipal SDFs<br>Coordinate land use and management nationally |
| Provincial SDF | Align with national, provincial and local<br>Coordinate and integrate provincial sector plans |
| District SDF | Give effect to development principles<br>Give effect to national policies and legislation<br>Indicate land use decisions in district<br>Guide spatial and land use planning |
| Local SDF | Give effect to development principles<br>Identify, quantify and provide location requirements of engineering infrastructure and services provision for existing and future development needs<br>Provide spatial expression of the co-ordination, alignment and integration of sectoral policies of all municipal department<br>Implementation plan including sectoral requirements |

**Water Services Development Plan Principles**

- Implementation Plan
- Indicate existing water services
- Indicate existing industrial water use
- Indicate where and to whom services cannot be provided
- Indicate conservation, protection and recycling measures

**Source: Own Construction (2012)**

The ten selected principles are combined in a GAM for assessment of the strategic spatial planning documents relating to water resource planning and management. Each principle is identified for the assessment and will be adjudicated for how well it contributes to effective strategic spatial planning and water resource planning and management.

The possible scores are: (1) below average, (3) sufficient and (5) above sufficient which can contribute to effective implementation. The detail for each principle's score is stipulated in Table 6 below.

**Table 6: GAM Assessment Principles**

| GAM Assessment Principles | | | | |
|---|---|---|---|---|
| Principle | | Below Average | Sufficient | Above sufficient and contributing to implementation |
| | **Score** | **1** | **3** | **5** |
| AP1 | Sustainability (related to water resource sustainability and vulnerability; infrastructure sustainability) meeting the current and future needs | Sustainability is not a priority | Sustainability is addressed | Sustainability leads to practical implementation |
| AP2 | Alignment with relevant policies and legislation in South Africa | Mention of other policies and legislation | Policies and legislation aligned | Policies and legislation aligned to contribute to effective management |
| AP3 | Current and future need assessment for water services and resources | No need determination conducted | A sufficient current need determination conducted | Current and future need assessment conducted |
| AP4 | Public and Stakeholder participation in need determination | No stakeholder or public participation done | Sufficient stakeholder and public participation conducted | Above sufficient consultation of the public and stakeholder |
| AP5 | Promote eual access to services and reverse past inequalities related to water | Do not address | Address sufficiently | Address above sufficient |
| AP6 | Degree of guidance related to planning and resource allocation | No guidance | A degree of guidance | Valuable guidance |
| AP7 | Planning for future water infrastructure expansions | No future planning | Sufficient planning | Above sufficient planning |
| AP8 | Budget allocation for water infrastructure | No budget for water resources or services | Some budget for water resources and services | Sufficient budget for water and services |
| AP9 | Water to contribute to social development and economic growth | No specific contribution | Sufficient contribution | Above sufficient contribution |
| AP10 | Spatial representation and integration of water resources and planning | No spatial component | Good spatial integration and representation | Above sufficient spatial integration and representation |

**Source: Own Construction (2012)**

## 4.4 CORRELATION WITH OTHER INTEGRATION SYSTEMS

In order to achieve optimal integration, the what, why, who and how needs to be determined for strategic spatial planning and water resource management as in the methodology developed by the International Institute for Environment and Development (IIED) with the International Stakeholder Panel (DBSA, 2009:53). Water resource management forms part of the environment and the concept of Environmental Mainstreaming thus also apply to water resource management and planning in relation to development and strategic spatial planning.

The required integration of strategic planning and water resource management can be compared to the concept of "Environmental Mainstreaming" (EM) which is the informed inclusion of relevant environmental concerns into the decisions of institutions that drive national, local and sectoral development policy, rules, plans, investment and action (Dalal-Clayton & Bass, 2009:11). It is a fact that environmental and developmental institutions and decisions tend to be separate, which results in environment being viewed as a set of problems rather than potentials.

According to the Global Environmental Facility (GEF), environmental mainstreaming is essential due to the interdependency of economic and social development and the environment. Furthermore the way we manage the economy, political and social institutions has critical impacts on the environment, while environmental quality and sustainability impacts the performance of the economy and social well-being. Environmental integration and mainstreaming is at the forefront of development planning and policy formulation (Dalal-Clayton & Bass, 2009:16)

Environmental Mainstreaming has been developed in order to find **integrated solutions** that avoid 'development vs. environment' arguments and enable more efficient planning of environmental assets. The outcomes of EM range from upstream to downstream changes like greater participation and interaction between environment and development stakeholders, integrated environment-development policy and associated political will / leadership, inclusion of development-environment linkages in national and sector plans and the inclusion of development-environment linkages in budgets and fiscal instruments (Dalal-Clayton & Bass, 2009:67)

To achieve these benefits, EM requires collaboration referring to the integration of environment and development interests and ideas, not just environment being forced into development. EM needs to be long-term process, depends on leadership and catalytic organisations and will be a political, institutional and technical change process.

Several constraints make it difficult to mainstream environment into development decisions and institutions, notably:

- the prevailing development paradigm, which treats environment as an institutional and economic 'externality';
- lack of data, information, skills and institutional capacity to work on environment-development links;
- weak environmental mainstreaming initiatives to date to act as a precedent;
- lack of political will for change (Dalal-Clayton & Bass, 2009:11)

The interacting factors that shape strategy for environmental mainstreaming are represented in Figure 24. The who (commitment from key decision-makers involving 'change agents' in planning as well as the private sector) and the when (time of exposure is critical while incorporating strategic agendas) can be seen as the critical success factors.

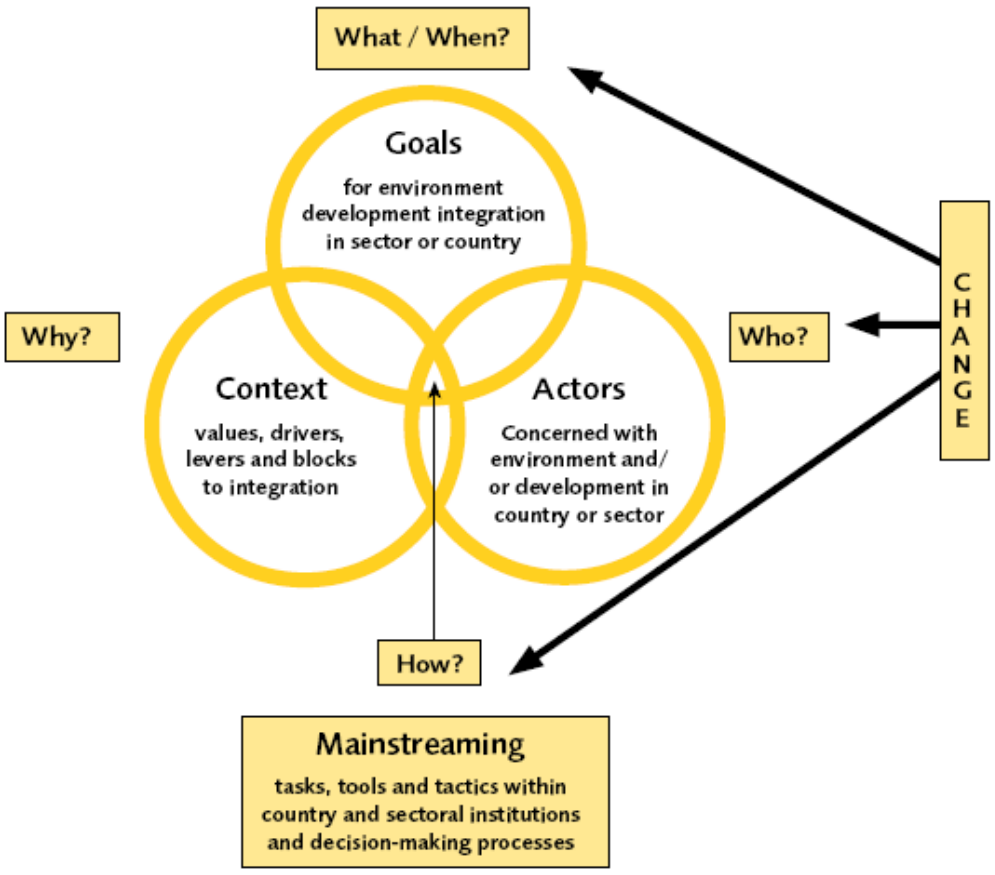



**Figure 24: Interacting factors that shape the strategy for environmental mainstreaming**

**Source: Dalal-Clayton & Bass (2009:33)**

For effective environmental mainstreaming, a conceptual shift is required to ensure that this goal should be a primary objective of the development process rather than a mere compliance with environmental standards (Dalal-Clayton & Bass, 2009:39)

The tasks associated with integrating environment and development in decision-making differ at each stage of the decision-making process – commonly assessment, case-making, option development, policy-making, strategy development, planning, shaping investments, and building capacity. Such processes tend to be most effective for sustainable development when they are considered together, at least nominally in a cyclical and iterative manner.

## 4.5 SUMMARY

Multi-criteria Analysis measures the performance of a range of multi-criteria projects against goals and objectives which can include quantitative and qualitative factors and relies heavily on assigned weightings (CWG, 2010:10). The Goal Achievement Matrix (GMA) utilises Multi-criteria Analysis methodologies for assessment and analysis. Goals and objectives form the foundation of selection criteria and performance measures that will ultimately ensure that a project can be successfully analysed and prioritised.

Based on the case study, a GMA is developed through which the applied water resource management principles' implementation within strategic spatial development frameworks is assessed. Each identified principle or requirement is weighted in accordance with the goal achievement matrix. To identify assessment principles, the legislative and policy framework giving form to strategic spatial planning and guiding water resource management first needs to be defined, elaborated and the applicable principles selected.

The Constitution and White Paper on Local Government (1998), delegate key environmental responsibilities, including that of environmental stewardship, and adopting more sustainable approaches to planning and development to local government. To date efforts to achieve sustainable development have been particularly weak and dangerously ineffective. The reasons behind this are that the environmental mandate of most municipalities remains poorly funded, there is a general lack of public and political will as well as a shortage of capacity and resources directed to environmental management (DBSA, 2009:11).

In the Green Paper: National Strategic Planning of September 2009, national spatial guidelines are identified as important tools for bringing about coordinated government action and alignment. Internationally, spatial planning instruments are increasingly being used to achieve alignment between the actions of different sectors and the various spheres of government. South Africa has an established spatial planning framework, through which alignment can readily be achieved. The country's overarching framework is provided in the National Spatial Development Perspective (NSDP). In the development of their PGDS, the provinces must include a spatial plan (the Provincial Spatial Development Framework). Similarly, local governments, in the development of their IDPs, must also include a spatial plan (the Spatial Development Framework or Spatial Development Plan). This means that both provincial and local governments need to align their development plans and spatial development frameworks with the national perspective. In this way, coordination, alignment and integrated action with respect to the development of a spatial economy can be achieved, and the integration of sustainability principles in the national strategic plan, the PGDS and the IDPs of local government will ensure that sustainability is also reflected in spatial

planning (Department of Environmental Affairs, 2011:36).

It is determined that there is a degree of integration of strategic spatial planning and water resource management in South Africa especially in terms of policies and legislative frameworks. The problem with integration mainly takes place on implementation level.

On a National level, the National Spatial Development Perspective (NSDP) is integrated in water resource planning in terms of National Water Resource Strategy. The NSDP identified 26 areas in the country considered key to the national economy. The NSDP concluded that "… The principles and methodology of the NSDP should inform the development plans, policies and programmes of all spheres and agencies of government as a matter of policy". The Department has taken its cue from this and a short description of water resource planning initiatives for each of the 26 growth points, with a summary of the water situation for each area (DWA, $2010_c$:9)

On a local level, the IDP must be informed, aligned and integrated with the WSDP and vice versa and the SDF must align and be integrated with the IDP and vice versa.

Water resources for development have an influence in a SDF as part of phase 2-7. This entails research as part of the Status Quo, public participation (where infrastructure issues comes forth) and implementation as part of phase 7 where projects need to be prioritised and aligned for budgeting purposes.

With a deficit of water infrastructure sector plans and questionable data contained in some IDPs, this required incorporation and integration of water resource data or management in a SDF is a challenging task. With the WSDP and the IDP process linked and informing one another, the provision of water services and the management of water services are linked and the requirements of the National Water Act are of utmost importance. Water services development planning thus needs to be addressed and integrated within a strategic framework that embraces water resource management as part of environmental protection and sustainable development (DWAF, 2001:6).

The structures and policies required to regulate South Africa's water resources are in place. However, historical lack of capacity and financial resources within the regulating bodies has led to inconsistent management and a lack of widespread enforcement. Water-supply organizations should strive to supply water efficiently and effectively, minimize water losses (from reticulation leakage, for example) and promote water conservation and water demand management among their consumers (Department of Environmental Affairs and Tourism, 2006:155)

From the discussions in Chapter 4, the assessment principles based on the goals and objectives is aggregated from the following as most representative for the aim of this study:

Assessment Principle 1: Sustainability (related to water resource sustainability and vulnerability; infrastructure sustainability) meeting the current and future needs

Assessment Principle 2: Alignment with relevant policies and legislation in South Africa

Assessment Principle 3: Need assessment for water services and resources

Assessment Principle 4: Public and Stakeholder participation in need determination

Assessment Principle 5: Promote equal access to services and reverse past inequalities related to water

Assessment Principle 6: Degree of guidance related to planning and resource allocation

Assessment Principle 7: Planning for future water infrastructure expansions

Assessment Principle 8: Budget allocation for water infrastructure

Assessment Principle 9: Water to contribute to social development and economic growth

Assessment Principle 10: Spatial representation and integration of water resources and planning

Other principles that can be considered additionally is the normative principles from the Department of Governmental Local Government and Housing as well as the principle of Environmental Mainstreaming

(1) The following normative guiding principles apply to all spatial planning, land use management and development and form the basis for integration:

- Principle of sustainability: The principle of sustainability requires the sustainable management and the use of resources making up the natural and built environment.
- Principle of equality: The principle of equality requires that everyone affected by spatial planning, land use management and land development actions or decisions must enjoy equal protection and benefits, and no unfair discrimination should be allowed.
- Principle of efficiency: The principle of efficiency requires that the desired result of land use must be produced with the minimum expenditure of resources.
- Principle of integration: The principle of integration requires that the separate and diverse elements involved in development planning and land use should be combined and coordinated into a more harmonious whole.
- Principle of fair and good governance: The principle of fair and good governance requires

that spatial planning; land use management and land development must be democratic, legitimate and participatory (Department of Governmental Local Government and Housing, 2008:10)

(2) The principle of Environmental Mainstreaming (EM) can be considered due to the fact that it enables more efficient planning of environmental assets and find integrative solutions.

# 5 APPLICATION OF THE GOAL ASSESSMENT MATRIX

The availability of water resources forms the basic requirement for most developments as in the case of a proposed eco-industrial park in the Limpopo Province. This proposed development is used to apply the Goal Achievement Matrix in aim to determine the degree to which water resource management and planning is incorporated in strategic spatial planning documents as the spatial development framework claims to guide development and inform investment.

The development of the GAM can be used and implemented as a comparative evaluation tool to compare the degree of integration and implementation of water resource management and strategic spatial planning of local municipal authorities internationally.

## 5.1 CASE STUDY: WATER SUPPLY TO AN ECO-INDUSTRIAL PARK IN LIMPOPO PROVINCE

### *5.1.1 Background*

AGES (Pty) Ltd was appointed in 2011 to investigate water supply options to a proposed eco-industrial park (report number 2011/09/04 PWS). The proposed eco-industrial park aims to be in close collaboration and in conjunction with development goals of the provincial and national governments.

The Eco-industrial Park entails the construction of a 3.0 - 4.5 million tonnes per annum (mtpa) Steel Plant with typical associated facilities, including expanded capacity Coking Plants that will allow for the exportation of one mtpa of coke. In addition, the industrial complex will include a 20,000 barrels per day (bbl/day) Coal-to-Liquids (CTL) Plant, or a Gas-to-Liquids (GTL) Plant pending confirmation of gas availability, as well as a 500 Mega Watt (MW) Independent Power Production (IPP) Plant (AGES, 2011).

The Major Industrial Complex (MIC) Project will therefore entail three independently owned plants, each of which shows a healthy unleveraged Internal Rate of Return (IRR) and short payback periods. The plants will extensively employ clean and green process technologies, which opens up additional sources of grants and funding opportunities that will serve to improve the economic viability of the projects. Preliminary projections for steel products, diesel fuel and power prices, as well as the estimated costs to produce these products, show that all of the plants are economically and technically viable and should attract considerable investor interest.

The positive impact of this development on the country's economy and the creation of jobs, particularly through the beneficiation of raw materials, are evident. The iron and steel plant

design will comply with the current environmental legislation and the design will strive to be "zero effluent" (AGES, 2011).

The study for water supply options conducted by AGES (Pty) Ltd to the eco-industrial park thus contributed to of the feasibility of the development. With the aim to determine the feasibility of the proposed eco-industrial park, the strategic spatial planning as well as the water resource planning and management documents were consulted in order to determine the desirability and degree of provision made in these policy frameworks for such a development.

As the Limpopo Province has limited water resources, the determination of the availability of water or alternative options for development is imperative. The pressure of the shortage in water, the large amounts of rural population without water combined with the contrast of rapid economic growth in the form of mining and the intervention for industrial development, makes this a contemporary issue.

International regulations must be taken into account as the proposed development is in the Limpopo Basin which is an internationally shared watercourse.

The integration (or lack thereof) of water needs and planning in the strategic spatial documents is specifically evaluated in the form of a Goal Achievement Matrix (GAM).

### *5.1.2 Introduction*

The aim of the pre-feasibility study of the eco-industrial park was to identify options for water supply and also to investigate whether this development was strategically desirable. In order to establish the strategic desirability, the SDFs, IDPs and WSDP on applicable levels need to be investigated. These documents guide development, inform municipal budgets and plans for water services provision. The assessment of these documents will determine if sufficient information and guidance in terms of this proposed development is given.

The eco-industrial park has a projected water demand in the order of 10 $Mm^3$/annum (27.4Mℓ/day). Although locally the area exhibits a low groundwater potential, regionally, groundwater options from the Limpopo Primary Aquifer were investigated. A number of water supply options were identified based on the evaluation of data and interaction with stakeholders. The various options were then assessed according to a set of weighted criteria, and were ranked based on the feasibility of the supply source (AGES, 2011: viii). Over 34 dams were investigated as part of this investigation, of which five were identified for further investigation. Water transfers from neighbouring water management areas (WMAs)

were also investigated as part of the study. High potential yields from International water transfer options make them appealing; however the lengthy legal processes may restrict their use. The desalination of sea water was considered as one of the remote options for water supply (AGES, 2011:1). As a supplementary option, the return water from waste water treatment works for the whole province was considered, and it was concluded that the return water of the Musina- and Nancefield Works in Musina may supply at least a portion of the total water demand. For the purpose of the study the method of option evaluation will not be further discussed, but the report is available at AGES.

