



**national planning
commission**

Department of Planning, Monitoring and Evaluation
REPUBLIC OF SOUTH AFRICA



DISCUSSION DOCUMENT **FOR PUBLIC COMMENTS**

National Water Security Framework

Version 0.0

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EXECUTIVE SUMMARY

1. Setting the scene

Introduction

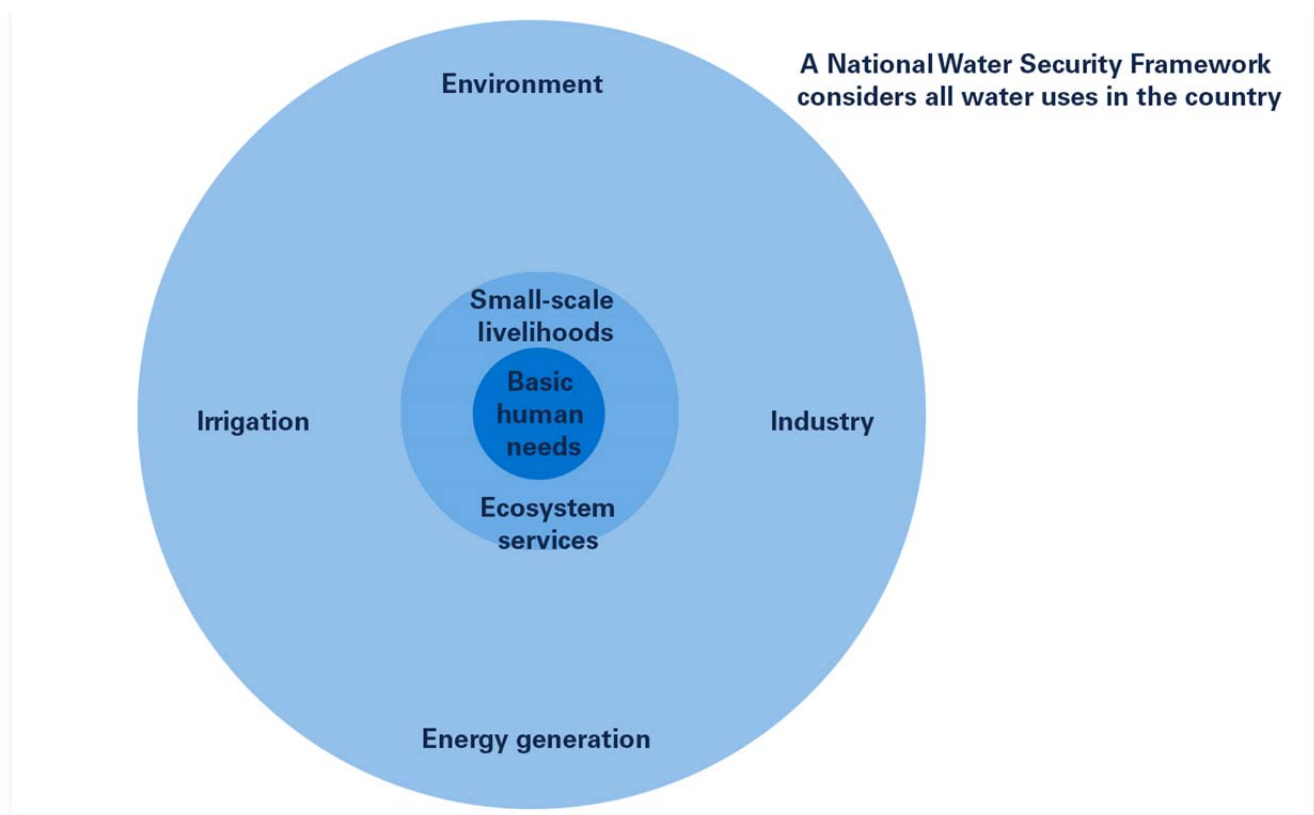
The issue of water security for South Africa not only circumscribes the entire water sector, but also has far reaching consequences across the entire economy of the country. It touches on growth and development of all sectors of our economy. This National Water Security Framework (NWSF) recognises the importance of water security for our country and operates at national, regional and local levels. Water security touches on many facets, including identifying future water sources for our growing population and the attendant future water resources development options, the operation and maintenance of water and sanitation infrastructure, the proper management of our water quality, water supply services, resilience of our country to climate change impacts and water conservation and water demand management.

This framework is driven by the National Planning Commission (NPC) and is informed by relevant policy directives such as the National Development Plan (*Vision 2030*), as well as by international agreements to which South Africa is a signatory, such as the United Nations Sustainable Development Goals (SDGs) and the African Union's Agenda 2063 strategic framework for the socio-economic transformation of the continent over the next 50 years.

The NWSF complements and dovetails with existing policy documents and national strategies. For example, the National Water and Sanitation Master Plan (NW&SMP) of the Department of Water and Sanitation (DWS), currently in draft form, is meant to be an implementation plan for the NWSF.

Background

An integrated NWSF is a comprehensive strategy that seeks to ensure the water security of a nation, and considers all water uses.



The framework must deliberately focus on national priorities, which includes meeting the SDGs. The priorities must be underpinned by a thriving economy, and international obligations in terms of the Africa development agenda within the Southern African Development Community (SADC) water protocols. It is

envisaged that the building blocks of the framework should emanate from local, regional, provincial and national needs. The integration will provide high-level direction and further demand accountability from all spheres of government for the implementation of this framework. It is expected that the plan be simplified and properly timed in order to track progress and identify areas needing intervention in order to achieve national objectives. The institutional framing for water security is therefore crafted in a manner that these aspects are seamlessly planned and managed.

Water security is much more than looking at basic needs “taking into account other needs”. It is meant to focus on livelihoods (beyond basic or subsistence). As articulated/implied elsewhere, the key issue is socio-economic development. We need to make an argument around “water for growth and development” or simply how water can contribute to economic growth.

South Africa’s awareness and elevation of water security gained further prominence following the 2006 Fourth World Water Forum (WW4), which was reflected in the theme document “*Water for Growth and Development*”¹. Ultimately the Department of Water Affairs and Forestry (DWAFF) as it was known at that time, developed a framework for growth and development (WfGD)² aimed at guiding actions and decisions to ensure water security in terms of quantity and of quality to support South Africa’s requirements for economic growth and social development – as required by the Constitution of the Republic of South Africa of 1996. The Development Bank of Southern Africa (DBSA) commissioned a number of papers on water security covering a number of aspects as interpreted at the time³. The evolution of water security has seen the refinement of earlier conceptual framing as evident from the report of the Global Water Partnership (GWP) and the Organisation for Economic Co-operation and Development (OECD) Task Force on Water Security and Sustainable Growth⁴. The framing takes into account key issues of risks associated with water insecurity and links to socio-economic development (growth, wealth and wellbeing). Risks would include climate and poor water governance – leading to scarcity, which in turn has an impact on national security. However, scarcity or supply and demand are no longer the main drivers of water security for sustainable development, but rather a complex set of elements such as human/community security (vulnerability), national security, water resources, ecological security, social (health, spiritual and religious) usage security, food security, energy security and climate security⁵.

Recently detailed analyses by the World Bank, Asian Development Bank, United Nations and the World Economic Forum rate water security as one of the risks and strategic challenges confronting humanity primarily due to a serious and worsening supply/demand imbalance and declining reliability of water supply caused by rapid population growth and industrialisation, over-extraction of water, widespread pollution and climate change. An international journal, *Water Security*, was launched in 2017 to publish papers that contribute to a better understanding of the economic, social, biophysical, technological, and institutional influencers of current and future global water security. The issue of water security provides greater consideration of human values, ethics and power and has been seen to complement the concept of integrated water resources management (IWRM)⁶ which in South Africa is done at catchment level. From a water security perspective, water resources should not be treated in isolation, as if independent of the food, climate or energy security of individuals, communities and the country.

¹“Water for Growth and Development.” David Grey and Claudia W. Sadoff in Thematic Documents of the IV World Water Forum. Comision Nacional del Agua: Mexico City. 2006.

² DWAFF, 2009. Water for growth and development version 7.

³ Muller, M. et al. 2009. Water security in South Africa. Development Planning Division. Working Paper Series No.12, DBSA: Midrand

⁴ Sadoff, C.W., Hall, J.W., Grey, D., Aerts, J.C.J.H., Ait-Kadi, M., Brown, C., Cox, A., Dadson, S., Garrick, D., Kelman, J., McCornick, P., Ringler, C., Rosegrant, M., Whittington, D. and Wiberg, D. (2015) *Securing Water, Sustaining Growth: Report of the GWP/OECD Task Force on Water Security and Sustainable Growth*, University of Oxford, UK, 180pp

⁵ Halmatov et al. 2017. Water security for productive economies: Applying an assessment framework in southern Africa. *Physics and Chemistry of the Earth* 100. 258-269.

⁶ A.K. Gerlak, F. Mukhtarov, ‘Ways of Knowing’ water: integrated water resources management and water security as complementary discourses, *Int. Environ. Agreements: Politics Law Economics* 15 (3) (2015) 257–272.

2. Defining water security

As a fairly new concept, water security has evolved in recent years and the multiple definitions must be appreciated in that these make analyses difficult. However, it is critical to focus on elements that are important for South Africa's positioning in respect of the notion of "beyond material water".

Water in and of itself is supposed to be freely and equitably accessible just like air we breathe. It is therefore not comparable to energy or transport or telecommunication infrastructure. The big issues become what one can call conveyance systems (pipes, canals, treatment facilities, chemicals, energy etc.) required to take "material water" from one form or geographical space to another, especially in terms of development and operations and maintenance. This line of thinking resonates with the argument that most of the water problems are not in the "water box".

UN Water defines water security as "the capacity of a population to safeguard sustainable access to adequate quantities of acceptable quality water for sustaining livelihoods, human well-being, and socio-economic development, for ensuring protection against water-borne pollution and water-related disasters, and for preserving ecosystems in a climate of peace and political stability". Several other definitions have been put forward, however all are characterised by common strands that include a focus on:

- Access to a reliable source of potable water for basic human needs or domestic use that ensures resilient communities. This is enshrined in the Bill of Rights in the Constitution and forms part of the definition the Reserve⁷;
- Provision of adequate water supplies for productive activities and livelihoods;
- Environmental sustainability, preservation of ecosystems to deliver their services upon which nature and people rely, including the provision of freshwater. This also forms part of the Reserve and is a Constitutional human right; and
- The risk associated with the presence or absence and reliability of water supply.

Taking into account that most of the challenges associated with water and the importance of its centrality to all aspects of life, in context for South Africa, the definition of water security by Jepson *et al*, 2017 is most suitable. It states that,

"...water security is less about obtaining water, and more about fostering human capabilities as they relate to water...

We thus ask: What are the social, cultural, and political relationships with water resources and flows that advance a life that fosters human dignity? And, how are those relationships secured to facilitate the freedom to achieve wellbeing, fulfilling social arrangements, and human flourishing?

... water security, then, is not simply a state of adequate water – however defined – to be achieved, but rather a relationship that describes how individuals, households, and communities navigate and transform hydro-social relations to access the water that they need and in ways that support the sustained development of human capabilities and wellbeing in their full breadth and scope"

⁷ The South African National Water Act grants water resources the status of public good, under state control and subject to obtaining a license. Under the Act, the Government is the custodian of the water resources and its powers are exercised as a public trust. It has the responsibility for the equitable allocation and usage of water and the transfer of water between catchments and international water matters.

The Act establishes the 'reserve' consisting of an unallocated portion of water that is not subject to competition with other water uses. It refers to both quality and quantity of water and has two segments: the basic human need reserve and the ecological reserve. The first one refers to the amount of water for drinking, food and personal hygiene and the second one to the amount of water required to protect the aquatic ecosystems. The determination of the reserve corresponds to the Minister, who can establish the reserve for all or part of a specific water resource. In addition, under the new Act the Minister, after consultation, can regulate activities that may reduce in-stream flows.

This resonates with the ultimate vision espoused by the NDP of rising living standards, falling poverty and inequality as well as restoring the dignity of the people.

3. Why the Framework? (Purpose and rationale)

South Africa is considered water insecure due to an acknowledged backlog in water infrastructure, insufficient maintenance and investment, inequities in access to water, and deteriorating water quality. These issues are all exacerbated by recurrent droughts driven by climatic variation.

Assessment has shown that despite South Africa's successes and world-renowned water policy and legislation, transformation and implementation has remained a serious challenge and this Framework brings a fresh and objective look at gaps and provides an opportunity for continuous evaluation and intervening at the highest national level.

This framework carefully focuses on flow dynamics – in terms of finance, knowledge and other drivers of planning such as population. For instance instead of overemphasising population growth we focus on dynamics, whilst on the financing we de-emphasise absolute figures and look at flows and impact. Similarly for environmental flows which is considered over and above water conservation *per se*.

This Water Security Framework complements and considers the other national, strategic water sector documents such as the National Water Resources Strategy (NWRS) and the National Water and Sanitation Master Plan (NW&SMP) which is currently in draft form with the Department of Water and Sanitation (DWS). The Master Plan also serves as an implementation plan for the Water Security Framework.

The NWRS focuses on water resources planning and management, improved water sector knowledge, research, monitoring and evaluation. While the NWRS does look into water security, but from the perspective of the planning and the provisioning of water, supply and delivery and holistic and integrated management and governance.

The Master Plan on the other hand, is intended to guide the water sector with investment planning for the development of water resources and the delivery of water and sanitation services over the horizon until 2030, and beyond. The core purpose of the NW&SMP is to provide an overall perspective of the scope of the water and sanitation business to provide a comprehensive schedule of actions needed to address present challenges, to estimate the investments required to ensure effective water resources, and water and sanitation services delivery, as well as to facilitate effective integrated investment planning, implementation of actions and evaluation of achievements.

The NWSF on the other hand sets out a framework for national, regional and local water security. It reflects South Africa's focus on water for basic human needs while acknowledging the importance of other water uses. It provides a set of concepts, approaches and commitments that the country can use to safeguard the water supplies of poor and marginalised communities and can be used as part of an integrated approach to improving water, sanitation and hygiene. Water security can touch on identifying future water sources for our growing population and the attendant future water resources development options, the operation and maintenance of water and sanitation infrastructure, the proper management of our water quality, water supply services, resilience of our country to climate change impacts and water conservation and water demand management.

The framework is first of its kind in the context of South Africa and seen as key to addressing the country's water security challenges in a holistic and decisive manner. This includes the framework being the highest level of guide in respect of roles and responsibilities and accountability expected from all mandated institutions towards achieving the goals of the NDP. It is meant to, among others:

- Guide all water-related policies across the system in terms of short-term, intermediate and long-term planning and support;
- Strengthen implementation and ensure that it is managed at a level that allows for holistic oversight and fostering of cross-departmental integration;

- Ensure national accountability linked to authority across the system to address the challenge of department-specific mandates in DWS and any other relevant government departments; and
- Provide cross-sectoral water security through full engagement of stakeholders at all levels.

It is vital that the NWSF is developed collectively by all key role players in the water and sanitation sector, and that it enjoys their full support, acceptance and agreement.

South Africa can only claim to be water secure when all its citizens have affordable access to safe and reliable water supplies, are not at risk of flooding, and have access to safely managed and dignified sanitation services. This will not be achieved by action in the water sector alone. The NWSF outlines the sources of water and the systems on which it depends. It considers how the country's waste waters are managed and considers the performance of the key institutions that manage and supply our water and identifies some of the emerging challenges that face the country if it is to achieve, and then sustain, its water security.

4. Situation assessment – Overview

Historical context

Given its limited water resources and the constraints that these have placed on its development alternatives, South Africa has a long history of innovation and investigation in water resource management (WRM), albeit skewed to the benefit of a minority of the population. The 20th century saw the advent of mining and industrialisation along with an extensive programme of infrastructural development in South Africa, including water infrastructure.

Since 1994, there have been particular efforts to address the legacy of inequality and the additional challenges that the transition to democracy has brought to bear. Importantly, during this period, South Africa crossed the “hydrological transition” and moved from a focus on water resource development for expanding supply, to one of water resource management. The transition was confirmed by post-1994 policy initiatives. These fundamentally changed the focus on infrastructural development to a more balanced approach, with equal emphasis on measures for “soft” WRM. The shift was accompanied by an explicit emphasis on managing water to derive optimum benefit from its use ensuring that water is used optimally in support of sustainable and pro-poor growth and development. This approach has guided government programmes since 1994.

Water resources across the globe are coming under increasing pressure as a result of economic and social development. Conventional management methods are unable to cope with these ever increasing demands; hence shift towards an integrated approach to water resources management. If managed in a sustainable manner, incorporating the three pillars of sustainability (the environment, society and the economy), water availability and access to it can enhance the development of a country.

Whilst acknowledging the significant progress made in the post-apartheid era a historical context is provided to equally acknowledge the challenges and lessons learnt to ensure that the new approach is built on solid foundation.

Planning for water security

In parts of the country, development choices are already being determined by water resource constraints. In many others, poor management of municipal infrastructure and other sources of pollution are causing a worrying decline in water quality. There is also growing competition for, and potential conflict over, South Africa's limited water resources, both within the country and with its neighbours.

In order to address the unintended consequences of the policy and legislative reform of the democratic period, the positioning of the Water Security Framework must articulate the critical issues and provide a guide that will ensure that the benefits of the transformation project are realised within a reasonable period.

South Africa is facing a water crisis caused by insufficient water infrastructure maintenance and investment, recurrent droughts driven by climatic variation, inequities in access to water and sanitation, deteriorating water quality, and a lack of skilled water engineers. This crisis is already having significant impacts on

economic growth and on the well-being of everyone in the country. These impacts will be exacerbated if the water crisis is not addressed.

Water is severely under-priced and cost recovery is not being achieved. To achieve water security, an estimated capital funding gap of around of R33 billion per annum for the next 10 years must be closed through, a combination of improved revenue generation and a significant reduction of costs.

South Africa's elevation of water security followed the 2006 Fourth World Water Forum (WW4) as reflected in the theme document "Water for Growth and Development". The then Department of Water Affairs and Forestry (DWAF) developed a framework for growth and development that was aimed at guiding actions and decisions to ensure water security in terms of quantity and of quality to support South Africa's requirements for economic growth and social development.

The evolution of water security has seen the refinement of earlier conceptual framing taking into account key issues of risks associated with water insecurity and links to socio-economic development. Scarcity or supply and demand are no longer the main drivers of water security, but rather a complex set of elements such as human and community security in terms of vulnerability, national security, water resources security, food security, energy security and climate security .

Complementing the National Water and Sanitation Master Plan, overall the Water Security Framework must reflect the quality and quantity of water available taking into account the demand required for transformation and national strategic goals, by reflecting on the processes and institutional mechanisms for implementation.

5. Supporting the NDP vision

The National Development Plan identifies water security among the key pillars of growth and development. Its importance is appreciated within the context of a water sector legislative and institutional framework that is considered well developed and among the most progressive in the world. The framework is premised within a decentralisation agenda that is given effect through an intricate web of laws and institutions – at a national and local level. It also establishes a basis for integrated water resource management (IWRM) and a human rights dimension to sustainable water services. This is set out against a backdrop of a country that is largely semi-arid and with limited water resources, but which has an elaborate infrastructure network at both a water resource and water services level.

In this report we have defined water security in the context of South Africa's development agenda and made a case for a Water Security Framework that offers an encompassing perspective that provides several value adds/comparative advantages over past approaches. Scarcity or supply and demand are no longer the main drivers of water security, but rather a complex set of elements such as human and community security in terms of vulnerability, national security, water resources security, food security, energy security and climate security.

The NWSF provides a framework for water security at a national level that is meant to guide the sector implementation of the NDP. This includes ensuring that the commitments made in the NDP vision and gaps identified are addressed effectively, and efficiently. While many of the concepts used in water security are consistent with past water planning, the explicit formulation and use of Water Security Framework for South Africa may reflect a slight departure from these approaches. The intention is not to repeat existing analysis and proposed solutions but to ensure that these are guided to ensure effective implementation while focusing on the long-term horizon beyond 2030.

The framework proposes an approach to achieving water security in South Africa in the context of the two overall targets in the National Development Plan (NDP), which are:

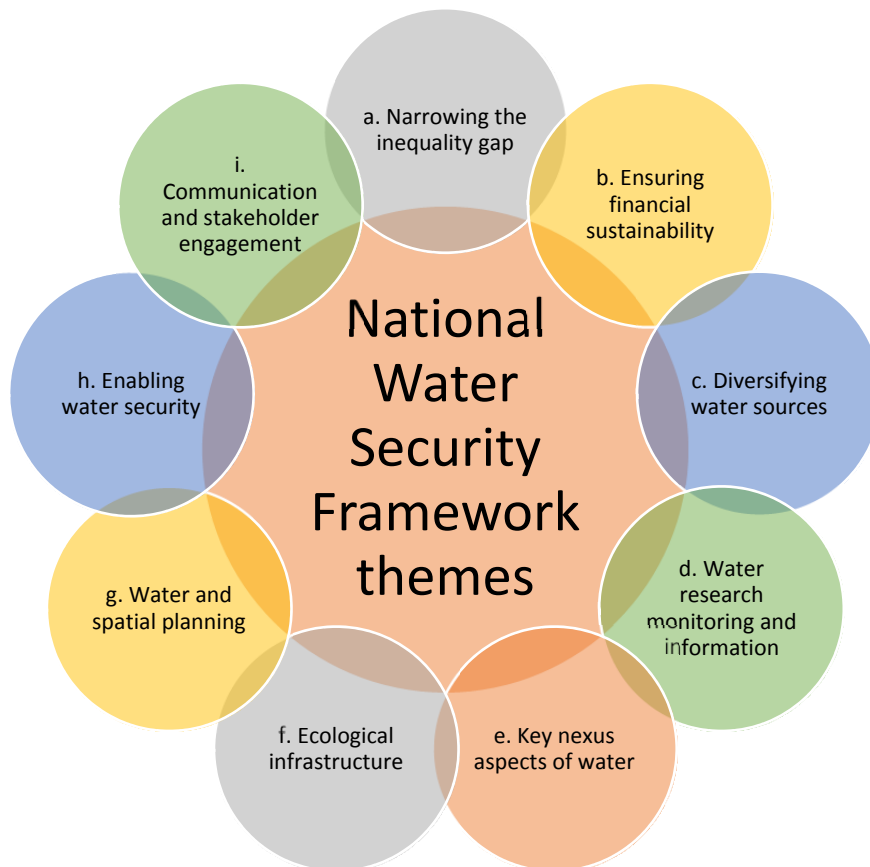
- Elimination of income poverty - By 2030, the number of households living below R418 a month per person (in 2009 Rands) should change from 39per cent to zero; and
- Reduction of inequality - The level of inequality as measured by the Gini coefficient should change from 0.7 in 2009 to 0.6 in 2030.

The intention is for the NWSF to be produced regularly as a living document to be revised as new information and knowledge is obtained and as the NDP is implemented.

A stakeholder engagement strategy will ensure synergy in communication about water security from the DWS and at NDP level.

6. Framework thematic areas

In order to address the various dimensions presented, thematic areas were identified to guide the framing and implementation. Nine thematic areas have been identified for South Africa's Water Security Framework.



a. Narrowing the inequality gap – water as an enabler

The first theme addresses the issue of measurable improved livelihoods, human well-being and socio-economic impact of the total value chain from conception to impact in the short, medium and long-term.

A paradigm shift in thinking and approach is required so that future planning takes place within the new Water Security Framework that emphasises scenario-based planning with continued measurement of impact both real and potential.

The World Bank reports that the inequality gap in South Africa is high, persistent and has increased since 1994 and states that South Africa is one of the most unequal countries in the world. The GWP/OECD indicates that the goal of improving the material wealth of societies must be negotiated within the boundaries imposed by the availability of the water resource and balanced with the cultural and spiritual values of water. Sustainable economic growth, wealth and human well-being are at the heart of water security. Drags on growth are associated with compromised water security in that where water is reliable, economic opportunities are enhanced, whilst where it is unreliable or inadequate quality or where water related hazards are present there will be drags on growth.

An assessment of in-country economic water security is recommended taking into account that although some assessments done show South Africa being among the top in terms of this, it is among the highest in terms of inequality.

b. Ensuring financial sustainability

This theme addresses the issue of financial sustainability from a point of view of financial flows and sustainability with some emphasis on investment on infrastructure and the associated interdependency with socio-economic development in the water sector.

Water is an expensive commodity irrespective of the mode of mobilisation of funding resources. Water projects tend to be indivisible and capital-intensive, and South Africa like many countries has major backlogs in developing water infrastructure. There is a need for innovative and smart national and international financing approaches as well as appropriate incentives to achieve development goals. Financial resources need also be allocated to public sector financing e.g. for the management of the resource, not only the water services. Therefore full value chain of infrastructure requirements, financing, including its impact on institutional alignment, financial flows etc. need to be clearly articulated as part of planning for water security.

Ensuring that projects are funded effectively from conception to execution through to outcome and impact needs to be clearly articulated to ensure effective implementation. Most importantly the financial flows and sustainability are critical as the projects on water tend to be interconnected with almost every other sector, especially in context of South Africa where water availability challenge is a reality due to the centrality of water.

From the NDP perspective, bottom up plans based on the full cycle and value chain and supported by proper funding are needed. Innovative ways of funding need to be found. Financial flows and decisions must be monitored and regulated appropriately with emphasis on accountability.

c. Diversifying water sources

In general, surface water from impoundments or dams as well as direct abstraction from the river systems account for all water available for use, 74 per cent of all water available in South African context taking into account that a proportion of this is transboundary or from shared rivers in nature. This theme looks at what can be regarded as “non-conventional water sources”, which although currently seen as comprising a smaller proportion (up to 25 per cent), are critically important for socio-economic development and indications are that there is substantive opportunity for growth towards contributing to water security.

The NWSF focuses on the full water cycle, namely a so-called source-to-sea approach, as well as the notion of circular economy.

It is useful nevertheless to look at the water uses.



The primary purpose of the theme is not to repeat the current national strategies on these source types but to look into integrating them from a point of view of strategic socio-economic development in the context of water.

d. Water research, monitoring and information

This theme focuses on water related information and research needed to ensure national water security by consolidating existing capacity from a functional, institutional and financing perspective. For water security to be guaranteed in the South African context and within reasonable scope, a specialised water intelligence centre, in the form of a shared service, should be considered. cursory assessment has indicated that this will not require additional funding or new legislation.

The water policy developed since the dawn of democracy and subsequent legislation envisaged the need for information and made provision for this. However as evident from the decisions taken or not taken, implementation has been found wanting. For instance, the water management as a system with tools such as National Water Resource Strategy (NWRS) and the associated Catchment Management Strategies (CMSs), Water Services Development Plans (WSDPs) as well as Integrated Development Plans (IDPs) is premised on the ability to assess the water resource base and the needs or demands every five years based on the information that is collected and assessed regularly. However, the ability to do this has significantly declined over time and most of the assessment is no longer systematic but ad hoc, disparate and largely under the control of consultants. To this end, an urgent need to create a sector-wide “water intelligence” capability through reorganisation of current configuration is critical. Such a facility must devote its time and resources to analysing the information and support the national planning and decision making across the board.

Knowing what we know, with improved data and information, at national level it should be possible to achieve the vision of reduced inequality by 2030 and poverty eradicated to globally acceptable levels from the perspective of both implementation and monitoring. Research and development must be aimed at technological and systems improvement to help with improved water security and management in general.

Positioning water and sanitation monitoring, information and research to enable water security planning in South Africa includes the role of knowledge generating organisations in producing national research that addresses mega-nexus challenges in the medium- to long-term. The focus is meant to be on water monitoring, research and information management.

e. Focus on key nexus aspects of water

Water security is pivotal in other “security” areas like climate, energy, food, economy, human well-being etc.

In this theme, special focus will be applied to agriculture, energy, climate change and mining in relation to access, cost or investment, economic and environmental foot print among others.

In response to the global trend in adopting the water-energy-food (WEF) nexus approach, the Water Security Framework considers the WEF nexus as part of the SDGs. Tackling these challenges will require coordinated efforts among different economic sectors, mostly water, energy and agriculture. The WEF nexus emphasises the inextricable linkages between the three sectors and that actions in one area often have impacts in one or both of the others.

The Water Security Plan therefore has a responsibility to raise awareness about the WEF nexus interlinkages and to create a platform for discussion of practical solution. The WEF nexus presents an opportunity to promote integrated planning in a sustainable manner. The translation of this knowledge into an actionable plan that can be adopted by policy makers remains the next frontier.

f. Ecological infrastructure

Ecological infrastructure is the network of natural lands, working landscapes and other open spaces that are the substructure or underlying foundation on which the continuance or growth of essential life-supporting and life-enhancing ecosystem goods and services depends.

This theme focuses on the aspects of environmental infrastructure and flow in relation to environmental goods and services, socio-economic benefits and impact.

Quality of life is inescapably linked to environmental conditions and how they are affected by human activities. A key concept is that of ecosystem services – defined as the benefits people derive from natural processes, such as the delivery of clean water and air, the habitat for biodiversity and the provisioning of food and fibre. As the land surface and water bodies are progressively transformed due to climate change, land use change, resource extraction and pollution, the plotting of a sustainable path requires a deep and predictive knowledge of the underlying processes and their limits.

Human rights and the environment are inextricably linked through the right of every citizen to a clean, healthy and productive environment. Sustainable development implies universally meeting basic needs and extending everyone the opportunity to fulfil their aspirations to live in dignity.

What does this mean in terms of SA’s Water Security Framework? In this context integrated catchment management, which is a holistic approach focusing on both water and land management, is necessary to ensure the integrity of ecosystems. Whilst substantive work has been done such as determination of the reserve at national level, and the implementation of programmes run by individual organisations, integrated catchment management has largely been hampered by the lack of a coordinated effort resulting from catchment management agencies not being established at the envisaged rate and catchment strategies not being properly developed.

In order to ensure water security, valuing (measuring) ecosystems services as an economic part of water infrastructure has become essential and must be incorporated in the assessment of the extent to which the water security is achieved.

g. Water and spatial planning

This theme considers the key elements of spatial planning and how this is intricately linked to water security both historically and into the future. This is also related to the movement of people, goods and services and

in turn socio-economic development. In considering this theme questions need to be asked regarding the extent to which we are able to seriously look into developmental planning.

The theme proposes a paradigm shift from past planning practices.

In going forward, bold decisions need to be made in respect of spatial planning and find a way to highlight issues as they relate to water especially given the many examples within the water sector in respect of flaws brought by apartheid spatial planning.

h. Enabling the water security

This theme has been identified to focus on, among others, issues of governance, policy and legislation, investment in human capital as well as institutional setting in terms of country readiness to ensure water security, especially within the NEXUS context. For the NWSF implementation to be successful, institutions must be created without delay. In order to enable planning for and implementing programmes to ensure water security, mechanisms need to be in place to address institutional, regulatory and policy requirements and implications.

Institutionally speaking the water sector management is generally based on multilevel governance and relations between water resources on one hand and provision of water and sanitation services on the other. The interdependencies of various levels make water management a seemingly straightforward set up yet it is highly complex despite globally accepted general practices. Institutional configuration can often make or break the implementation of the water programmes as evident from recent developments in South Africa where policy and legislation are regarded as among the very best and at cutting edge, yet implementation remains elusive.

Recent parliamentary proceedings through the Portfolio Committee on Water and Sanitation as well as Standing Committee on Public Accounts (SCOPA) are a case in point where issues of poor governance became apparent when corruption, incompetence and lack of accountability were identified as key problems currently.

It is for this reason that the Water Security Framework must as a matter of course seek to clarify the institutional framing and ensure that the roles and responsibilities are articulated upfront at different levels of scale and across the full water value chain. That will ensure a focussed intervention that takes into account the respective roles in the value chain.

The approach will include:

- Enabling water security through effective institutional arrangements;
- Enabling water security through effective water management and governance; and
- Enabling water security through capacity building.

The skills needs and strategy need to be re-evaluated in context of the NDP's commitment to building capable state. From the water sector perspective there has not been a careful assessment of skills needs other than commitments made in the NWS2.

i. Communication and stakeholder engagement

To bring in from main document and link to the other areas in the NDP implementation process

Before aiming to engage and influence stakeholders, it's crucial to seek to understand the people you will be working with and relying on throughout the phases of the implementation process. Sharing information with stakeholders is important, but it is equally important to first gather information about the stakeholders.

Communication and stakeholder engagement is about two-way communication and an open dialogue – the process must ensure that the NPC speaks to, listens to and collaborates with stakeholders to motivate, educate and reach the best possible outcomes for the NWSF. The communication and stakeholder engagement should link to other areas in the NDP implementation process.

This theme is required to be aligned with needs of other streams and to ensure that the necessary paradigm shift on planning for water security is internalised throughout the value chain and across various role players.

The strategy must enable key stakeholders to actively engage with each other, with the wider public and with organisations that have the responsibility for carrying out activities related to water security at different institutional levels. In the context of the Water Security Framework, this must be seen to be more than exchanging and sharing information, knowledge experience and views; but also involve debate, negotiation and joint learning that has the potential to build trust and social capital away from anecdotal to evidence-based decisions. Key to this is that ensuring water security will require serious and difficult trade-offs that will ensure proper pathways to a water secure South Africa.

Communication and stakeholder engagement, whilst a separate process at NDP level, efforts must be made for messages not to be crossed with the line Department.

The following principles will be applied during the stakeholder engagement process:

- Invest in careful planning before engaging stakeholders;
- Identify and build stakeholder relationships to increase confidence across the relevant sectors, minimise uncertainty, and speed up problem-solving and decision-making. Where there is trust, people work together more easily and effectively;
- Consult early and often;
- Ongoing and regular communication;
- Maintain a productive relationship throughout the process;
- Use foresight to anticipate misunderstandings, and take simple and timely actions with stakeholders to significantly improve delivery;
- Stakeholders are important influential resources and should be treated as potential sources of risk and opportunity within the project;
- Manage stakeholders' expectations and priorities; and finally
- Manage roles and responsibilities by providing clarity about what is expected of people involved in the process.

Communications planning: developing, sharing and maintaining a stakeholder engagement strategy and communications plan is important throughout the process. It is important to update plans, seek stakeholder feedback about the value of communications and adapt plans to reflect stakeholder changes, feedback and progress.

7. Monitoring and evaluation

Reliable data and information on the status of the country's water resources is required for the proper analysis of hydrological trends, for the protection of water resources, for regulating water use, for the operation of water infrastructure, for the planning of new works, and for disaster management.

The draft NW&SMP states that:

"Inadequate data and information resulting from a weak monitoring system poses high risks to decision making and planning and urgently needs to be addressed through the formalisation of an effective national hydrological monitoring centre."

Reliable data is also required on the performance of the water sector institutions and on the state of water and sanitation assets to monitor progress on the implementation of the NW&SMP, and progress towards the goals set out in the Second Edition of the National Water Resources Strategy (NWRS2) and the NDP. Current data on water authorisation and use, as captured in the Water Authorization Registration Management System (WARMS) database, is also critical for effective management of water use.

Water security has spatial and temporal dimensions. Spatially it can range from individual family unit to a community or village, town, district, province, country level or continentally. It can vary from spatial unit to another or seasonally to a year, a decade or century. The framework for monitoring must therefore take these dimensions into account.

From a water security perspective, immediate interventions needed include aspects such as the development of a monitoring and evaluation (M&E) system that will include development of indicators at outcome and impact level in order to monitor and evaluate programmes beyond processes.

It is suggested that the M&E system focus on whether policy and legislation are producing the correct enabling environment; whether the national objectives articulated through the NDP and the Water Security Framework are being achieved; whether delegation of powers within the sector is effective and responsibilities that the president delegates to the minister, who in turn delegates to the institutions that report to him/her are performed.

Three criteria will drive the monitoring of water-related planning and implementation at NDP level, namely: economic growth (measured by gross domestic product (GDP) growth contributed by or through water); eliminating or reducing the inequality gap (measured in terms human development index); and poverty alleviation, addressing inequality and unemployment.

A framework for Water Security Assessment for South Africa is provided in chapter 6 below, as are processes and specific interventions stating that the Water Security Framework needs to be produced regularly as a living document to be revised as new information and knowledge is obtained and as the NDP is implemented.

8. Responses and next steps

South Africa's National Water Act gives correct and clear guidance on water management, but implementation has been weak. Therefore a clear understanding of roles and responsibilities and difficulties in implementation is urgently required. In framing and planning the water security approach journey, cognisance is given to difficulty that comes with disrupting the status quo and the associated need to invest in paradigm shifts, as well as building the necessary momentum for change. Accordingly, the framework is expressed in a manner that allows for a possible phased approach that takes into account the urgency to deal with the lower hanging fruits such as urgently implementing the legislation and commitments made through the various strategies.

A series of steps are thus recommended which include:

- Assessing and taking stock of current difficulty in implementing policies and programmes. If relevant, mitigation measures should be identified for potential difficulties in implementations;
- Roll-out of this national framework to guide national processes and provide a long-term view of ensuring water security;
- Positioning of the effective implementation of the framework by creating a centre of water intelligence, taking into account the importance of water in all aspects of human life, especially for the South African condition. This will further involve development and refinement of national indicators on water security and redirecting the various institutions mandated to carry out the water business, including stakeholders, public and private sectors as well as citizens;
- Creating a planning and monitoring framework that is robust to ensure that water-related risks are avoided or mitigated; and
- Consultation processes, during development and execution, taking all role players and stakeholders along through a participatory process without losing focus.

An assessment framework is proposed with indicators aimed at addressing the full spectrum of water security considerations that are in line with the identified key apex priorities. Water is seen as cross-cutting in all aspects of human life and the NWSF is set to address this.

Specific recommendations that form part of the next steps include:

- Aligning local government legislation and national legislation;
- Unpacking roles and responsibilities;
- Given the lessons over the past 20 years since the National Water Policy and subsequent individual work done by the Department and researchers from across the country as well as internationally, further

detailed assessments need to be done within 12 to 24 months. The key for this would be to consolidate what has been learnt and ensure that the amendments address the shortcomings.

- It is evident that one of the key risks in the sector is the enabling environment for water security. It is therefore important to immediately implement the institutional framework by establishing the institution for water management without delay.
- Consultation process both during the development of framework and execution taking all role players.

This framework is the first of its kind in South Africa and meant to bring a fresh, internationally-legitimised, and inclusive approach to assessing and addressing South Africa's challenges and opportunities for managing its water resources and provision of services to harness benefits and mitigate risks.

GLOSSARY OF TERMS

Term	Definition ⁸
Ecological infrastructure	Naturally functioning ecosystems that deliver valuable services to people, such as water and climate regulation, soil formation and disaster risk reduction.
Environmental flows	A system for managing the quantity, timing, and quality of water flows below a dam, with the goal of sustaining freshwater and estuarine ecosystems and the human livelihoods that depend on them.
Integrated Water Management	<p>Defined by the GWP as "a process which promotes 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." It is based on the three principles: social equity, economic efficiency and environmental sustainability. Considering these principles means answering the following questions:</p> <ul style="list-style-type: none"> • How will my decision/action affect access for other users to water or the benefits from its use? • Will my decision/action result in the most efficient use of the available financial & water resources? • How will my decision/action affect the functioning of natural systems?
Integrated water resources management (IWRM)	The coordinated development and management of water, land and related resources, to maximise economic and social welfare in an equitable manner without compromising the sustainability of vital ecosystems.
Mass balance approach	The law of conservation of matter states that matter (e.g. water) is conserved – that is, neither created nor destroyed. A mass balance is an accounting of a material for a specific system boundary. In other words, you are keeping track of all sources of the material that enter the system, all sinks of the material that leave the system, and all storage of the material within the system.. This method is called the mass balance technique.
The reserve	<p>The South African National Water Act grants water resources the status of public good, under state control and subject to obtaining a license. Under the Act, the Government is the custodian of the water resources and its powers are exercised as a public trust. It has the responsibility for the equitable allocation and usage of water and the transfer of water between catchments and international water matters.</p> <p>The Act establishes the 'reserve' consisting of an unallocated portion of water that is not subject to competition with other water uses. It refers to both quality and quantity of water and has two segments: the basic human need reserve and the ecological reserve. The first one refers to the amount of water for drinking, food and personal hygiene and the second one to the amount of water required to protect the aquatic ecosystems. The determination of the reserve corresponds to the Minister, who can establish the reserve for all or part of a specific</p>

⁸ Sources: National Water Act of SA, Global Water Partnership (GWP), UN Water, Water Research Commission (WRC), Water Governance Facility (WGF), Food and Agriculture Organization (FAO), <https://www.iwapublishing.com/news/integrated-water-resources-management-basic->

	water resource. In addition, under the new Act the Minister, after consultation, can regulate activities that may reduce in-stream flows.
Sustainable Development Goals (SDGs)	The blueprint to achieve a better and more sustainable future for all. The SDGs address the global challenges we face, including those related to poverty, inequality, climate, environmental degradation, prosperity, and peace and justice. The Goals interconnect and in order to leave no one behind, it is important that we achieve each Goal by 2030.
Virtual water	The volume of water required to produce a commodity or service. Virtual water will generally flow from water-rich to water-poor regions. Also known as embedded or embodied water, it refers to the hidden flow of water if food or other commodities are traded from one place to another.
Water allocation	Water allocation plans and agreements are designed to resolve international, regional and local conflicts over access to water.
Water endowments	The amount of accessible, reliable and sustainable water supplies to which a country and its citizens have access. The range from a water-scarce country to a water-abundant country (or region) is determined by the per capita water endowment or water availability statistic. Water endowments can be naturally occurring or managed.
Water-energy-food nexus (WEF)	The intersection of the water security, energy security and food security sectors, which are inextricably linked. Actions in one area more often than not has impacts in one or both of the others. The WEF nexus is increasingly recognised as a conceptual framework able to support the efficient implementation of the SDGs.
Water governance	The political, social, economic and administrative systems that influence water's use and management. It determines the equity and efficiency in water resource and services allocation and distribution, and balances water use between socio-economic activities and ecosystems.
Water information	Datasets, indicators or systems with information relevant to the water sector. Data exchanges can be restricted to a closed group of stakeholders or the system may be open. Stakeholders may or may not contribute data and they can agree to exploit information with common objectives especially in the case of a national water information system.
Water security	Reducing water-related risks to a level at which water's benefits can be securely and sustainably realised.

ACRONYMS AND ABBREVIATIONS

AIS	Administrative and institutional system
AU	African Union
CMA	Catchment Management Agency
CMS	Catchment Management Strategy
DBSA	Development Bank of Southern Africa
DPME	Department of Planning Monitoring and Evaluation
DST	Department of Science and Technology
DWA	Department of Water Affairs (superseded DWAF)
DWAF	Department of Water Affairs and Forestry (superseded DWS)
DWS	Department of Water and Sanitation
FAO	Food and Agriculture Organization
FETWater	Framework Programme for Research, Education and Training in the Water Sector
GDP	Gross domestic product
GWP	Global Water Partnership
HDI	Human development index
IDP	Integrated Development Plan
IHP	International Hydrological Programme
IWM	Integrated water management
IWRM	Integrated water resource management
NBI	National Business Initiative
OECD	Organisation for Economic Cooperation and Development
M&E	Monitoring and evaluation
MDGs	Millennium Development Goals
MUS	Multiple use water system
NIWIS	National Integrated Water Information System
NIWS	National Integrated Water Strategy
NDP	National Development Plan
NPC	National Planning Commission
NRS	Natural resource system
NWA	National Water Act
NWPDR	National Water Plan Diagnostic Report
NWRS	National Water Resource Strategy
NWSF	National Water Security Framework
NW&SMP	National Water and Sanitation Master Plan
RWP	Regional Water Policy
RWS	Regional Water Strategy
SADC	Southern African Development Community

WUA	Water User Association
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1. INTRODUCTION AND BACKGROUND

1.1. Background and Purpose

The water sector in South Africa has made clear progress in the last two and a half decades in terms of substantial advances in water supply extension in rural areas. In its 2017 general household survey, Statistics South Africa (Stats SA) reported that an estimated 46.7% of households had access to piped water in their dwellings. A further 27.5% accessed water on site while 12.2% relied on communal taps and 2.1% relied on neighbours' taps. The report confirmed that the number and percentage of households with access to piped water had increased since 2006, showing that 13.5 million households had access to piped water in 2017 compared to 9.3 million in 2006.⁹

Another positive has been the country's work on the identification and implementation of environmental flows¹⁰, which has met with relative success in some of the country's river basins. South Africa is considered a pioneer in environmental flows and has developed highly regarded methodologies for environmental flows. The country is recognised as one of the best recent examples of legislation being developed to address environmental flows and it has introduced a strong social component to its methods that describes the implications of management interventions not only on the ecosystem but also on its common-property subsistence users. In the Limpopo River Basin (Botswana, Zimbabwe, South Africa and Mozambique) interest in environmental flows has been promoted by the South African Water Law, which calls for prioritisation of water allocation to meet the basic needs of people and the needs of ecosystems.

Equally, the water sector has faced some challenges: the roll-out of Catchment Management Agencies (CMAs) and other water institutions that will be responsible for managing water resources at catchment management level has not proceeded at the envisaged rate. Ambitions related to standards for domestic water access have not evolved. Recent challenges to water supply in the Western Cape, Eastern Cape and KwaZulu-Natal raise concerns about water planning and management strategies.

This document is drafted taking into account the current and past approach to water management in South Africa in order to foster better outcomes in the future. It provides a framework for water security at a national level that is meant to guide the sector implementation of the National Development Plan (NDP). This includes ensuring that the commitments made in the NDP vision and gaps identified in the National Water Plan Diagnostic Report (NWPDR)¹¹ that was produced for the Department of Planning, Monitoring and Evaluation (DPME) in October 2015 and subsequent assessments are addressed effectively, and efficiently. While many of the concepts used in water security are consistent with past water planning, the explicit formulation and use of a Water Security Framework for South Africa may reflect a slight departure from these approaches. The intention is not to repeat existing analysis and proposed solutions but that these are guided to ensure effective implementation while focusing on the long-term horizon beyond 2030.

⁹ Stats SA GHS 2017

¹⁰ An environmental flow is the water regime provided within a river or wetland to maintain ecosystems and their benefits where there are competing water uses and where flows are regulated. Environmental flows provide critical contributions to river health, economic development and poverty alleviation. They ensure the continued availability of the many benefits that healthy river and groundwater systems bring to society.

It is increasingly clear that, in the mid- and long-term, failure to meet environmental flow requirements has disastrous consequences for many river users. Addressing the water needs of aquatic ecosystems will often mean reducing the water use of one or more sectors. These are tough choices, but they have to be made to ensure the long-term health of the basin and the activities it encompasses. Source: IUCN

¹¹ DPME, 2015. National Water Plan Diagnostic Report

The framework proposes an approach to achieving water security in South Africa in the context of the two overall targets in the NDP, which are:

- **Elimination of income poverty** - By 2030, the number of households living below R418 a month per person (in 2009 Rands) should change from 39 per cent to zero; and
- **Reduction of inequality** - The level of inequality as measured by the Gini coefficient should change from 0.7 in 2009 to 0.6 in 2030.

To achieve this, the NDP highlights a number of enabling milestones and critical actions, the majority of which underscore the centrality of the water in planning for socio-economic development. These resonate with global plans and strategies such as Africa 2063 and Sustainable Development Goals (SDGs). This framework seeks to articulate the link between how achieving water security contributes to achieving the targets shown above with the aim of ensuring that planning for delivery and sustainable socio-economic development is improved.

The framework identifies appropriate measures to reduce the risks to water security such as e.g. clearing a backlog in water infrastructure (storage enhancement), diversifying water sources (conjunctive water use), improved access to water and sanitation, and improved water governance at all levels.

1.2. Defining Water Security

Water security has recently emerged as one of the most deliberated water concepts that is increasingly used to analyse our capacity to ensure the availability of and access to water. It does this by responding to various risks, vulnerabilities, insecurities, inequities and policy challenges that societies and ecosystems face due to variations and levels of either quantity or quality of water, as well as water related disasters¹².

Despite some variation in definition, water security relates to reducing water-related risks to a level at which water's benefits can be securely and sustainably realised. In South Africa, these ideals are enshrined in the Constitution and the associated policy and legislation.

Jepson defines water security as follows

“Water security means adequate, reliable, affordable water for a healthy life.”¹³

...water security is less about obtaining water, and more about fostering human capabilities as they relate to water...

We thus ask: What are the social, cultural, and political relationships with water resources and flows that advance a life that fosters human dignity? And, how are those relationships secured to facilitate the freedom to achieve wellbeing, fulfilling social arrangements, and human flourishing?

... water security, then, is not simply a state of adequate water – however defined – to be achieved, but rather a relationship that describes how individuals, households, and communities navigate and transform hydro-social relations to access the water that they need and in ways that support the sustained development of human capabilities and wellbeing in their full breadth and scope.”

This definition is suited to the South African situation and crystallises the work that needs to be done.

UN-Water¹⁴ (2013) defines water security as (**Figure 1. Core elements necessary to achieving and maintaining water security**)

¹² Olli Varis O, Keskinen M, and Kummu M. 2017. Four dimensions of water security with a case of the indirect role of water in global food security.

¹³ <https://h2osecurity.net/>

¹⁴ UN-water, 2013

“the capacity of a population to safeguard sustainable access to adequate quantities of acceptable quality water for sustaining livelihoods, human well-being, and socio-economic development, for ensuring protection against water-borne pollution and water-related disasters, and for preserving ecosystems in a climate of peace and political stability”.

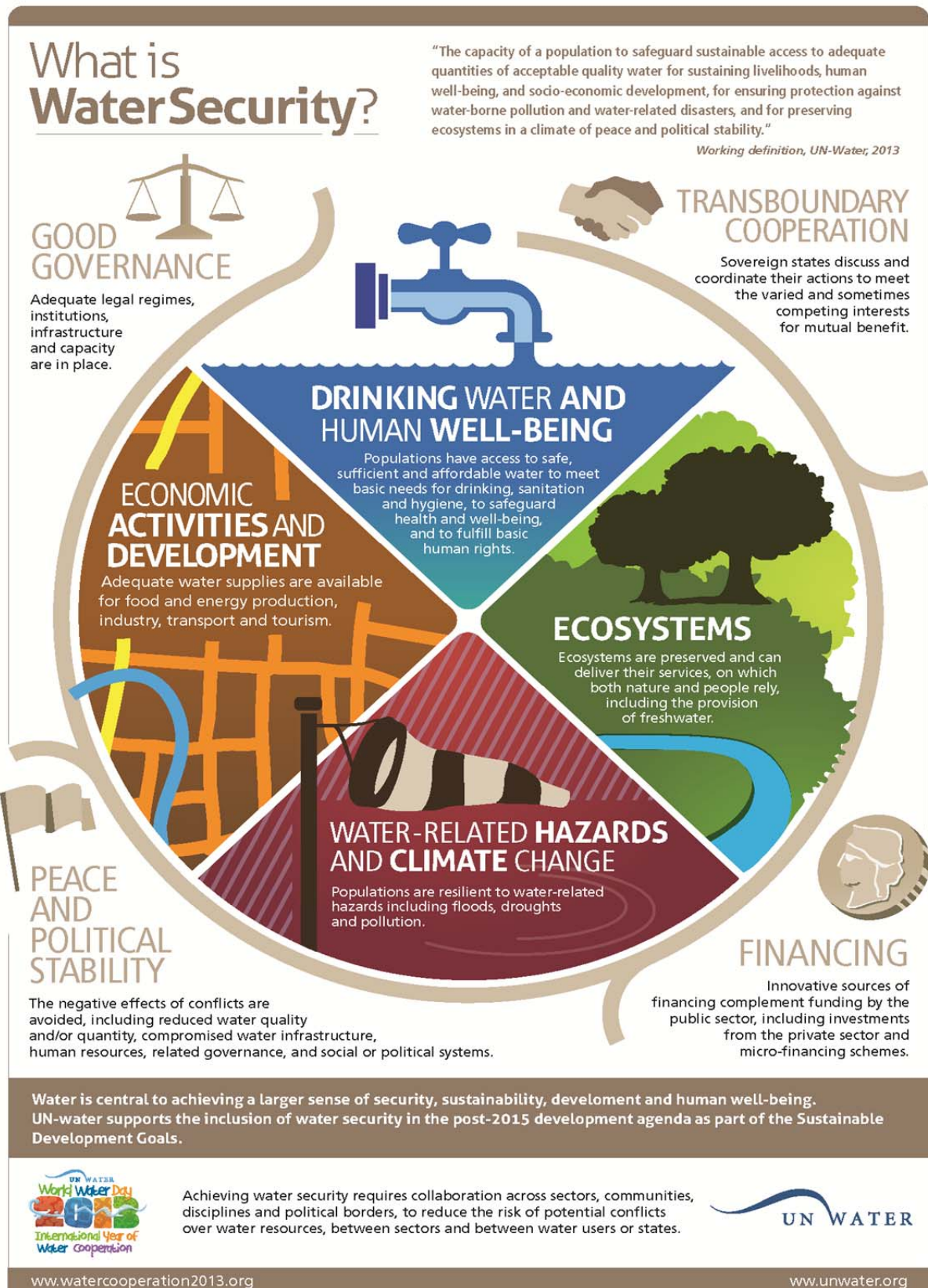


Figure 1. Core elements necessary to achieving and maintaining water security

Unlike food and energy security, water security needs to be considered in terms of both absence and presence having the potential to be a threat and thus uniquely bringing a destructive quality¹⁵. Access to

¹⁵ Grey and Sadoff, 2007

water and food is a Constitutional human right, while access to energy is not. To this end, Grey and Sadoff define water security as:

“the availability [...and reliability] of an acceptable quantity and quality of water for health, livelihoods, ecosystems and production, coupled with an acceptable level of water-related risks to people, environments and economics”.

Abedin, *et al* (2013)¹⁶ provide the following summary of core elements necessary to achieving and maintaining water security:

- Access to safe and sufficient drinking water at an affordable cost in order to meet basic needs, which includes sanitation and hygiene, and the safeguarding of health and well-being;
- Protection of livelihoods, human rights, and cultural and recreational values;
- Preservation and protection of ecosystems in water allocation and management systems in order to maintain their ability to deliver and sustain the functioning of essential ecosystem services;
- Water supplies for socio-economic development and activities (such as energy, transport, industry, tourism);
- Collection and treatment of used water to protect human life and the environment from pollution;
- Collaborative approaches to transboundary water resources management within and between countries to promote freshwater sustainability and cooperation;
- The ability to cope with uncertainties and risks of water-related hazards, such as floods, droughts and pollution, among others; and,
- Good governance and accountability, and the due consideration of the interests of all stakeholders through
 - appropriate and effective legal regimes;
 - transparent, participatory and accountable institutions;
 - properly planned, operated and maintained infrastructure; and
 - capacity development.

While many of the concepts embedded in water security are consistent with past water planning in the country, explicit formulation and use of Water Security Framework for South Africa reflect a slight departure from past approaches. This is informed by the developments over the years regarding focus on water security. The Water Security Framework is meant to capture in various ways our capacity to ensure availability and access to water by responding to various risks, vulnerabilities, insecurities, inequities and policy challenges that societies and ecosystems face.

In this context for South Africa, the definition of water security by Jepson *et al*, 2017 is most suitable in that as they stated,

“...water security is less about obtaining water, and more about fostering human capabilities as they relate to water...”

We thus ask: What are the social, cultural, and political relationships with water resources and flows that advance a life that fosters human dignity? And, how are those relationships secured to facilitate the freedom to achieve wellbeing, fulfilling social arrangements, and human flourishing?

... water security, then, is not simply a state of adequate water – however defined – to be achieved, but rather a relationship that describes how individuals, households, and communities navigate and transform hydro-social relations to access the water that they need and in ways that support the sustained development of human capabilities and

¹⁶ Abedin M.A (2013) – pp5-6

wellbeing in their full breadth and scope”

Considering water security in this way therefore, it will be possible to contribute to the achieving the ultimate vision espoused by the NDP of rising living standards, falling poverty and inequality as well as restoring the dignity of the people.

1.3. Why a Water Security Framework?

It is the first of its kind in South Africa and meant to bring a fresh, internationally-legitimised, and inclusive approach to assessing and addressing South Africa’s challenges and opportunities for managing its water resources and provision of services to harness benefits and mitigate risks.

A water secure future South Africa needs to have:

- A resilient and fit-for-use water supply;
- Universal water and sanitation provision;
- Equitable sharing and allocation of water resources;
- Effective infrastructure management, operation and maintenance; and
- A reduction in future water demand.

These five objectives enable the achievement of the NDP’s Vision for 2030, of affordable and reliable access to sufficient and safe water and hygienic sanitation for socio-economic growth and well-being, with due regard to the environment.

The Water Security Framework is a perspective that provides several comparative advantages over approaches utilised previously. These include among others the following:

- To guide all water-related policies across the system in terms of long-term planning and support;
- To strengthen implementation and ensure that it is managed at a level that allows for holistic oversight and fostering of cross-departmental integration; and
- To ensure national accountability linked to authority across the system to address the challenge of Department-specific mandates.

Achieving the NDP vision of a water secure future is one of the biggest challenges facing South Africa in the 21st century. It is a critical element of achieving social well-being and sustainable economic growth.

South Africa is facing increasing water demands to meet the needs of a rapidly growing and urbanising population, changing lifestyles, and economic growth. At the same time, climate change is driving the country towards a warmer and drier future, with predicted longer and more extreme droughts, and more intense floods. Climate change means that there will be less water available to meet water needs.