Through the course of the investigation, it was determined that the proposed water options do align with local and regional strategic frameworks, the legal and strategic framework on national level and, depending on the option, may need to fulfil international requirements and procedures during the feasibility phase of the development. From the strategic frameworks evaluated it was evident that sufficient water can be made available to the proposed development in co-operative planning with the Department of Water Affairs and all regulatory departments on international, national, provincial, municipal and local levels (AGES, 2011:viii).

### *5.1.3 Methodology for study*

One of the primary objectives of the project was to collect and evaluate the available water information relevant to the project. Project meetings were held on a regular basis to assess the data and to co-ordinate data from numerous sources. Discussions with the Department of Water Affairs on both a provincial and a national level were important to retain the overall water perspective in the province. Strategic meetings with the Premier's Office and the Limpopo Department of Economic Development, Environment and Tourism provided invaluable insight to the provincial perspective on water for development. Professional service providers from the engineering sector were consulted, and a number of strategic water supply reports and documents were secured. A workshop to discuss and evaluate all the water related issues and reporting formats and structures provided the information leading to water supply options for the eco-industrial park (AGES, 2011:8).

Large volumes of data were sourced to define the resource potential for the project from consultants, the internet, government departments, town planners, and municipalities. The data was sourced. The data obtained was typically:

- Water Management Area plans;
- Water resource strategies;

- Classification of Water Resources;
- Internal Strategic Perspectives;
- Integrated Development Plans;
- Spatial Development Frameworks;
- Applicable WWTW sources, specifically the Green Drop Report;
- Available electronic databases of environmental and other issues and constraints;
- Various other planning documents and annual reports and development plans.

These documents were sourced from the Internet, from Municipalities, Private Consultants or DWA.

Programmes used in the assessment phase were: Geographic Information Systems (GIS) for the mapping and spatial representation of data; Global Mapper V12 for the Shuttle Radar Topography Mission (SRTM) data representing visual elevation topography and Google Earth Pro 2011 (AGES, 2011:8).

### *5.1.4 Site description*

The proposed site for the eco-industrial site is located approximately 6km southwest of Musina and is located in quaternary catchment A71K and A71L. This is part of the Sand Catchment which forms part of the Limpopo Water Management Area on a regional scale.

Administratively the site is within the Musina Local Municipality (Category B), the Vhembe District Municipality (Category C) and the Limpopo Province (refer to Figure 25 for the locality map).

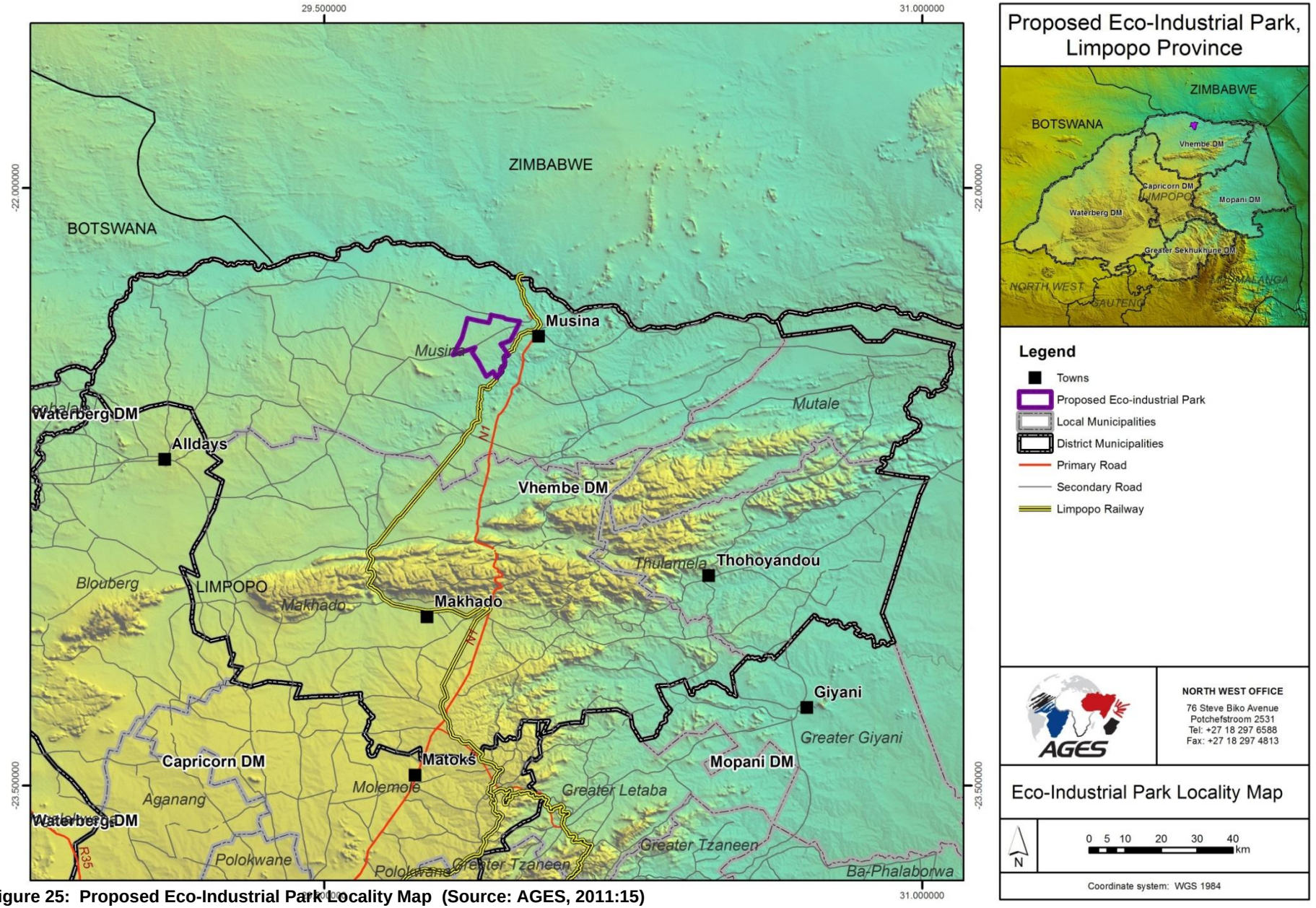



**Figure 25: Proposed Eco-Industrial Park Locality Map (Source: AGES, 2011:15)**

### *5.1.5 Applied Legislative and Policy Framework*

Various legal acts and policies form the departure point from where the Goal Achievement Matrix will be applied. In preparation of the assessment, a summary of the all discussed legislation and policies is represented in Table 7.

The following section will be attributed to the desirability of the project on a strategic spatial planning and water resource management level. It is important to determine whether the eco-industrial park fulfil in and align with the principles and requirements of the policy and legal framework in terms of both strategic planning and water resource management. In the following section, SDFs, IDPs and the WSDP are deliberately overseen as they are applied in the Goal Achievement Matrix assessment.

#### *5.1.5.1 Key Alignment at Local and Regional*

In general, through the course of the investigation, it is evident that the proposed development of the Eco-Industrial Park aligns with local and regional strategic frameworks in the following aspects:

- It will positively contribute to economic development and will be an essential injection in the development of the local and district municipalities;
- If water is transferred from other resource areas, water supply to the Eco-Industrial Park project can relieve and possibly contribute to the domestic water supply to the passing villages and towns on the water supply route;
- Although access to water is one of the biggest obstacles to development within the jurisdiction of the local municipal area, the Spatial Development Framework advocate a flexible approach and that long-term development possibility must not be excluded through short term planning initiatives;
- The Vhembe District Spatial Development Framework listed the reduction of unemployment as target;
- Increases in water requirements are predicted in the Internal Strategic Perspective of the catchment area due to mining development, growing urban areas, basic services to rural communities and planned industrial developments;
- Since there is no potential for additional water supply in the Sand Key Area, all additional water requirements will have to be sourced from transfers in from other areas. According to the ISP no new licences from any local source would be issued except for domestic use and plans are mentioned to increase transfers into the Sand Key Area from the

Olifants WMA to meet increasing urban and mining requirements;

- One of the five development objectives adopted by the Province supports growing the economy of the province, sustainable job creation; innovation and competitiveness. The Eco- Industrial Park will definitely contribute to this objective of the Province.

*5.1.5.2 Key Alignment at Provincial*

On a **provincial** level, the proposed eco-industrial park must especially align with the Limpopo Growth and Development Strategy (PGDS) and the Limpopo Employment, Growth and Development Plan (LEGDP).

- According to the Limpopo Growth and Development Strategy of 2004 - 2014, Government has committed itself to the general growth and development of the Limpopo Province. This commitment was based on a strategy of seven development industrial clusters following the value-chain approach adopted in a development summit, as a vehicle to create employment opportunities, to raise the international competitiveness and investment rating of the province, to combine public and private sector contributions to development and to align the interventions of various public development institutions for greater impact (Limpopo Provincial Government, 2004:24).
- It should be noted, however, that all these clusters are faced with one major development constraint, namely water. The formation and promotion of the cluster development, however, has to go hand in hand with a water resource and management strategy to ensure optimal use. All effort should be made to use the existing water in the best possible way. This includes implementing water demand-side and conservation strategies. Continuous research to improve water use efficiency is therefore of the utmost importance.
- The seven development clusters are:

(1) Platinum mining cluster on the Dilokong Corridor between Polokwane and Burgersfort (Sekhukhune district) and also in the Waterberg district (Waterberg district)

(2) Coal mining and petrochemical cluster at Lephalale on the East-West Corridor

(3) Fruit and Vegetable (horticulture) cluster in Vhembe, Mopani and Bohlabela

(4) Logistics cluster in Polokwane (Capricorn district)

(5) Red and White meat cluster on all the corridors (all districts)

(6) Eight tourism sub-clusters at a number of high-potential destinations

(7) Forestry cluster in the Mopani and Vhembe Districts impact (Limpopo Provincial

Government, 2004:25).

- The Limpopo PGDS states that "the provision of physical infrastructure should be informed by spatial and economic logic." Provision of infrastructural services is very important for economic growth and development and a major factor in establishing a sustainable spatial pattern for the province (Pieterse du Toit & Associates, 2007:184). Emphasises is made that developments should be planned in conjunction with national and local government developments due to the important role that water plays.
- According to the Limpopo Employment, Growth and Development Plan (Limpopo Provincial Government, 2009), the most pressing problem facing Limpopo Province today is the absence of sustained economic growth and job creation, which are essential to reduce poverty and improve living conditions. The transition to a multi-racial democracy posed difficult political, social and economic challenges and South Africa's noteworthy achievements in surmounting these challenges have been widely recognized. What lies ahead is the daunting task of ensuring that Limpopo Province's rich natural and human resources are employed for the benefit of all, promoting sustainable livelihood, green economy, improving social conditions and alleviating poverty.
- The LEGDP outlines key action programmes with key strategic interventions that will ensure Limpopo to reduce poverty and improve living conditions. The following are the identified programmes:
- Industrial development programme
    - Regional economic development and integration
    - Water resource development and demand management
- There are key strategic interventions (relating to water) entailing the following:
    - Initiative: Meeting water demands for mining, agriculture and consumption
    - Industrial Development Strategy
- Although the eco-industrial park does not form part of one of the seven development clusters as stipulated in the Limpopo PGDS of 2004-2014, the LEGDP recommends the Industrial development programme as well as the water resource development and demand management

#### *5.1.5.3 Key Alignment at National Level*

The planning of water supply to the Eco-Industrial Park development found confidence in the following legal framework en strategy development as well as spatial development

perspectives regarding water management on national level:

- The White Paper on National Water Policy (1997) supports the value that mining, industry, manufacturing and power generation add and the jobs they create per kilolitre of water and that in the interest of national prosperity, no unnecessarily constrain must be placed on industry's access to water;
- The Constitution of South Africa (1996) on the other hand brings balance by focussing on the right everyone has to have access to sufficient water and to an environment that is not harmful to their health or well-being;
- These concepts were defined in a legal framework through the Water Services Act (108 of 1997), the National Environmental Management Act (107 of 1998), and the National Water Act (36 of 1998) with the NWA as the principal legal instrument relating to water resource management in South Africa;
- The National Water Resource Strategy (2004) indicated that sufficient water can be made available at all significant urban and industrial growth points in the country for water not to be a limiting factor to economic development and that co-operative planning will be required;
- The Strategic Plan of DWA states that the first strategic priority is to contribute to economic growth, rural development, food security and land reform;
- The NSDP supports the principles of sustained, inclusive and rapid economic growth as a pre-requisite for the achievement of other policy objectives (especially poverty alleviation), that Government has a constitutional obligation to provide basic services including water, should focus on economic growth, concentrate on human capital development in places with low economic potential and to channel future development opportunities into activity corridors and nodes that are adjacent to/ linked to the main growth centres in the country.
- Water supply in terms of the socio-economic factors should also be considered. According ding to DWAF's Water for Growth and Development Framework, the Millennium Development Goals' (MDGs) targets in respect to the halving of water and sanitation backlogs in 2005 and 2008 respectively, has been met. However, the concern is that many South Africans still do not have access to basic water and sanitation services (AGES, 2011:26).
- They aim is to achieve the target of full access to basic water and sanitation services for all by 2014. Short-term interventions are proposed, but ultimately, a balance needs to be struck between large and small-scale infrastructure projects. Where a community can be

serviced by existing large-scale infrastructure, this should happen with immediate effect (AGES, 2011:26).

- The local population will benefit from the Eco-Industrial Park development where large-scale infrastructure and investment is required. This development will provide a large amount of employment opportunities and might also contribute socially to the domestic water supply of the larger area (AGES, 2011:26).
- Inter-basin water transfers as water supply option to the Eco-Industrial Park development is supported by national strategy as this plays an effective and acceptable part in systems to meet water demands on a reliable and sustainable basis in South Africa. The following criteria were identified within the strategic framework related to water supply:
    - The National Water Policy specified that special planning and implementation procedures are required involving the management of all catchments involved in the transfer;
    - An appropriate framework of cooperation is needed when a water course shared with another state is involved;
    - If inter-basin water transfer contribute to water supply to the Eco-Industrial Park development, the Limpopo River as international waterway are concern and international cooperation must be established;
    - Co-operation with water management authorities will enable South Africa to adhere to the normative principles applicable to trans-boundary waters.

The proposed development is situated in the catchment of the Limpopo River, and water from this river is listed as one of the water supply options. The strategic framework for water supply to development in an international shared water course defines the following:

- The Specific Provisions of the Protocol, states that notification concerning planned measures with possible adverse effects is essential in the development process to all affected countries;
- This notification must be followed with information including technical data and the results of any Environmental Impact Assessment;
- It is the role and responsibility of DWA to negotiate with LIMCOM. Contact was made with DWA during this project and water needs were discussed. It is however important to note that during the feasibility phase of the project formal contact with the Department will be in terms of formal water use licensing procedures. According to local DWA officials the submission of a 21a WULA will initiate internal DWA modelling and water allocation

scenarios

- In order to adhere to international agreements and due to the international nature of the Limpopo Water Management Area, any development of water resources in the South African section remains under the authority of the Minister of the Department of Water Affairs.

### *5.1.6 Results from Case Study*

From the investigation, it is evident that sufficient water can be made available to significant urban and industrial growth points in the country, and specific to the proposed Eco-Industrial Park development. As condition, co-operative planning is necessary on all levels (international, national, provincial, municipal, local) between developers, existing water users and water management institutions to ensure that the availability of water will not be a limiting factor to economic development and that water can be made available on a sustainable and affordable basis.

The following recommendations were made in terms of the evaluation of the strategic framework for water supply:

- DWA is the custodian of bulk water supply and will therefore be responsible to fund related infrastructure and "sell" water to the end user. A private partnership in order to facilitate and speed-up this process must be pursued;
- Water demand needs to be formalised through a water use license application so that internal modelling and source investigation can be activated;
- The possible combination of water sources and cooperation with the Musina Local Municipality is of high importance and they have to be incorporated in the way forward;
- Water right and allocation "trading" needs to be further investigated with the focus to change existing agricultural allocations to industrial use. This have to be fast tracked as there is a high level of competition for water in the area within the mining sector;
- The possibility of water supply exists based on government's intentions, but it must be confirmed in terms of the technical feasibility of the water supply options;
- A complete strategic environmental policy investigation must be conducted for the feasibility phase of the Eco-Industrial Park development. This will entail the identification of all relevant environmental policy documents and spatial environmental guidelines, the interpretation and the summary thereof (AGES, 2011:24).