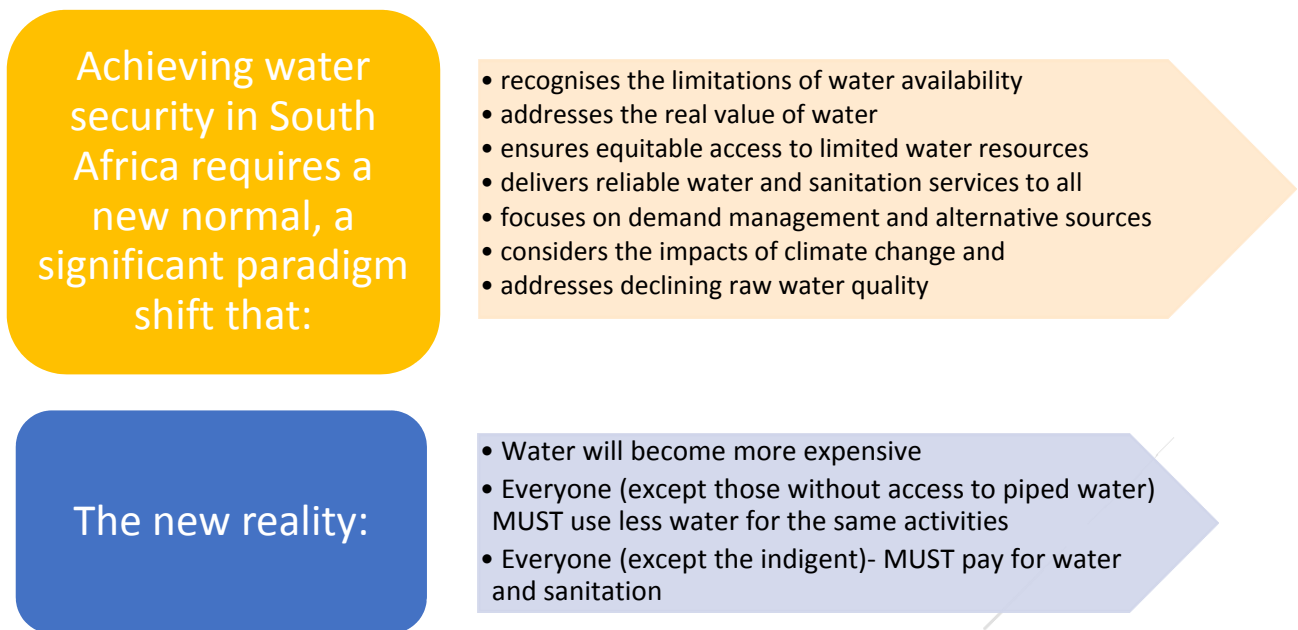


Figure 2. Achieving water security in South Africa

UN-Water points out¹⁷ that achieving water security requires collaboration across sectors, communities, disciplines and political boundaries/borders, to reduce the risk of potential conflicts over water, between sectors and between water users or states. This can range from local in-country conflicting priorities to cross-border or even across continents or region. Of critical importance is to note that such view can be mapped (spatially and temporally) from the lowest level in a village (local scale) through to cross-border between nations or even continents through trade and other multinational activities. In this instance, the impact of virtual water becomes an important aspect of development. Water needs to not only support economic development but must be able to catalyse and in certain situations create economic development.

Addressing the sustainable development goal 6 (SDG 6), water security requires transdisciplinary collaboration across sectors, communities and geopolitical boundaries, as well as competing priorities or potential conflicting demands or expectations. A transdisciplinary approach is a systems approach not based on a functional or silo approach and covers among others, ethics, politics, law, environmental flows, and economics.

Any water framework or plan needs to be sufficiently comprehensive and integrated to cover all necessary bases. For instance, with respect to capacity it would be incomplete or even risky to focus only on infrastructure development if the paucity of engineers in the water sector is not addressed. In addition, a balance of skills sets covering a full spectrum of all the dimensions necessary to fulfil the implementation as expected or planned in context of policy, legislation and institutional setting is essential. This takes into account the globally accepted notion that most water ills are outside the “water box”. Whilst it may be true that the plan should be comprehensive, it needs to be prioritised, clear and to the point. Further, it would equally be futile to use the same information and models that may have reached their limits in respect of robustness to respond to current and future challenges. These two areas of capacity and planning approach can be seen as among the most serious shortcomings of the current water and sanitation planning and management regimes within the sector in South Africa. These shortcomings are recognised in the draft NW&SMP and detailed proposals for the development and implementation of a long-term plan (to be updated bi-annually) for the turn-around of water supply and sanitation services in the country is incorporated. The proposals include detailed actions, assigns roles and responsibilities and

¹⁷ Water security and the global water agenda. A UN-Water Analytical Brief. 2013

completion dates for better water planning and management; improved water information systems; as well as training for water managers.

Factors contributing to water security generally lie outside the “water sector box” which affect decisions on water (**Figure 3. Decision-making affecting water that are outside the "water box"**).

DECISION-MAKING AFFECTING WATER

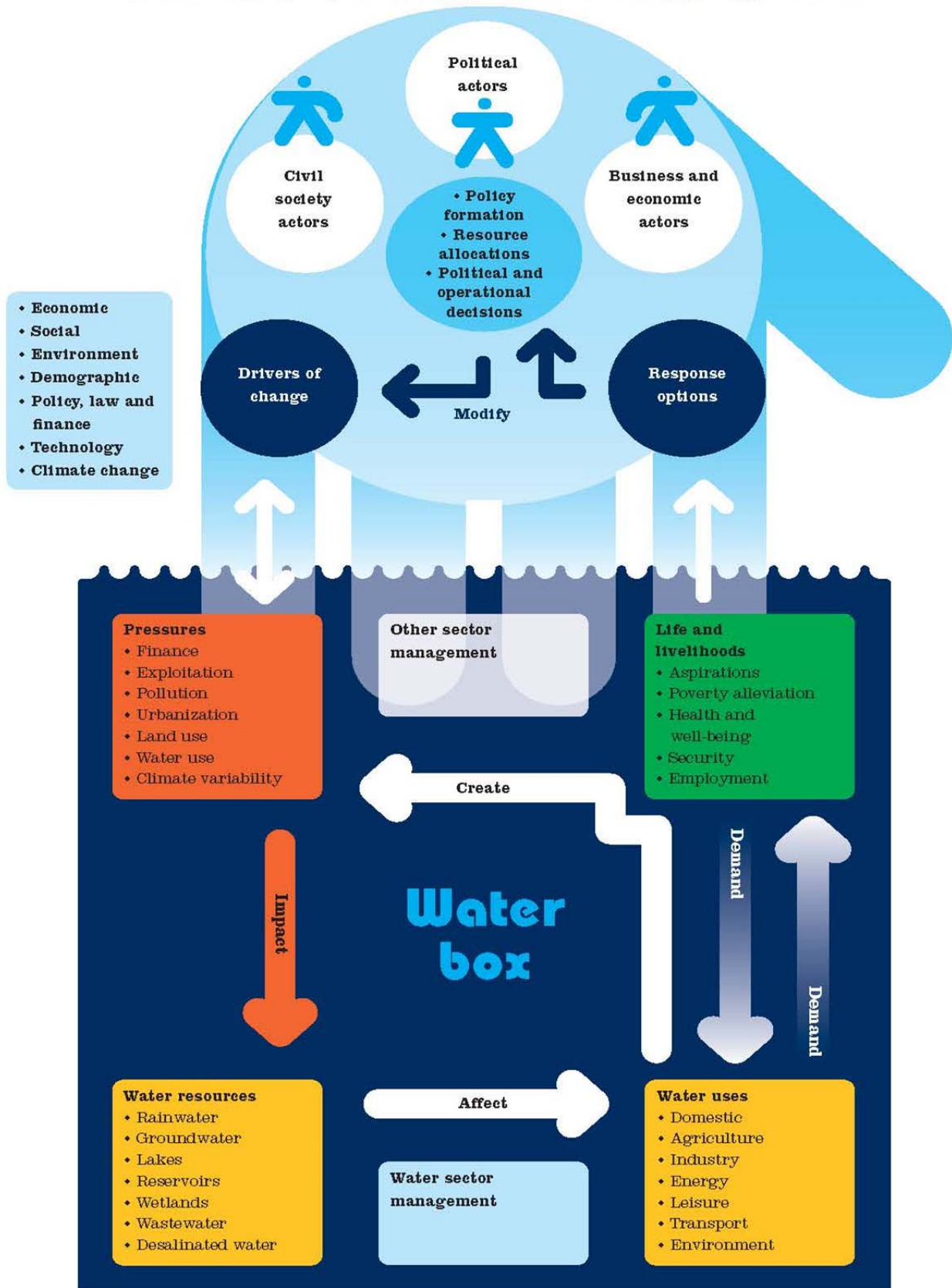


Figure 3. Decision-making affecting water that are outside the "water box"¹⁸

Some key drivers of water security that are largely outside the "water box":

- Level of economic development
- Financing, which is often supported by prioritization/recognition of water as key foundation to viability of related sectors
- Strength of governance
- Economic regional integration
- Peace and political stability (may be similar to regional integration)
- Socio-economic development

The NDP reflected on actions that are required to achieve the 2030 goals that were not achieved, which included:

- Review of the National Water Resource Strategy (NWRS) by mid-2012 and approved by year-end to guide the development of the sector;
- Defining the future institutional arrangements for water resource management by 2013 with implementation by 2015 at the latest, to ensure institutional memory and retain continuity in management. The institutional arrangements were seen to include:
 - A national water-resource infrastructure agency to develop and manage large economic infrastructure systems;
 - Catchment management agencies to undertake resource management on a decentralised basis, with the involvement of local stakeholders;
 - National capacity to support research, development and operation of water reuse and desalination facilities.
- A comprehensive investment programme for water resource development, bulk water supply and waste water management established for major water centres;
- Creation of regional water and waste water utilities, including expanding existing water boards mandates between 2012 and 2017.

A key observation is that the water sector has not significantly transformed¹⁹ as was envisaged when the policies were developed in the mid to late 1990s. Much of this could be attributed to the pressure of the Reconstruction and Development Programme (RDP) that left the fundamental architecture of the old system largely intact. Examples include the fact that very little of the envisaged institutional architecture has been implemented including new institutions such as CMAs and Water User Associations (WUAs) and parts of the legislation relating to the regulatory regime (ref. **Figure 4**). Challenges remain in terms of implementation of policy for a number of reasons including an erosion of capacity and a lack of collaboration between responsible entities. This is exacerbated by the shift of resources away from the Department which has had an effect on its ability to provide sector leadership as expected.

South Africa has led policy debates in the region, yet struggled to implement even the very policies it advocates. The root causes of the problems must be examined carefully going forward. What is apparent from **Figure 4** is that the delays, in and by themselves, do not seem to be directly linked to administrative changes, but are rather cumulative in nature.

According to section 7.2.3 of the National Water Policy of April 1997 "At national level, it is also necessary to address the problems ... with respect to the management of the national infrastructure. Provision may

¹⁸ World Water Development Report 3

¹⁹ Transformation defined as fundamental deconstruction and reconfiguration of the entire system.

be made to allow the functions of managing the national water infrastructure to be transferred to a public water utility established for that purpose. The functions of such utility could include the planning and development of infrastructure, its operation and financing.”

It is critical to note that modifying past institutional frameworks will not in itself sufficiently address the identified challenges and risks. There has to be a deliberate and concerted effort to deconstruct the institutional framework that is largely based on the legacy of apartheid and reconfigure the whole system to address the current and future needs. This does not in any way mean physical disestablishment of institutions *per se* but the models and assumptions upon which these were based; and deliberately ask difficult and uncomfortable questions regarding what works under the current and future scenarios.

The framework must deliberately focus on national priorities, which includes meeting the SDGs. The priorities must be underpinned by a thriving economy, and international obligations in terms of the Africa development agenda within the SADC water protocols. It is envisaged that the building blocks of the framework should emanate from local, regional, provincial and national needs. The integration will provide high-level direction and further demand accountability from all spheres of government for the implementation of this framework. It is expected that the plan be simplified and properly timed in order to track progress and identify areas needing intervention in order to achieve national objectives. The institutional framing for water security is therefore crafted in a manner that these aspects are seamlessly planned and managed.

The RDP policy framework included the right of access to clean water as a fundamental policy principle to ensure “water security for all”.²⁰ It recognised the economic value of water and of the environment and advocated an economically, environmentally and politically sustainable approach to the management of water resources and the collection, treatment and disposal of waste. The policy identified the following as critical:

- Spatial planning and water to recognise the geographic limit to water availability, and encourage the creation of reserve;
- Long-term environmental costs, including as a result of interprovincial and transboundary water sources and transfers;
- Restructuring of the line department and its role in building local and provincial agencies as well as ensuring effective oversight.

²⁰ <http://www.dwa.gov.za/Documents/Policies/nwpwp.pdf>

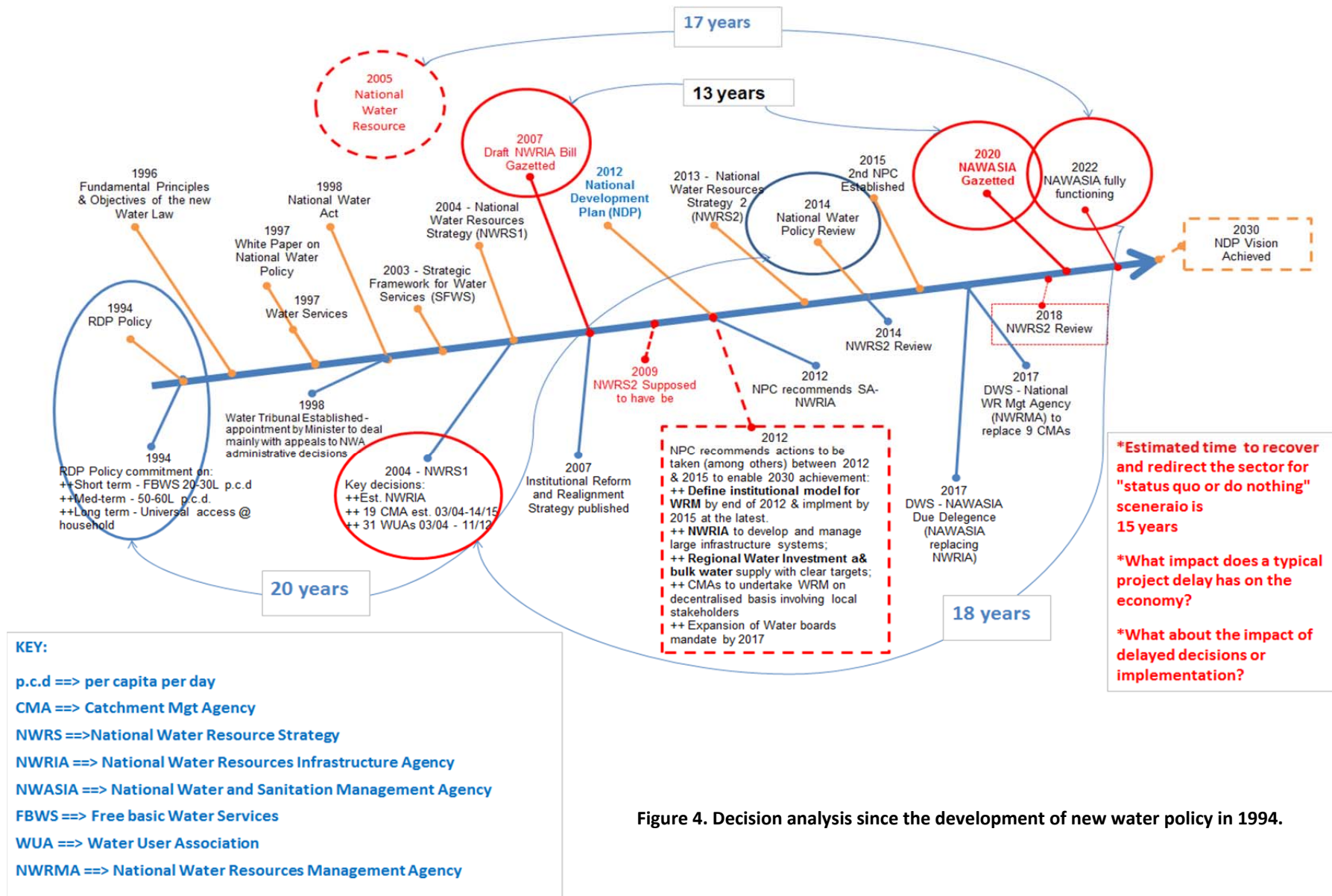


Figure 4. Decision analysis since the development of new water policy in 1994.

The inability of the country to do five yearly assessments at water management area level to inform the various plans and processes is serious cause for concern and is directly linked to deteriorating basic monitoring and assessment of water resources.

To date there has not been sufficient development of the regulatory regime as evident from lack of or limited capability for compliance monitoring and enforcement. The establishment of institutions to address the demand side of the water management is evident from weak assessment of actual use through the authorisation processes or monitoring of authorised use. The water use licencing process makes provision for users to provide certain information on water use as part of monitoring requirements, however, capability to put this in a national system and use it to assess the water use environment does not seem to be sufficient. This is a critically important gap.

According to the DWS's National Integrated Water Information System (NIWIS)²¹, only 63 per cent of the water use by volume is measured, which begs the question of how then are we able to manage the demand or even properly plan if we are not measuring sufficiently. The issue of lack of reliable information whether due to lack of monitoring or ineffective monitoring systems design or lack of capacity is extremely problematic given that based on the current allocation numbers, South Africa is regarded as having literally allocated all available water. This was done at high level of assurance. Again this is an illustration that the current planning and monitoring regime lack the robustness required for effective water security. It cannot be business as usual.

The fact that confirmation of lawful use has not yet been finalised as originally planned for around two years after the promulgation of the National Water Act, Act 36 of 1998, shows that the sector is at serious risk. Further the institutional reform that is meant to ensure that the model articulated in the post-Apartheid era is used has not yet been fully implemented resulting at least in the main, a less than optimal water management. New capacity requirements have therefore not been properly addressed as the skills map has to change to be commensurate with these requirements.

The issue of inadequate measurements of use has serious implications on revenue collection and management thereof.

The country through the line Department and its entities are far from achieving the level of implementation that was envisaged when the NDP was developed and further deterioration is bound to occur if drastic and focused action is not taken urgently. This includes immediate need to stabilise decision making processes and create space for careful assessment before decisions are changed or carried.

The water policy review that was approved by Cabinet in 2013²² has recommended that the Minister be accorded the mandate to develop the National Integrated Water Strategy (NIWS) that deals with the full water value chain covering water resource management, water and sanitation services as well as required infrastructure investment. It also emphasised the issue of a multiple-water-use service (MUS) approach in planning and infrastructure which begins to address issues of socio-economic development, food security among others, at different scales. Overall the Water Security Framework must engage the NWRS and reflect how much water is available and in what quantity and quality for all. It must further articulate the demand dictated by transformation and national strategic goals, and reflect on the processes, tools and institutional mechanisms or tools for appropriate implementation. Key aspects of this is the required intelligence (empirically supported) not only to implement but to deconstruct and reconfigure the institutional and implementation models to reflect the current and future needs. In viewing the water security from individual or household through to national and regional we must ensure that the NDP goals are achieved holistically.

²¹ DWS, 2014

Firstly, water security at an individual or household or local community level means having sufficient water to meet basic needs. Household water security is an essential component in efforts to eradicate poverty and support economic development. Currently in South Africa, this is defined as 25 litres per person per day, but research has shown that when water is carried, consumption drops to less than half of this daily requirement. Even at this lower figure, it is dependent on water actually being available. Although infrastructure has been provided in many cases (approximately 30 per cent of the schemes), they do not meet the functional criteria set out in the Strategic Framework for Water Services (2003). Invariably the non-functioning schemes are those with communal taps rather than in-house supply.

The challenges faced by these sections of the population with meeting the basic water needs impact on their ability to improve their standard of living and have water for productive purposes. The exclusion of certain sectors from access to water for productive purposes results in the water sector promoting inequality, which is contrary to the principles set out in the National Water Act, which are as follows:

- Recognising that water is a scarce and unevenly distributed national resource which occurs in many different forms which are all part of a unitary, interdependent cycle;
- Recognising that while water is a natural resource that belongs to all people, the discriminatory laws and practices of the past have prevented equal access to water, and use of water resources;
- Acknowledging the National Government's overall responsibility for and authority over the nation's water resources and their use, including the equitable allocation of water for beneficial use, the redistribution of water, and international water matters;
- Recognising that the ultimate aim of water resource management is to achieve the sustainable use of water for the benefit of all users;
- Recognising that the protection of the quality of water resources is necessary to ensure sustainability of the nation's water resources in the interests of all water users; and
- Recognising the need for the integrated management of all aspects of water resources and, where appropriate, the delegation of management functions to a regional or catchment level so as to enable everyone to participate;

Water security at this level is the constitutional responsibility of local government sphere with national government playing an oversight and regulatory role.

Secondly, water security at a national and sub-regional level. The inclusion of the sub-region is crucial as South Africa shares its river basins with neighbouring countries and, in accordance with the SADC protocol on shared watercourses, must jointly manage them.

The question that faces the Southern African region is; how after reserve for basic human needs and environmental considerations have been met' can it manage the remainder of the finite water resources available, to achieve sustainable economic growth. Since water is a finite resource it is not possible for demand to continue to increase *ad infinitum*; at some point it must plateau. As South Africa approaches that plateau or limit, the questions that need to be answered are:

- Is South Africa using water in the most efficient manner possible and, if not, how does the country achieve the required changes so that it does?
- If it is, which sectors are able to make the most productive use of the available water given the current use of water as per sector?

Water security at this level is the constitutional responsibility of National sphere Government. The executive authority is assigned to the Minister of Water and Sanitation in terms of the National Water Act who ensures it takes place through the regulation of water services (efficient use of water and prevention of pollution of the resource from sanitation) and the overall responsibility for and authority over the nation's water resources and their use. Although national government (as public trustee of the nation's

water resources) has overall responsibility for the nation's water resources, actual implementation often takes place at local (municipal and household) level with little or no direct input from national government. This particularly applies to water supply schemes that fall wholly within a municipal area and are operated by the municipality and household operated systems such as wells, boreholes and rainwater harvesting as well as sanitation services.

1.4. Historical Context

The linkage of schemes and systems enhances water security together as cost efficiency is achieved through economies of scale, however as a result of South Africa's history; this resulted in a paradoxical situation. As the demand grew in the urban centres and the centres of mining in the pre-democracy period, these areas had their water security enhanced by the national government, by being able to draw from a number of catchments and rainfall areas. The rural towns and rural areas with dispersed populations still continued to rely on local resources reducing their resilience in times of drought. However, the same infrastructure which gave the urban centres this resilience took water from and passed through the rural areas, which during apartheid were the reservoirs of manual labour for the urban areas, without serving them. Numerous examples of this continues to exist such as the Tugela-Vaal Scheme which passes through the communities surrounding Woodstock Dam and the Vaal River Eastern Subsystem Augmentation Project (VRESAP) which passes through the Dipaleseng (Balfour and Greylingstad) Local Municipality.

A reading of the 1956 Water Act (Water Act No. 54 of 1956), is instructive as it gave the Minister the power to establish both irrigation and water boards. They are clearly both national institutions, could both supply the same set of users, with either raw or potable water, what differed is how they functioned. In a water board users generally had no restriction on when they could take water from the scheme; the board held the license with the Department and the users had no say in the appointment of the board.

In an irrigation scheme the users were restricted on the times they could extract water, generally held the license in their individual capacity and elected the board members. The different structure is a reflection of the more co-operative approach that is required in an irrigation scheme. Where national government has ownership of the common infrastructure the irrigation board acted as an agency for national government. In neither case was a distinction made between potable and raw water.

The 1956 Water Act also empowered the Minister to supply water and sanitation services outside of municipal area (wall to wall municipalities not existing at that time). The Minister was empowered to take a very holistic approach to the supply of water and the provision of sanitation.

Despite the apartheid policies, the former government did, in fact, treat water supply holistically, as can be seen in the construction of Welbedacht Dam and the southern Mangaung potable supply system in 1973 and the Vaal-Gamagara Scheme constructed in 1968. The construction of the Kouga Dam with the supply to Nelson Mandela Bay Municipality is also a good example of this integrated approach, albeit this time within an irrigation scheme.

However, this holistic approach was not expanded in 1994, and the current legislation in the form of the National Water Act, 36 of 1998 (1998 National Water Act) and the Water Services Act 108 of 1997 (1997 Water Services Act) made a distinction between planning for and implementing bulk raw water and water services. The National Water Act and Water Services Act then institutionalised this by putting water boards, which remained national government institutions in terms of the Public Finance Management Act, into the Water Services Act, legislation pertaining to Local Government, restricting their mandate to potable water and giving the impression that Local Government now exercised Executive Authority instead of the Minister.

The Water Services Act was superseded when the Municipal Systems, Municipal Structures and Municipal Finance Management Acts were passed and because it remained on the legislation, conflict was created. The conflict could have been easily avoided by recognising that the municipal acts take precedence and

that the regulation of municipalities is the Department of Cooperative Governance and Traditional Affairs and National Treasury's competency, not the Department of Water and Sanitation. For example the intention to separate the regulation of water services from the provision, the Water Services Authority and Water Services Provider as set out in the Water Services Act, was undermined as Part 2 of Chapter 8 of the Municipal Systems Act did not mandate this separation thereby allowing a Municipality to be both poacher and gamekeeper. The result has been that municipalities remained completely in control of water service provision, either by keeping it in-house or as a wholly owned subsidiary with billing and revenue collection being retained by the municipality. This allowed political manipulation at municipalities for short-term political gain through allowing tariffs that are not sufficiently cost-reflective to allow for operation, maintenance and capital investment to the long-term detriment of water security, the City of Cape Town being a prime example of not investing sufficiently in water resource management.

The transformation of the Irrigation Boards into Water User Associations as articulated in the National Water Act faced challenges with interpretation of their purpose and membership as well as a lack of understanding of the different types of Irrigation Boards. The result has been that instead of the water sector expanding to provide a sustainable water and sanitation supply to all users it has become increasingly polarised between the different players. It has become increasingly difficult to find sufficient funds to operate, maintain rehabilitate, replace and build new infrastructure.

In order to address these unintended consequences of the policy and legislative reform of the democratic period, the positioning of the Water Security Framework must articulate the critical issues and provide a guide that will ensure that the benefits of the transformation project are realised within a reasonable period.

BOX 3

"In pursuit of a '*virtuous cycle of growth and development*' as espoused in the National Development Plan – the Vision for 2030, water security has been identified among the key pillars. Its importance is appreciated within the context of a water sector legislative and institutional framework that is considered well developed and among the most progressive in the world. The framework is premised within a decentralisation agenda that is given effect through an intricate web of laws and institutions – at a national and local level. It also establishes a basis for integrated water resource management (IWRM) and a human rights dimension to sustainable water services. This is set out against a backdrop of a country that is largely semi-arid and with limited water resources, but which has an elaborate infrastructure network at both a water resource and water services level."

National Water Plan Diagnostic Report, 2015

In this report we have defined water security in the context of South Africa's development agenda and made a case for a Water Security Framework that offers an encompassing perspective that provides several value adds/comparative advantages over past approaches. Whilst acknowledging the significant progress made in the post-apartheid era a historical context is provided to equally acknowledge the challenges and lessons learnt to ensure that the new approach is built on solid foundation. The sections that follow provide key aspects of the Water Security Framework which is also seen as the beginning of change.

2. WATER SECURITY FRAMEWORK CONTEXT

2.1. Water Security in the Context of National Development Planning

The development of the NWSF is based on South Africa's stated approach of a developmental state which is generally characterised by having strong state intervention²³, as well as extensive regulation and planning balanced by participatory democracy and progressive realisation of the transformation imperatives. Within this context, the attainment of the developmental state will not be complete if it does not include equity and redress of past imbalances created as a result of the apartheid system and the colonial legacy.

This context informed the NWPDR which was structured around some of the following broad questions:

- How likely is South Africa to experience water shortages (and access to sufficient water is a fundamental Constitutional right) in the same way that energy shortages (and access to electricity is not a fundamental Constitutional right, although it might affect other rights such as a right to dignity) were experienced in the recent past?
- How far are we from such a scenario?
- What form is the challenge likely to take?
- What would it take to avert the shortages and what are the key interventions required?
- State of planning: how prepared are we to respond to such a scenario should it arise?
- Where are the gaps in knowledge, planning and implementation?

The NWPDR produced is a synthesis of the current situation in the water sector, although a number of nuances can be added which are critical to ensuring a workable turnaround towards a water secure South Africa. In developing the Water Security Framework in the context of the NDP, key questions that are frank need to be asked by re-emphasising and elaborating on areas that may not have been explicitly diagnosed or reflected. Such questions may include the impact of loss of apartheid based agricultural subsidy to the game farming and tourism industry on one hand and the agricultural landscape on the other. To this end, the consistent creation of employment in the tourism industry may need to be assessed against the backdrop of change in the agricultural landscape and real water use. It may be argued that the questioning of 63 per cent agricultural water use²⁴ is not relevant given the economic footprint which that sector brings. Besides, this number tends to include only irrigated agriculture whilst the new policy regime is that every water use, direct and in direct is expected to be authorised, licenced and accounted for! In short there are questions of accounting for all water use that need to be had.

The development of the national water policy and subsequent codification of water law and post-apartheid transformation has led to the development of what is regarded as among the best policies and legislative regimes in the world. The principles and objectives of South Africa's Water Policy and Legislation are still as relevant today as they were when they were approved by Cabinet more than two decades ago. More recently, South Africa through the NDP recognises the need to ensure universal access to clean water as a right which is given further impetus through its commitment to the SDGs, specifically SDG 6 (Box 5).

²³ Peter Meyns and Charity Musamba (eds.): The Developmental State in Africa: Problems and Prospects. Institute for Development and Peace, University of Duisburg-Essen (INEF Report, 101/2010)

²⁴ DWA 2015

BOX 5**Goal 6 Targets:
(Ensure access to water and sanitation for all)****By 2030:**

- achieve universal and equitable access to safe and affordable drinking water for all;
- achieve access to adequate and equitable sanitation and hygiene for all and end open defecation, paying special attention to the needs of women and girls and those in vulnerable situations;
- improve water quality by reducing pollution, eliminating dumping and minimizing release of hazardous chemicals and materials, halving the proportion of untreated wastewater and substantially increasing recycling and safe reuse globally;
- substantially increase water-use efficiency across all sectors and ensure sustainable withdrawals and supply of freshwater to address water scarcity and substantially reduce the number of people suffering from water scarcity;
- implement integrated water resources management at all levels, including through transboundary cooperation as appropriate;
 - protect and restore water-related ecosystems, including mountains, forests, wetlands, rivers, aquifers and lakes;
 - expand international cooperation and capacity-building support to developing countries in water- and sanitation-related activities and programmes, including water harvesting, desalination, water efficiency, wastewater treatment, recycling and reuse technologies;
- Support and strengthen the participation of local communities in improving water and sanitation management.

Planning for water security at NDP level must include thinking in the medium- to long-term (2030 at least) horizon and align the current situation in respect of the outcomes and impact. From a developmental planning perspective, the two key overall targets as reflected in the NDP, on elimination of income poverty and reducing inequality – require enabling milestones and critical actions, most of which underscore the centrality of water in planning for socio-economic development. Investment in water security is a long-term pay-off for human development and economic growth, with immediate visible short-term gains.

Three basic factors that determine water security can be identified²⁵ as follows:

- The *hydrologic environment* which, for the purpose of this document, could be referred to as the biogeophysical environment, i.e. mainly the natural legacy inherited by society;
- The *socio-economic environment* which, is economic structure and the associated behaviour of its actors which reflect natural and cultural legacies and policy choices. In the South African context this includes the legacy of inequalities resulting from decades of exploitation, discriminatory policies and the resultant inequality, and the need for redress at fundamental level. To this end the policy of developmental state is critical and requires assessment and analysis within the context of the water sector.
- The *future environment* inclusive of sustainability, global change, and climate change and adaptation. In the context of the NDP, this is critical as it is related to long-term planning based on the current scenario.

²⁵ Grey and Sadoff, 2007

These factors play an important role in determining the institutions and the type of infrastructure needed to achieve water security. The six thematic areas identified in the diagnostic report²⁶ fall within these three broad factors, namely

- *The* water demand and supply situation
- Impact of extreme climatic events and climate change
- Infrastructure asset management and functionality
- Infrastructure planning and development
- Institutional and regulatory framework
- Human capital and *institutional capacity*

These are further elaborated under challenges in **Error! Reference source not found.** below.

2.2. Planning For Water Security – The South African Experience

South Africa's elevation of water security followed the 2006 Fourth World Water Forum (WW4) as reflected in the theme document "Water for Growth and Development"²⁷. The then Department of Water Affairs and Forestry (DWAF) developed a framework for growth and development (WfGD)²⁸ that was aimed at guiding actions and decisions to ensure water security in terms of quantity and of quality to support South Africa's requirements for economic growth and social development. The Development Bank of Southern Africa (DBSA) commissioned several papers on water security which covered a number of aspects of the issue at the time²⁹. The evolution of water security has seen the refinement of earlier conceptual framing (Figure 5) which is also reflected in the recent report of the GWP/OECD Task Force on Water Security and Sustainable Growth³⁰. The framing takes into account key issues of risks associated with water insecurity and link to socio-economic development. Scarcity or supply and demand are no longer the main drivers of water security, but rather a complex set of elements such as human and community security in terms of vulnerability, national security, water resources security, food security, energy security and climate security³¹.

²⁶ National Water Plan Diagnostic Report, 2015

²⁷"Water for Growth and Development." David Grey and Claudia W. Sadoff in Thematic Documents of the IV World Water Forum. Commission Nacional del Agua: Mexico City. 2006.

²⁸ DWAF, 2009. Water for growth and development version 7.

²⁹ Muller, M. et al. 2009. Water security in South Africa. Development Planning Division. Working Paper Series No.12, DBSA: Midrand

³⁰ Sadoff, C.W., Hall, J.W., Grey, D., Aerts, J.C.J.H., Ait-Kadi, M., Brown, C., Cox, A., Dadson, S., Garrick, D., Kelman, J., McCornick, P., Ringler, C., Rosegrant, M., Whittington, D. and Wiberg, D. (2015) Securing Water, Sustaining Growth: Report of the GWP/OECD Task Force on Water Security and Sustainable Growth, University of Oxford, UK, 180pp

³¹ Halmatov et al. 2017. Water security for productive economies: Applying an assessment framework in southern Africa. Physics and Chemistry of the Earth 100. 258-269.

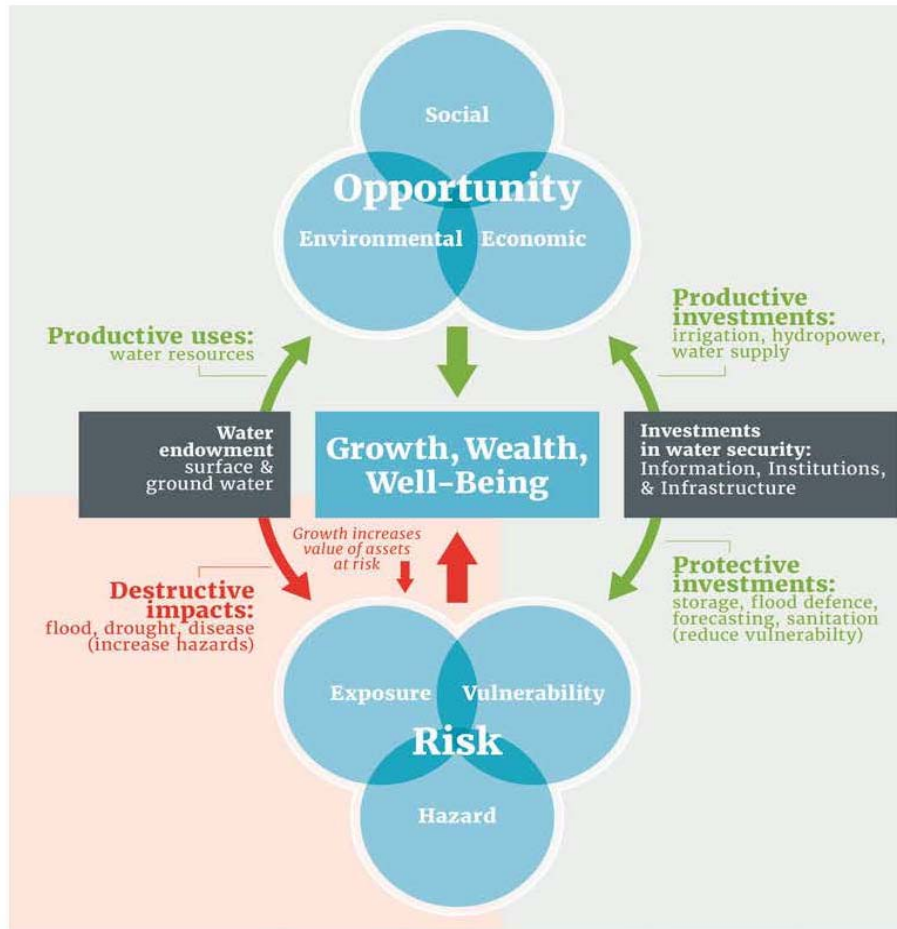


Figure 5. Conceptual framing of the dynamic of water security and sustainable growth³².

The water policy review that was approved by Cabinet in 2013 and published by the Department of Water and Sanitation (DWS) in 2014³³ (DWS 2014 Revised policy) recommended that the Minister be accorded the mandate to develop a National Integrated Water Strategy (NIWS) that deals with the full water value chain covering water resource management, water and sanitation services as well as required infrastructure investment. The revised policy further emphasised a multiple water use service (MUS) approach in planning and infrastructure which begins to address issues of socio-economic development, food security among others – at different scales. A careful assessment of these considerations leads to a conclusion that this is in reality what is now referred to or expected to be the Master Plan or roadmap!

Overall the Water Security Framework must reflect the quality and quantity of water available taking into account the demand required for transformation and national strategic goals, by reflecting on the processes and institutional mechanisms for implementation. While this is covered in the current policy and legislation framework, the problem of effective implementation remains a serious challenge. To date, the water planning in South Africa has been largely based on the response to policy and legislative transformation from the 1956 Act to the RDP policy, the Water Services Act, 103 of 1997 and the National Water Act, 36 of 1998. The current planning regime remains highly influenced by the past reactive approach, which does not necessarily fully utilise instruments created for planning such as scenario planning, which looks into uncertainty and volatility. These methodologies may have reached their

³² Sadoff et al. 2015. Securing Water, Sustaining Growth: Report of the GWP/OECD Task Force on Water Security and Sustainable Growth, University of Oxford, UK, 180pp

³³ DWS, 2014

maximum capabilities given the complexities and changes brought about by the democratic dispensation and engagement in the global space.

2.3. Integrated Planning For Water Resources and Provision of Water Services

Balancing the pressures of development alongside long-term prosperity for social, economic, environmental and health measures requires the coordinated development and management of water, land and related resources, to maximise economic and social welfare in an equitable manner without compromising the sustainability of vital ecosystems.

2.3.1. Water Value Chain and Water Cycle

It is critical that the value chain is appropriately contextualised in the NWSF to ensure that every aspect of service delivery is clear at different levels of governance and associated scale of execution. These contexts will be functional and institutional reflecting both hierarchical and horizontal scope and mandates.

Government, through DWS, takes full responsibility of the whole water cycle management (**Figure 6**) and the implementation taking place at different locations of the cycle. The cycle management includes

- Supply and demand management
- Environmental flows management
- Water use sector management
- Institutional arrangements – local through to national and across sectors
- Financial flows (including beneficiation or value capture)

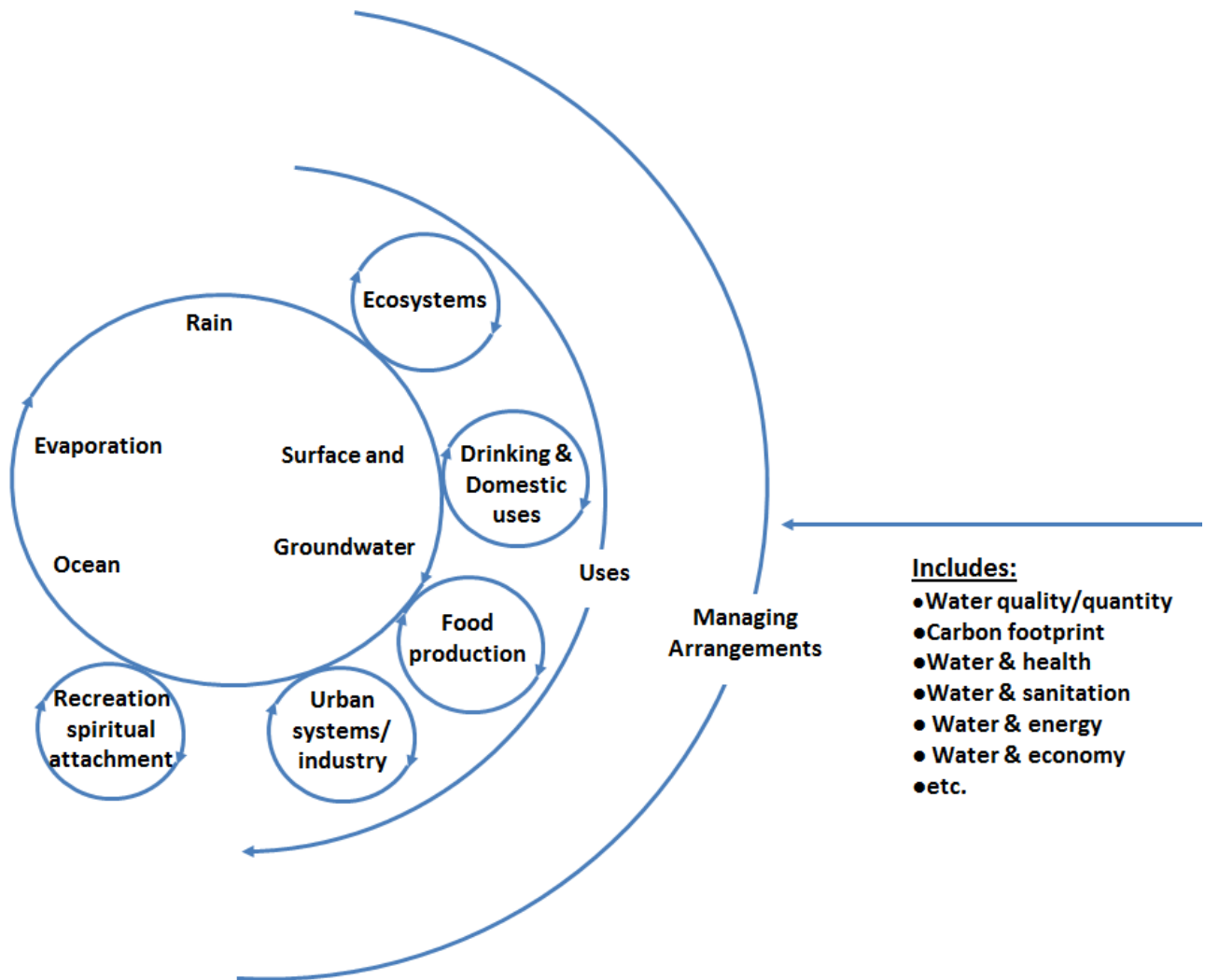


Figure 6. Simplified whole water cycle management at all levels

2.3.2. Institutional and hierarchical context

Figure 7 reflects the water value chain from an institutional perspective and associated tools at different scales of operation. From policy and legislative perspective these tools have been designed to ensure effective functioning of the institutions at different scales.

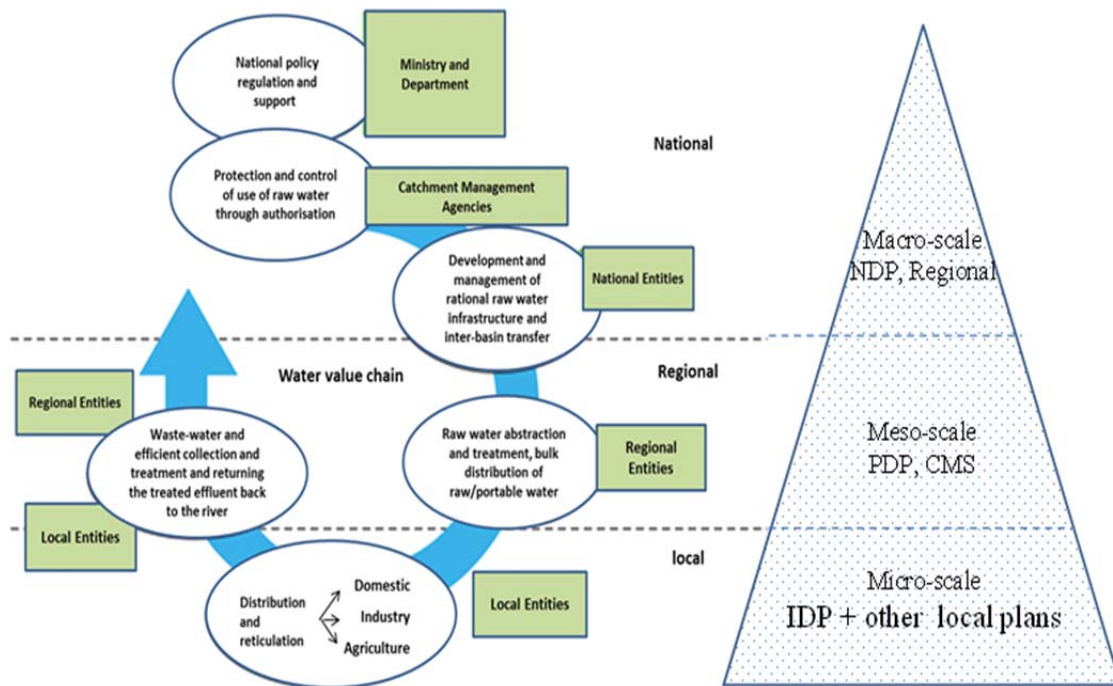


Figure 7. Water value chain in context of institutional positioning from local through to national.

2.3.3. Functional context

Figure 8 provides a schematic representation of the functional aspects of the water value chain that may provide insight into the challenges with implementation of policies and legislation in addition to the pressure to provide services to the entire population after 1994. The activities and functions are carried out by various role players in water. Other aspects of the functional value chain that are critical include an understanding of the funding requirements, institutional arrangements, tools for management, financial flows, information flows and the human capital requirements. Functional aspects of water are impacted by the institutional framework that covers a large spectrum of organisations operating at different level within the same space which include involving regulators relating land usage and activities impacting on the water resources.

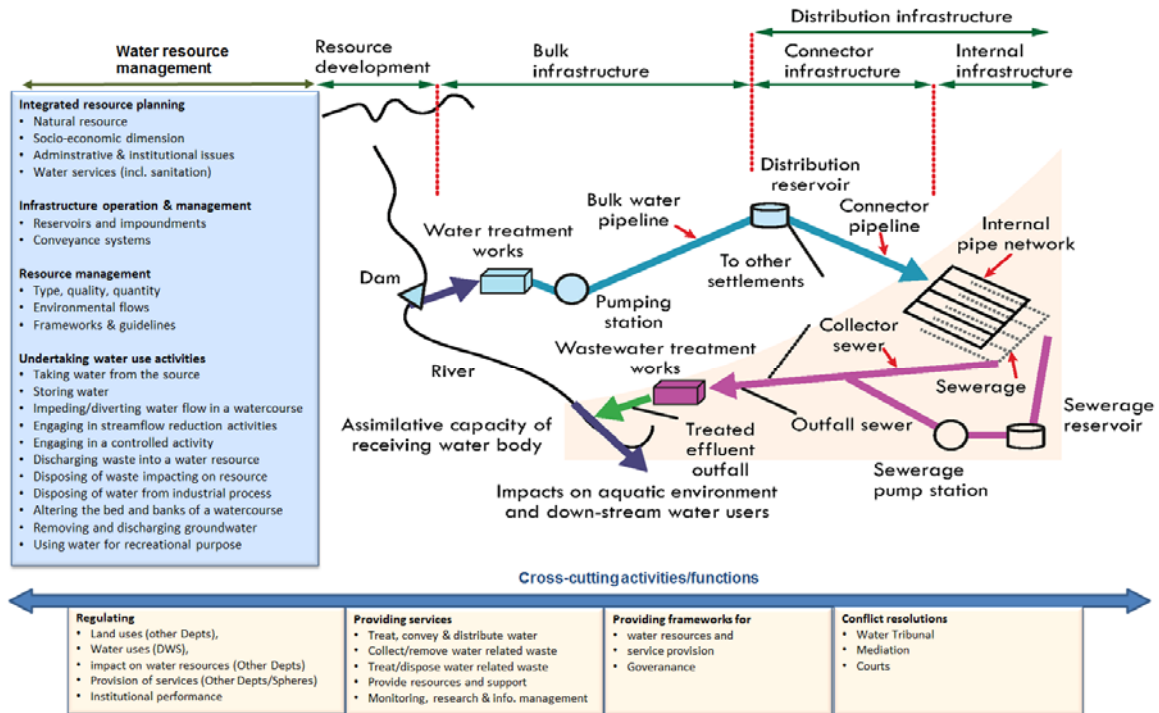


Figure 8. Water value chain from functional perspective

2.3.4. Planning hierarchy

a) Water Planning from Rural and Local Perspective

The DWS 2014 revised policy mentioned in 2.2 earlier in this document included ensuring that water supply should be based on yard taps and no longer based on RDP standard of 200m from the tap. The MUS approach to planning of water development and management means that key elements of the value chain at local level are covered to ensure that all aspects of water management are taken into account, thereby resonating with the concept of circular economy in which water projects and programmes are set to ensure *end-to-end value chain consideration* in a non-linear fashion.

Figure 9 below shows water management from local perspective for a typical urban environment.

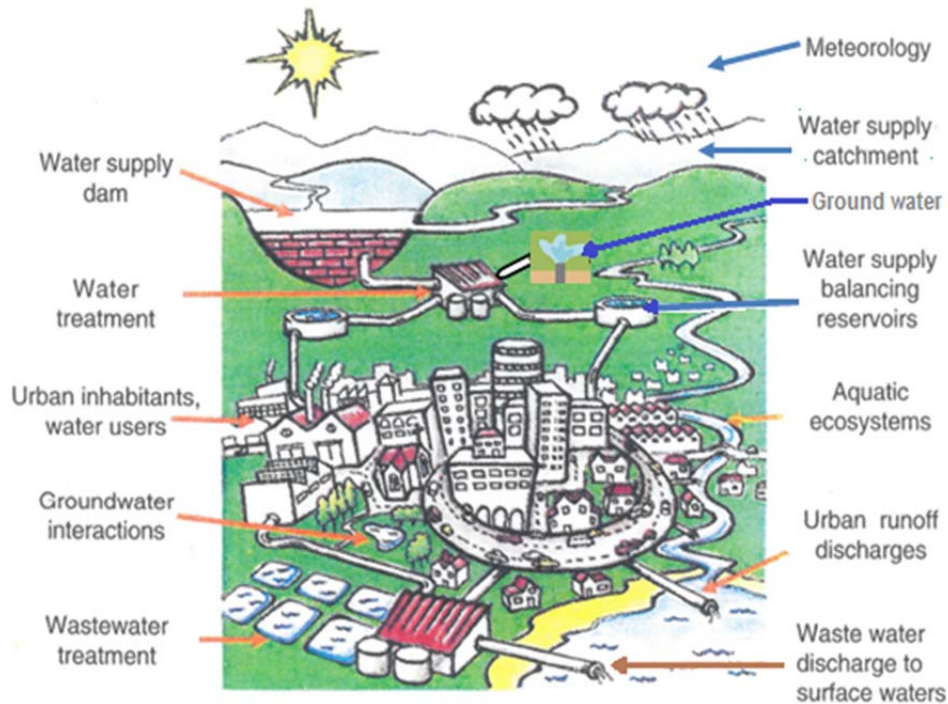


Figure 9. Water management from local perspective³⁴

South Africa, like the rest of Sub-Saharan Africa is urbanising faster than any other continent, and most of the urbanisation is in emerging towns and villages³⁵. Current estimates indicate that up to 65 per cent of the population reside in urban areas. These areas often do not have mature or sufficient infrastructure and governance structures. South Africa's revised water policy mentioned above provides an opportunity to relook at the institutional, functional and financing arrangements that are suitable for growing urban systems based on integrated urban water management referred to in the policy review as local water management. Such systems will include introduction of circular nonlinear systems that maximise opportunities for water reuse and recycling and generation of energy and nutrients from used water. Eckart *et al.*, 2013, proposed a water framework specific for African cities (Figure 10) that takes into account a number of water and sanitation practices characteristic of the African environment, where limitations of water supplies, infrastructure, leakages, demand management programmes are not based on developed cities.

The South African Local Government Agency (SALGA) has recognised a number of interventions as part of the quest to improve service delivery by enabling and executing water local economy and innovation taking into account the livelihood and deconstruction of historical models. This involves whole-cycle water management covering various aspects among others from governance, consumer behaviour, knowledge management to partnerships.

³⁴ Data requirements for integrated urban water management. Urban Water Series – UNESCO IHP. Fletcher, TD and Deletić A (eds). 2007.

³⁵ Integrated urban water frameworks for emerging cities in sub-Saharan Africa. Vairavamoorthy, K, Tsegaye S and Ecart J. 2013.

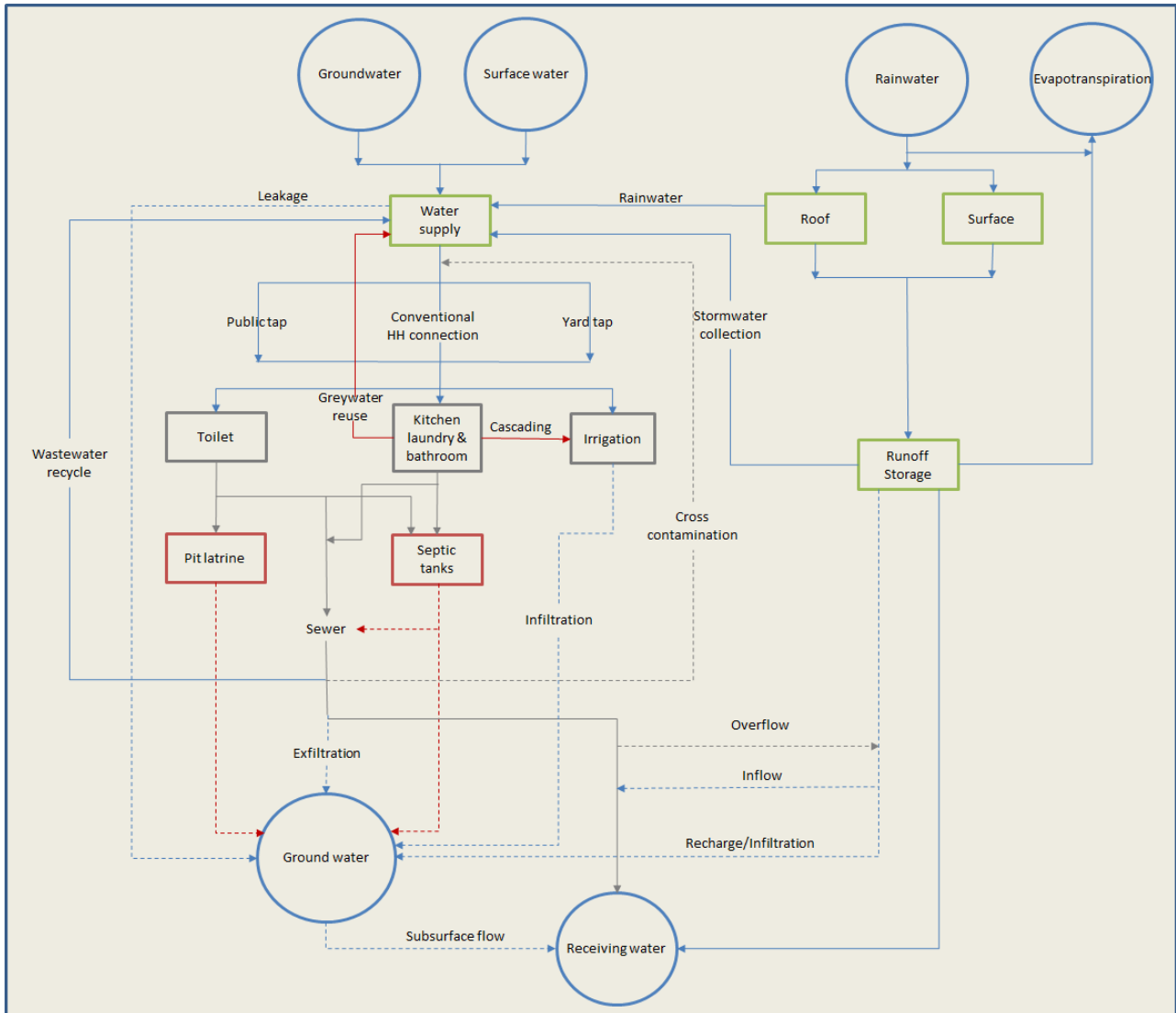


Figure 10. A tailored integrated urban water infrastructure for cities in sub-Saharan Africa³⁶

b) Water Planning from Regional/Catchment Perspective

Comprehensive assessment of water resources at the catchment level date back to the early 1950s when it was part of national hydrological assessments. These studies were limited by the amount of data, tools for assessment and the technological advancement which evolved over time. Over the past 10 years, a consistent problem of deteriorating monitoring networks and data collection required for assessment has been raised and is seen to be one of the key bottlenecks. Further, with the resource assessment has become more and more complex due to increase in land use, deterioration in water quality and the need to examine the interaction between surface and groundwater. All this is exacerbated by climate change and the other pressures on natural resources, which calls for a more integrated assessment using the tools available.