**Table 7: Case Study: Legal Framework Summary**

| Legal Framework Summary - Eco Industrial Park | | | | |
|---|---|---|---|---|
| **LEVEL** | **Strategic Spatial Planning Framework with reference to development** | Comment / Impact on Case Study A | **Water Resource Management Framework with reference to water resources** | Comment/ Impact on Case Study A |
| **INTERNATIONAL** | **Sustainable Development - 1987** | Strategically, the eco-industrial park development must take place within the interactive zone or area of sustainability and must aim to promote human well-being, environmental integrity and economic efficiency | **Sustainable Development - 1987** | Access to water resources for the eco-industrial park, contribute to economic efficiency, one of the three global imperatives |
| | **Millennium Development Goals - 2010** | Target 7d aims to improve the lives of at least 100 million slum dwellers.<br>Housing development as part of a spin-off from the eco-industrial park may contribute to this aim | **Millennium Development Goals - 2010** | Effective water resource management and availability of water will contribute in achieving Target 7c.<br>This target indicates prioritisation of societies needs rather on industrial development |
| | | | **Helsinki Rules - 1966** | The international drainage basins (in this case the Limpopo Basin) is entitled, within its territory, to a reasonable and equitable share of beneficial uses of the waters of and international drainage basin. |
| | | | **Berlin Rules - 2004** | Notification of the eco-industrial activity on this shared watercourse should take place and public participation is essential |
| | | | **Revised Protocol on Shared Watercourses - 2003** | A timely notification of the eco-industrial activity with possible adverse effects to State Parties for evaluation must be given<br>Technical data and information as well as EIA results of activity should be provided to the State Parties |
| | | | **Limpopo Watercourse Commission - 2003** | Responsible management of the Limpopo River water resources<br>The eco-industrial development still falls under the authority of DWA |
| **Level** | **Strategic Planning Framework with reference to development** | Comment / Impact | **Water Resource Management Framework with reference to water resources** | Comment / Impact |
| **NATIONAL** | **The Constitution of the Republic of South Africa (108 of 1996)** | The Constitution promotes ecologically sustainable development - whereas the eco-industrial park plans to be zero waste<br>It is furthermore local government's responsibility to promote social and economic development - to be promoted by Vhembe District and Musina Local Municipalities | **The Constitution of the Republic of South Africa (108 of 1996)** | Everyone has the right to water security, sufficient water as well as an environment that is not harmful to their well-being. The balance should be considered and the eco-industrial park can to contribute to water provision to villages along the way (social aspect)<br>Local government has a responsibility to ensure provision of water |
| | **National Environmental Management Act (107 of 1998)** | Any development must be socially, environmentally and economically sustainable - the eco-industrial park aims to achieve these | **National Environmental Management Act (107 of 1998)** | To be sustainable, waste should be avoided or minimised- the eco-industrial park aims to be zero waste<br>The use of water as non-renewable resource should be responsible and equitable<br>The beneficial use of water must serve the public interest |
| | **Municipal Systems Act (32 of 2000)** | Must prepare a IDP for developmental role of government - Musina and Vhembe IDP will be discussed in detail | **Municipal Systems Act (32 of 2000)** | It is local government's responsibility to provide municipal services |
| | **National Development Plan (2011)** | The new approach includes the transformation of rural and urban spaces - no specific reference is made to industrial development<br>The approach entails the creation of jobs and livelihoods in which the eco-park will contribute | **National Development Plan (2011)** | The provision of infrastructure prioritises the development of key water schemes for urban and industrial centres - which might be to the benefit to the eco-industrial park |
| | **Medium Term Strategic Framework (2009)** | Regional development is a strategic priority | **Medium Term Strategic Framework (2009)** | Sustainable resource (water) management is a priority |
| | **National Strategic Development Perspective (2006)** | Future settlement and economic development opportunities should be channelled into activity corridors and nodes - Musina is a provincial growth point | **White Paper on National Water Policy (1997)** | It would not be in the interest of national prosperity to unnecessarily constrain industry's access to water<br>The use of water for the Eco-park will be subject to authorisation.<br>International water resources (in this case the Limpopo River), shall be managed in a manner that optimises the benefits for all parties in a spirit of mutual co-operation. |
| | **Spatial Planning Land Use Management Bill (2012)** | A SDF must guide planning and development across all sectors and should thus guide the eco-industrial park development | **Water Services Act (108 of 1997)** | The Vhembe District, as WSA, has a duty to the Eco-industrial park in its area of jurisdiction to progressively ensure efficient, affordable, economical and sustainable access to water services |
| | | A SDF should further provide direction for strategic developments, infrastructure investment, promote efficient, sustainable and planned investments by all sectors and indicate priority areas for investment in land development | **National Water Act (36 of 1998)** | The NWA must ensure that the nation's water resources are protected, used, developed, conserved, managed and controlled in ways which take the facilitation of social and economic development into account |
| | | | **Strategic Framework for Water Services (2003)** | Vision for the next ten years for the water sector<br>WSA must develop WSDPs. The WSDP must integrate technical planning with social, institutional, financial and environmental planning |
| | | | **National Water Resource Strategy (2004)** | NWRS strategically direct the management of water resources from a national perspective.<br>As part of the fourth priority for beneficial water utilisation, the eco-industrial park will fall in the category of water for uses that are strategically important to the national economy.<br>Sufficient water can be made available at all significant urban and industrial growth points (like the Eco-Industrial Park) for water not to be a limiting factor to economic development<br>For the Water Licence application, a water management plan will be required |
| | | | **DWA Strategic Plan (2010-2013)** | The first strategic priority is to contribute to economic growth (eco-industrial development) whilst ensuring sustainable and equitable resource management |
| | | | **Inter-basin water transfers as part of the National Strategy** | If inter-basin water transfers contribute to the water supply to the eco-industrial park, a framework of cooperation is needed |
| **Level** | **Strategic Planning Framework with reference to development** | Comment / Impact | **Water Resource Management Framework with reference to water resources** | Comment / Impact |
| **PROVINCIAL** | **Limpopo, Growth and Development Strategy (2004)** | Government has committed itself to the general growth and development of the Limpopo Province<br>The eco-industrial park is however not part of one of the identified clusters | **Limpopo WMA ISP(2004)** | Water resources which occur within the WMA are nearly fully developed, with all the available water being highly utilised.<br>Limited options for further resource development exist<br>Various large scale transfers exist |
| | **Limpopo Employment, Growth and Development Plan (2009)** | Key action programmes with key strategic interventions include industrial development programme and water resource development and demand management | | |
| | **Limpopo Spatial Development Framework (2007)** | One of the five development objectives adopted by the Limpopo Province supports growing the economy of the province, sustainable job creation, innovation and competitiveness to which the Eco-Industrial Park will definitely contribute | | |
| **Level** | **Strategic Planning Framework with reference to development** | Comment / Impact | **Water Resource Management Framework with reference to water resources** | Comment / Impact |
| **DISTRICT** | **Vhembe District Municipality SDF** | In Vhembe, Musina has the smallest percentage (6%) of the people not meeting RDP water supply levels<br>Musina is identified as a provincial growth point and on a corridor which can be supportive in the motivation for the eco-industrial park | **Vhembe Water Services Development Plan** | The current need as well as the water resource availability status. There is however not enough to eradicate the backlog. The lack of infrastructure information is an issue |
| **Level** | **Strategic Planning Framework with reference to development** | Comment / Impact | **Water Resource Management Framework with reference to water resources** | Comment / Impact |
| **Local** | **Musina Spatial Development Framework** | Two factors that drive development initiatives:<br>The expectations of development related to the Vele Coal Mine and mining in general;<br>The potential created by cross border linkages. | | |

**Source: Own Construction (2012)**

## 5.2 GOAL ACHIEVEMENT MATRIX

In this section a goal achievement matrix (GAM) is developed in which the ten assessment principles (refer to Table 6) are compared. The purpose of the GAM is to determine and compare the effectiveness of the incorporation of water resource management and planning in spatial development frameworks at a local level. This GAM can then be used and implemented as a comparative evaluation tool to compare the degree of integration and implementation of water resource management and strategic spatial planning of local municipal authorities internationally. This GAM may further be implemented for comparison at national, provincial, district and local levels. Depending on the implementation level, the various Goals may be included or excluded from the evaluation based on the common higher administrative level applicable to the specific level of implementation.

As an example of the evaluation framework, this GAM is applied to the case study of a water consumer in the Musina Local Municipality, Vhembe District Municipality within Limpopo Province. From this evaluation the degree to which the consumers need for water is addressed, is also evident.

It is important to take cognisance that the assessment is area-specific in context of the regional strategic spatial planning documents. The variables in the achievement matrix are dependent on the interpretation of the area conditions. The ability and effectiveness of the document compiler may also contribute to the total result and outcome of the evaluation framework.

As derived from Multi Criteria Analysis methodology (CWG: 2010:9), the assessment makes use of a statistical tree analysis. This entail the multiplication of weights and percentages from right to left with tree “branches”. This method will enable one to determine the integration of strategic spatial planning and water resource management in all 3 spheres of Government in South Africa. Refer to Figure 26 for the graphical illustration of the statistical tree for the GAM.

In order to enable a comparative tool at a local administrative level, the various spheres of Government are weighted according to the following system:

(1) Local and district level authorities as the third sphere of Government are cumulatively assigned a weight of 50% - this is the critical area where implementation and application should take place;

(2) Provincial Level as second sphere of Government has a total weight of 20%;

(3) National Level as the first sphere of Government has a weight of 30%.

Note that the local and national level has the highest assigned weights due to the nature of implementation through water service provision at local level and water resource management currently predominantly taking place on national level. The sum of the three totals 100%.

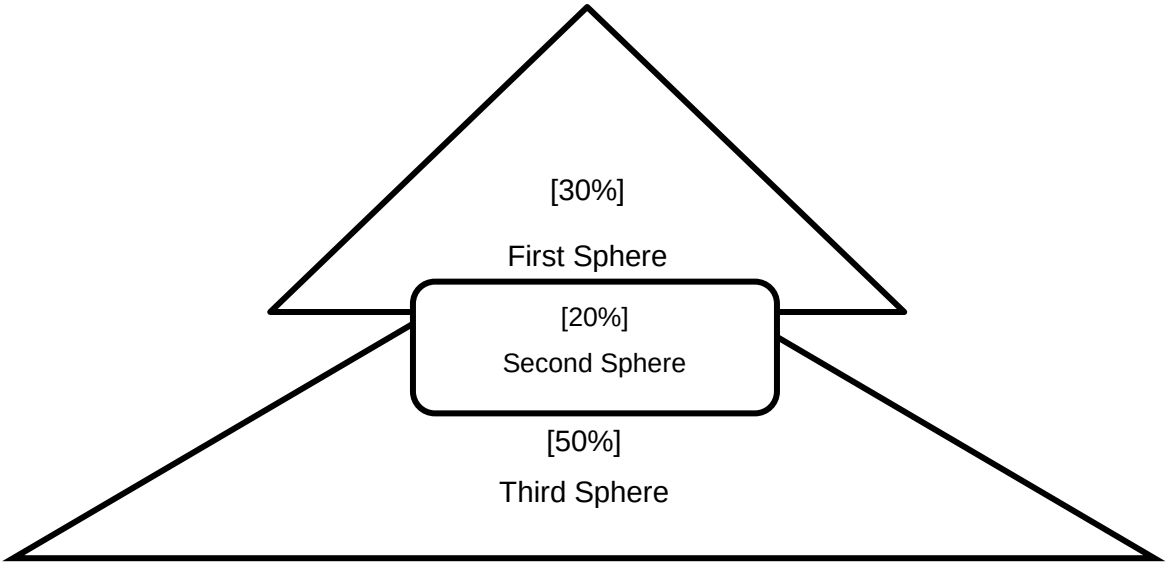



**Figure 26: Weighting the three spheres of government**

**Source: Own Construction (2012)**

Local Level (as part of the first sphere of Government) as Goal 1 a high weight of 30% as this is the level where implementation takes place. This is a very important level for strategic spatial planning to incorporate water resource planning and management. The two branches which form Goal 1 are the SDF and IDP. They are both equally weighed with 50% as they are interdependent and inform one another. Optimum integration is essential.

District Level (as part of the first sphere of Government) is weighed as 20%. The three branches of Goal 2 are the SDF, IDP and WSDP. On district level it is critical that strategic spatial planning is integrated with water resource management and planning at this level as it informs the provincial and local levels. Within Goal 2, the SDF has the highest weight of 50%, followed by the IDP with 30% and lastly the WSDP with 20%. This is attributed to the fact that the WSDP informs the IDP which informs the SDF but that the SDF is ultimately the framework guiding investment and development.

Goal 3 or the Provincial Level (as the third sphere of Government) has a low weight of 20%. Here the provincial SDF and Limpopo WMA's ISP forms the branches and are weighed 75% and 25% respectively. The SDF should incorporate relevant water resource planning and management information from the ISP, but the SDF will guide provincial development and also inform district and local SDFs.

The National Level (the first sphere of Government) as Goal 4 is an overarching level guiding all other levels and is weighed at 30%. This is the second most significant level for integration. The branches are the National Spatial Development Perspective (NSDP) and the National Water Resource Strategy (NWRS), both equally weighed as they are at the origin of integration between strategic spatial planning and water resource planning and management.

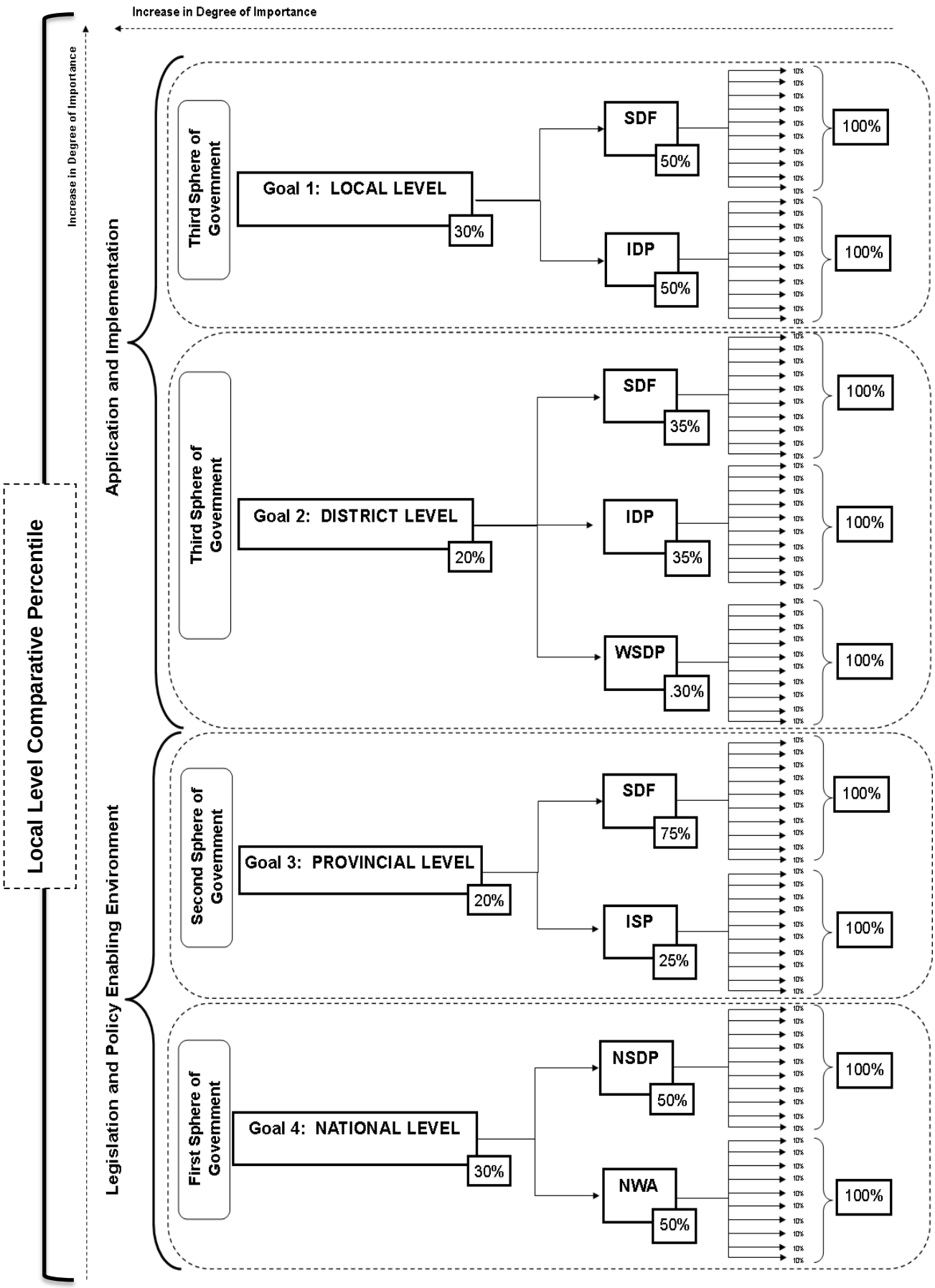



**Figure 27: GAM Statistical Tree**

**Source: Own Construction (2012) as derived from CWG, 2010**

### *5.2.1 Goal Achievement Matrix Application*

Nine key strategic spatial planning and water resource management and planning related documents in all three spheres of Government were identified to be used in the assessment. The documents apply to the following four goals as administrative levels:

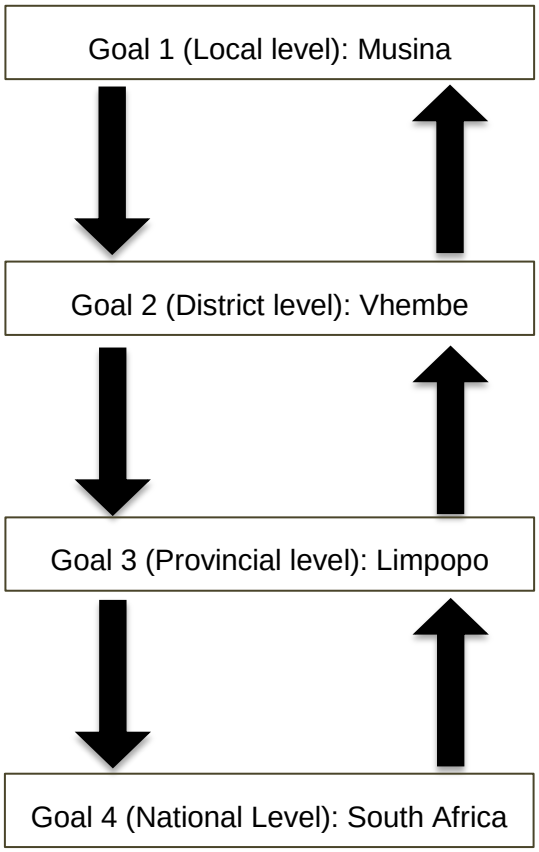



**Figure 28: Goals of GAM Application**

**Source: Own Construction (2012)**

#### *5.2.1.1 Goal 1: Local Level*

The SDF and IDP of Musina forms part of the Goal Achievement Matrix assessment of the local level to determine whether water resource planning and management has been incorporated in strategic spatial planning documents. Implementation takes place at the local level. With a strong emphasis on spatial planning in the SDF and strategic (and budget) planning in the IDP, the assessment will indicate whether these two plans/frameworks are adequately integrated for sustainable planning in terms of development and water resources. First a brief discussion on the content of each document is given where after the assessment in the form of the Goal Achievement Matrix is done.

**Musina Local Municipality Spatial Development Framework**

Musina was establishment of as a copper mining town in the early part of the previous century. Currently, Musina town has been identified as a provincial growth point and is a key district development priority area while Tshipise serves as a local service point in the Musina municipality (BC Gildenhuys & Associates, 2011:14)

The Musina SDF aims to integrate the policies and frameworks of provincial and national levels. The Council adheres to the national free basic services policies but deviates from national norms in terms of the quantities delivered as free basic services which also contribute to the principle of sustainability. The Musina SDF listed two main factors that currently drive development initiatives in the Musina area. The first is the expectations of development related to the Vele Coal Mine and mining in general and secondly the potential created by cross border linkages.

Regarding water supply, the Musina SDF focussed on domestic water supply to communities. Access to water is one of the biggest obstacles to development in the municipality. Apart from the general absence of surface water, the available water from boreholes is often not fit for human consumption (BC Gildenhuys & Associates, 2011:144). In terms of bulk water services in Musina LM, the Council use a number of boreholes in the Limpopo riverbed and on its banks as its bulk water source. The transfer station's currently pumps 650Ml per day and has sufficient capacity to meet short and medium term demands. The reservoirs have a total storage capacity of 29.2Ml (BC Gildenhuys & Associates, 2011:75). The existing river opportunities entail undisturbed river catchment areas as well as opportunities for irrigation (BC Gildenhuys & Associates, 2011:149). Some challenges in this regard are the limited surface water resources, seasonal and irregular flow of rivers, groundwater quality not always suitable for human consumption, the use of water in Limpopo restricted by international protocols and some major rivers are critically endangered. Figure 29 indicates the bulk water infrastructure provision in Musina spatially.

The four key development sectors in Musina LM are mining, agriculture, tourism and conservation and settlement and urban dynamics. The expectations around mining development are reflected in the large number of township applications that are prepared in this regard. The expectations are around light industrial stands that one must accept to be to cater for industries supporting the future mining activities and secondly lower cost residential development to meet a potential demand from the mines. Furthermore, the expectation around developing a transport logistic hub in Musina is a further aspect that supports the light industrial nature of the prosed development. This especially applies to the extension along the N1 north of Musina.

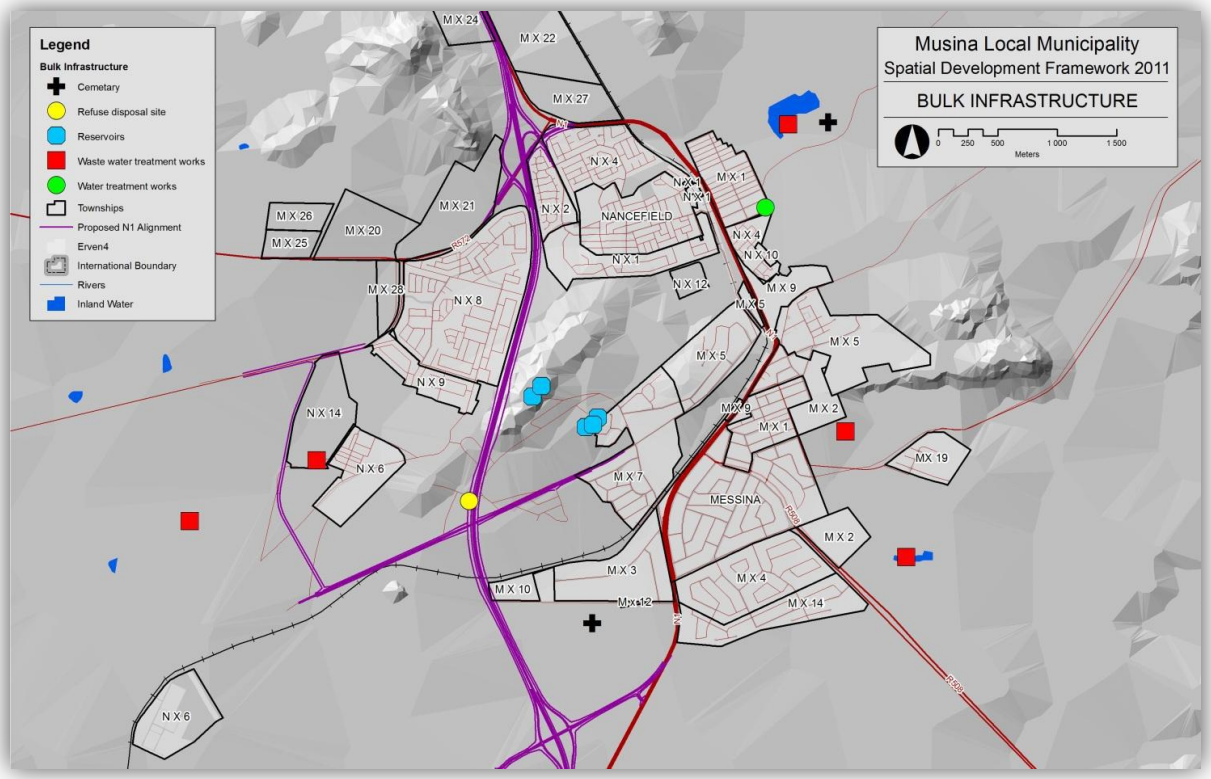



**Figure 29: Bulk Infrastructure in Musina**

**Source: BC Gildenhuys & Associates (2011)**

Musina's regional location can be capitalised and to three initiatives should be noted. The first is the Musina to Africa Strategic Supply Hub Initiative (MUTASSHI), the second is the development of the Musina Gateway Economic Zone and the third is the Greater Mapungubwe Transfrontier Conservation Area (GMTCA). The first two projects are in the conceptual and pre-planning stages while the Greater Mapungubwe GMTCA is already in existence and functioning in terms of trilateral agreements between the governments of South Africa, Botswana and Zimbabwe. These projects might have a positive long-term effect on development in the municipal area. However, all these developments come at a cost and will eventually put a demand on the Council's resources (BC Gildenhuys & Associates, 2010:163). Long term water resource management and planning is required for the strategic spatial planning.

There is an inability from Council's side to make its annual capital budget. Only once in the report period, the Council has met or exceeded its budget targets. On average, the Council spent less than 50% of its budget. This either points to an inability to draft realistic budgets or points to serious capacity constraints in the ability of the council to implement the budget (BC Gildenhuys & Associates, 2010:88). There is no alignment between the budget and the IDP. It will there for be necessary for the Council to address infrastructure investment

planning and asset management as a core strategic activity over the next few years.

Many factors will determine the rate of development that is not possible to discount fully in long term spatial planning. However, the approach should be to be flexible and prepared and not to exclude any long-term development possibilities through short term planning initiatives.

In the light of the Musina SDF discussion and with application of the Goal Achievement Matrix, the only assessment principle to be above sufficiently addressed was AP5 to promote equal access to water. The assessment principles being sufficiently addressed were sustainability (AP1), alignment (AP2), water for socio-economic growth (AP9) and spatial representation (AP10). The rest of the assessment principles proved to be below average and will need attention. The total GAM score amounts to 22 (44%).

**Musina Integrated Development Plan**

The vision of the Musina IDP states: “Vehicle of affordable quality services and stability through socio-economic development and collective leadership”.

It is a power and function of Musina Local Municipality to ensure provision and maintenance of water and sanitation. Musina LM is a water service provider whereas Vhembe DM is the water services authority.

The provision of water supply and sanitation is part of the cluster of priorities listed under infrastructure. Water management in the municipality faces the following challenges: poorly managed sewage systems, drought, alien invasion, imbalance between supply and demand for water and inadequate monitoring (Musina Local Municipality, 2012:47). The possible delay of water and sanitation services for new developments may be a threat to sustainable development.

The following points summarises the status on water services:

- 7879 households in the urban area of Musina have metered yard connections;
- 1037 households in Madimbo, 700 households in Malale and 127 households in Domboni have standpipes of RDP standard, 156 households in Tanda and 192 households in Tshikhudini are on RDP standards;
- At present all households have access to water;
- 2459 households in urban arrears receive free basic water;
- 523 households in the villages of Madimbo, Domboni, Malale,Tshikhudini and Tanda receive free basic water.

**Table 8: Percentage distributions of households by type of water source**

| Distributions of households by type of water source | | |
|---|---|---|
| Water Source | Census 2001 | Community Survey 2007 |
| Piped water<br>- Inside dwelling<br>- Inside the yard<br>- From access point outside the yard | <br>16,6<br>48,1<br>27,7 | <br>33,6<br>38,7<br>20,8 |
| Borehole | 2,2 | 1,1 |
| Spring | 0,0 | 0,4 |
| Dam/Pool | 2,2 | 2,0 |
| River/Stream | 2,3 | 2,0 |
| Water vendor | 0,2 | 0,1 |
| Rainwater tank | 0,3 | 0,1 |
| Other | 0,5 | 1,0 |
| Totals | 100% | 100% |

**Source: Musina Local Municipality (2012:58)**

**Table 9: Access to Water in MLM**

| Access to Water Services in Musina Local Municipality | | | | | |
|---|---|---|---|---|---|
| 1996<br>(8 401 Households - HH) | | 2001<br>(13955 Households) | | 2005<br>(14 903 Households) | |
| Basic and Above | Below Basic | Basic and Above | Below Basic | Access RDP Standard | No Access (below RDP Standard) |
| 7324 | 1 077 | 12 797 | 1 158 | 14 503 | 400 |

**Source: Musina Local Municipality (2012:61)**

The Integrated Development Plan for the Musina Local Municipality states that Musina only has a 3.6% backlog in water provision. This figure is one of the best in the Province (Musina Local Municipality, 2011/2012). The lack of water supply and the associated costs may place a constraint on development in the mining sector.

In alignment with the NSDP the bulk infrastructure investment is to be focused/ prioritised in Musina as the growth point, while in rural settlement clusters and service centres infrastructure should be focused on the provision of basic services (Musina Local Municipality, 2012/2013-2017:34).

The relevant projects listed in the project implementation plan entail operation and maintenance, water supply at Mapani, household water connections for Madimbo, Malale,Tanda,Tshikhudini, and Domboni, water provision in rural farming areas, water provision in new proclamation areas, water installations, bulk upgrading, water upgrade and maintenance (Musina Local Municipality, 2012/2013-2017).

In the Musina IDP as assessed in the Goal Achievement Matrix indicates a much better result than that of the SDF mainly due to the document's planning for future infrastructure expansions (AP7) and budget allocation (AP8) which scored above sufficient. The principles of sustainability (AP1), public participation (AP4), planning and resource allocation (AP6) and spatial representation (AP10) have not been adequately addressed in the IDP. The alignment (AP2), promoting of equal access to services (AP5) and water contributing to social and economic growth (AP9) are sufficient at this stage. For future social development and economic growth, water resource planning and management will have to be enhanced. The Musina IDP has a total GAM score of 28 (or 56%).

**Table 10: Local Level Goal Achievement Matrix**

| Goal Achievement Matrix | | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Goal Levels | Level Weight | Level Score | Relevant Strategic Spatial and Water Resource Management and Planning Documents | Weight | Sub level Score | Assessment Principles | | | | | | | | | | Totals | | |
| | | | | | | AP1 | AP2 | AP3 | AP4 | AP5 | AP6 | AP7 | AP8 | AP9 | AP10 | Total GAM Score | Possible maximum score | Percentage |
| Local Level | 30% | 15 | Musina SDF | 50% | 22 | 3 | 3 | 1 | 1 | 5 | 1 | 1 | 1 | 3 | 3 | 22 | **50** | 44% |
| | | | Musina IDP | 50% | 28 | 1 | 3 | 5 | 1 | 3 | 1 | 5 | 5 | 3 | 1 | 28 | **50** | 56% |

**Source: Own Construction (2012)**

#### *5.2.1.2 Goal 2: District Level*

To determine the extent to which strategic spatial planning and water resource management has been integrated on district level, the Vhembe SDF, Vhembe IDP and Water Service Development Plan is evaluated in the Goal Achievement Matrix. As part of the third sphere of government, the district level still covers application and implementation and is as important as the local level. Alignment and cooperation between these two levels are thus essential. First a brief discussion on the content of each document is given where after the assessment in the form of the Goal Achievement Matrix is done.

### Vhembe District Municipality Spatial Development Framework

Vhembe District Municipality consists of Musina Local Municipality, Thumelela Local Municipality, Makhado Local Municipality and Mutale Local Municipality.

The main objective of the Vhembe SDF is to restructure the current spatial pattern, ensure equity, efficiency, sustainability, integration and economic growth in order to contribute towards eradication of poverty (Hannes Lerm and Associates, 2007:2).

According to the Vhembe SDF, water infrastructure is not meeting the population growth within the municipality. Water is being supplied below the RDP standard as the source is not meeting the RDP standard. Figure 30 indicates the provision of water services based on the IDP standards.

A status quo on water services needs are given for the Vhembe SDF and per local municipality:

- 87% of the Vhembe District's population does not meet the standard or better RDP level of water supply, as only 13% of the population meet the minimum RDP.
- Musina has the best RDP standard with only 6% not meeting the required RDP water supply levels.
- Mutale and Thumelela has 100% and 89% of population respectively not having water meeting RDP levels of water supply,
- In Vhembe, only 46% is on RDP level and has 25 litre or more per person per day: 38% of the population receive 0-1 litre per person per day and 16% receive 10-25 litre per day.
- Mutale Local Municipality is worst off as 82% of its population only receive 0-10 litre of water per person per day. It is followed by Makhado and Thulamela which have 43% and 33%, respectively of the population only receiving 0-10 litre per person per day.
- In Vhembe, 68% of the population do not have reliable access to water (less than 98% of

the time) and in terms of the access 55% of the population in this district is within 0-200m from a water supply point (Hannes Lerm and Associates, 2007:39).

An Integrated Environmental Programme (IEP) is recommended for Vhembe in order to evaluate the outcomes of the IDP Process in terms of its environmental implications. The Integrated Environmental Programme (IEP) of the municipality should set out detailed strategies that are needed to align the efforts and resources of the municipality and also other collaborating institutions (e.g. government departments) with achieving the environmental goals and objectives of the municipality (Hannes Lerm and Associates, 2007:89).

With application of the Goal Achievement Matrix (GAM), the following aspects are highlighted: the current and future need assessment (AP3) and spatial representation of water resources and planning (AP10) scored above sufficient and contributes to more effective implementation. Only public participation (AP4) was below average addressed and the rest of the assessment principles scored sufficiently. The total GAM score for Vhembe SDF is 36 or 72%.

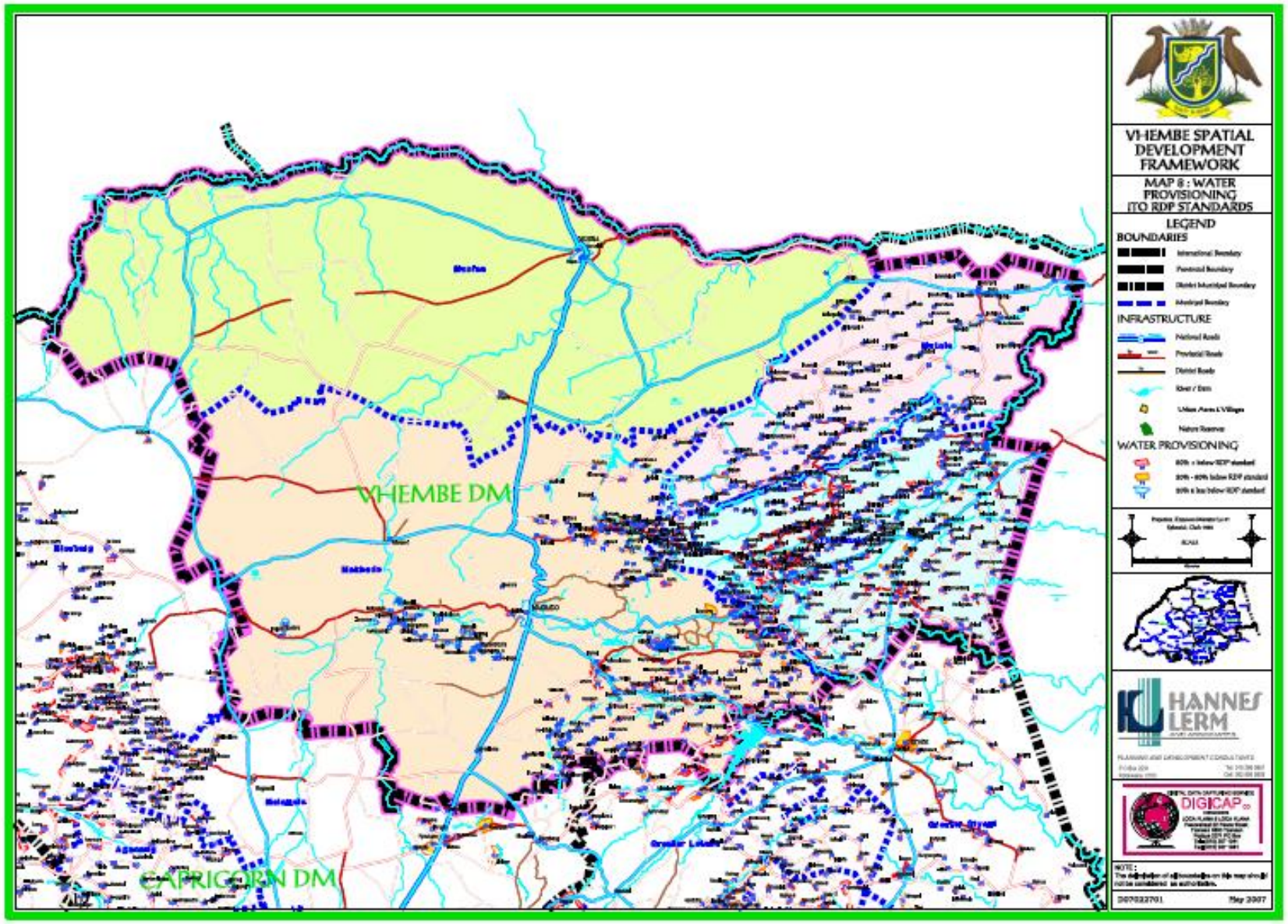



**Figure 30: Water Provision in Vhembe DM (Source: Hannes Lerm & Associates, 2007)**

## Vhembe District Municipality Integrated Development Plan (Review 2011/2012)

The vision of the IDP is “The legendary cultural hub in the Southern hemisphere and a catalyst for agro- and tourism development.” The mission is “To be an accountable and community driven municipality in addressing poverty and unemployment through sustainable socio-economic development and service delivery.”