A full assessment needs to be done at quaternary level – initially using the DWS state of water report to establish baseline information. This should include exploring the idea of smaller more affordable dams closer to communities to counter or balance the situation where our people live in source areas. The establishment of CMAs is critical to ensure that the catchment management strategies (CMSs) required at

³⁶ Variavamoorthy et al. 2012

this level of planning are in place. Globally, the trend in water resources management policies is to manage water at a catchment level, with the participation of all relevant stakeholders and aiming at the sustainable development of water resources. Currently, it is envisaged that South Africa will have nine CMAs across 19 Water Management Areas (WMAs). Thus far two CMAs are operational namely: the Breede-Overberg CMA in the Western Cape and the Inkomati-Usuthu CMA in Mpumalanga. Two proto-CMA processes are underway, namely: the Vaal in the Gauteng and Free State Provinces and the Pongola-Umzimkulu in KwaZulu-Natal. The remaining five CMAs are yet to be established.

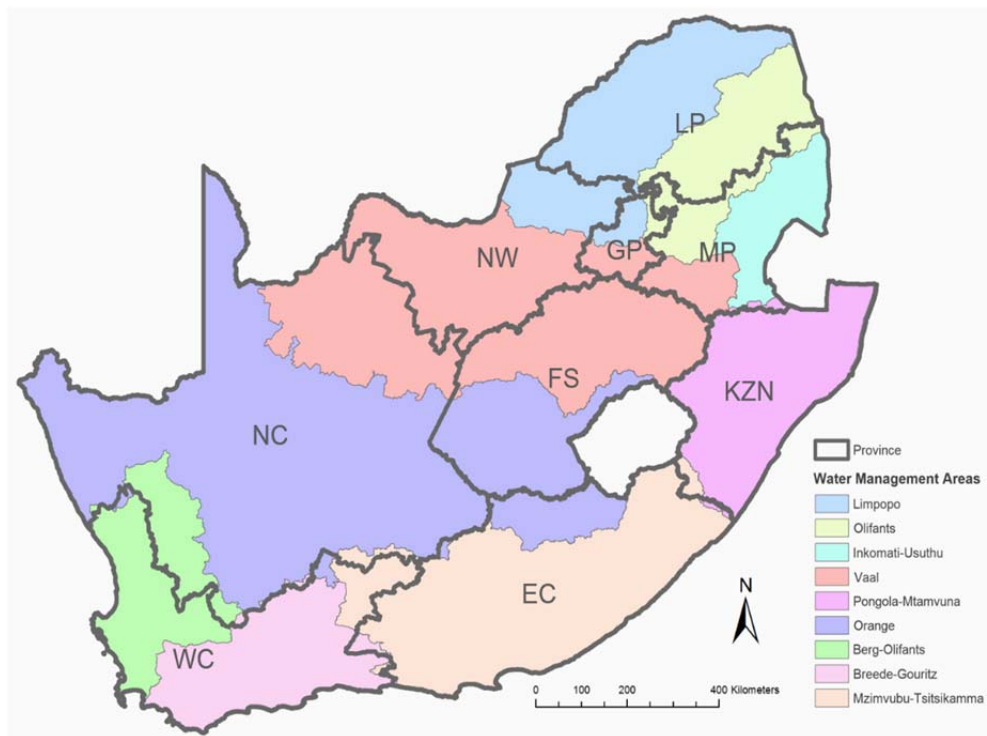


Figure 11. South African water management areas boundaries in relation to provinces³⁷

c) Water Planning from a National Perspective

An analysis of the 1986 publication on Management of Water Resources of South Africa that was building on the 1971 Water Commission Report shows that unless drastic steps are taken the sector will continue to be eroded and uncertainty increase. A number of challenges that were raised then remain in place today – or have been amplified despite plans and high-level commitments made.

Given the lessons over the past 20 years since the National Water Policy and subsequent individual work done by the Department and researchers from across the country as well as internationally, it will be possible to do a detailed assessment within 12 to 24 months. The process becomes feasible in these timeframes if what has been learnt is consolidated to ensure that the amendments address the shortcomings.

d) Water Planning from International and Global Perspective

South Africa's standing in the international and global space has demonstrated its capability to punch beyond its weight. Among others this international recognition includes involvement at the highest level globally – as part of the UN/World Bank High-Level Panel on Water. South Africa is also recognised as one

³⁷ NWRS2, DWA. 2013

of the leading nations in water resource infrastructure development to address the water supply requirements, and the country is a leader in the development of legislation and new policies on access to water as a human right.

There are institutions and professionals that are celebrated in the water fraternity, such as the levy model of the Water Research Commission (WRC); the Department itself in respect of national monitoring; and the UNEP GEMS work done within SADC context.³⁸ A great number of universities that provide programmes and lectures on the sector are sought after by international students and many professionals have been recognised for the work they do.

However, this does not address the challenges of the water sector, which requires high-level skills in the knowledge space as the sector interacts with the best internationally and globally. There are examples of excellent work being done in this field, such as the Framework Programme for Research, Education and Training in the Water Sector (FETWater), but more of the same is needed.

2.3.5. Systems Planning for Water Resources and Provision of Water Services

From a systems planning perspective³⁹, it is well accepted that generally the water resources and water supply system comprise the following:

- 1) The **natural resource system (NRS) (How much and what are the sources)**:
 - i. The **natural sub-system** - streams, rivers, wetlands, lakes and their embankments and bottoms and groundwater aquifer
 - ii. The **infrastructure sub-system** - canals, reservoirs, dams, weirs, sluices, wells/boreholes, pumping plants and wastewater treatment plants (including operating rules for elements in this subsystem)
 - iii. The **water itself**, including its physical, chemical and biological components in and above the soil
- 2) The **socio-economic system (SES) - Demand**:
 - i. Water use and water-related human activities
 - ii. Financing for water development and management, including the financial flows in respect of livelihoods across the water value chain.

As earlier discussed, South Africa's growth areas and implications for water requirements must now be determined by two key drivers of change as articulated in the NDP regarding a reduced inequality gap and increased economic development.

- Growth over time must be measurable in real terms over say 10, 20, 30 40 years...
- Historical assumptions must be questioned based on current and future medium- to long-term expectations and not focus on "protecting the status quo"
- Risks – natural and anthropogenic/climate change are to be assessed based on available empirical evidence
- Geopolitical movement is no longer only national but transboundary in nature thus vulnerability and interdependencies are more than just water

³⁸ The United Nations Environment Programme (UNEP) Global Environment Monitoring System (GEMS) drives the global fresh water quality monitoring programme. More than a hundred countries contribute data from existing national monitoring networks to GEMS/Water, where the data is stored in a central database called the GLOWDAT. South Africa joined GEMS/Water in 2003.

³⁹ "Water resources systems planning and management: an introduction to methods, models and applications." Loucks D.P. and Van Beek E., UNESCO. 2005

- Historical institutional issues need to be dismantled.
- 3) **Administrative and institutional system (AIS) – Processes, institutional tools or mechanisms:**
- i. System of administration, legislation and regulation, including authorities responsible for managing and implementing laws and regulations
 - ii. Water governance in general, including national requirements and international obligations.
- 4) The **water and sanitation services** (conveyance systems up to tap or utilisation) can be seen mainly from a socio-economic perspective and include relevant infrastructure aspects. This must also be viewed in context of environmental flows, especially in terms of impact on ecosystems generally.
- 5) In addition, **water information and knowledge** (knowledge capital) is an integral part of the various elements, especially in view of the interdependency of water with other factors outside the water realm or so-called “water box” (**Figure 3. Decision-making affecting water that are outside the "water box"**). The South African legislation takes the issue of monitoring and information seriously as evident from the peremptory nature of the Chapter 14 of the National Water Act, 36, of 1998. The old adage of “*To measure is to know*” is critical in this instance.

As identified earlier in this document one of the key transformational issues is that of monitoring water use as result of change in focus to demand management and increased regulatory regime both from a compliance perspective and from the perspective of understanding the systems behaviour or response.

Figure 12 shows the three main interdependent aspects of the NRS which are of equal importance in any analysis. Inadequate attention to any of the three subsystems can undermine the value of the work done to improve any of the other.

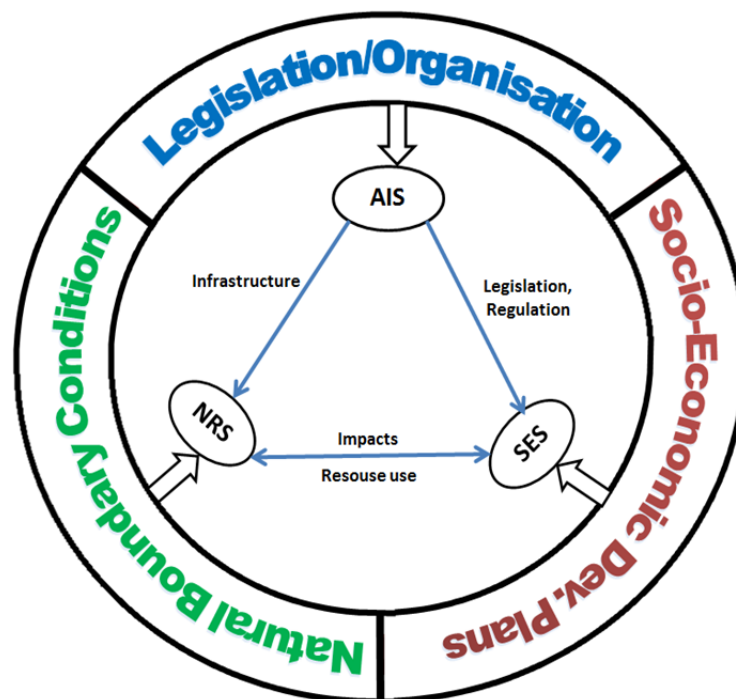


Figure 12 - Interaction between water resources sub-systems⁴⁰

⁴⁰ “Overview of water resource assessment in South Africa: Current state and future challenges”. WV Pitman, Water S.A. 2011

Systems planning for water resources and provision of water services and sanitation in South Africa have not been done in an integrative or holistic manner to sufficiently address interdependencies and new pressures of complexities and increased demands resulting from issues such as political constructs and global change, including climate change, land use changes etc. This has continued despite the 1996-98 policy and legislative changes that anticipated and planned for these changes and provided tools that could have been better utilised and improved upon. For instance an overview of current and future challenges water resources assessment in South Africa⁴¹ suggests that the approach to do these assessments separately or in isolation has continued for decades, changing only in complexities rather than assumptions. Although the studies themselves are invaluable and provide an opportunity to have an excellent assessment of the natural resources subsystem and the other subsystems over the long-term, there does not seem to have been sufficient questioning of the assumptions and the level at which interdependencies across the water value chain is looking like today or from a future perspective.

3. CHALLENGES

This Water Security Framework complements and considers the other national, strategic water sector documents such as the National Water Resources Strategy (NWRS) and the National Water and Sanitation Master Plan (NW&SMP) which is currently in draft form with the Department of Water and Sanitation (DWS). The Master Plan must also serve as an implementation plan for the Water Security Framework.

The NWRS focuses on water resources planning and management, improved water sector knowledge, research, monitoring and evaluation. While the NWRS does look into water security, but from the perspective of the planning and the provisioning of water, supply and delivery and holistic and integrated management and governance.

The Master Plan on the other hand, is intended to guide the water sector with investment planning for the development of water resources and the delivery of water and sanitation services over the horizon until 2030, and beyond. The core purpose of the NW&SMP is to provide an overall perspective of the scope of the water and sanitation business to provide a comprehensive schedule of actions needed to address present challenges, to estimate the investments required to ensure effective water resources, and water and sanitation services delivery, as well as to facilitate effective integrated investment planning, implementation of actions and evaluation of achievements.

Flowing from the earlier reference to the definition of water security, some key gaps relating to planning for water security can be discernible, such as:

a) **Inadequate understanding of the biogeophysical environment** largely due to lack of sufficient regular assessment, including as a result of using old or out-dated information or spatial planning models that are not necessarily responsive to new and complex demands.

b) **Water governance and leadership issues**

These refer mainly to adequacy of legal regime, institutional arrangements, infrastructure and capacity required for implementation and management -

- i. Lack of follow through on policy and legislation – reflected in many decisions being aborted, slowed down or reviewed unnecessarily;
- ii. Functional instability and lack of continuity resulting from change in leadership of the Department and some water entities over the past few years since 1994;

⁴¹ "Overview of water resource assessment in South Africa: Current state and future challenges". WV Pitman, Water S.A. 2011

- iii. Failure to implement the basic institutional framework espoused in the post-Apartheid water policy and legislation;
 - iv. Inadequate emphasis on the new water management model and consistent stretching or even extrapolating old strategies without analysis based on empirical evidence;
 - v. Incapacity resulting from incompetence and ineptitude – many decisions appear to have been either delayed or aborted due to this, including officials lacking confidence or being afraid to make decisions.
 - vi. Incomplete restructuring and re-organisation processes that is exacerbated by start-stop processes since 1999.
- c) Inadequate **enforcement of data and information ownership and curatorship** resulting in moving away from the notion of the knowledge commons – large consultancy companies appear to have a hold on critical data and information required for national planning needs.
- d) Consistent under-expenditure and qualified audits by the sector leader – a serious concern that requires closer examination and decisive intervention. One of the most critical factors contributing to risks to water security is corruption and misappropriation of funds and lack of accountability.
- e) Inadequate financing and investment exacerbated by too much wastage in the system resulting mainly from how the function is done.

The DPME's 2015 diagnostic report identified and delineated six key thematic areas that are seen as critical for water security as reflected in **Error! Reference source not found.** below.

Table 1. Key issues identified in the National Water Diagnostic Report, 2015

ISSUE/AREA	COMMENTS/OBSERVATIONS
The water demand and supply situation	<ul style="list-style-type: none"> • Inefficient water use • Unconstrained water use increases in many municipalities • Unauthorised water use is prevalent especially in mining & agriculture
Impact of extreme climatic events and climate change	<ul style="list-style-type: none"> • Precise magnitude and spatial extent are uncertain; • A recent flagship research programme on climate change - using a scenario-based approach to explore adaptation options • Under a 'wetter' scenario, water allocation between sectors will be less restrictive, but under a 'drier' scenario significant trade-offs are inevitable • Under all scenarios, higher frequencies of flood and drought events are anticipated
Infrastructure asset management and functionality	<ul style="list-style-type: none"> • history of under-investment in asset maintenance and renewal and deficient management systems and record keeping • Concern about the actual state of existing water resource schemes • Failure to adhere to the established operating rules poses a critical water security risk • Prevalence of water supply interruptions and recurring social protests • High number of water systems are in the high to critical risk category • Pockets of waste water effluent infrastructure in a critical state require urgent refurbishment
Infrastructure planning and development	<ul style="list-style-type: none"> • While there is an elaborate inventory of planned projects to ensure water security, based on past records there are concerns about the sufficiency of funding, robustness of institutions, and decisiveness in implementing the envisaged infrastructure • Commitments made during the conception of such infrastructure tend to be irreversible once implemented, and given that resultant assets might have limited functionality outside the original 'intent, the robustness of

ISSUE/AREA	COMMENTS/OBSERVATIONS
	<p>governance during the planning stage is critical. (socially robust information)</p> <ul style="list-style-type: none"> • Many municipalities fail to comply adequately with the prescripts. • Planning maturity in most municipalities has remained poor • Challenges to coherent planning, amid increasing urbanisation and migration • Indications that factors like political interference, lengthy litigation processes, time constraints, limited skills, and inadequate alignment across the spheres of government, all contribute to deficient planning
Institutional and regulatory framework	<ul style="list-style-type: none"> • Collaboration appears to be elusive • Across all spheres of government, divergent interpretations of the framework seem to have fuelled territorial contests to the detriment of service delivery • Two decades into the democratic era, while access to a safe water supply is a constitutional right and critical in meeting socio-economic objectives, there is still inequitable access and allocation • Many institutions in the sector and their overlapping roles have often severely compromised effective regulation • Prevalence of limited compliance with the prescripts of the regulatory framework
Human capital and institutional capacity.	<ul style="list-style-type: none"> • In each of the foregoing themes, deficient human capital and institutional capacity across the water value chain have surfaced among the key features that could inhibit water security • Skills shortage in the country has been at the centre of many discussions, and well documented • Although the skills deficit in the country is considered as critical, the problem is part of a global phenomenon affecting both developed and developing countries • Concerns about the capacity of key national government departments and municipalities - in ensuring the effective implementation of developmental water management and services

The diagnostic report recognises significant strides that have been made in confronting the daunting legacy of apartheid, and in particular in addressing serious backlogs in water services. It raises a wide range of issues that cut across the various themes and that are seen as exhibiting *wicked* attributes where the term ‘wicked’ in this context is used to suggest problems that comprise complex interdependencies – where there is often little consensus on the precise problem to be addressed or the approach to its resolution. It is stated that moving forward, the continued ability to ensure water security for the country will only be certain if a number of critical choices are prioritised and implemented to urgently confront the challenges and limitations facing the water sector. The report proposes a suite of opportunities and recommendations for sector-wide and migration into water security strategies that covers the following:

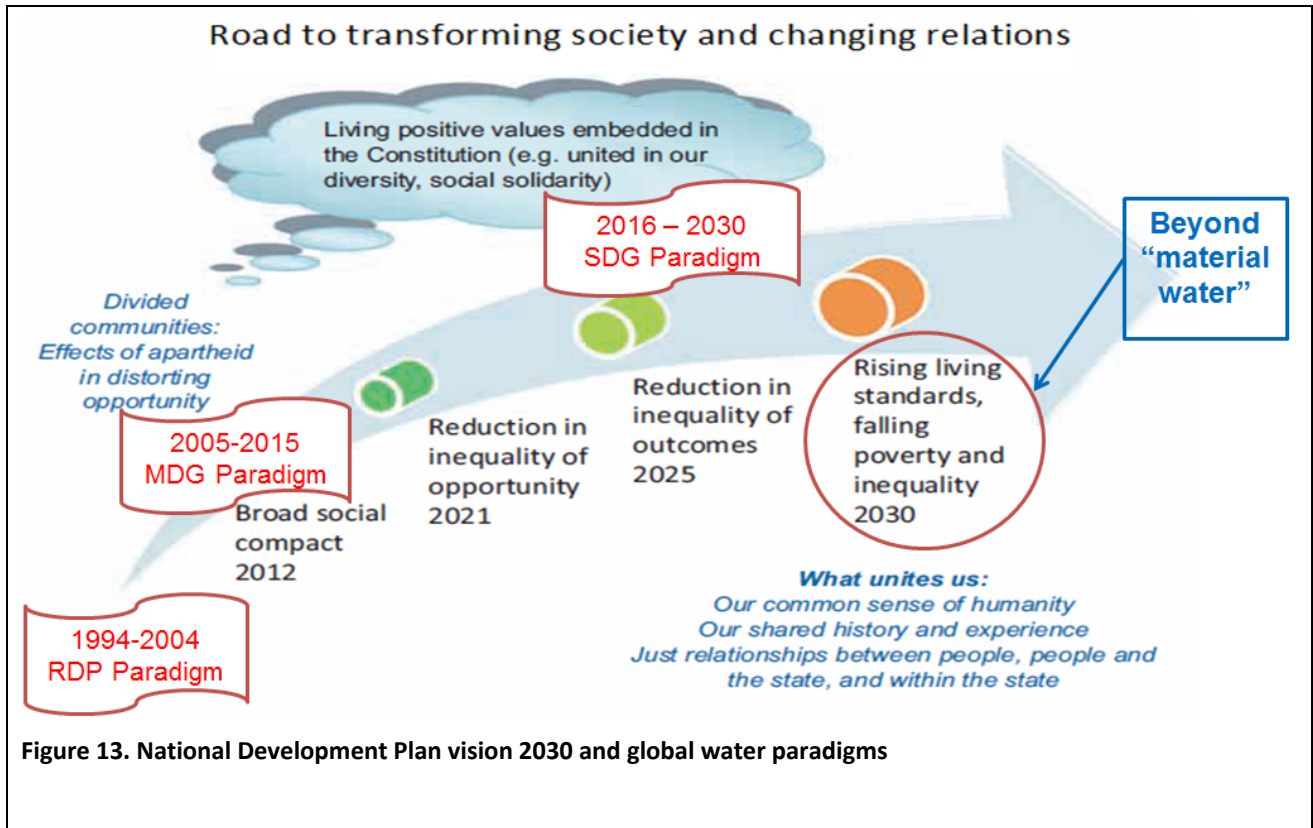
- Scaling-up non-traditional water augmentation;
- Enhancing demand-side management and conservation;
- Innovatively pursuing universal service coverage;
- Proactively planning for strategic water infrastructure;
- Increasing attention to water resource protection;
- Strengthening human and institutional capacity; and

- Establishing quality assurance protocols for the front-end phase.

4. SCOPE, PRINCIPLES AND APPROACH

4.1. NPC PROPOSITION

At national level, the overall **vision** of the National Planning Commission (NPC) is that of rising living standards, and falling poverty and inequality by 2030 (Figure 13).



Vision 2030 of the NDP resonates with the 2015 World Water Development Report's vision on water security which states that:

"By 2050, humanity has achieved a water secure world, where every person has access to adequate quantities of water of an acceptable quality and from sustainable sources, to meet their basic needs and sustain their wellbeing and development. The human population is protected from waterborne pollution and diseases and water-related disasters. Accessing water is no longer a gendered burden, and equitable access to water resources and services for both women and men has fostered greater social inclusion. Ecosystems are protected in a climate of peace and stability. Local and national economies are more robust, as the risks and uncertainties related to the availability of water resources have been taken into account in the long-term planning for poverty reduction and economic development. Norms and attitudes have changed as a result of educational interventions, institutional changes, improved scientific and technical knowledge, sharing of lessons learned and best practices, and proactive policy and legislative developments.

Key aspects of the NDP vision are reduced inequality by 2030; reduction of inequality; eradication of poverty; and significantly reduced unemployment.

The recent report by the World Bank Group in collaboration with Stats SA and the DPME assesses the poverty and inequality looking at drivers, constraints and opportunities. The diagnosis shows that:

- Poverty levels are high for an upper middle-income country;
- High inequality slows down poverty reduction;
- Skills and labour market factors have grown in importance in explaining poverty and inequality and that
- Root causes of poverty and inequality in South Africa and potential solutions.

The report puts water insecurity (environmental fragility) among key challenges and underscores the need to focus on a Water Security Framework which will form part of the solution to achieving the NDP goals. The GWP/OECD report mentioned earlier in this document provides a starting point to analysis and framing water security for South Africa.

Within the context of the centrality of contribution of water to socio-economic growth and development to address the above priorities and from a monitoring perspective two key aspects are considered, namely,

- Economic growth measured by GDP growth contributed directly or indirectly through water;
- Reducing the inequality gap measured in terms of human development index focusing on livelihoods locally through to national (bottom up) and reflective of past imbalances.

The NWRS2 highlights the vision 2030 for the water sector in relation to NDP as a driver. As stated, the NDP articulates the national development goal of eradicating poverty and sharply reducing inequality by 2030.

To achieve this, government has defined a New Growth Path, which is one of inclusive growth and development, with a focus on diversification and wide participation by South African citizens within a vibrant and growing economy. Given that water plays a central role in all sectors, including agriculture, energy, mining, industry, tourism, urban growth and rural development, the allocation, development and protection of water is an essential prerequisite for inclusive economic growth, poverty reduction and the significant reduction of inequality in South Africa.

The NWRS2 analyses the role of water in the economy and identifies the specific challenges, development opportunities and actions that inform an agreed framework for priority areas of focus for the country. It is meant to seek to address concerns about socio-economic growth and South Africa's potential, which may be restricted if water security, resource quality and associated water management issues are not resolved in time, efficiently and effectively. The NWRS2 aims to ensure that water serves as an enabler for inclusive economic and social development and not a bottleneck. This begs the question of how we are doing as a country after all is said and done. The diagnostic report suggests that a lot still needs to be done and a radical change is needed, hence the decision to develop a national master plan that addresses the transformative role that water sector should play at a level beyond the different plans.

The Water Security Framework must provoke thinking so that the country looks at the medium to long-term horizon (2030 and beyond) and ensure that current actions are always aligned with outcomes and impacts. It cannot simply elevate the outputs and programmes as listed in the Departmental plans as the trustee of water resources and overseer of water services and sanitation in the country.

Radical paradigm change is needed if the implementation of the NDP goals and aspirations is to be realised. It is critical that at the highest level the Water Security Framework's achievement must be tested against two key aspects of the country's development, namely, per capita growth and reduction in inequality. It must be able to connect all aspects of water contribution to social and economic

development which has proved to be difficult if not impossible for the line Department, especially in recent times and given that it is not necessarily mandated to control or manage the total value chain.

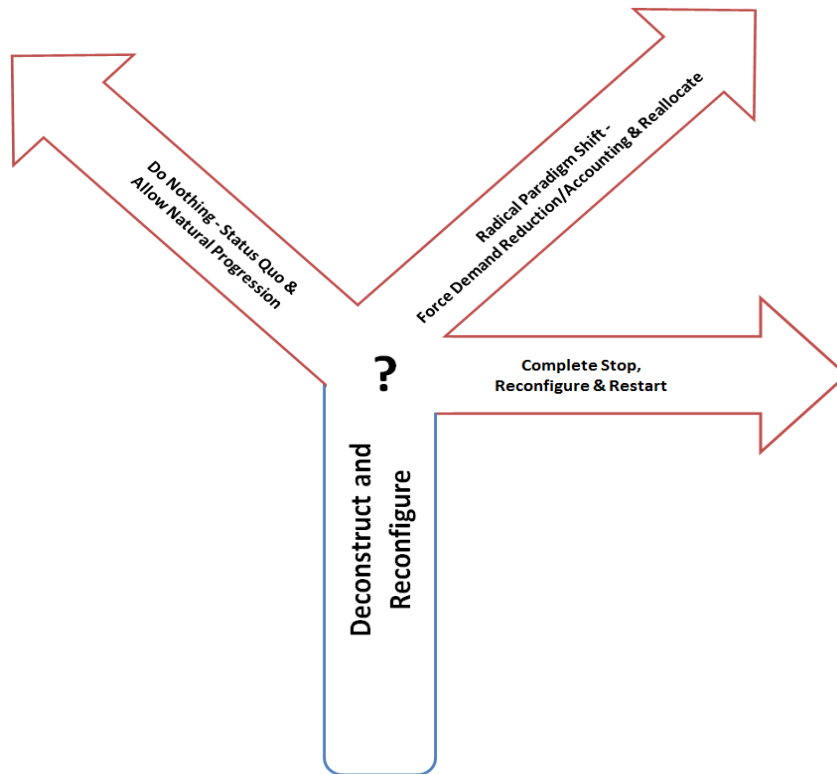


Figure 14. Three scenarios to a 30-year future

Defining the end state for this sector with a radical view to address the spatial equity and examine why there are gaps between the intent of policy and legislation on one hand and the implementation on the other. Systems and processes must be compatible with the goals. Specifically, the following, among others, need to be revisited:

- Poor quality, quantity and relevance of data. A concern that was also raised in the 2013 WWF report on South African water sources;
- Poor regulation and enforcement thereof;
- Lack of reform and transformation of the water institutions as envisaged during policy and legislative development;
- Lack of integration and common goals;
- Lack of accountability and unclear roles and responsibilities; and
- Arguably sufficient legislation, but poor implementation and lack of decision making or follow through.

The framework must focus on national priorities, which include meeting the SDGs as well. The priorities must be underpinned by a thriving economy, and international obligations in terms of the Africa's development agenda. It is envisaged that the building blocks of the framework emanates from local, regional, provincial and national needs. The integration will provide high level direction and further demand accountability from all spheres of Government for the implementation of this framework. It is expected that the framework be simplified and properly timed in order to track down progress and identify areas needing national intervention in order to achieve national objectives.

It is necessary for the framework to be integrated and use the **mass balance approach**⁴² when it comes to water in that it must ensure aspirational need for every drop and movement thereof to be accounted for. The framework will seek to integrate:

- All the competing water requirements from all sectors, look into input water from neighbouring states (surface and ground water through shared basins and aquifers) and precipitation (meteorological information necessary), sea water (desalinated for potable or industrial use)
- Look at output in the form of evaporation, exit to neighbouring states, and consumptive use of water (irrigation without runoff); and
- Span beyond South Africa and do risk assessment for security of supply in neighbouring countries like Lesotho, from which bulk of our water comes from.

It is also evident that the silo paradigm and approach in the water sector has persisted into the democratic dispensation, which results in a tendency or risk of focusing on the lowest common denominator and not focusing on interdependencies. **Spatial planning** has not managed to break the former homeland boundaries, which deprives many communities the required economies of scale when it comes to water for livelihoods and economic development. The allocations for irrigation use must be reformed and structured to be informed by the quantified livelihoods benefit per volume allocated.