- Water Services is transferred to the district whilst service level agreements were signed with local municipalities to perform the function of water service providers. Vhembe DM engaged in the process of reviewing their IDP to inform the budget and also align with other programmes and projects from sector departments (VDM, 2011/2012:59). These actions will enhance alignment between the district and local level
- As an infrastructure priority, part of the cluster of priorities, water resource development and demand management aims to meet the goal as per the MDGs – to halve by 2015 people without sustainable access to safe drinking water and basic sanitation (VDM, 2011/2012:4). The district has a Basic Water and Sanitation Service Policy to manage the provision of basic water to the indigent people and Vhembe DM strives to provide free basic water and sanitation to all indigent households (VDM, 2011/2012:20). There is a district budget for free water supply stipulated in the IDP and there is an indigent register. The priority and Policy will contribute to promote equal access and to promote past inequalities,
    - In order to achieve the goal, the Vhembe DM’s objective is to purchase 8000x14 tankers, deliver 122 640 000 litres of water per year (water x3 a day for 365), 40% water supply to indigents where there is adequate infrastructure, yards connection of 4243 households and 3754 households to RDP standard in order to halve by 2015 people without sustainable access to safe drinking water (VDM, 2011/2012:70).
- The current situation is that there is a backlog of 128 372 households that do not have access to water on RDP standard. In the local municipalities, Thulamela is has a RDP level below standard of 55 202 households, Mutale 11 163, Musina 1 631 and Makhado 60 376 households (VDM, 2011/2012:18). The Musina LM’s water abstraction and consumer supply is perfectly balanced. In the urban area, 6244 Ml/annum is abstracted from the Limpopo River and 6244Ml/annum is supplied to consumers. In the rural areas 189 Ml/annum is abstracted and 189 Ml/annum is supplied. The other local municipalities in Vhembe do either not have records, or there are no water meters.
- The district has no water demand management plan and a great need exists for the implementation of water demand and conservation management projects (VDM, 2011/2012:19).

- In terms of the water resources, there is a limited supply of both the ground and surface water. Currently, the sources of water are from 11 dams and 1358 boreholes (groundwater). A few catchments areas are stressed by high demand of water for development activities such as agriculture, human consumption and mining. Furthermore, water management in the district faces challenges like: an imbalance between the supply and demand for water, alien invasion, and inappropriate land uses in the river valleys as well as flood events and droughts. The Limpopo River System on the northern part of the district is considered as the life blood of the Northern Vhembe semi-arid area. Limpopo River is the country's third most important river which provides sustenance to the hot drylands through which it meanders (VDM, 2011/2012:44). The increase in population and variety of land use practices impose pressure on water resources and the future need for alternative resources.
    - There is an infrastructure investment programme as part of the infrastructure priority cluster where the objective is to maintain 10 dams, 4 sand-well, 13 weirs, 448 reservoirs, 21 water purifications plants, drill and equip 60 boreholes, change 243 diesel boreholes to electrical driven motors, refurbish 50km pipelines to half the proportion of people who do not have access to drinking water by 2014 (VDM, 2011/2012:70)
- Water services are budgeted for in terms of operating and expenditure as well as in terms of capital budget (VDM, 2011/2012:136) and there are also various DWA funded projects for bulk water supply and reticulation, MIG funded water projects as well as disaster management funded projects.

With the abovementioned important information derived from the Vhembe IDP, the Goal Achievement Matrix is applied to determine the degree of compliance with the assessment principles. Based on the results, the Vhembe IDP has a total GAM score of 38 (or 76%). This is due to the high scores in the above sufficient field with a current and future need assessment (AP3), promoting of equal access and aim to reverse past inequalities especially through the indigent policy (AP5), resource allocation (AP6), planning for future expansions (AP7), extensive budget allocation (AP8) and water contributing to social development and economic growth (P9). In the areas of sustainability (AP1) and spatial representation (AP10) the Vhembe DM IDP failed with below average scores. Alignment (AP2) and public participation (AP4) are on standard.

## Vhembe Water Services Development Plan (2012)

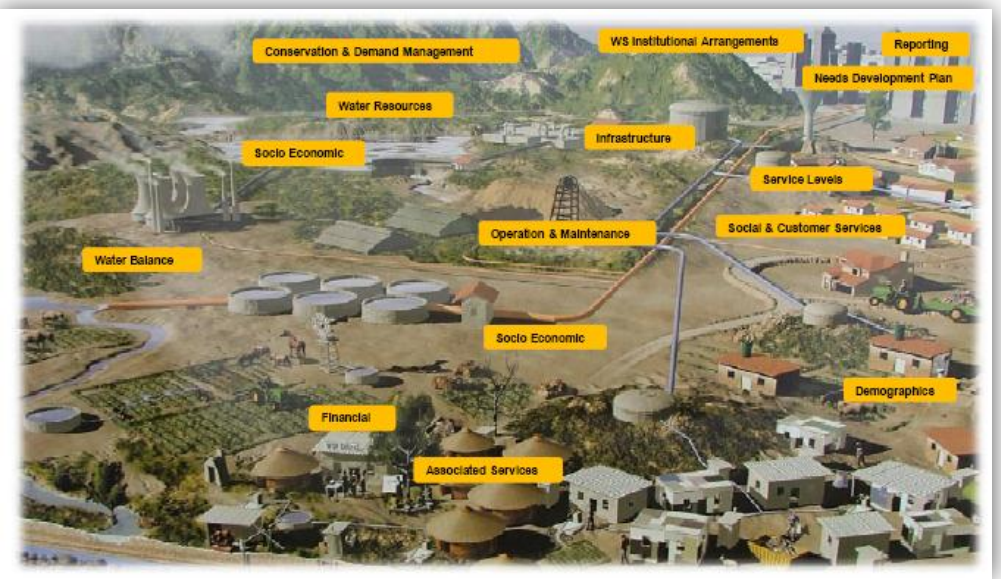



**Figure 31: Water Services Development Plan**

**Source: DWA (2012$_b$)**

The WSDP gives the current need of water (Table 11) as well as the water availability status to supply in these needs. According to the WSDP the budget is not enough to eradicate backlog and maintain the water services structure and there is a big shortfall. However, there are a number of 358 projects in order to address the water services issues and requirements. In general, there are no future plans or strategies in place to address these backlogs for households below the RDP water services level (DWA, 2012$_b$: 5).

**Table 11: Vhembe DM Water needs**

| Water Category | Water Need Description | Settlements | Population | Households |
|---|---|---|---|---|
| 10 | No Service | 32 | 118678 | 2525 |
| 7 | Infrastructure Upgrade | 3 | 503 | 107 |
| 7 | Infrastructure Extension | | | |
| 7 | Infrastructure Refurbishment | | | |
| 6 | O&M Need (Total Settlement) | | | |
| 5 | Water Resource Needs | | | |
| 8 | Infrastructure O&M Need | 87 | 99311 | 21130 |
| 9 | Infrastructure & O&M Need & Water Resource Needs | 680 | 784374 | 166888 |
| Adequate: | Stand Pipe | 757 | 786869 | 177419 |
| Adequate: | Yard Connection | 113 | 66693 | 14190 |
| Adequate: | House Connection | 35 | 151542 | 32243 |
| Informal Below | No Service | | | |
| Informal Adequate | Temporary Services Provided | 1 | 122 | 26 |
| TOTALS | | | 2008092 | 414528 |

**Source: DWA (2012$_b$)**

**Table 12: Vhembe DM Source availability status**

| Water sources | Number of sources | Current abstraction (Ml/Day) | Licensed abstraction (Ml/Day) |
|---|---|---|---|
| Groundwater | 600 | 0 | UNKNOWN |
| Surface Water | 11 | 153 | 0 |
| External Sources (Bulk purchase) | 1 | 0 | 0 |
| Water returned to resources | 7 | 10.3 | 0 |
| How much water is re-used (Recycled Water) | 0 | 0 | 0 |

**Source: DWA ($2012_b$)**

In terms of operation and maintenance of water resources, the existing groundwater and surface water infrastructure, waste water treatment works infrastructure, water works infrastructure, bulk pipeline as well as reticulation infrastructure are either at zero compliance or below the requirement with the possible impact being critical. In terms of the budget for these aspects, it is the same situation (DWA, $2012_b$: 13). A main contributor to the issue is that no information on infrastructure exists even though it is a critical aspect of water re Furthermore, there is very little information regarding needs development for monitoring and water quality. The status quo information indicates a lack of budget, tools and personnel to monitor and maintain water quality. The concern is that even though there is a lack of basics such as budget, tools and personnel the municipality has no development. The accuracy and completeness of information regarding sources and volumes for future sources are very low (25 %).sources (DWA, $2012_b$: 27)

The WSDP of Vhembe has an extremely low GAM score of 14 or 28%. This is due to the accumulative below average scores in sustainability (AP1), alignment (AP2), public participation (AP4), promotion of equal access (AP5), guidance to planning and resource allocation (AP6), planning for future expansions (AP7), contribution to social and economic growth (AP9) and no spatial representation of water infrastructure (AP10). The only compliance to sufficient assessment principles is the current needs (AP3) and the budget allocation with the projects (AP8).

In order for the IDP, SDF and WSDP to be, even at the most basic form, integrated it is essential to spatially represent the water resource infrastructure and planning to enable sustainable future planning.

**Table 13: District Level Goal Achievement Matrix**

| Goal Achievement Matrix | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Goal Levels | Level Weight | Level Score | Relevant Strategic Spatial and Water Resource Management and Planning Documents | Weight | Sub level Score | Assessment Principles | | | | | | | | | | Totals | | |
| | | | | | | AP1 | AP2 | AP3 | AP4 | AP5 | AP6 | AP7 | AP8 | AP9 | AP10 | Total GAM Score | Possible maximum score | Percentage |
| District Level | 20% | 12 | Vhembe SDF | 50% | 32 | 3 | 3 | 5 | 1 | 3 | 3 | 3 | 3 | 3 | 5 | 32 | **50** | 64% |
| | | | Vhembe IDP | 30% | 23 | 1 | 3 | 5 | 3 | 5 | 5 | 5 | 5 | 5 | 1 | 38 | **50** | 76% |
| | | | Vhembe WSDP | 20% | 6 | 1 | 1 | 3 | 1 | 1 | 1 | 1 | 3 | 1 | 1 | 14 | **50** | 28% |

**Source: Own Construction (2012)**

#### *5.2.1.3 Goal 3: Provincial Level*

The Goal Achievement Matrix is applied to the Limpopo Spatial Development Framework and Limpopo Water Management Area's Internal Strategic Perspective in order to determine the incorporation of water resource management and planning in strategic spatial planning in Limpopo Province. At this stage the Limpopo WMA ISP is DWAF's management tool of the water resources in the Limpopo WMA. A brief discussion on the content of each document is given where after the assessment in the form of the Goal Achievement Matrix is done.

**Limpopo Spatial Development Framework**

The main objective with the provincial SDF was a spatial framework to guide and encourage equitable distribution of investment in terms of a functional settlement hierarchy, to achieve spatially balanced development across the Limpopo Province and support investment in sustainable settlements (Pieterse du Toit & Associates, 2007:141). From an environmental perspective, it is aimed to ensure that resources in the province are used to their fullest potential in promoting, protecting and managing a sustainable environment;

In order to ensure optimal spatial development, rural and regional development should be integrated, as rural development should play a much more significant role in future regional development, but it should occur within framework of the macro spatial plan. The implementation of the Integrated Sustainable Rural Development Strategy (ISRDS) in all areas seems to be the most appropriate mechanism for effective rural development. Furthermore, the management entailing implementation, review and monitoring of the Spatial Development Framework as a part of the integrated development planning process must be a priority. All municipal infrastructure programmes must be integrated and co-ordinated with source development and bulk supply networks to support the Spatial Development Framework's macro spatial plan (Pieterse du Toit & Associates, 2007:168).

To ensure proper planning and provision of water services, the hierarchy of settlements as in the spatial development framework must be taken into account for the planning and development of water supply schemes. Source development and bulk supply schemes requires input from the spatial development frameworks for municipal areas and an indication of the level of services, linked to different categories of settlements in terms of the settlement hierarchy (Pieterse du Toit & Associates, 2007:191).

A guideline for spatial development is given that in terms of service provision new development should as far as possible be restricted to priority development areas (that is first and second order settlements with growth points and population concentrations) in terms of the hierarchy as proposed in the macro spatial plan. A policy principle should be that

services provision will only be considered for new development if it is situated in 1st and 2nd order settlements (clusters) as identified in the provincial spatial plan. Service provision to existing 3rd, 4th and 5th order settlements should still be upgraded to minimum RDP levels. In terms of bulk service provision, decisions w.r.t. bulk services should primarily be based on cost effectivity (to provide a service to as many people as possible within the budget limitations). Furthermore, source development and bulk supply networks should focus on priority development areas (Pieterse du Toit & Associates, 2007:196).

According to the 2007 Spatial Development Framework level of the Limpopo Province, 78% of this province's population does not meet the RDP of water supply whilst 58% doesn't have reliable access to water. This situation may have improved since. It is however well-known that the Limpopo Province is a water scarce area with little water resources available.

Various major surface water resource development projects will be initiated in some of the river systems in the next 10 years, namely:

- Levuvhu River – Vhembe District Municipality;
- Letaba River – Mopani District Municipality;
- Olifants River – Sekhukhune District Municipality;
- Steelpoort River – Sekhukhune District Municipality and Mpumalanga Province

Possible future transfer schemes include:

- Augmentation of Loskop Dam from Usutu-Vaal Scheme to provide for increased releases to Arabie Dam (Limpopo Province) – medium term (2010);
- Extension of the Roodeplaat Dam transfer scheme to Warmbaths, Nylstroom and Potgietersrus – short to medium term (2005); and
- Importation of water from the Limpopo River – long term (2020) (Pieterse du Toit & Associates, 2007:115).

The province adopted 5 development objectives with objective 2 supporting growing the economy of the province, sustainable job creation, innovation and competitiveness.

7 Industrial Development Clusters was identified by the Province:

- Platinum mining cluster on the Dilokong Corridor between Polokwane and Burgersfort (Sekhukhune district) and also in the Waterberg district;
- Coal mining and petrochemical cluster at Lephalale on the East-West Corridor (Waterberg district);

- Fruit and Vegetable (horticulture) cluster in Vhembe and Mopani ;
- Logistics cluster in Polokwane (Capricorn district);
- Red and White meat cluster on all the corridors (all districts);
- Eight tourism sub-clusters at a number of high-potential destinations; and
- Forestry cluster in the Mopani and Vhembe districts.

Cognisance should be taken of the RDP level of service in each district:

- Waterberg Final Analysis: 56 % of this district's population doesn't meet the RDP level of water supply (25l/c/day)
- Capricorn Final Analysis: 80 % of this district's population doesn't meet the RDP level of water supply.
- Mopani Final Analysis: 75 % of this district's population doesn't meet the RDP level of water supply
- Vhembe Final Analysis: 86 % of this district's population doesn't meet the RDP level of water supply
- Sekhukhune Final Analysis: 96 % of this district's population doesn't meet the RDP level of water supply

Growth points identified in the Limpopo SDF should be stimulated by amongst others, providing a higher level of service infrastructure which will ensure that appropriate services are available for potential business and service/light industrial concerns. The higher level of services, relative to other settlements in the area will also attract residential development to these growth points, with the implication that certain threshold values in population be reached, to provide for higher levels of social, physical, institutional and economic services (Pieterse du Toit & Associates, 2007:87)

Water supply and other infrastructure services provision is a key determinant in the future planning of the Limpopo Province and the availability of the resource also influences the provincial aggregate factors (provincial economy).

With abovementioned information from the Limpopo Provincial SDF, the Goal Achievement Matrix is applied. The results show a GAM score of 38 (76%). Water resource management is addressed and incorporated to a relatively large extent in comparison to the other SDFs.

It scored full scores in sustainability (AP1), alignment of policies and legislation (AP2), promoting of equal access to services (AP5), guidance in planning and resource allocation (AP6) and water contributing to social development and economic growth (AP9). The

Limpopo SDF scored sufficiently in the current and future need assessment (AP3), public and stakeholder participation (AP4), planning for future water infrastructure (AP7), budget allocation (AP8). The spatial representation (AP10) is where the Limpopo SDF is once again below average.

**Limpopo Water Management Area Internal Strategic Perspective (2004)**

The objective of an ISP is to provide a framework for DWAF's management of the water resources in each Water Management Area, until the management functions can be handed over to the then established CMAs.

The Limpopo WMA is the northern most WMA in South Africa and stretches over a total surface area of 60 420 km². The proposed eco-industrial site location falls inside the Limpopo WMA and the WMA also contains a large portion of the Limpopo Basin, which is also shared by Mozambique, Botswana and Zimbabwe. The Limpopo River forms the international border to the north of the WMA between Botswana and Zimbabwe before it flows through to Mozambique. The Limpopo WMA is bordered by the Olifants WMA in the south, the Luvuvhu/Letaba to the east and the Crocodile West & Marico WMA to the south-west as seen in Figure 32. Due to the fact that the Limpopo WMA falls within the greater Limpopo River Basin, which is shared by South Africa, Botswana, Zimbabwe and Mozambique, any activities impacting on the basin should adhere to principles as discussed in Section 4.2.4.1-4.2.4.5.

There are seven prominent rivers in the Limpopo WMA: Matlabas, Mokolo, Lepahlala, Mogalakwena, Sand, Nzhele and the Nwanedi River. All of the rivers discharge in the Limpopo River. Some of the larger towns in the Limpopo WMA include: Polokwane, Mokopane, Modimolle, Makhado, Lepahlala and Musina.

The water resources which occur within the WMA are nearly fully developed, with all the available water being highly utilised. Limited options for further resource development exist, which is attributable to the arid climate, unfavourable topography, sandy rivers as well as important conservation areas.

Due to the relative low rainfall over this part of the country, relative little surface runoff is generated in the Limpopo WMA. This runoff is highly seasonal and varies with intermittent flow in many of the tributaries. The WMA consists of a number of catchments which are mostly independent of each other. As a result, separate and mostly independent strategies are required to manage each catchment. The main catchments are the Matlabas, Mokolo, Lephalala, Mogalakwena, Sand, Nzhelele and Nwanedi. Deficits are shown with respect to the Matlabas/Mokolo, Mogalakwena and Nzhelele/Nzwanedi Catchments.

Water use in the Limpopo WMA is dominated by the irrigation sector, which accounted for nearly 75%, in the year 2000. Approximately 16% of the requirements are for urban, industrial and mining use, 9% for rural domestic supplies and stock watering and a small quantity for power generation.