Discussions with water experts have shown that per capita consumption per day may be in the region of 150 litres (based on mean annual rainfall availability per quaternary catchment generally). There are areas where higher allocations can be made to enable local economic activities. This in contrast with the incremental, proposed RDP/MDG standards ranging from 25 litres to 60 litres, progressively to universal access. The argument was that it should be enough to allow for livelihoods locally, compared to the RDP initial plan. From a planning perspective we should be doing this where possible, such as the eastern parts of the country which are source areas, yet communities in those areas have been somewhat deprived at the expense of so-called development zones. Huge amounts of money are spent to transport water and yet locals do not have enough allocated. In short we were trying to suggest planning from the needs perspective.

The reported actual use is much higher than 150 litres (averaging 188 litres countrywide and 270 litres for Gauteng, for example). The number of 150 litres must be seen as target, which needs to be verified through scenario planning and depending on what is possible, hence the condition of 'where possible'. These numbers are proposed as a starting point for discussion. The actual figures can be tested through a consultation process in the same way we did when we came to the earlier 25 litres per capita.

Irrespective of the actual figures that are agreed upon once the research has been done, the fact remains that radical changes, such as raising the minimum up to 150 litres (depending on local conditions) per person per day, need to be considered in areas where this is possible. This would include but not be limited to, employment created by revenue from produce, food security and achieved efficient water use efficiency index, and contribution to GDP. In this context the nexus approach should be clearly articulated and implemented.

In considering the radical changes, the mutual interconnections between water, energy and food (the WEF nexus) must as a matter of course be taken into account. It can no longer be seen as an isolated issue as a

⁴² The law of conservation of matter states that matter (e.g. water) is conserved – that is, neither created nor destroyed. A mass balance is an accounting of a material for a specific system boundary. In other words, you are keeping track of all sources of the material that enter the system, all sinks of the material that leave the system, and all storage of the material within the system. This method is called the mass balance technique. Source: <http://environ.andrew.cmu.edu/m3/s4/matbalance.shtml>

result of lack of understanding and complexities of the relations between the component parts⁴³. For instance if the demand for water for energy and the associated impact on water quality is reduced significantly by 2030, the water allocated for energy will become available for other uses. The interdependencies with agricultural requirements for both water and energy need to be strategically determined in order to maximise the benefit to society.

The Water Security Framework should take cognisance of the fact that unlike other resources, **WATER CANNOT BE SUBSTITUTED** with anything. It is finite and must be preserved and protected for future generations.

We should also note that the scarcity of fresh water or water fit for use is driving the world towards **innovative technologies** which look into more efficient ways of treating water and also reducing pollution of our water resources. Desalination of sea water into potable or industrial grade water is common practice around the world where surface water is depleted. These technologies demand huge investment costs together with high level skills sets which South Africa should have.

In recent years, a *fatigue* resulting from start-stop regarding issues of **water governance** can be discernible. The advent of Local Government legislation made the governance of water services even more competitive. Understanding and alignment of legislation is a critical process that must be undertaken. It should be noted that legislation is one of the critical tools at our disposal for the governance and management of water in South Africa. Legislation should be clear on the allocation of responsibilities and mandates across the water value chain, and across the various role players. Of utmost importance is the enforcement of regulation, where accountability is demanded.

The OECD⁴⁴ in addressing the question of why water security matters, after assessing the common challenges of water security globally and in the context of OECD countries, recommended that a risk-based approach to water security is essential. Achieving water security means maintaining acceptable risk levels for four water risks, namely:

- Physical shortage (including drought): Lack of sufficient water to meet demand in short, medium and long-term for beneficial uses by all water users;
- Inadequate quality: Lack of water of suitable quality for a particular purpose or use;
- Excess: Overflow of the normal confines of water system or the destructive accumulation of water over areas that are not normally submerged; and
- Risk of undermining the resilience of freshwater systems: Exceeding the coping capacity of the surface and groundwater bodies and their interactions (the “system”); possibly crossing tipping points, and causing irreversible damage to the system’s hydraulic and biological functions.

In the context of South Africa and her relatively new transformational policies the above risks are exacerbated by the lack of skills and capacity in general across the board. Assessment of the risks needs to be done conjunctively as they impact on each other given the nature as a hydrologically interconnected resource. Effective management of the risks is central to achieving the objectives of the Water Security Framework.

Key aspects of the framework include the fact that it must, as a matter of course:

- Remain a high-level national guide that is long-term in nature but that determines immediate decisions and actions based on empirical evidence and best available information and knowledge.

⁴³ Mpandeli *et al.* 2016

⁴⁴ OECD (2013), Water Security for Better Lives, OECD Studies on Water, OECD Publishing.
<http://dx.doi.org/10.1787/9789264202405-en>

- Be sufficiently instructive to ensure that all mandated institutions and organisations draw from it with the line Department sufficiently capacitated to play its sector leadership role properly;
- Provide an analysis of why the sector seems to be in a stagnant state with decisions either not being made or if made they are not executed or followed through;
- Reflect urgent and immediate decisions to be made to ensure sector functionality such as institutional framing and establishment as well as high level roles and responsibilities and financing etc.;
- Recognize and take into account that water programmes are by nature long-term and that every effort must be made to decouple water security planning cycles from the geopolitical, financial and other cycles which are largely short term in nature. Further, bad planning whether due to wrong assumptions or lack of requisite capacity can result in irreversible or devastating impact in the long-term. For instance, on average a mega project conceptualised in 2017 can produce first results in to 2032 to 2037 (three to four political/administrative/governance cycles multiplied by three spheres of government and several economic cycles which may include recessions and so on); and
- Cursory assessment of the water situation in the country reflects that the challenges faced are a result of cumulative effect over a long period which needed proper long-term, scenario-based planning and implementation (Refer to **Figure 4. Decision analysis since the development of new water policy in 1994.** on decision analysis in early in the document).

Further,

- National spatial planning needs to be responsive to the redistributive needs of the country and not the *usual* economic zoning which by default leads to maintaining the *status quo*. Water should form an integral part of the spatial planning. It is an irreplaceable commodity and a national asset in Government's trusteeship;
- Water Security needs to be seen as key driver, especially in respect of sustainability and the nexus approach (water-food-energy-health etc.);
- Sector direction as dictated and lead at the highest level with clear roles and responsibilities across the value chain is critical;
- Strengthening leadership, water governance and stewardship should be non-negotiable.
- Serious consideration is to be given to separating the technical functions through a structured process, starting immediately with those that will not need political or legislative changes;
- Tools and instruments exist to be used for co-implementation, state-owned enterprises, private institutions, and other spheres of government;
- As a country we must be looking at *end-to-end value chain* coverage that takes into account a holistic development agenda through beneficiation.

4.2. SCOPE

The scope of the framework is to position the NPC with respect to key interventions at short, medium and long-term with the objective of developing an integrated approach to planning for water security, creating an enabling mechanism for implementation and clarifying roles and responsibilities. For instance, linking water issues with other aspects of the NDP such as spatial planning among others, and ensuring that the various role players at national level focus on the priorities of the NDP goals and objectives.

The framework segregates the various elements of implementation both in terms of areas of focus and the respective roles and responsibilities across the board. Most importantly it provides a platform for monitoring implementation in a focused manner at the highest level in line with short-, medium- and long-term impact. To this end, two key areas will drive the monitoring, namely:

- Economic growth measured by GDP growth contributed through water and allied activities;
- Reducing the inequality gap measured in terms of human development index (HDI) focusing on livelihoods locally through to national (bottom up) and reflective of past imbalances.

The above must be viewed in terms of the NDP's vision of reducing the Gini coefficient to globally acceptable levels and enabling milestones of universal access to clean running water in the homes as well as the commitments made through the SDGs.

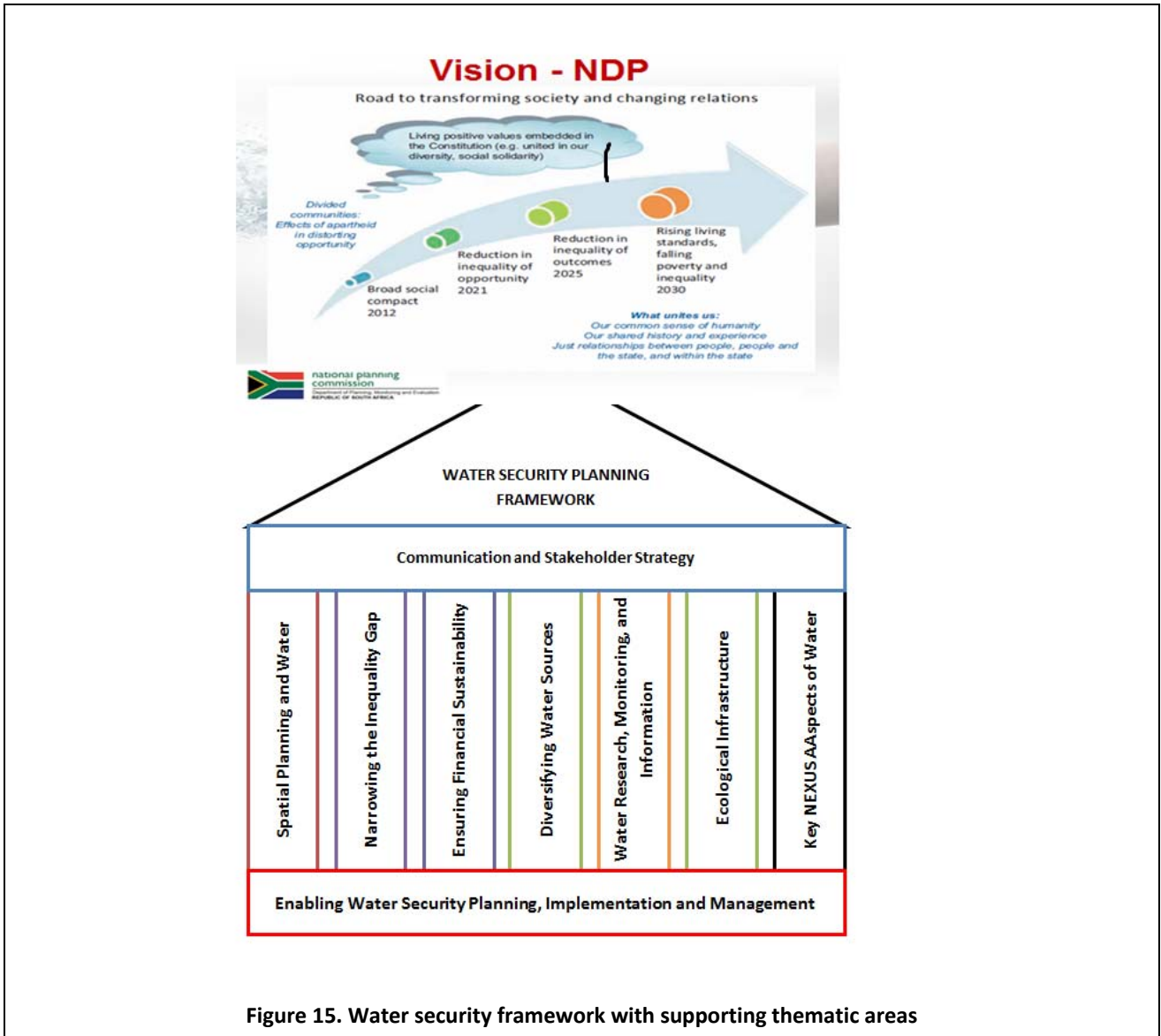
4.3. STRUCTURE OF THE FRAMEWORK

The Water Security Framework is divided into themes and these are outlined in the sections that follow. It includes a chapter dedicated to background and context, which provide an overview and rationale for water security planning and the approach adopted to deal with the question of water security.

The contents have been configured to cover the six key thematic areas highlighted in the diagnostic report and delineated as critical for water security. Overview and rationale for water security planning:

- a) **Situation Assessment**, covering at least the following subsystems:
 - i) natural resource system;
 - ii) socio-economic system;
 - iii) Administrative and institutional system;
 - iv) Water services and sanitation;
- b) National water security **vision**
- c) National **water information** status and requirements
- d) The **water demand and supply** situation;
- e) **Global change** and adaptation to climate change;
- f) **Strategic infrastructure asset management** and functionality;
- g) **Strategic infrastructure planning** and development;
- h) **Institutional and regulatory framework** to enable planning for water security encompassing:
 - i) Policy and legislative framework;
 - ii) Governance and implementation;
 - iii) Financing and investment;
 - iv) Regulatory regime;
 - v) Institutional model;
- i) **Human and institutional capacity** (including intellectual capital contribution to the growth in the knowledge economy).

The areas above are deliberately organised into main framework and supporting thematic areas, as illustrated in **Figure 15** below, to reflect the complexity of the interdependencies, as well as the transdisciplinary and nexus nature of the water challenges.



4.4. PRINCIPLES AND APPROACH TO PLANNING FOR WATER SECURITY

- i) Source to sea across the water value chain

In articulating the water and sanitation value chain, water supply and use are considered from source to sea in holistic or integrated manner (Figure 16) with indication of needs for conveyance systems that link to infrastructure requirement, financial flows and impact at the lowest/local scale.

The framework is based on a holistic approach that considers the entire water cycle from **source to sea, and back**; and should put human influence on the water and *nutrient* cycle (environmental flows) at the centre⁴⁵. In the South African context this must as a matter of course include putting livelihoods and improvement of the country’s majority at the forefront of efforts. The moment this approach is taken, the transboundary aspect of water security gets logically incorporated. A case in point is the ORASECOM’s approach where both land and oceanic circulation are taken into account from Angola’s Cabinda Province

⁴⁵ Katharina Conradin, 2012

through to the Eastern Cape (Port Elizabeth) in South Africa⁴⁶. Further, discussion and planning on projects such as the opportunities presented by the Zambezi and Congo Rivers, as well as desalination bring about a different narrative which is in a way narrow.

This framework reflects key elements of an “*end-to-end water value chain*” consideration that will allow full beneficiation upstream and downstream of any project. A case in point would be the drive for Operation Phakisa⁴⁷ that aims at unlocking the oceans’ economy in that water resource and provision of water and sanitation services development must be looked at as an integral part of the marine integrated plan. Further, local water management must as a matter of course be considered within the context of socio-economic development and not just from a social perspective.

⁴⁶ ORASECOM (2013). From Source to Sea: Interactions between the Orange-Senqu River Basin and the Benguela Current Large Marine Ecosystem.

⁴⁷ <https://www.operationphakisa.gov.za/Pages/Home.aspx>

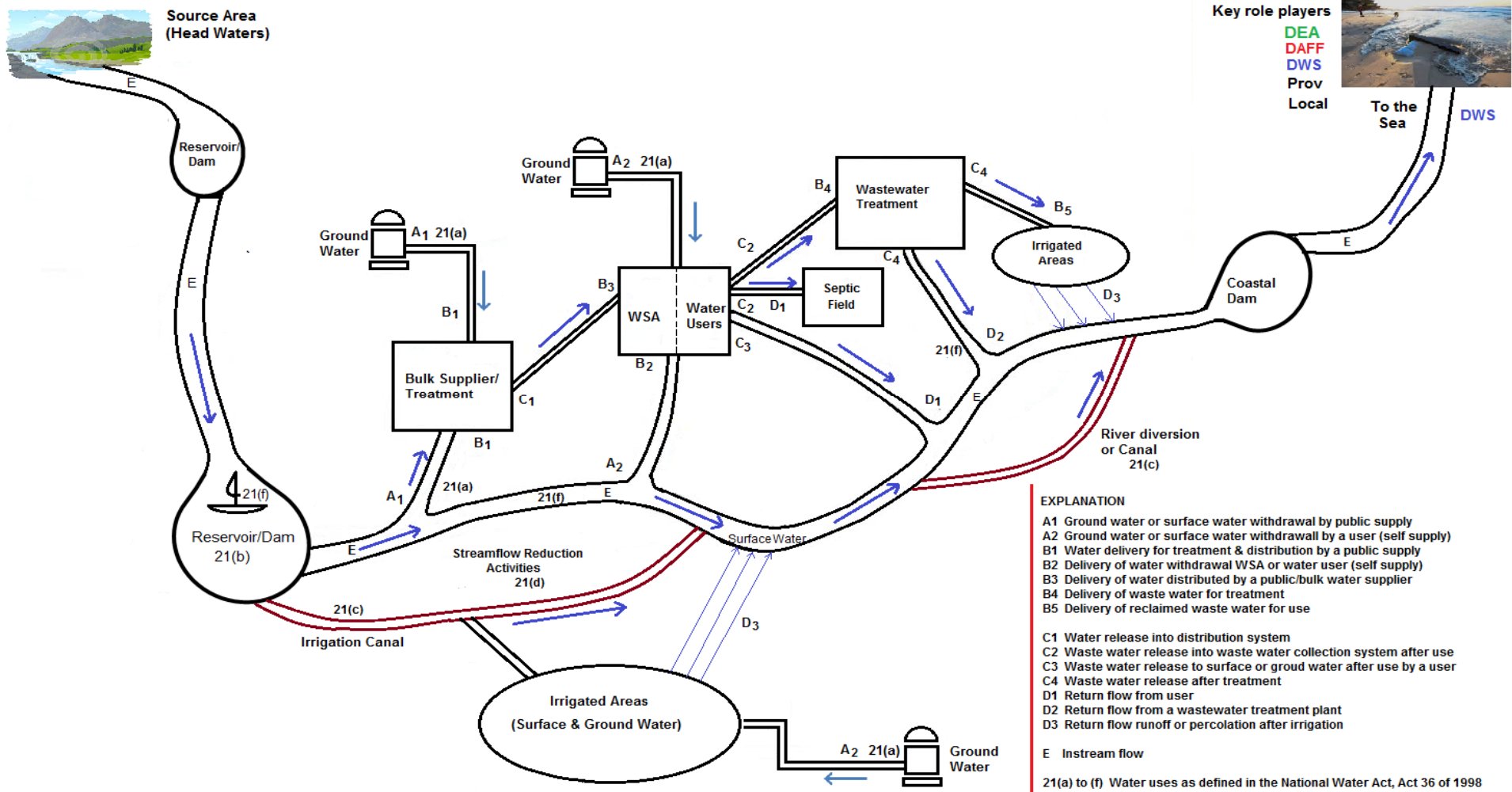


Figure 16. Value chain from water use perspective⁴⁸

⁴⁸ Modified from USGS, (2002): <http://water.usgs.gov/pubs/chapter11/index.html>

ii) Long-term view based on scenario planning and associated risks

Water management generally takes a long-term view due to the nature of the resource. For instance, a typical large water resource development scheme generally takes 15 to 20 years from conception to first day of benefit realisation like water coming out of the tap. Further, the impact of such project will take several decades. Viewed in the context of the South African water situation of scarcity and uneven distribution, as well as impact of high climatic events, climate variability and change are critical that interventions and management need to be holistic and take into account the various supply and demand scenarios.

It is critical that planning for water security must by design go beyond the 2030 horizon reflected in the NDP. The various planning horizons should be accommodated for, depending on the objectives as well as the size of planned intervention.

iii) Policy and Legislation as starting point

In line with the 1996 principles of the National Water Policy and the revised positions of the 2013/14 policy and legislation need to ensure focus and creation of enabling conditions. Reviewing of policies and legislation must be informed by the need to enable planning for water security and judicious management. The basic assumption in this regard is that until changes to policy and legislation are motivated for and carried out, water security planning, management and implementation must be based on the current policy and legislative regimes. That is why water security planning and implementation should be an integral part of IWRM. Changes to legislation or policy must be run as parallel processes to avoid unnecessary delay in implementation.

The institutional framework must be finalised within the shortest possible time, so that the policy and legislative regime is properly tested through implementation and not defeated or questioned before implemented at least at a 60 to 70 per cent level of implementation.

iv) NEXUS approach to planning, implementation and management

In simplest terms NEXUS refers to a connection or series of connections within a particular system. Within the water context, it is recognised that water is central and in many respects a limiting factor in terms of energy, food, health, economy, etc. In the context of the Water Security Framework, focus is placed on the WEF nexus which refers to the interconnections that exist between the water, energy and food sectors. Since 2011, the WEF nexus approach has been promoted as an integrated and sustainable approach to managing key sectors related to water resources, energy and food security. These three are critical to sustainable development, with synergies and trade-offs, that if not managed well can derail sustainable development efforts. This realisation led to global leaders meeting in 2011 at the World Economic Forum in Davos, Switzerland, agreeing to drive the WEF nexus in a sustainable or integrated manner. Although the Millennium Development Goals (MDGs) missed an opportunity to clearly factor the WEF nexus especially in its targets, the approach is now adopted under the SDGs framework. After the SDGs agenda was established by the United Nations (UN) in 2015, the WEF nexus activities were factored as part of the SDGs, especially goals 2, 6 and 7 (**Figure 17**). Based on the decisions taken by the UN on the SDGs, various countries including South Africa are at various stages of driving the WEF nexus both at technical and policy levels.



Figure 17. Shows the 17 SDGs agreed upon by 193 countries in UN General Assembly in 2015⁴⁹.

v) Decision support from credible information and research results

Policy, planning and implementation decisions must be based on credible information and appropriate knowledge currently available.

Intellectual capital associated with full value chain in recognition of the importance of knowledge economy is essential. South Africa's capability to leverage this aspect in line with its positioning, especially in respect of infrastructure and socio-economic development is critical.

vi) Mass balance approach to assessment and implementation

A mass balance approach to assessment and implementation is necessary to ensure that the spatial and temporal distribution of water effectively address the imbalances of the past on one hand and the social and economic needs in the long-term. Mass balance will ensure accounting for what happens through the water value chain. Continuous improvement through identification of risks and bottlenecks and provision of appropriate interventions and guidance needs to be taken into account.

Such assessment brings to the fore the notion of accounting for water which looks into water inflow, change in storage, depletion or process as well as outflow taking into account the quantitative and qualitative values. Water productivity has been studied over the years, especially in respect of agriculture normally represented in kg/m^3 or even monetarily in $\$/\text{m}^3$ and so on.

5. PROPOSED – THEMATIC AREAS

5.1. CONTEXTUAL OVERVIEW

The DPME's 2015 Diagnostic Report outlined a roadmap towards what was then called a water plan based on sector-wide consultation process (**Figure 18**) and which was used to guide this framework.

⁴⁹ Source: UN 2015

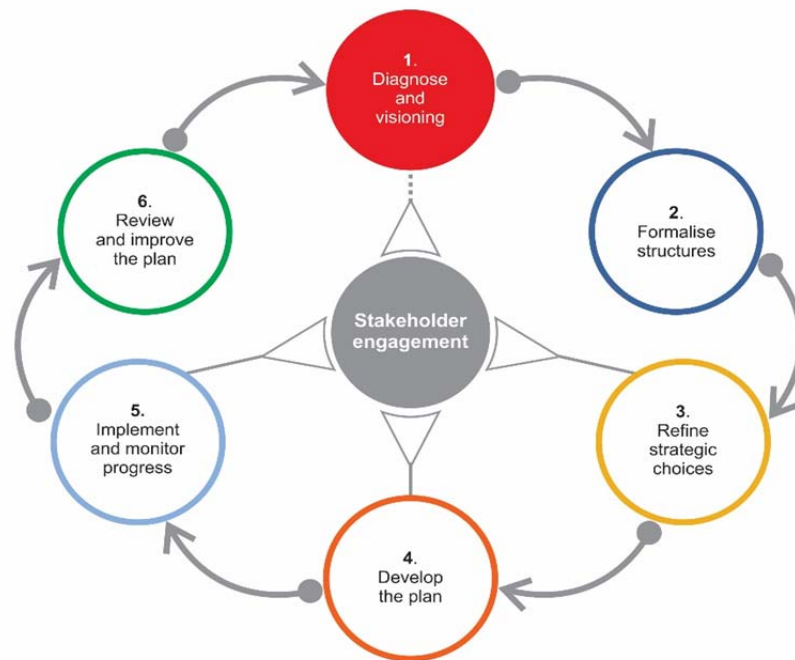


Figure 18 Water Plan Roadmap from the National Water Plan Diagnostic Report, 2015

As earlier stated, this framework is the highest national planning platform and tool from which all other plans draw. By design, it is set to clearly and unambiguously address the developmental state as articulated in government policies and the NDP. Its focus is the socio-economic development and is strategically broader to form the “hook and hanger” from which all other plans draw implementation plans. The performance indicators are largely those that directly impact on the country’s economic position and national transformation imperatives. The WfGD was attempting to address some of these needs – albeit in part. Further, the plan resonates with international obligations as well as intersectoral interdependencies which would not otherwise be fully covered from Departmental perspective.

Different levels of plans from NDP to local integrated water management plan based on value chain at that scale with clear articulation of roles and responsibilities at that scale will be in place following the hierarchical schematic below (Figure 19. Hierarchical schematic illustration of NWSF in relation to other plans.). Institutional setting should be able to cover these in a regionalised manner in line with legislative model.

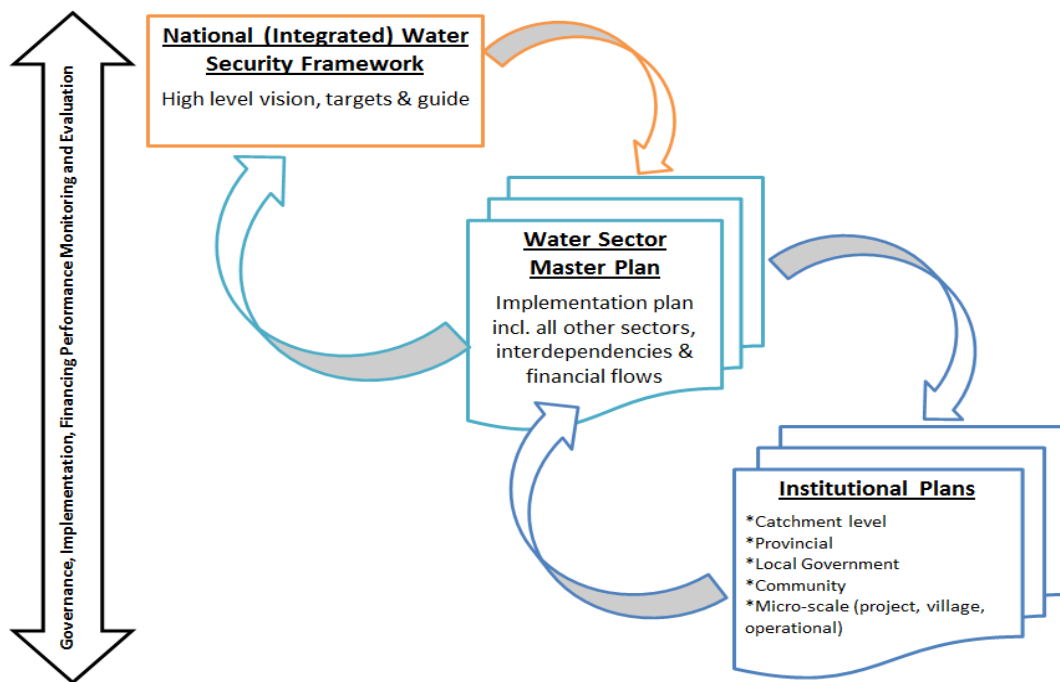


Figure 19. Hierarchical schematic illustration of NWSF in relation to other plans.

The roadmap for the NWSF will take into account the institutional jurisdictional boundaries and help ensure that each institution is clear about what is expected.

The diagnostic report⁵⁰ provides a general overview of the water situation in the country and will not be repeated here. Further unpacking of the water situation will be articulated in the Water Security Framework with examples of successes and failures over the past and setting the scene on what is to be done in the medium- to long-term.

It is worth pointing out the infrastructural works planned in time to accommodate for increases in water demand. The NWRS2 speaks to addressing our infrastructure challenges and demands for the entire water value chain. The document states that we need an estimated R670 billion over the next ten years. In addition we require an investment of R30 billion for sustainable water management programmes, bringing our total sector investment to R700 billion, being R70 billion per year. This is a considerable investment which will be funded from on-budget and off-budget sources through the private sector.

5.1.1. Natural Resource System – the Hydrologic Environment

The positioning of Africa globally is that the continent is a resource-based economy continent, with a low rainfall:runoff ratio and high evaporation rate. Only 20 per cent of the runoff is available for development, while 80% evaporates (Figure 20).