The study area falls within the Sand Catchment. The Sand Key Area is by far the driest of all the Key Areas in the WMA and the surface water resource of the Sand Key Area is very limited. The bulk of the water requirements in this Key Area are met from the groundwater resource. The Key Area also relies heavily on transfers from other WMAs, which are used to meet the urban and industrial demands of Polokwane, Sheshego and Makhado. There is also a small transfer from the Limpopo River to the Venetia Mine. In addition to this there is a small transfer in from the Olifants WMA to Polokwane. The other significant towns in the area are Musina and Dendron. Musina abstract their water from sand aquifers in the Limpopo River while Dendron relies on groundwater. The water resource of the Sand Key Area is largely dependent on groundwater. There is large deficit in the Sand Key Area while the NWRS indicates that this catchment is in balance. Since there is no potential for additional water use in this Key Area, all additional water requirements will have to be sourced from transfers in from other Key Areas (DWAF, $2004_b$:43). Irrigation is the largest water user, with a requirement of 187 million $m^3$/a. Urban requirements, estimated at 24 million $m^3$/a, are mostly sourced from transfers in from other WMAs. The catchment is in deficit due to the over-development of irrigators relying on the very sparse surface water resource. Also there is a very real concern that the groundwater resources could have been over-exploited but further studies are required to confirm this. In the interim, no new licences from any local source should be issued except for domestic use (DWAF, $2004_b$: iii). Plans are far advanced to increase transfers into this Key Area from the Olifants WMA to meet increasing urban and mining requirements. In the long term, if it can be shown that the groundwater resource has been overexploited, compulsory licencing may be required in order to reduce abstractions from groundwater to sustainable levels (DWAF, $2004_b$:44).

Various large scale transfers and water reservations were reported on in 2003, based on the National Water Resource Strategy and affect the Limpopo WMA. Development of new dams or large water resource projects within the Limpopo WMA will be subject to national authorisation due to possible impacts on neighbouring countries.

It has been noticed that water resource planning has not been considered sufficiently in the WSDPs and it is intended that this ISP inform these planning processes in future. The only information of relevance which could be gleaned from WSDPs and IDPs in terms of this ISP is that approximately half the rural population does not have access to RDP standard water services or sanitation. The establishment of the Limpopo CMA is not a high priority and

there has not been much progress in this regard. In the interim period prior to the establishment of the CMA, this ISP will serve as DWAF's strategy to manage the water resources in the Limpopo WMA.

Co-operative governance (co-ordinated planning and co-operation with other national, provincial, district and local authorities) and other legal requirements need to be co-ordinated. Innovative communication strategies need to be developed to encourage this synergy, which is intended to streamline public service inputs into the provision of an enabling environment that can encourage **equitable and sustainable social and economic development** (DWAF, $2004_b$:19).

Water Resource Management Strategies within the WMA include:

- Water Balance & Reconciliation;
- International Obligations;
- Water Quality Management;
- Water Use Management;
- Water Conservation and Demand Management;
- Co-operative governance;
- Monitoring and information;
- Waterworks Management;
- Poverty eradication;
- Support to Local Authorities;
- Implementation of the ISP.

An integrated Environmental Management Framework (EMF) must be developed to ensure that its approach is aligned with the principles prescribed in NEMA and the ECA (DWAF, $2004_b$:7). In terms of the study area, there is no EMF for the Vhembe District which leaves a gap in the integration requirement.

The Limpopo ISP has a total GAM score of 34 (or 68%). The following assessment principles scored below average: public participation (AP4), budget allocation (AP8) and spatial representation (AP10).

**Table 14: Provincial Level Goal Achievement Matrix**

| Goal Achievement Matrix | | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Goal Levels | Level Weight | Level Score | Relevant Strategic Spatial and Water Resource Management and Planning Documents | Weight | Sub level Score | Assessment Principles | | | | | | | | | | Totals | | |
| | | | | | | AP1 | AP2 | AP3 | AP4 | AP5 | AP6 | AP7 | AP8 | AP9 | AP10 | Total GAM Score | Possible maximum score | Percentage |
| Provincial Level | 20% | 15 | Limpopo SDF | 75% | 57 | 5 | 5 | 3 | 3 | 5 | 5 | 3 | 3 | 5 | 1 | 38 | **50** | 76% |
| | | | Limpopo ISP | 25% | 17 | 3 | 3 | 5 | 1 | 5 | 5 | 5 | 1 | 5 | 1 | 34 | **50** | 68% |

**Source: Own Construction (2012)**

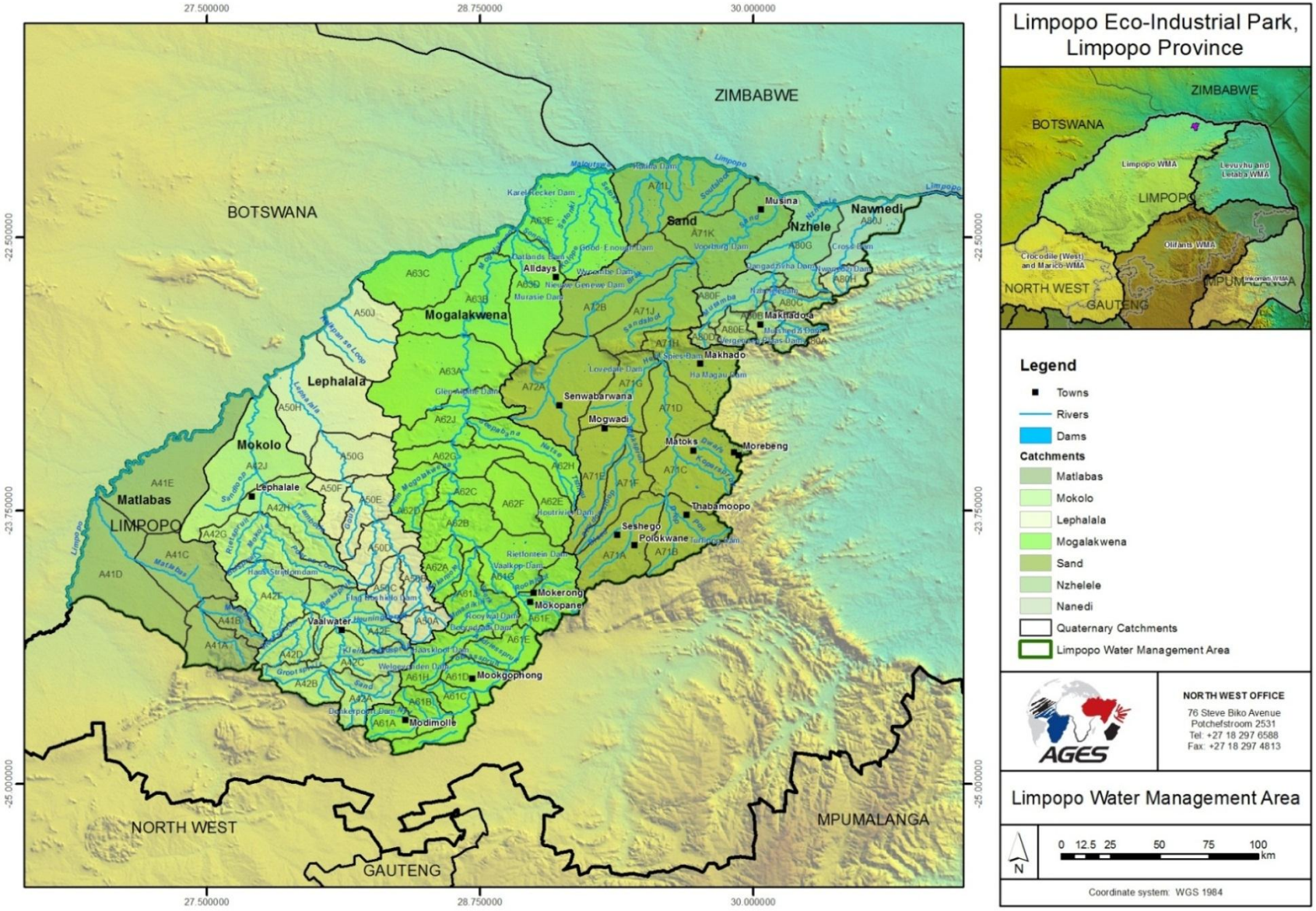



**Figure 32: Limpopo Water Management Area (Source: AGES, 2011)**

#### *5.2.1.4 Goal 4: National Level*

At national level (as part of the first sphere of government), integration between the National Spatial Development Perspective (NSDP) and the National Water Resource Strategy (NWRS) is key as these two documents is the guiding policies for strategic spatial planning and water resource management and planning for South Africa.

**National Spatial Development Perspective**

Essentially, the NSDP is was about providing an analytical and strategic framework to reconfigure spatial relations and structures and tackle head-on the dualistic and polarised nature of the South African space economy (South Africa, 2006:2). Ultimately, all government programmes and activities find expression in space. The spatial dispensation and the nature of the space economy of a country/region have important implications for meeting the social, economic and environmental objectives of a government.

As part of principle 2 of the NSDP, government has a constitutional obligation to provide basic services to all citizens (which include water) wherever they reside. However it is also stated in principle 3 that spending and investment should be focused in economic growth areas or areas with high economic potential.

According to the NSDP (2006:68) the dominant pattern of settlement and economic activity in South Africa is largely out of line with water availability. Furthermore the rising demand for water within the context of growing resource limits is likely to have extensive and differential impacts on different parts of the country. It is proposed that water-resource management and existing policy emphasis on water-resource protection, conservation, water-demand management and improved efficiency of use should be intensified.

Due to the high amount of South Africans still living below the medium living level (MLL) Development plans, including spatial plans at all levels, will need to factor in sustainable resource-use as well as energy and water-resource management, so as to avoid the potential negative social, economic and ecological consequences of inefficient and unsustainable resource-use in the medium-to long-term.

The various policy guidelines and strategies that has been developed, tend to be sectoral in nature and will need to be systematically integrated into the social and economic policies in a coherent and balanced way (South Africa, 2006:68)

The NSDP aligns strongly with the MTSEF of 2009 which is meant to guide planning and resource allocation across all the spheres of government (refer to Figure 33 for graphical illustration). The 26 identified areas in the country considered key to the national economy with the water supply systems are indicated in Figure 34.

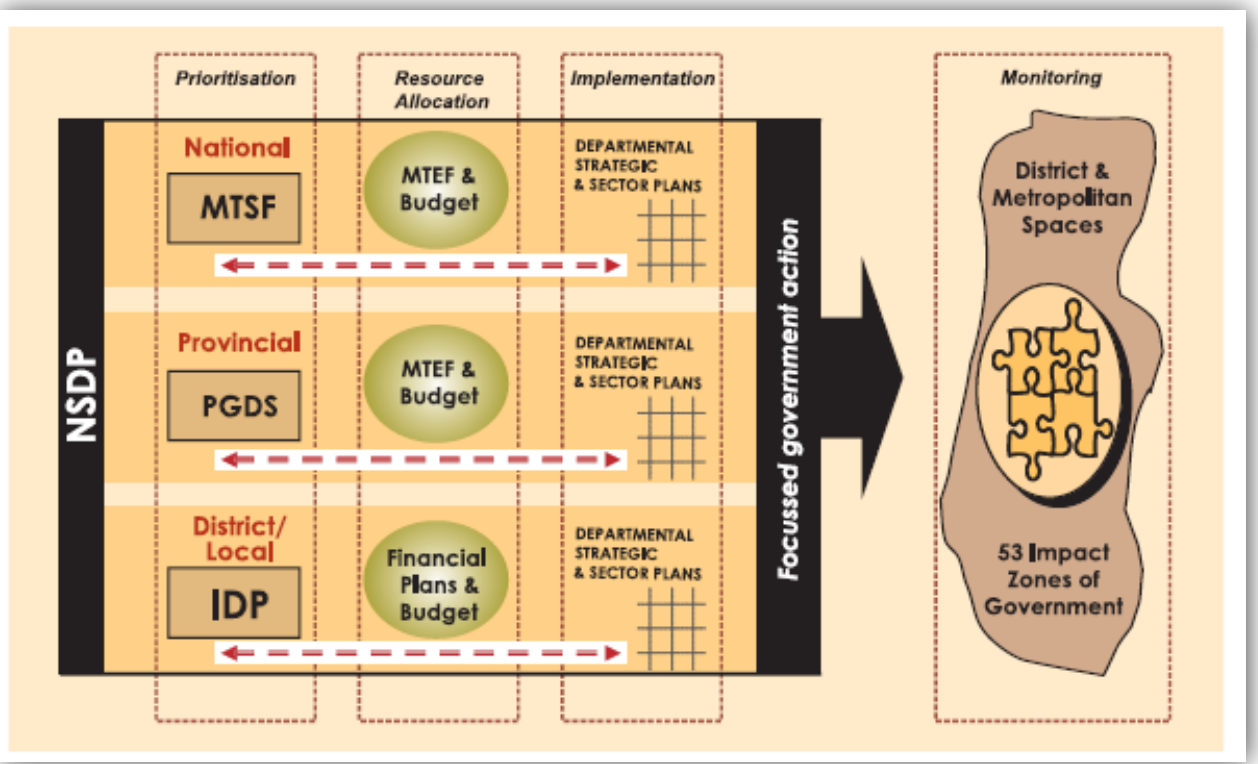



**Figure 33: NSDP and MTSF alignment**

**Source: South Africa (2006)**

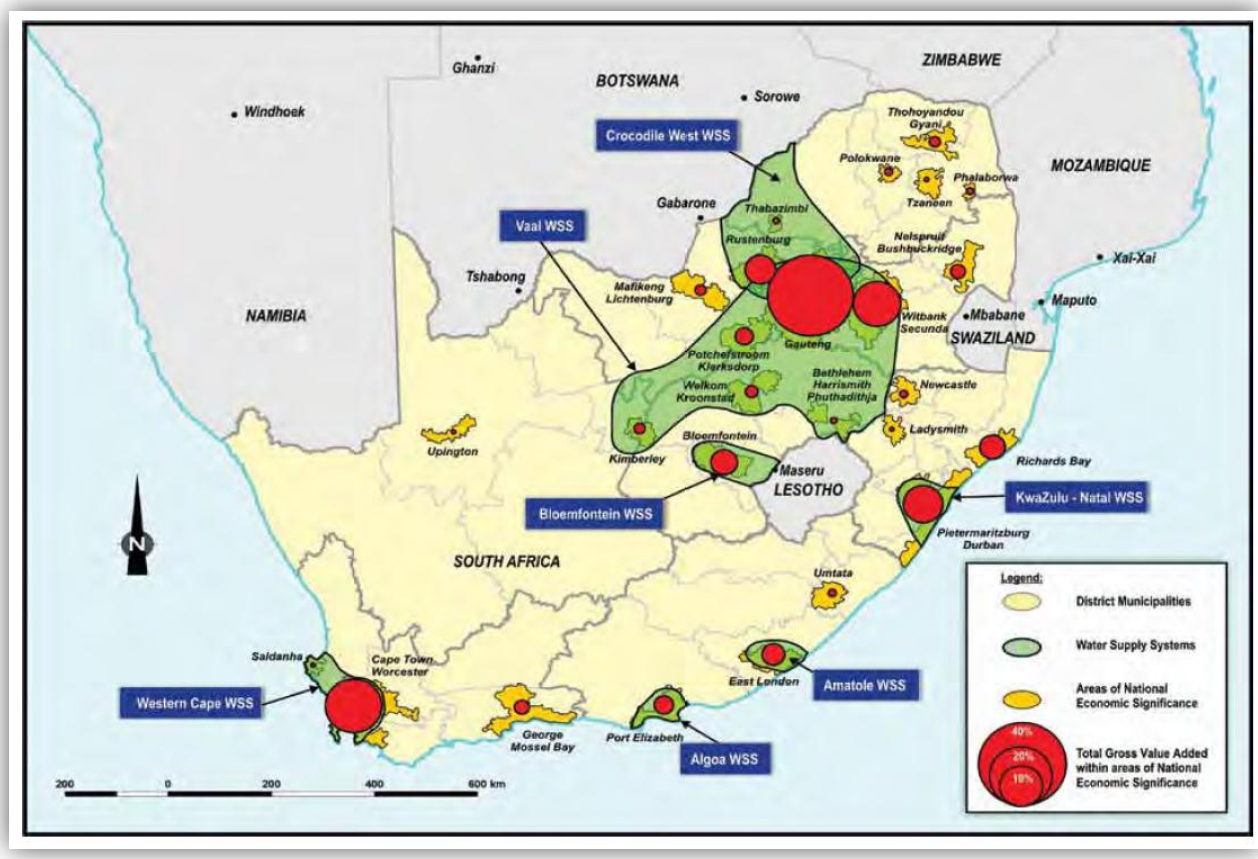



**Figure 34: Areas of key economic significance in the 2006 NSDP, in relation to existing water supply systems**

**Source: DWA (2010c)**

In the light of the assessment of the National Spatial Development Perspective in terms of the Goal Achievement Matrix, the total GAM score is 42 which accounts to 84%. This exceptional high score indicates the quality of this national strategy. The NSDP scored above average in the assessment principles of sustainability (AP1), alignment (AP2), public and stakeholder consultation (AP4), promoting of equal access to services (AP5), the degree of guidance related to planning and resource allocation (AP6), water contributing to social development and economic growth (AP9) and lastly the spatial representation (AP10). The current and future needs assessment (AP3), planning for future water infrastructure expansions (AP7) and the budget allocation (AP8) scored only as sufficient.

**National Water Resource Strategy**

The first edition of the NWRS (2004) gives an indication of the overall state of the country's water resources at year 2000, projected also to 2025. The NWRS stated that "In general, sufficient water can be made available at all significant urban and industrial growth points in the country for water not to be a limiting factor to economic development. However, given the long lead times for developing new supply schemes, co-operative planning will be required between water users and water management institutions to ensure that water can be made available when it is needed." To achieve this, the following reconciliation interventions were listed:

- water demand management;
- water resource management;
- managing groundwater resources;
- re-use of water;
- control of invasive alien vegetation;
- re-allocation of water;
- development of surface water resources;
- inter-catchment transfers (DWAF, $2004_d$:43)

According to the integrated water resource planning document (DWA, $2012_b$:10) the fact that water resources are limited cannot be disputed, and furthermore the fact that growth puts increasing strain on those resources. It is important not to lose sight of social needs, equity, and the ultimate reason for achieving economic growth, which is to create better lives for all. This increases the imperative for careful planning on the one hand, and efficient use on the other.