⁵⁰ DPME, 2015

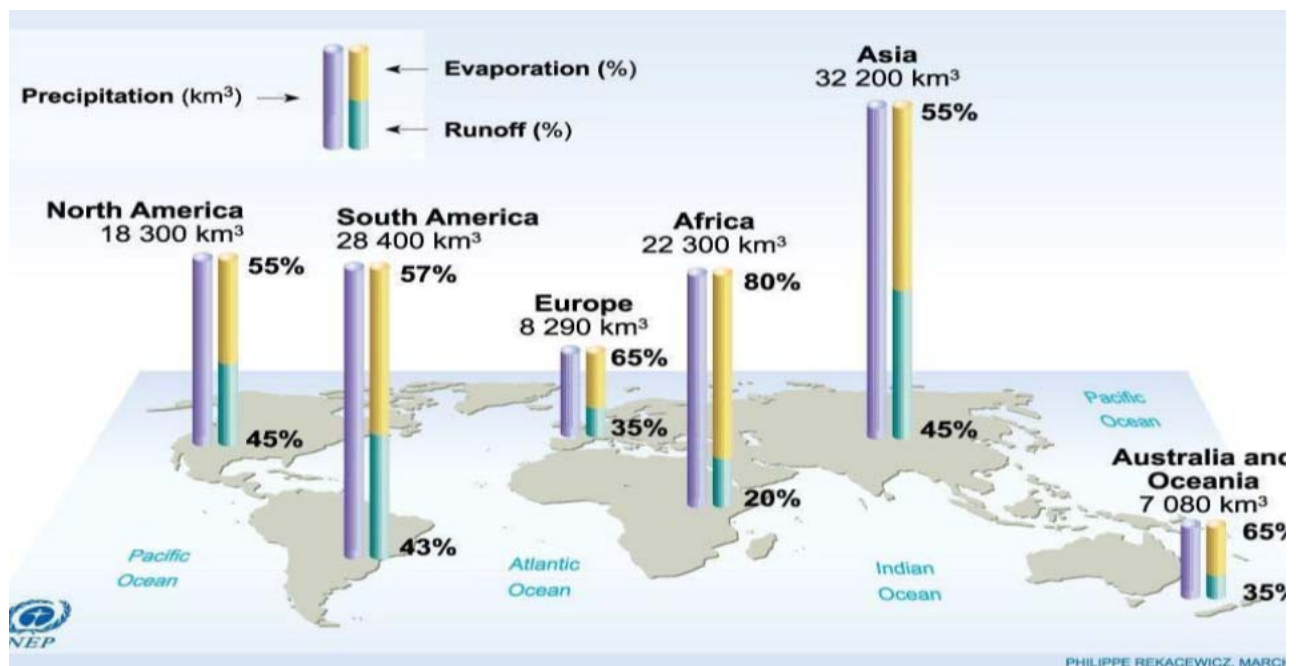


Figure 20. World's surface water precipitation, evaporation and runoff by region⁵¹.

Africa's water towers (Figure 21) have been identified as elevated areas where precipitation is higher than 750mm and runoff above 250mm. They contribute to water resources for population beyond their delineated boundaries.

In the South African context this would be primarily the Drakensberg mountain range and the Lesotho highlands which contribute more than 60 per cent of the total precipitation. In assessing long distance water transfer schemes this could be the areas to look into in terms of benefit to cost analyses.

South Africa has 22 water source areas spread across five provinces (KwaZulu-Natal, Mpumalanga, Western Cape, Eastern Cape and Limpopo). The total size of our water source areas is 12.32 million hectares. A number of these areas extend and are shared with Lesotho and Swaziland; approximately 1.91 million hectares in Lesotho and 0.93 million hectares in Swaziland. The total volume of water supplied by these areas per year is approximately 2 457 million cubic metres. The greatest volume of recharge is generated by the Southern Drakensberg, followed by the Eastern Cape Drakensberg and the Boland Mountains.⁵²

Of the 263 major international transboundary river basins, Africa has 63 (comprising about 24 per cent) covering about 64 per cent of the continent's land area and containing about 93 per cent of the total surface water resources (Figure 21). Some 77 per cent of Africa's population is said to be located in these areas.

⁵¹ UNEP

⁵² <https://water.cer.org.za/>

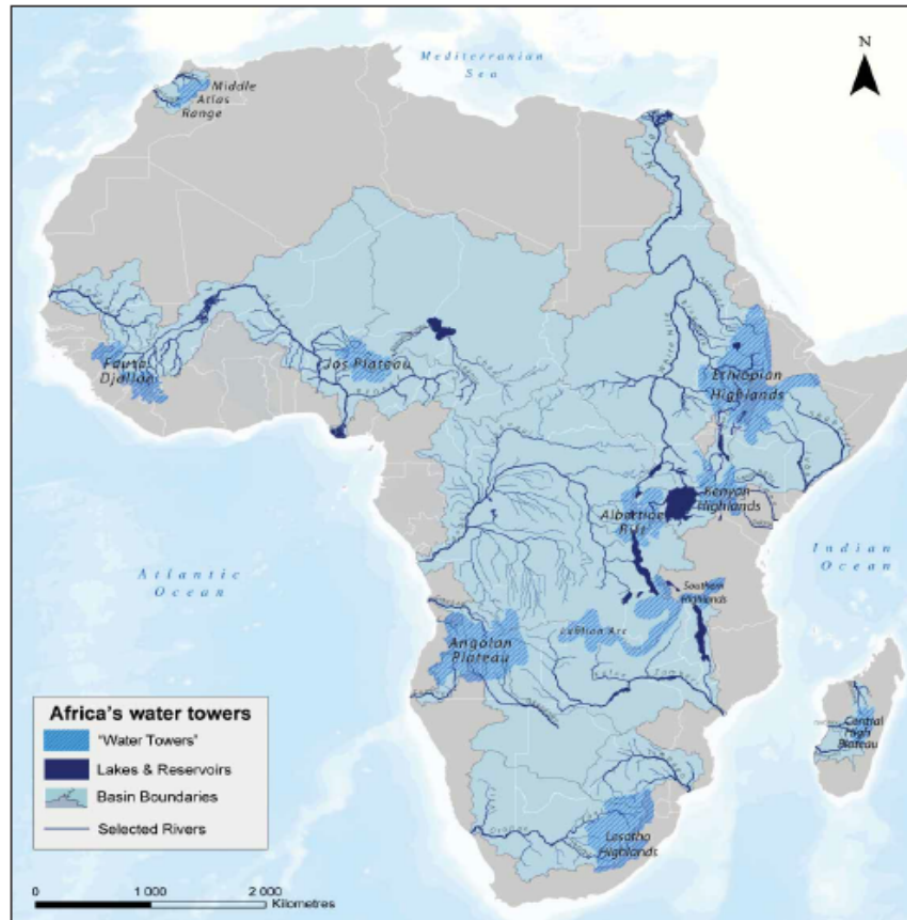


Figure 21. Africa's "Water Towers" with selected rivers

Within the context of Southern African Development Community (SADC) political boundaries and major river basins (Figure 22 and Figure 22) comprise:

- 15 River basins shared by at least two countries;
- 70per cent rural population relies on groundwater supplies – compare this to poverty levels and livelihoods in general;
- Of 280 million people, 40per cent is said to have no access to adequate safe drinking water and 60 per cent has access to adequate sanitation services;
- Of 50 million irrigable hectares, only 7per cent (3.4 million ha) is currently irrigated; and
- 14 per cent of total annual renewable water resources utilised compared to 70-90per cent in industrialised countries.

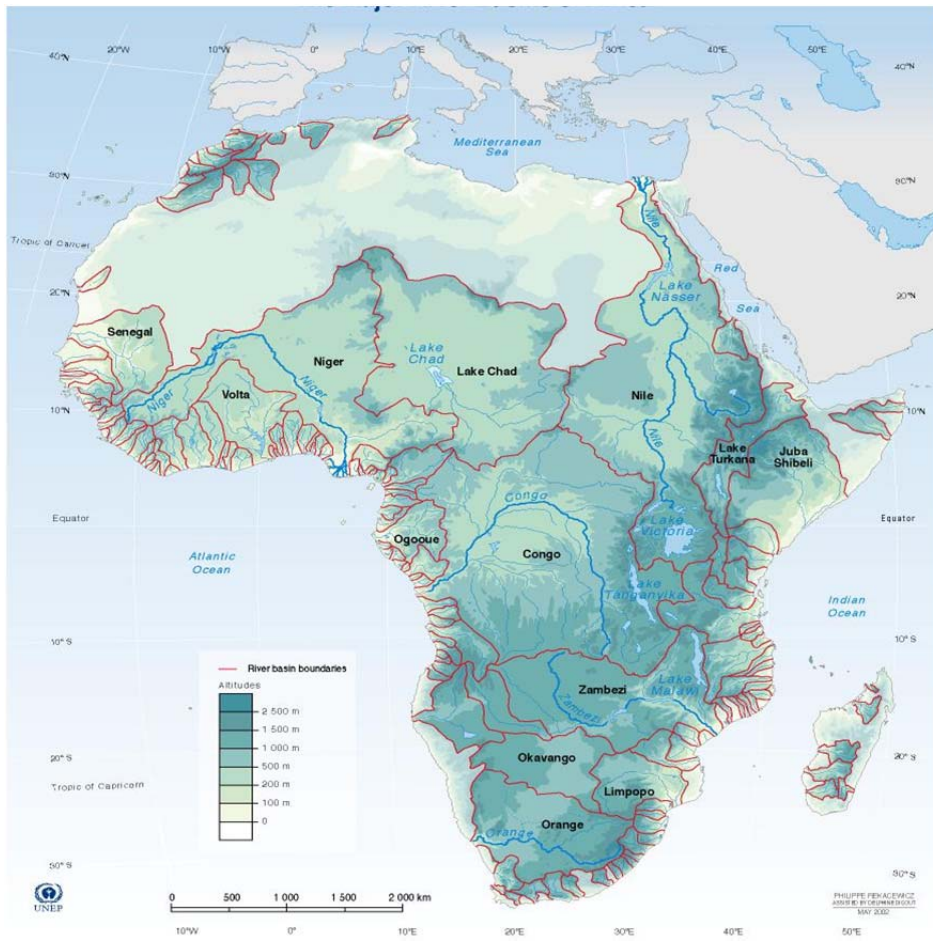


Figure 22. Major river basins of Africa⁵³

⁵³ UNEP, (2001)



Figure 23. SADC Political boundaries and major river basins

In the South African context, more than 60 per cent of river systems are shared with neighbouring countries and the international allocation is written into policy and law as one of the priorities. Regionally transboundary water management is done through the Revised Protocol on Shared Watercourses in SADC which provides the context for the Regional Water Policy (RWP) which states over-arching goals designed to be put into practice by the Regional Water Strategy (RWS), namely:

- Regional cooperation in water resources management
- Water for development and poverty eradication
- Water for environmental sustainability
- Security for water-related disasters
- Water resources information management
- Water resources development and management
- Regional water resources institutional framework
- Stakeholder Participation and Capacity Development
- Accessing funding and resources.



Figure 24. Shared basins providing water sources and reflecting transboundary inter-basin transfer

Institutions to manage international obligations created and recognised under the South African Law include:

- Limpopo Water Course Commission (LIMCOM)
- Inkomati Tripartite Permanent Technical Committee and the associated Komati Basin Water Authority (KOBWA)
- Orange-Senqu River Commission (ORASECOM)
- Lesotho Highlands Water Commission (LHWC)

These are also complemented by the bilateral agreements with neighbouring countries on water matters. In this context, it is important to note that where South Africa is not a riparian state, it makes it complex to negotiate water transfer even when geopolitically this could make sense.

Water availability in Southern Africa is characterised by uneven spatial distribution and seasonal variation with the driest parts being the southern-most parts of SADC. Key elements of water availability in South Africa include the following:

- 43 per cent of rain falls on 13 per cent of land⁵⁴;
- Unreliable and fluctuating stream flow for use;
- Total natural runoff averages 50 billion m³ p.a.⁵⁵;
- Major urban and industrial development areas are not located in areas with water resources – necessitating large scale transfers;
- Of the 50 billion m³, only 14 billion m³ (28 per cent) is available for use through dams, basin transfers and other resource developments throughout the country. This must be viewed in the context of high levels of sedimentation and evaporation which impact water available for use.⁵⁶

South Africa's water sources in relation to SADC are shown in Figure 25 which also illustrate that the reases are mainly in the eastern side of the country.

⁵⁴ Aquastat: http://www.fao.org/nr/water/aquastat/countries_regions/ZAF/

⁵⁵ National Water Conservation and Demand Management Strategy, DWAF, May 2000

⁵⁶ National Water Conservation and Demand Management Strategy, DWAF, May 2000

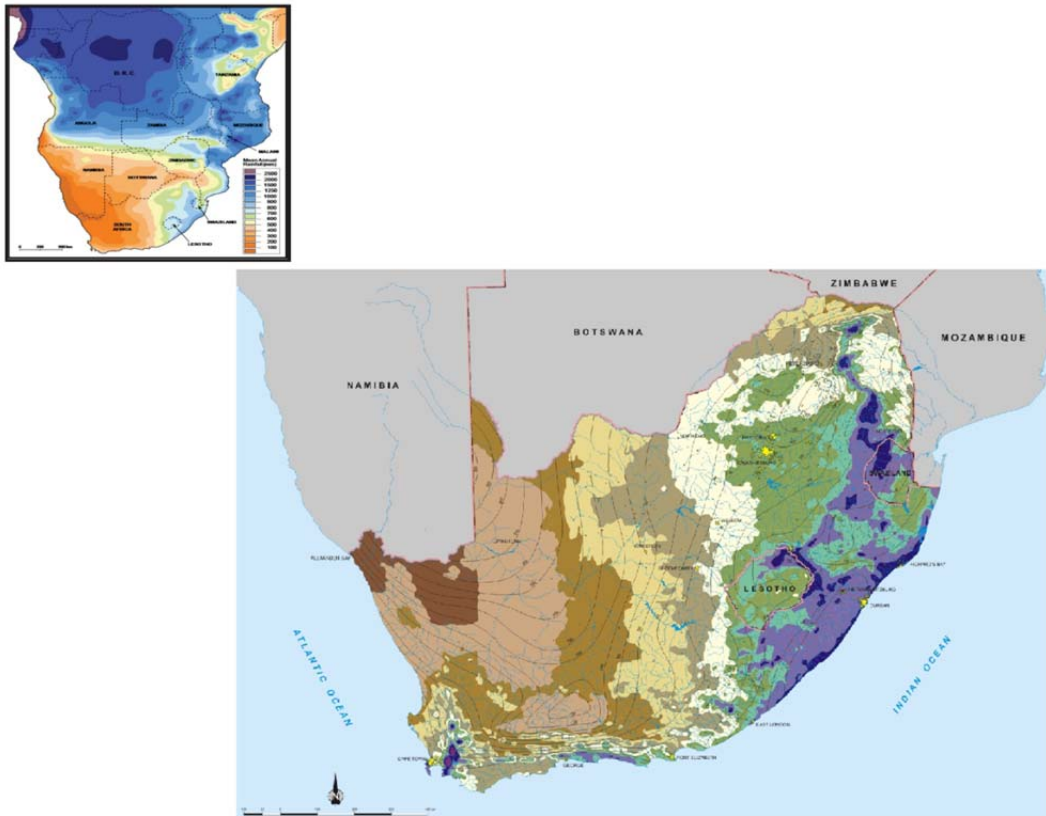


Figure 25. South Africa's water sources in relation to SADC



Figure 26. Interbasin/catchment transfer for South Africa, (DWAf)

The story of freshwater systems cannot be complete without including groundwater. An equivalent map has been produced on shared transboundary aquifers on the continent. Although these resources are very important as part of fresh water sources for drought security, and can be

available for productive use, they are largely under explored both nationally and at transboundary level.

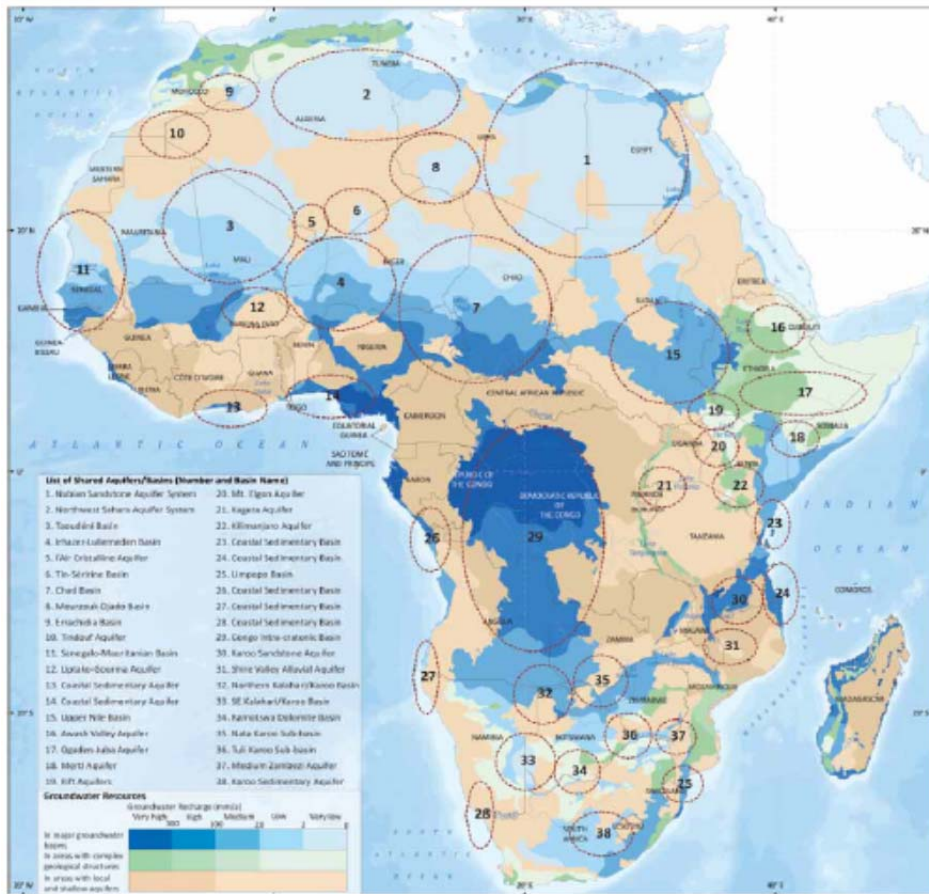


Figure 27. Major transboundary shared aquifers in Africa⁵⁷

Groundwater is limited due to the geology of the country and large porous aquifers occur only in a few areas and availability is estimated at 10 per cent of the total water availability of 910 m³/capita/annum⁵⁸. From water availability perspective it is estimated that National Utilisable Groundwater Exploitation Potential m³/km²/a is:

- 12 billion surface water (+11 billion allocated);
- 10 billion ground water (7.5 billion under drought conditions (only 2-3 billion used); and
- 2 billion usable return flows.

Groundwater is often the primary source in the rural and more arid areas, as well as for many towns. It is estimated that more than 100 towns (more than 60 per cent of small towns) in South Africa depend on groundwater and about 7.5 per cent of the water supply to Pretoria is from groundwater. It also supplies water to large irrigated areas, livestock and many mines and industries. Groundwater use can be increased substantively, at least in a local supply context. It is expected that groundwater use for human consumption will further increase, especially in the western part of the country which lacks perennial rivers.

⁵⁷ UNESCO

⁵⁸ Kevin Pieterse, K and Hans Beekman, H. 2015. Groundwater Management in the Southern African Development Community.

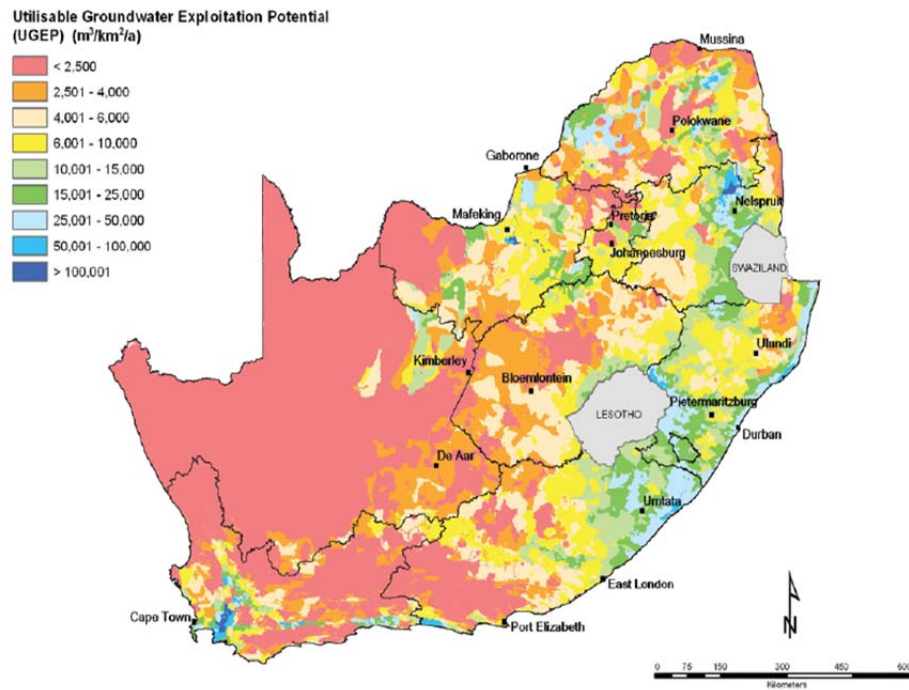


Figure 28. Utilisable groundwater exploitation potential⁵⁹

Distribution of dams in Africa⁶⁰ (Figure 29) reflects that South Africa takes the lion’s share of reservoirs and reconfirms the argument that spaces for large water resource development projects are limited.

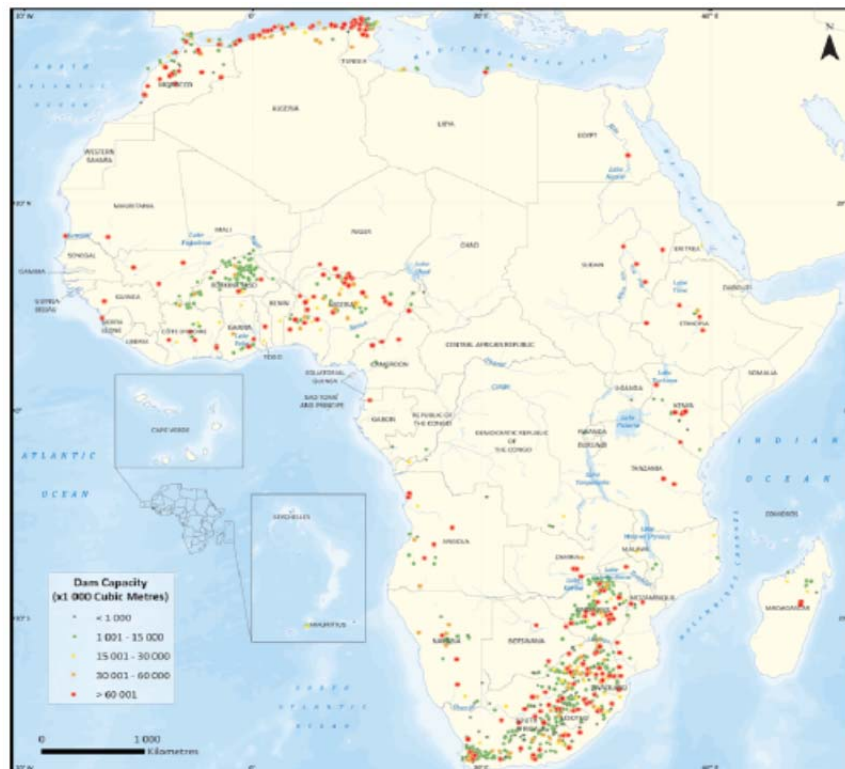


Figure 29. Dam/Reservoir distribution in Africa⁶¹

⁵⁹ DWAF, 2013

⁶⁰ UNEP, Africa Water Atlas, 2010

⁶¹ UNEP, Africa Water Atlas, 2010

5.1.2. The socio-economic environment

South Africa's water challenges are in general Africa's challenges. South Africa's estimated water use per sector reflects a high level of allocation to irrigation like many sub-Saharan countries.

As reported by the WWF in their 2017 publication on *Scenarios for the Future of Water in South Africa* water demand in South Africa has been witnessing a steep increase, with three major sectors driving the demand. The agriculture sector is the highest at around 62 per cent irrigation water, followed by the municipal and industrial sectors at 27 per cent and 11 per cent respectively. This demand is expected to further grow at around 1 per cent annually to reach ~18 bn m³ in 2030 from 15 bn m³ in 2016.

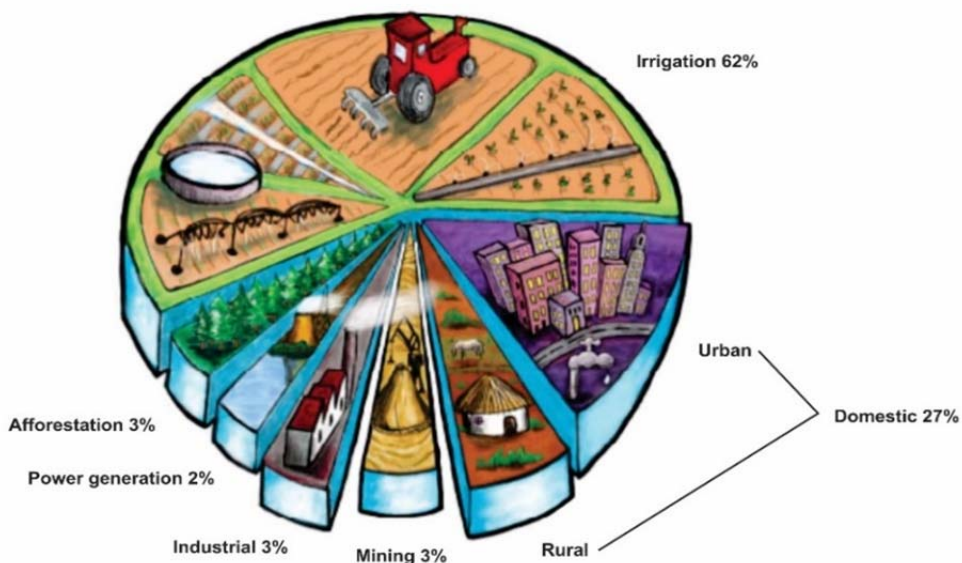
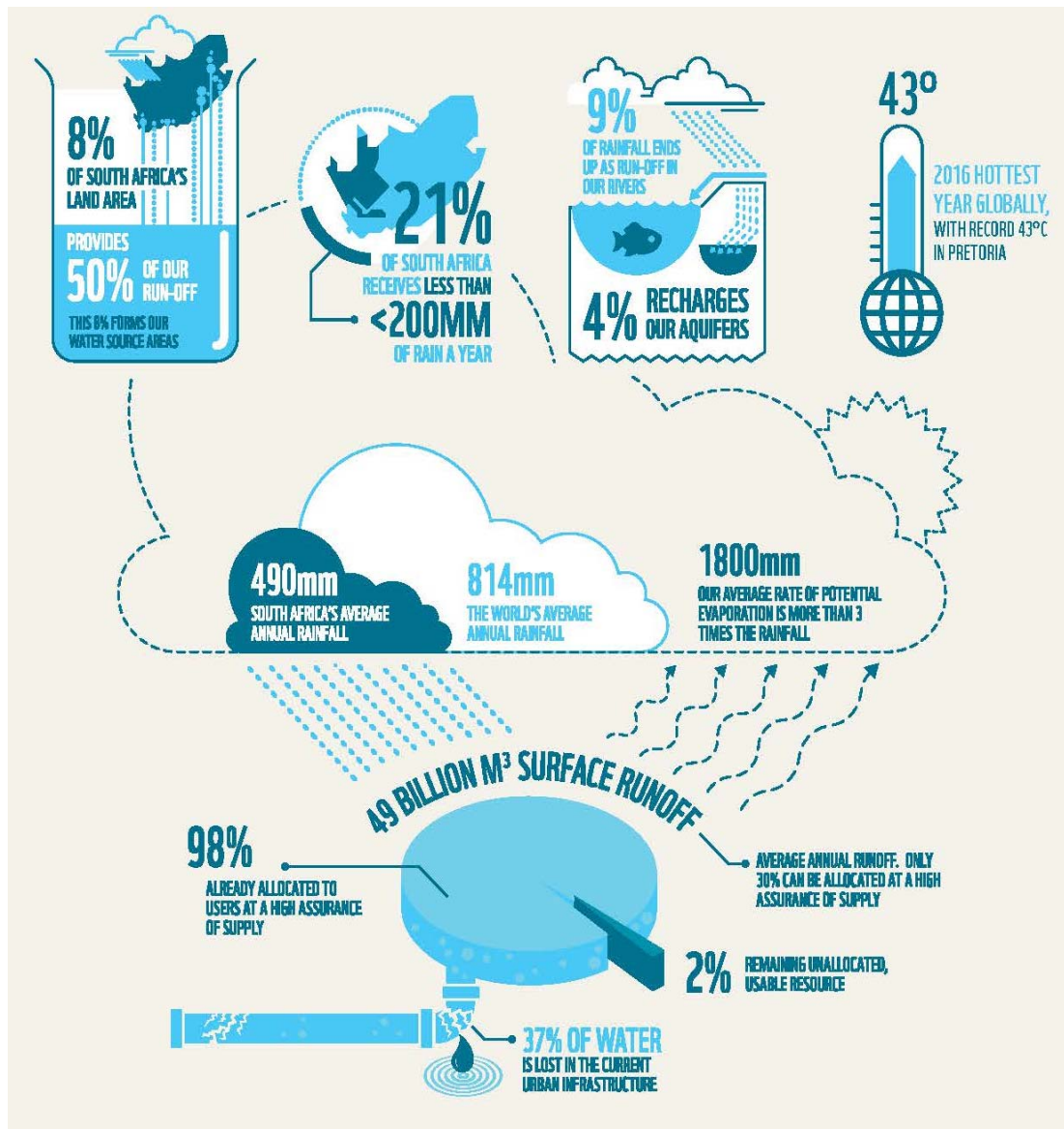


Figure 30. South Africa's estimated water use per sector (DWS)

Figure 31. South Africa's water facts⁶²

Overall, the demand management has become a key part of water management in that demand is estimated to far outstrip the supply (reported to be estimated at 17 per cent by 2030⁶³). However this is still not fully accounted for in respect of efficiencies and true return on investment. In considering the use per sector, the following need to be taken into account:

- A proportion of about 35 per cent of waste water can be recycled;
- Measurements on use are largely based on allocation and modelled data;
- Up to 62 percent of the data is unmeasured or not monitored;
- The need to cleanup and creating better responsive tools to facilitate planning and monitoring;
- “New water” (desalination, cross-border transfers, etc.) is needed but we must also ensure efficient use of current available water – ground and surface.