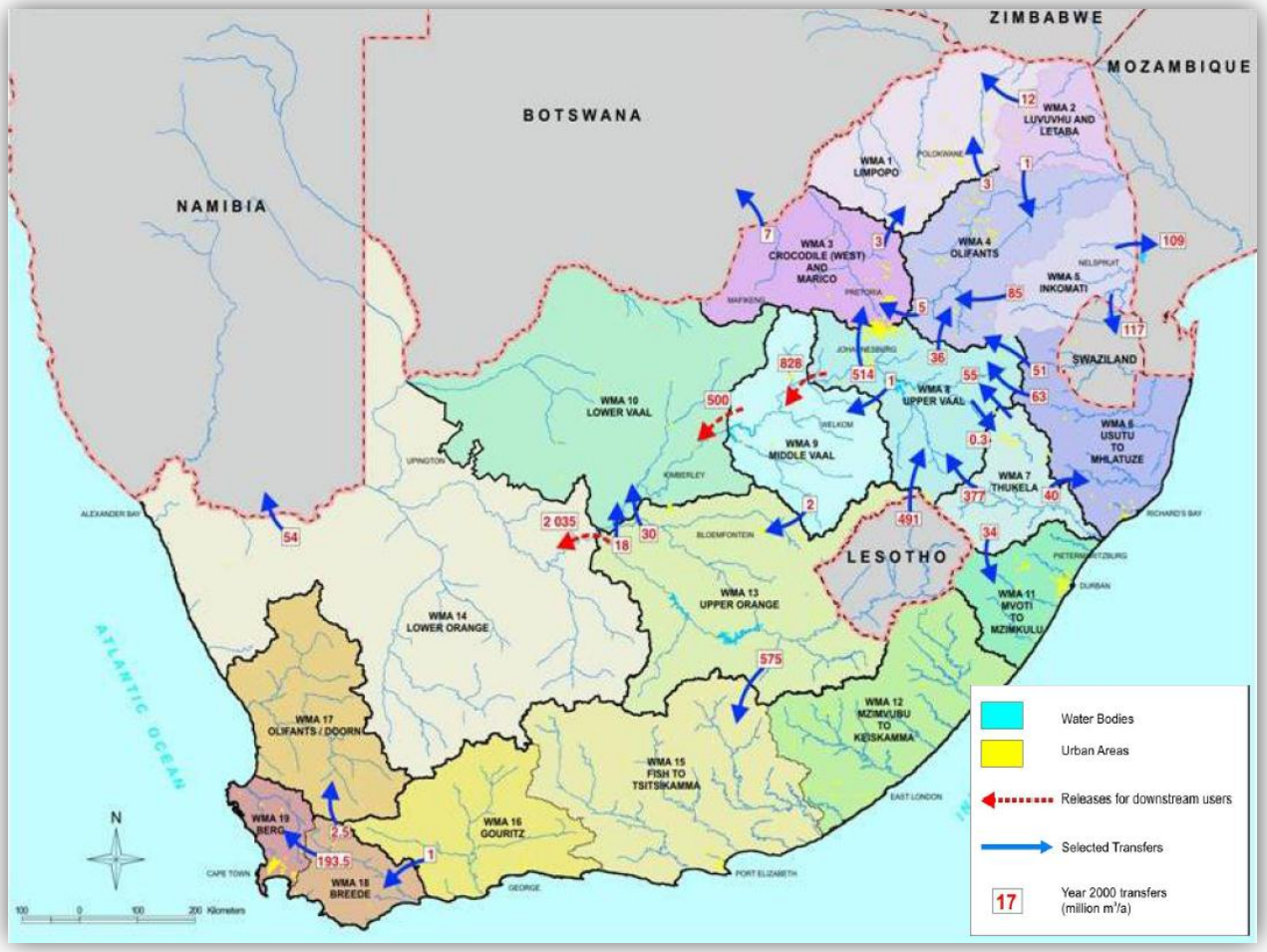



**Figure 35: Location of water management areas and inter-water management area transfers**

**Source: DWA (2004d)**

The assessment of the National Water Resource Strategy in terms of the Goal Achievement Matrix indicates that the NWRS has the highest GAM score of 46 (92%). It scores above sufficient in all the assessment principles except for spatial representation where it is below average.

**Table 15: National Level Goal Achievement Matrix**

| Goal Achievement Matrix | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Goal Levels | Level Weight | Level Score | Relevant Strategic Spatial and Water Resource Management and Planning Documents | Weight | Sub level Score | Assessment Principles | | | | | | | | | | Totals | | |
| | | | | | | AP1 | AP2 | AP3 | AP4 | AP5 | AP6 | AP7 | AP8 | AP9 | AP10 | Total GAM Score | Possible maximum score | Percentage |
| National Level | 30% | 26 | NSDP | 50% | 42 | 5 | 5 | 3 | 5 | 5 | 5 | 3 | 1 | 5 | 5 | 42 | 50 | 84% |
| | | | NWRS | 50% | 46 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 1 | 46 | 50 | 92% |

**Source: Own Construction (2012)**

## 5.3 SUMMARY

The cumulative Goal Achievement Matrix is represented in Table 16. The local level's (Goal 1) contribution towards the total score is 15 (based on a weight of 30), the district level (Goal 2) has a score of 12 (based on a weight of 20), the provincial level (Goal 3) is 15 (based on a weight of 20) and the national level (Goal 4) has a score of 26 (based on a weight of 30). The total GAM score for the overall local level percentile is 68%. This score can be used in comparison in future studies with other local municipalities, even on an international level

National Level has thus performed the best with 86%, followed by the provincial level with 75%, then the District Level with 60% and lastly the Local Level with 50%. The statistical tree indicated an increase from the national towards the local level with local level being of higher significance due to the nature of implementation at this level.

These scores indicates that exceptional legislation, policies and systems are not enough to eradicate poverty, provide water for all, plan sustainably and on long-term if the implementation at local level falters.

Spatial Development Frameworks (as a component of strategic spatial planning) and water resource management and planning on a local level are thus not effectively integrated.

According to Table 17, the assessment principles are prioritised according to their GAM score. In terms of the cumulative results per assessment principle, AP5 scored the highest (82%), followed by AP3 (78%) and AP9 (78%). In the majority of documents, equal access to services is promoted in the hope to revers or restore the past inequalities. Current and future needs are generally discussed and in water contributing to social development and economic growth overall. AP10 performed the overall worst (42%) as spatial representation of water resources in planning documents is either bad or non-existent. The assessment principle AP4 - Public Participation scored also a disappointing low 47%. This highlights a flaw in previous strategic spatial planning and water resource management policies and plans.

The principles performing the best indicate progress in some areas while the poorest performing principle namely spatial representation should be addressed in order to enhance its performance.

**Table 16: Cummulative Goal Achievement Matrix**

| Goal Achievement Matrix | | | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Speres of Govern-ment | Goal Levels | Level Weight | Level Score | Relevant Strategic Spatial and Water Resource Management and Planning Documents | Weight | Sub level Score | Assessment Principles | | | | | | | | | | Totals | | |
| | | | | | | | AP1 | AP2 | AP3 | AP4 | AP5 | AP6 | AP7 | AP8 | AP9 | AP10 | Total GAM Score | Possible maximum score | Percentage |
| Third Sphere of Government | Local Level | 30% | 15 | Musina SDF | 50% | 22 | 3 | 3 | 1 | 1 | 5 | 1 | 1 | 1 | 3 | 3 | 22 | 50 | 44% |
| | | | | Musina IDP | 50% | 28 | 1 | 3 | 5 | 1 | 3 | 1 | 5 | 5 | 3 | 1 | 28 | 50 | 56% |
| | District Level | 20% | 12 | Vhembe SDF | 50% | 32 | 3 | 3 | 5 | 1 | 3 | 3 | 3 | 3 | 3 | 5 | 32 | 50 | 64% |
| | | | | Vhembe IDP | 30% | 23 | 1 | 3 | 5 | 3 | 5 | 5 | 5 | 5 | 5 | 1 | 38 | 50 | 76% |
| | | | | Vhembe WSDP | 20% | 6 | 1 | 1 | 3 | 1 | 1 | 1 | 1 | 3 | 1 | 1 | 14 | 50 | 28% |
| Second Sphere of Government | Provincial Level | 20% | 15 | Limpopo SDF | 75% | 57 | 5 | 5 | 3 | 3 | 5 | 5 | 3 | 3 | 5 | 1 | 38 | 50 | 76% |
| | | | | Limpopo ISP | 25% | 17 | 3 | 3 | 5 | 1 | 5 | 5 | 5 | 1 | 5 | 1 | 34 | 50 | 68% |
| First Sphere of Government | National Level | 30% | 26 | NSDP | 50% | 42 | 5 | 5 | 3 | 5 | 5 | 5 | 3 | 1 | 5 | 5 | 42 | 50 | 84% |
| | | | | NWRS | 50% | 46 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 1 | 46 | 50 | 92% |
| | | | | | Totals | | 27 | 31 | 35 | 21 | 37 | 31 | 31 | 27 | 35 | 19 | | | |
| | | | | | Possible Maximum per Assessment Principle | | 45 | 45 | 45 | 45 | 45 | 45 | 45 | 45 | 45 | 45 | | | |
| | | | | | Percentage | | 60% | 69% | 78% | 47% | 82% | 69% | 69% | 60% | 78% | 42% | | | |

**Source: Own Construction (2012)**

**Table 17: Position Results of Assessment Principles**

| GAM Assessment Principles | | | | |
|---|---|---|---|---|
| | **Principle** | **Score** | **Percentage** | **Position** |
| AP5 | Promote equal access to services and reverse past inequalities related to water | 37 | 82% | 1 |
| AP3 | Current and future need assessment for water services and resources | 35 | 78% | 2 |
| AP9 | Water to contribute to social development and economic growth | 35 | 78% | 3 |
| AP2 | Alignment with relevant policies and legislation in South Africa | 31 | 69% | 4 |
| AP6 | Degree of guidance related to planning and resource allocation | 31 | 69% | 5 |
| AP7 | Planning for future water infrastructure expansions | 31 | 69% | 6 |
| AP1 | Sustainability (related to spatial representation and infrastructure) meeting the current and future needs | 27 | 60% | 7 |
| AP8 | Budget allocation for water infrastructure | 27 | 60% | 8 |
| AP4 | Public and Stakeholder participation in need determination | 21 | 47% | 9 |
| AP10 | Spatial representation and integration of water resources and planning | 19 | 42% | 10 |

**Source: Own Construction (2012)**

# 6 CONCLUSIONS

Based on the investigation with regards to the practical assessment of spatial development frameworks in terms of water resources, the following conclusions are made:

- Spatial Development Frameworks (as a component of strategic spatial planning) and water resource management and planning on a local level are not effectively integrated and it is recommended that water resources and planned future development must be effectively managed and integrated in order to ensure sustainable communities at local level;
- Water is the resource that not only drives development, but that underpins most, if not all of it. It is thus a government's or department's duty to be in a position to respond to the expected growth, and to ensure, where economically viable, that water is available when and where it is required;
- In the past, alignment between strategic spatial planning and water resource management has not been very effective due to the numerous policies and legislation which needs to be adhered to. This causes confusion and a lack of communication at both the local and national levels;
- The Multi-Criteria Analysis (MCA) and Goal Achievement Matrix (GAM) can be combined to scientifically evaluate the degree of interaction between water resource management and strategic spatial planning
    - MCA in itself is multi-functional and needs an alternative to compare and verify.
    - GAM confirms the MCA and can be investigated in a more in-depth study in the continued study
- The GAM results indicate a poor degree of integration of water resource management and planning within the strategic spatial planning documents on local and district level (Third Tier of Government). This confirms the issue of implementation and application on local level. On a national level, high degree of integration can be mainly attributed to our sound democratic legislation and strategies.
- The planning for water resources must be done far in advance of the actual need and a long-term vision is required and should be incorporated in the strategic spatial planning plans and policies in order to ensure sustainable development;
- The provision of all physical infrastructure should be informed by spatial and economic logic;
- The lack of sufficient and accurate information in terms of water resource planning and

management is a critical problem. Due to this, sustainable strategic spatial planning is a growing challenge;

- Currently, integration and interaction takes place from the WSDP to the IDP and vice versa and then from the IDP to the SDF and vice versa.
    - As indicated in Figure 36, the WSDP receives (or is supposed to) information with regards to water resource management and planning. This information should be transferred to the IDP and eventually also reflect in the IDP. There is however a flaw in the system as the strategic spatial documents are overall not effectively representing water resource management or planning and therefore cannot sufficiently guide development and inform investment.
    - The process should be dramatically changed to a direct interrelationship between the WSDP – IDP and WSDP – SDF to eliminate any issues or incapability.
- At this stage, the IWRM is only a concept and not implemented to its full potential in South Africa.

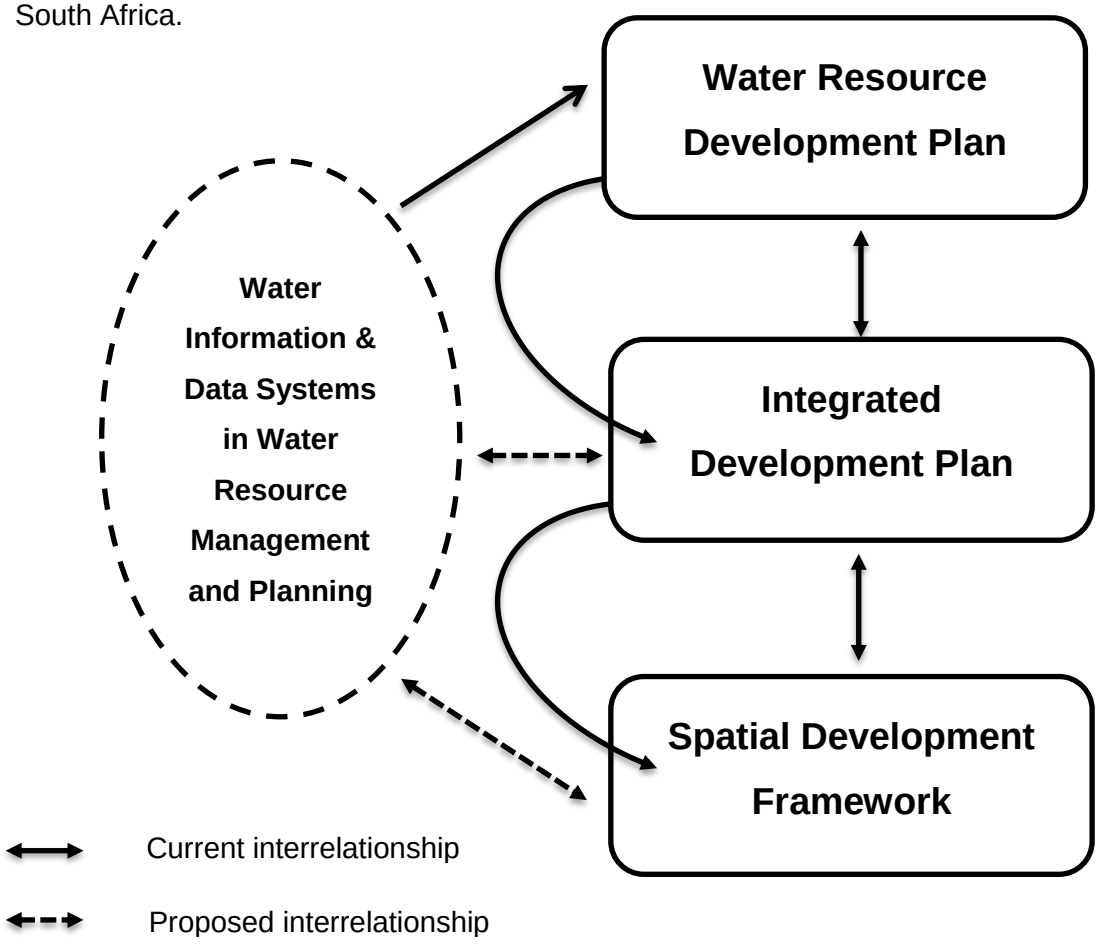



**Figure 36: WSDP, IDP and SDF interrelationship**

**Source: Own Construction (2012)**

- South Africa shows clearly that the political apparatus has been and possibly continues to be the most important in shaping the water rights structure and water management processes. To promote effective water resource management and strategic spatial planning integration, a political champion will be needed. Political buy-in is furthermore required;
- Water use efficiency is to be enforced by devolving water management in the country at the catchment level. The establishment of catchment management agencies should be expedited as they are responsible for:
    - Development of a strategy in the catchment to meet the objectives of the National Water Act
    - Management of water resources and coordination of the water-related activities of water users and other water management institutions within the area (Tewari, 2009:706)
- The spatial representation and integration of water resources and planning within strategic spatial planning is a critical principle to which current policies and plans like SDFs and IDPs are not complying.

# 7 RECOMMENDATIONS

- From the study it is recommended that water resource management plans and strategic spatial plans should be more effectively aligned and integrated at a local authority level. This is required in order to achieve sustainable development, service delivery, water security and poverty relief.
- As a planning recommendation, the Guidelines for the Development of Spatial Development Frameworks developed by the Department of Rural Development and Land Reform, must be extended to incorporate the integrative approach between strategic spatial planning and water resource management as a fundamental aspect
- In order to enhance the integration between strategic spatial planning and water resource management in South Africa, a comprehensive set of guidelines should be compiled from the legislative and policy framework. This will enable and guide uniform decision making across all levels;
- It is recommended that the establishment of CMA's need to be prioritised;
- Verified accurate datasets should be available for strategic planning purposes and the spatial representation thereof is required;
- To avoid the risk in water shortages, significant investment in Water Conservation and Water Demand Management at national level must be implemented. This must be adopted and implemented further at local level (DWA, $2012_b$:16)

## 7.1 RECOMMENDATIONS FOR FUTURE RESEARCH

During the course of this study, the following additional research areas have been identified for further research relating to effective and sustainable water resource management and strategic development:

- Transport and water
    - To investigate the integration and correlation between transport networks and water supply as access forms an integral part of water services provision. This is evident in the lack of water supply in rural areas with little or no access to transportation networks.
    - To investigate the effect of integrated public transport infrastructure and services on environmental aspects such as greenhouse gas emissions, conservation and reuse of water and possible increase in natural habitat and food production (Sustainable public transport source)

- Water to the energy Sector
    - Power stations require water at the highest assurance of supply and water for energy is a top planning priority. The implementation of new power stations and a possible coal-to-liquid fuel plant at Lephalale will require substantial extra water. This can be provided thanks to high, and growing, levels of return flows from northern Gauteng into the Crocodile (West) system. A 200 km pipeline is planned and these return flows will be pumped and piped, at considerable cost, to Lephalale.
    - Planning the supply of water to possible solar power stations in the vicinity of Upington is also being undertaken. Nuclear power stations, which are not tied to their energy source like coalfired stations, should be built at the coast, using seawater for cooling
- Housing
    - To investigate various sustainable housing prototypes and systems and evaluate them based on their energy, water and materials consumptions.
- Water and Waste water and Sanitation Systems
    - To investigate the effect that water and waste water systems have on urban and rural communities and to develop new systems to protect public health. The effect is evident in the detrimental water and waste water systems in Accra, Ghana and Mombai, India.
- Stormwater Systems
    - Effective design and implementation of storm water systems that enable the sustainable use of rainwater (rainwater harvesting)

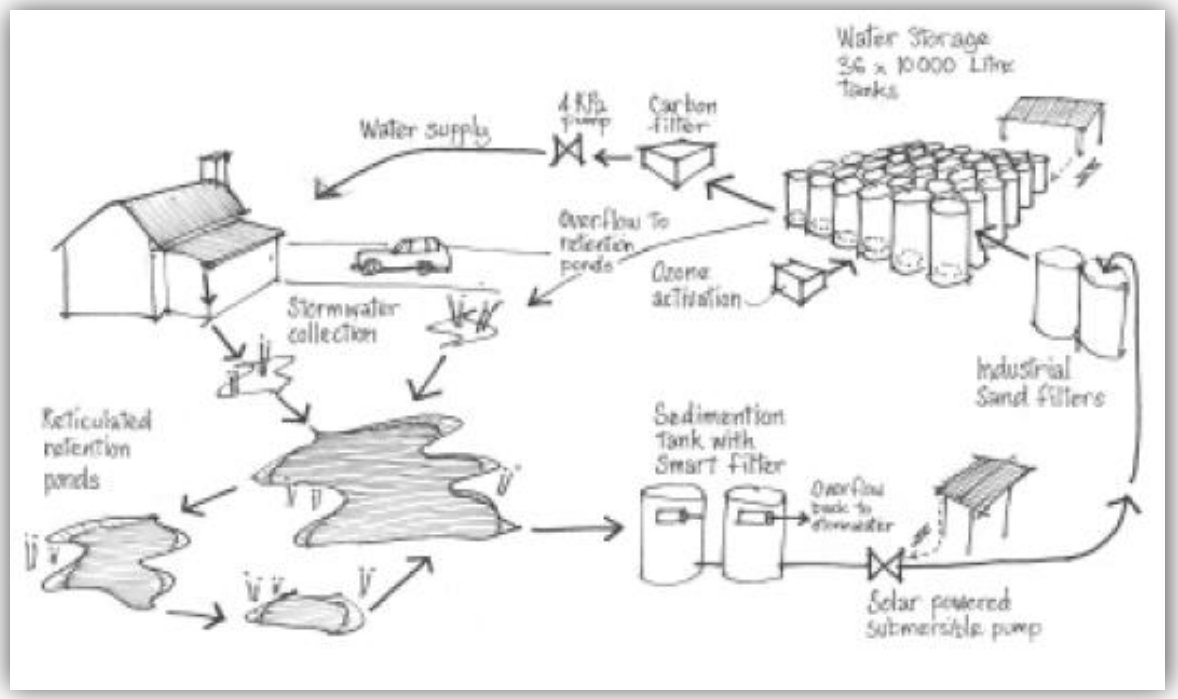



**Figure 37: Proposed Rainwater Harvesting**

**Source: CNDV (2012)**

- Municipal Water Management
    - The role of the Bluedrop and Greendrop Reports in effective and integrative water resource management and planning
- IDP and SDF Cycles issue
    - There is a continuous issue with the cycles of the IDPs and SDFs in a local municipality or district municipality. More attention should be given to this issue as without affective alignment and integration, the implementation through the IDP and future spatial planning through the SDF will not be sustainable.
- Environmental Management Framework
    - Alignment within the third sphere of Government in terms of the Environmental Management Framework is essential as this form an area of integration between water resources and strategic spatial planning.

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# 9 APPENDIX A

The following methodology was summarised as from the Guidelines developed by the Department of Rural Development and Land Reform for the Formulation of Spatial Development Frameworks.

**PHASE 1: START-UP PHASE**

The main deliverables of the start-up phase is:

- An inception report providing the background and platform for the following Phase 2;
- A project plan outlining the details of the methodology, the key deliverables and project timeframe;
- The appointment of a steering committee (DRDLR, 2011:1).

**Action 1.1: Determine roles and requirements**

This action requires detail allocation of responsibilities and roles in terms of the requirements set out in the TOR of the tender document in order to ensure the success of the project. The following sub-actions are important:

- Obtaining a Council Resolution;
- Composing a Steering Committee and define and communicate their role;
- Composing a Joint Technical Committee who must define and prepare a project plan (DRDLR, 2011:7).

**Action 1.2: Scope**

- Confirm the scope for the SDF.

**Action 1.3: Spatial Principles and policies**

- Summarise relevant laws and policies;
- Consult provincial acts and policies;
- Introduce the Critical Assessment Framework containing spatial principles (DRDLR, 2011:21).

**Action 1.4: Project plan and inception report**

- Background and current municipal situation assessment;
- Source existing spatial plans, the existing sector plans and the surrounding SDF's to be reviewed and summarised in the following phases.

- Develop project plan and summarise all abovementioned actions in an inception report (DRDLR, 2011:26).

## PHASE 2: ISSUES AND VISION

In Phase 2 the focus will be placed on intensive public participation. The main deliverables will be to:

- Develop a community stakeholder database;
- Develop a process for participation from government agencies;
- Facilitate skills development and transfers;
- Summarise the spatial vision and accompanying goals with political support.

**Action 2.1: Public Participation and stakeholder engagement**

- Inclusion in the IDP cycle;
- Advertise the SDF to encourage public participation;
- Involve stakeholders through public meetings, sector engagements and render a workshop report;
- Incorporate skills transfers (DRDLR, 2011:32).

**Action 2.2: Development of vision statement and associated goals**

- Formulate the vision by incorporating the IDP vision, giving it a special aspect and taking the nature of the municipality into account (DRDLR, 2011:33).

**Action 2.3: Identify each settlement and the municipality's sense of place**

- The sense of place will take scenery, memorability, events, morphology and heritage into account (DRDLR, 2011:34).

**Action 2.4: Engage with neighbouring municipalities**

- Workshop with neighbouring municipalities: vision, cross-boundary issues
- Engage with the applicable District Municipality.

**Action 2.5: Government agencies' input**

- Comprehension of impacting initiatives;
- Access to database information;
- Include important listed agencies and conduct a workshop.

**Action 2.6: Political support - council consensus**

- Present the issues, vision and goals to the Council for their consensus (DRDLR, 2011:36).

## PHASE 3: SPATIAL ANALYSIS AND SYNTHESIS

This phase builds on the previous phases to guide an in-depth spatial analysis of the conditions within the applicable Municipality. The deliverables of this phase will be:

- An updated current reality analysis;
- Spatial issues and opportunities of the Municipality.

**Action 3.1: Summary of information Phase 1 & 2**

- Identify implications for the SDF with regards to following from phase 1 and 2:
  - any new developments/changes in the legal and policy context;
  - impact of relevant neighbouring municipalities;
  - implications of the existing sector plans (DRDLR, 2011:39).

**Action 3.2: Status Quo Analyses**

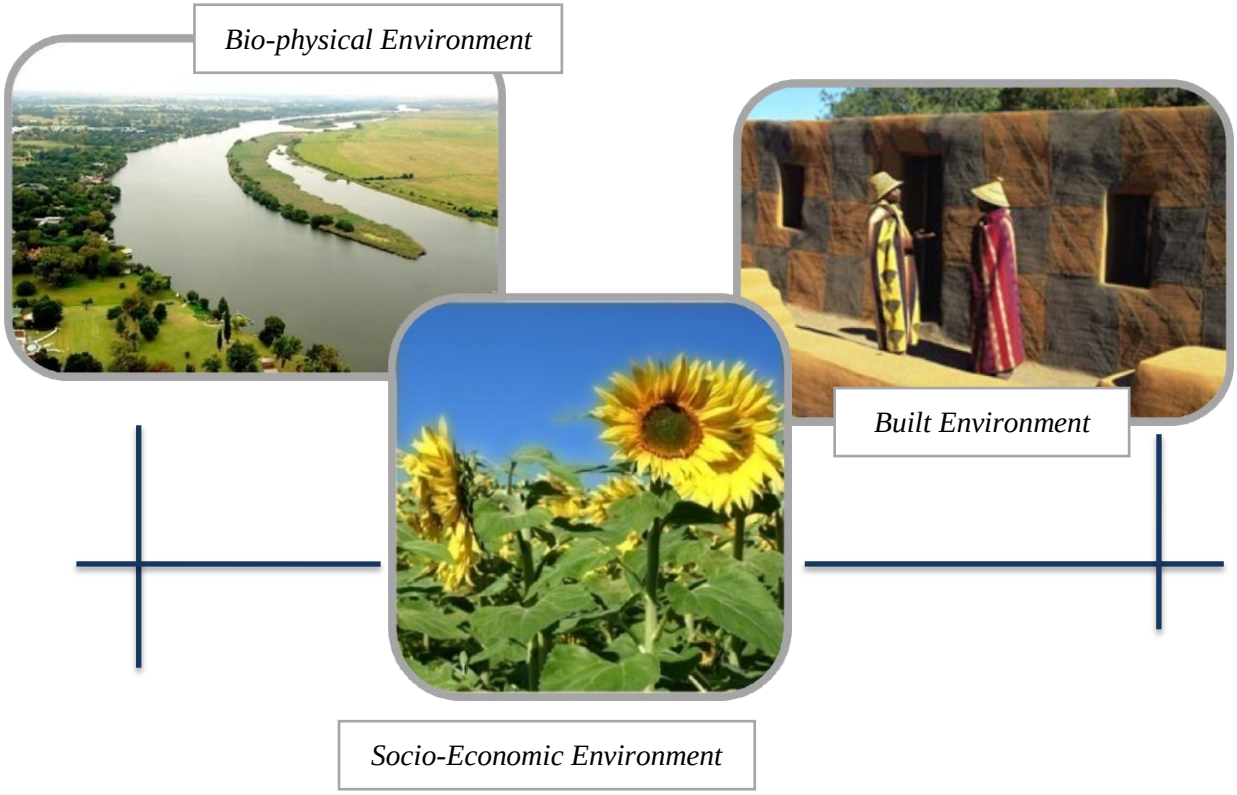


**Figure 38: Bio-physical, Built and Socio-economic Environments**

**Source: AGES (2012)**

- Quantify the needs and capacities of the Municipality;
- Gathering/ sourcing of current information for three categories:
    - Bio-Physical environment,
    - Socio-economic environment and the
    - Built environment with three aspects, planning, heritage and environment continuously playing a role (DRDLR, 2011:41).
- The following important aspects of the Bio-Physical environment will be addressed (DRDLR, 2011:44):
    - Geology and Soils;
    - Climate;
    - Topography and slopes;
    - Hydrology;
    - Geohydrology;
    - Biodiversity;
    - Vegetation;
    - Conservation and Heritage;
    - Agriculture;
    - Building Materials;
    - and Mining.
- The following aspects from the Socio-economic environment will be addressed (DRDLR, 2011:49):
    - Demographic profile;
    - Health;
    - Education;
    - Employment;
    - Occupation and Income Levels;
    - Land Reform;
    - Cemeteries;

- Crime;
- Property Market patterns and growth pressures;
- Municipal Finances.

- Important aspects from the Built environment will be addressed (DRDLR, 2011:51):
  - Hierarchy and role of settlements;
  - Settlement Densities;
  - Land Use Management Issues;
  - Transportation;
  - Water Infrastructure;
  - Waste Water Treatment (sanitation);
  - Solid Waste Management;
  - Energy;
  - Telecommunications;
  - Human settlements;
  - Land;
  - Secondary Sectors: Manufacturing, Construction, Transport;
  - Tourism.

**Action 3.3: Mapping of information on Status Quo and issues, spatial challenges and opportunities**

- Although the graphical representation of information and data will take place continuously throughout all the phases in GIS, this is an essential action;
- All the information up until this point will be consolidated and mapped as the status quo of the Municipality;
- The identification of issues, spatial challenges and opportunities can be done from the resulting visual maps.

**Action 3.4: Synthesis of Phase 3 findings**

- Formulation of relationship between the status quo themes and a synthesis structured according to the three main layers;
- A SWOT analyses will be conducted for issues like municipal income and spending;

- Summarise the municipal issues, challenges and opportunities and illustrate on a map (DRDLR, 2011:55).

## PHASE 4: DRAFT SDF - DESIRED CONCEPTUAL SPATIAL GOAL AND DEVELOPMENT PATTERN

In Phase 4, the draft SDF proposals are formulated by incorporating the policies and principles of Phase 1, the issues and vision of Phase 2 and the status quo of Phase 3. The key deliverables will be:

- A draft SDF;
- Summary of Phase 1-3 outcomes;
- Interactive SDF map;
- A monitoring and evaluation framework.

**Action 4.1: Identification of common issues and objectives: Intervention**

- Formulation of objectives;
- Identification of spatial tools needed;
    - Nodes;
    - Corridors;
    - Infill and densification;
    - Containment;
    - Protection;
    - Growth areas.
- Investigate the restructuring of settlements;
- Address rural development issues.

**Action 4.2: Conceptual Framework**

- Formulate a conceptual framework for the Municipality which will identify:
    - Generalised local land-use patterns;
    - Key nodes and links and what activities these might focus on;
    - No-go areas for urban development for environmental or agricultural protection; and
    - Key areas of opportunity or challenges (DRDLR, 2011:64).

**Action 4.3: Scenario Planning**

- Prior to formulating proposals, formulate alternative scenarios for the future development of the municipality;
- Public Participation (similar as in Phase 2) (DRDLR, 2011:66).

**Action 4.4: SDF Proposals**

- Formulation of a SDF plan with the following important aspects:
    - Using the Ecological Socio-Economic Relationship Framework;
    - Spatial Planning Categories (SPCs);

**Table 18: Proposed Spatial Planning Categories**

| | |
|---|---|
| Core Areas | Nature reserves, eco corridors, dams, rivers, pans |
| Buffer Areas | Extensive agriculture, game farming, private conservancies |
| Intensive Agriculture 1 | Irrigation farms |
| Intensive Agriculture 2 | Dryland farms |
| Intensive Agriculture 3 | Commonage incubators (also stock) |
| Urban Development | All urban settlement uses inside Urban Edge |

    - The Growth Potential of Settlements;
    - Land Ownership and Value;
    - Spatial Budget;
    - Densification and Urban Edges;
    - Valuable Agricultural Land (DRDLR, 2011:71).
- Preparation of maps and guidelines for drawing up of detailed SDFs/ Sectorial Plans
    - The following steps will be used for the applicable Municipality


**Figure 39: Steps to be followed for a SDF (Source: Own Construction, 2012)**

**Action 4.5: Land use management system relation**

- Comparison of the land use management implications of the SDF Proposals with the provisions of the land use management system;
- GIS integration of SDF proposals with LUMS attributes and property information and address the differences (DRDLR, 2011:74).

**Action 4.6: Implementation Framework**

- Define the order of priorities, phasing and development control guidelines;
- Define necessary actions to facilitate the implementation;
- Link to the budget and integrate the IDP, SDF and MTEIF budgets.

**Action 4.7: Monitoring and evaluation framework**

- Develop a monitoring and evaluation framework;
- Outline actions required if targets are not met (DRDLR, 2011:75).

## PHASE 5: ACHIEVING SUPPORT FOR THE DRAFT SDF: PUBLIC PARTICIPATION

The focus of Phase 5 will be to achieve support for the SDF proposals. The activities to be undertaken entail engagement with municipalities, government departments and other key stakeholders. This will be the ideal opportunity to do skills development and transfer in a workshop format. Councillors and officials will be made aware, receive the essential information and be empowered to make key decisions. The key deliverables for Phase 5 are:

- Political endorsement of SDF;
- Record documents of decisions and comments;
- Capacity building and skills transfer for the Municipality and other government officials (especially of the DRDLR).

**Action 5.1: Municipal, other government departments, key private stakeholders and political support: Inputs**

- Interaction (via workshops) with neighbouring municipalities to discuss cross-border implications;
- Workshop with government departments to discuss the draft SDF;
- Ensure the alignment of key private stakeholder's development proposals with the SDF;

- Workshop with the Council with representation of the draft SDF (DRDLR, 2011:87).

**Action 5.2: Public Input and Participation**

- Workshop engaging with the public and receiving and incorporating their inputs.

**Action 5.3: Sector expert inputs**

- Meetings/ workshops with other sector stakeholders (DRDLR, 2011:88).

**Action 5.4: Concluding issues**

- Require political decision making when issues arise to ensure that it won't unduly delay the finalisation of the SDF.

## PHASE 6: FINALIZATION AND APPROVAL

Resulting from inputs from Phase 5, the SDF will be amended and finalised. The main outcomes of Phase 6 are:

- A record of comments and amendments;
- An approved SDF.

**Action 6.1: Assessment of inputs, determination and recording of amendments**

- Assess and record the relevance of inputs according to specified criteria;
- Prepare a response to the comments and present for discussion for the steering committee;
- Amend the SDF according to the response from the committee (DRDLR, 2011:90).

**Action 6.2: Endorsement by Municipal departments and other government agencies**

- Obtain endorsement of all relevant municipal departments.

**Action 6.3: Legal Requirements for approval and National DRLR notification**

- Municipal approval takes place when they adopt their IDP;
- Submit the SDF after Council approval and endorsement by the MEC (DRDLR, 2011:91).

## PHASE 7: IMPLEMENTATION

The implementation phase is often neglected. This is a critical phase, for the SDF to be effective and reach its full potential and objectives. The deliverables of this phase are:

- A final SDF;

- Formulation of relevant strategies and policies to implement the framework and to determine specific points of intervention;
- Recommendation of strategies to facilitate the process between rural and urban areas as well as neighbouring municipalities.

**Action 7.1: Implementation**

- Use SDF to guide municipal decision making;
- Draw up policies, incentive and by-laws to facilitate implementation of SDF;
- Development control procedures (DRDLR, 2011:92).

**Action 7.2: Monitoring**

- Define responsibilities for monitoring the implementation of the SDF.

**Action 7.3: Revision of cycles (20, 5 year and annually)**

- Provide a 20 year spatial vision for the SDF;
- Review SDF every 5 years, in line with the 5 year IDP cycle;
- Revise implementation plan annually (DRDLR, 2011:93).

**Action 7.4: Production and review of sector plans**

- Alignment of all sector plans with the SDF.