⁶² WWF, 2017

⁶³ WWF, WWF, 2017 Scenarios for the Future of Water in South Africa

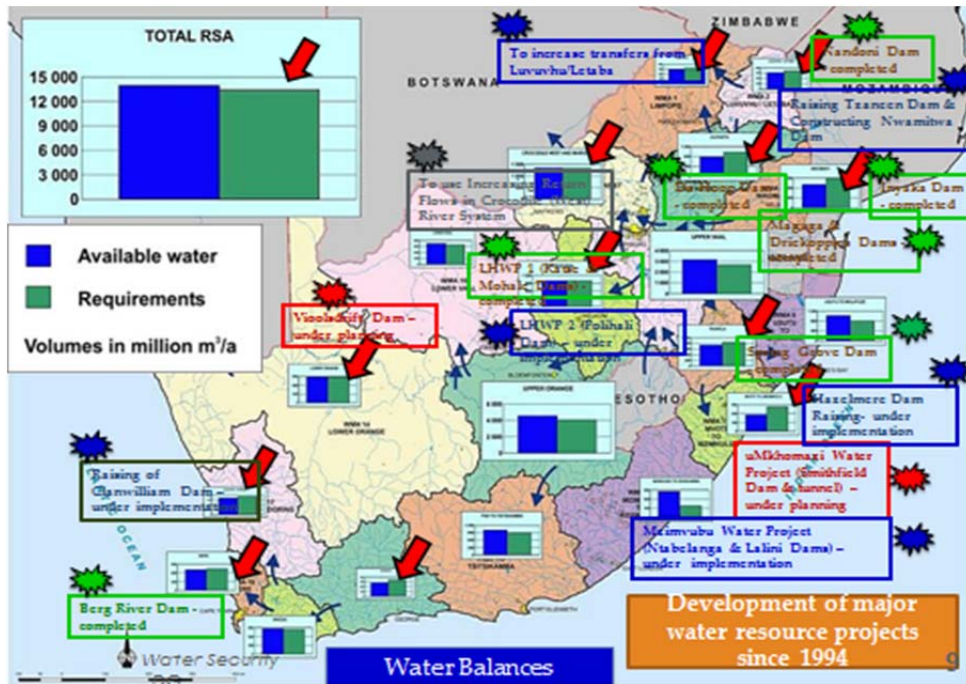


Figure 32. South Africa's water balances at macro level⁶⁴

The planning regime still maintains a *status quo* of “economic zoning” as demand centres that are largely a construct of the past economic and social engineering. With South Africa’s population currently estimated at 65 per cent in urban centres and still growing the planning for water will continue to be a serious challenge.

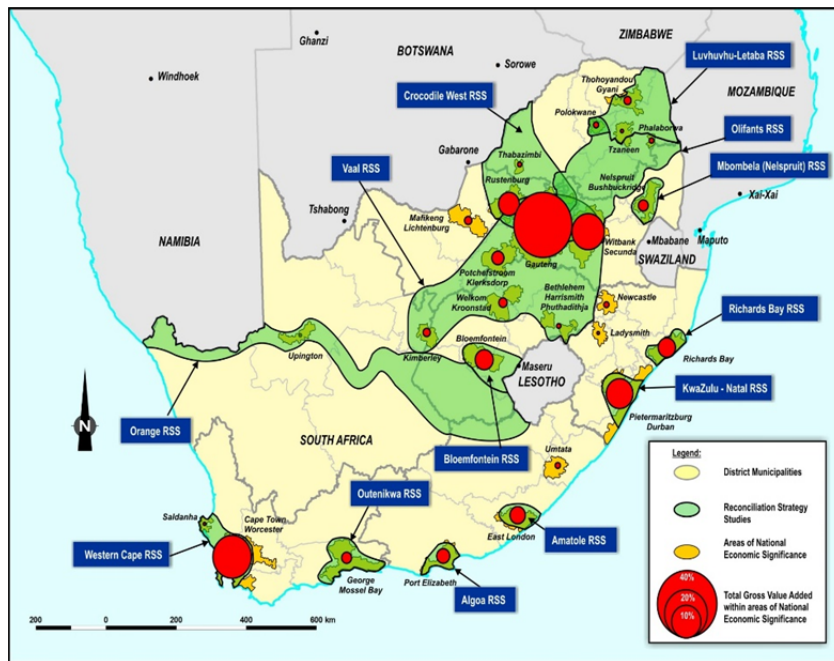


Figure 33 Economic zoning as demand centres

Current demand and water use dynamics within the context of sub-Saharan Africa and implications for South Africa are such that

- Water is embedded in goods and services;

⁶⁴ DWS

- South Africa has more diversified economies characterised by a relatively higher level of development and political stability;
- Water rich goods and services exported from drier south to wetter north.

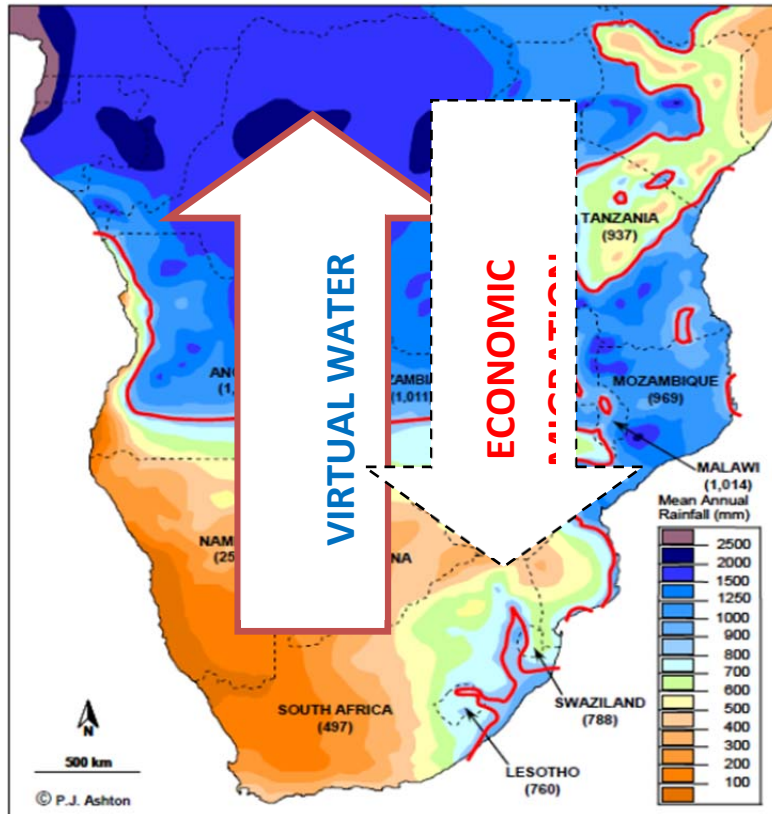


Figure 34. Water demand and use dynamics in Southern African context

Given the situation depicted in Figure 34 is it not important then to review our planning models, boundary conditions and assumptions to be robust enough to address the current realities and future scenarios?

In its country report for South Africa, the Aquastat database of the Food and Agriculture Organisation (FAO) states that:

“development and use of water resources differ widely between the northern arid parts of the country, where both surface and groundwater resources are nearly fully developed and utilized, while in the well-watered south-eastern regions of the country are significantly undeveloped and little-used resources exist.”

The question is how do we use our data to predict future rainfall patterns? How robust are the methodologies given the opportunities brought about by supercomputing for instance? SA is behind the curve on this kind of investment especially in the context of water sector.

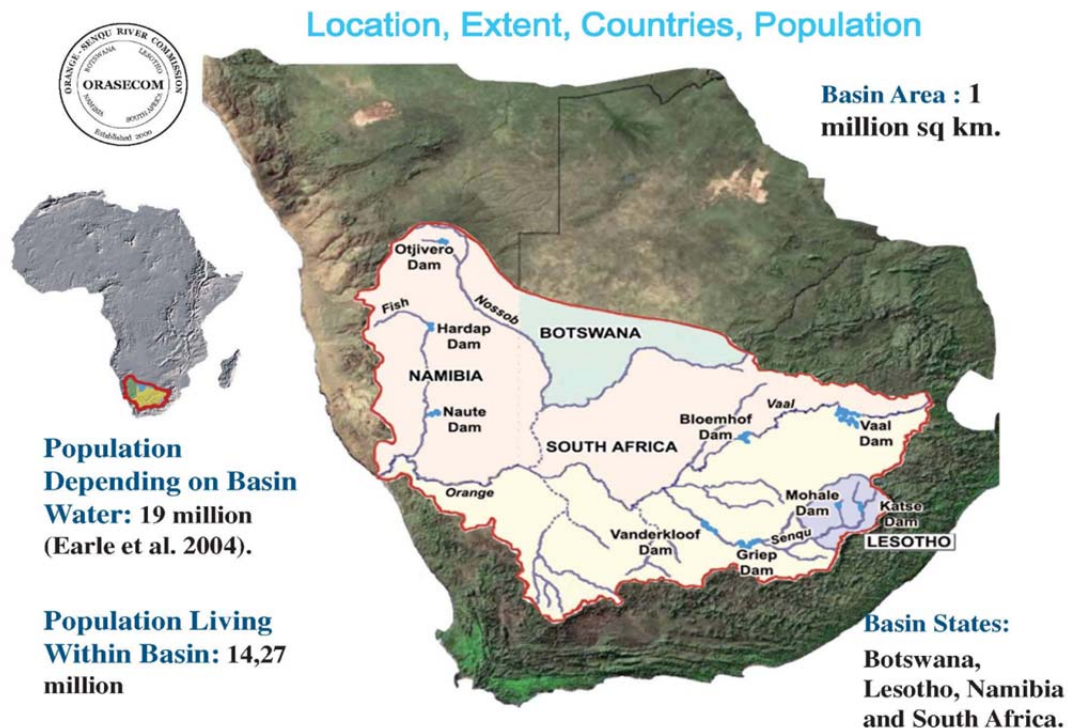


Figure 35. Vaal-Orange/Senqu basin to be seen in context of economic footprint of the Vaal-Orange River System and the potential risk of water insecurity

5.1.3. The future environment – Risks and opportunities

This framework provides broad and varied definitions of water security and selects what covers the relationship of water with the individual right through to the collective or national/international level, hence the notion of “hydrosocial relations”. This is important because a focus on mega projects or macro issues alone does not necessarily translate to bettering the people’s lives materially. Of importance is that the modified definition takes us closer to the issues such as indigenous knowledge systems that resonate with judicious use of scarce resources or resource stewardship. Clearly some of the biggest challenges have to do with behaviour and the idea of “hydrosocial relations” takes us away from the “brick & mortar” approach to relational and flow dynamics be it ecological, environmental, political, hydrologic cycle and so on.

That water is increasingly a regional and not only a national challenge, is no longer debatable. National and regional implications for water are now interconnected and in the current challenges of global climate change the need for planning in regional context has become a reality as more water sources are explored.

South Africa is warming at a slower rate if compared to other continental parts of the world - 1985 to 2014 global near-surface temperature trends (°C per decade).

The 1951 to 2015 annual mean near-surface temperature anomalies (°C), as calculated from the base period 1981–2010 and as recorded at 26 climate stations across South Africa (black dots on the map).

Figure 36 and Figure 37 demonstrate the impact of global warming with current projections. According to the charts are for less than normal rainfall in October – November and December. In the period January and February, above average rainfall is expected.

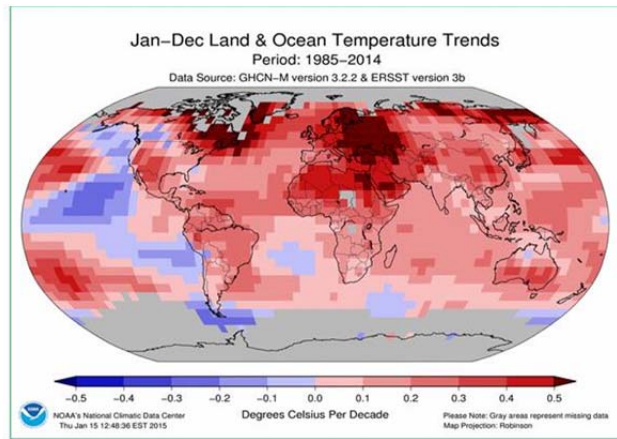
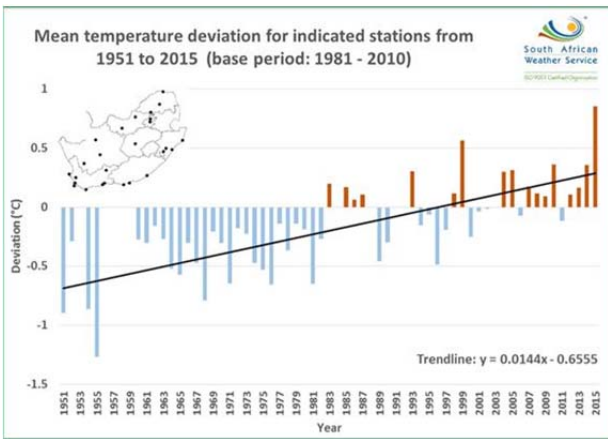


Figure 36 South Africa warms at a rate of 0.14 °C per decade (NOAA)

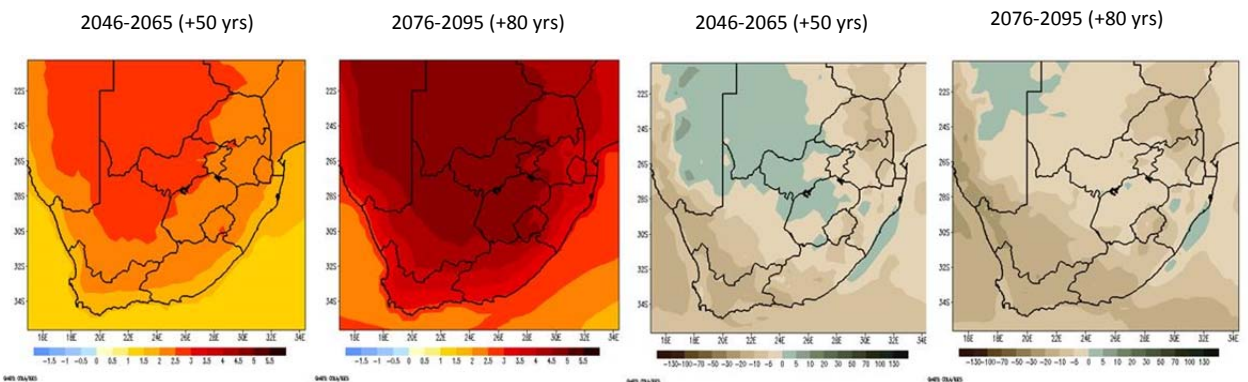


Figure 37 Annual temperature change (°C) and annual rainfall change (mm/month) relative to 1985-2005

Going into the future, interventions and management will need to be holistic and integrated taking cognisance of the various supply and demand scenarios such as potable, agriculture/raw water requirements as well as subsistence needs. The ability to manage or operate the system will become even more important and understanding the relative influence to and by the catchment. Whilst future climate change research will focus on “The weather of climate change” or climate variability within climate change, operating rules with more and more emphasise inter-catchment management not only from a hydrological perspective but also geopolitical economy.

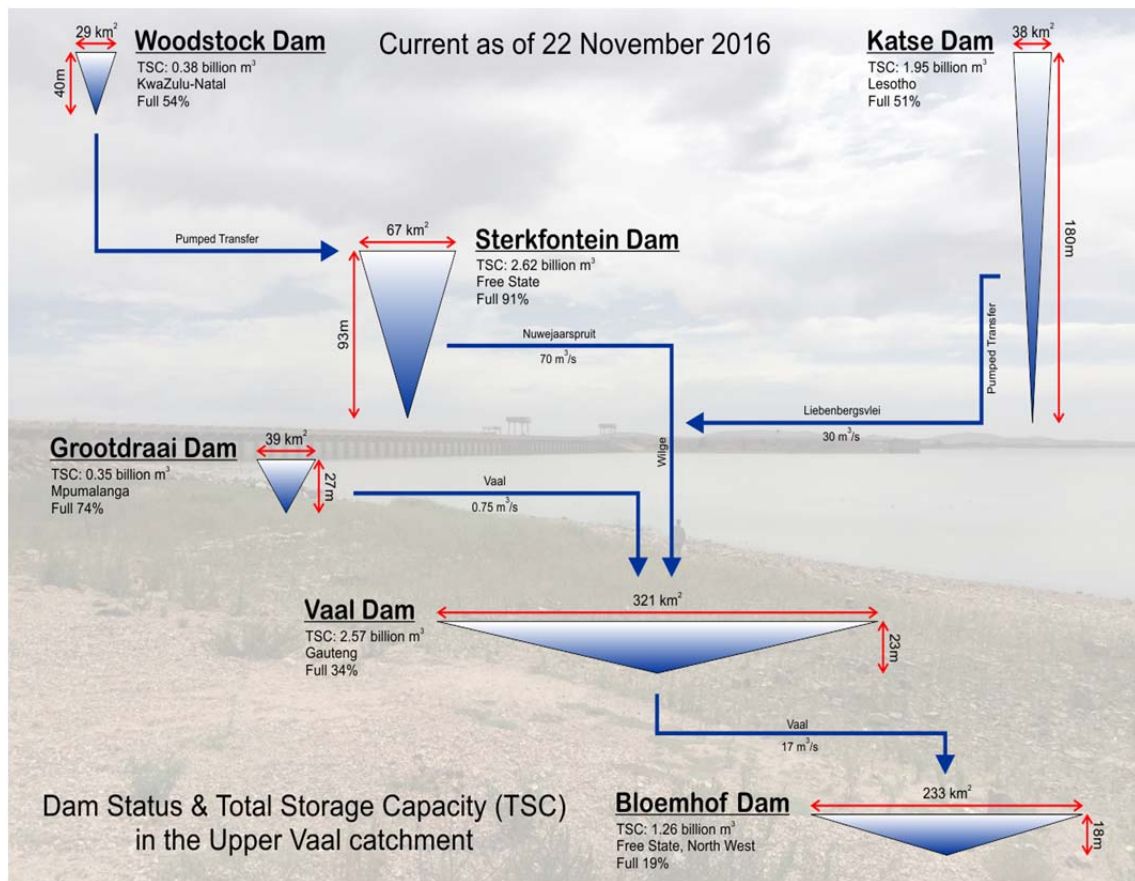


Figure 38 Vaal system management and implications for integrated management

The ability to operate and manage complex networks of systems under extreme conditions will need to improve greatly into the future. An example (Figure 38) of this is illustrated by the events of 2011 where three parties, namely, Eskom, Department of Water Affairs (operating rules/policies dictate when the sluices are opened) and the farmers. It needed a balance of how to manage Eskom’s take-off and the irrigation needs of the downstream farmers without flooding them. The 2011 multi-million ZAR damage to the crops due to water released from the dam. Heavy rainfall meant gates needed to be opened to avoid dam overflow and potential disaster, resulted in crops being destroyed. Flood management and electricity demand management taken into account.

Solutions to water shortage and utilisation preferably need to be found at local/national scale. On a local/national level, the following opportunities should be considered:

- ability to make use of more sources of water (including alternatives);
- improved governance, planning and management of supply, delivery, demand and use;
- infrastructure;
- improved operational performance;
- reduced losses and increase in productive use of water;
- improved pricing, monitoring, billing, metering and collection;
- wide spread roll-out of innovative, locally developed technologies that already exist.

Opportunities at national level should be considered e.g. a “smart” water supply mix comprising not only surface water but also groundwater, desalinated water, recycled water, etc. and the mix being specific for the particular area. There are lots of lessons learned from the drought in Cape Town such as innovative water savings measures that have been implemented in new developments, water sensitive design and

management etc. Water efficiency measures for various sectors, water innovation technologies, such as low flush toilets, and other water-saving techniques need to be promoted.

On a larger scale, opportunities exist for large regional inter-basin transfer such as the Zambezi looking into raw water, hydropower and cogeneration. The Zambezi River Basin Transfer scheme (Figure 39. Zambezi inter-basin transfer project) proposal includes a “retrofit” along the railway line involving a pipeline to Bulawayo-Botswana and South Africa that is estimated to be 50 per cent less than the original cost estimate of \$2billion⁶⁵.

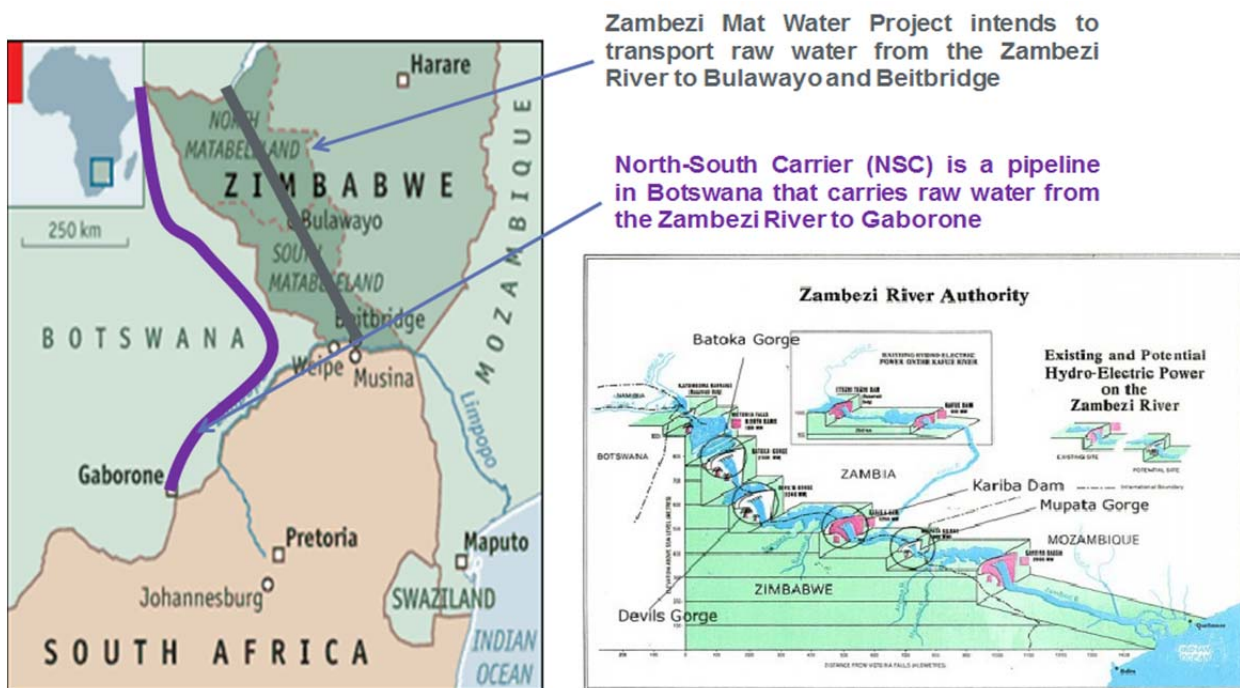


Figure 39. Zambezi inter-basin transfer project

Another potential mega inter-basin transfer project is that of Inga in Congo that has already been approved for hydroelectricity in the SADC region. The geopolitical social and economic implications are enormous and only the worst case technical scenario will make such a project unviable. The Inga Dams, located in western Democratic Republic of the Congo about 225 kilometres southwest of Kinshasa, are two hydroelectric dams on the largest waterfalls in the world, Inga Falls. Here the Congo River drops 96 metres and has an average flow of 42 476 m³/s. At its maximum capacity, the Inga project can power the whole African continent. Further, at its maximum capacity, it can supply potable water to the whole of the sub-Saharan region.

⁶⁵ <http://www.chronicle.co.zw/engineer-proposes-alternative-zambezi-water-project-design/>



Figure 40. Inga I dam, with the feeding canal for Inga II in the foreground

The excellent political engagements between South Africa and the DRC at the highest level, has always presented an opportunity for South Africa to participate in these Inga Dam projects from a water supply perspective. The question that needs to be asked is why serious consideration is not given for the current hydroelectricity project to focus on water transfer with hydroelectricity generation as a by-product so that development considers both energy and water?

5.1.4. Provision of Water and Sanitation Services

Principle 25 of the Fundamental Principles and Objectives for a New Water Law in South Africa⁶⁶ states that

“The right of all citizens to have access to basic water services (the provision of potable water supply and the removal and disposal of human excreta and waste water) necessary to afford them a healthy environment on an equitable and economically and environmentally sustainable basis shall be supported.”

Further, Principle 27 states that

“While the provision of water services is an activity distinct from the development and management of water resources, water services shall be provided in a manner consistent with the goals of water resource management.”

Critical to note is that there cannot be planning for water resources without full consideration of water services and sanitation. Second, the national department through the Minister focuses on policy and regulatory functions as well as the larger proportion of the water resources part of the value chain whilst the services are the preserve of local government.

From the NPC point, it therefore becomes critical to ensure that the total system functions seamlessly even when the activities are better carried out separately. It is for this reason that the concept of “hook and hanger” becomes critical in respect of securing water for the country.

As reflected in the 20 year review, South Africa has gone a long way to addressing the provision of water and sanitation, especially given the historical backlogs inherited from the past. However with the current pressure from higher demand and changing socio-political environment as well as global climate change coupled with lack of implementation capacity a lot needs to be done to reach a level of comfort in respect of water security.

⁶⁶ Water Law Principle 1996

5.1.5. Administrative and institutional system

Administrative and institutional system (AIS) refers to processes, institutional tools or mechanisms. It encapsulates water governance in general, including national requirements and international obligations.

According to legislation in general Government takes the lion's share of this component and depending on how it is managed, a lot can go wrong. Key to note is that South Africa's water policy and legislation are arguably among the best in the world. These were highly consulted and analysed during their development and subsequent promulgation.

Capacity to implement was also assessed and specific programmes put in place to ensure that skills are sufficient both from quantity, quality and relevance perspective. However, implementation to date has proved to be seriously wanting. The reasons are complex and varied but among them is the pressure to provide the access to water services and the transformational paradigm shift.

From a national perspective, and in line with NDP goals, it is critical for the various spheres of government and private users to play their respective roles based on the model as reflected in the policy and legislation. Details of the enabling water security will be covered in the section to follow.

5.2. THEMATIC AREA 1: NARROWING THE INEQUALITY GAP – WATER AS AN ENABLER

This **theme** addresses the issue of measurable improved livelihoods, human well-being and socio-economic impact of the total value chain from conception to impact in the short-, medium- and long-term.

A paradigm shift in thinking and approach is required so that future planning takes place within the new Water Security Framework that emphasises scenario-based planning with continued measurement of impact both real and potential. For instance, a holistic approach is required to plan and monitor the contribution/benefits/relevance of schemes to communities throughout the water value chain taking into account long-term implications. Project or operational planning must not be confounded with scenario/strategic long-term planning. From water accounting perspective as envisaged within Stats SA, it will be critical for all scales from lowest level (individuals, households and communities through to national scale intervention) to be assessed to see how water impact or contribute to the economy in the real sense, not indirectly.

The World Bank report cited earlier in this document shows that the inequality gap in South Africa is high, persistent and has increased since 1994 and states that South Africa is one of the most unequal countries in the world. The report further shows that the wealth inequality is high and has been increasing, suggesting that the commitments made through the NDP will not be achieved by 2030 unless some drastic actions are taken. From the water security perspective GWP/OECD examined the effects of water security on wealth and wellbeing and indicated that the goal of improving the material wealth of societies must be negotiated within the boundaries imposed by the availability of the water resource and balanced with the cultural and spiritual values of water. Sustainable economic growth, wealth and human well-being are at the heart of the water security framing presented (ref. **Figure 5**). Drags on growth is associated with compromised water security in that where water is reliable, economic opportunities are enhanced, whilst where it is unreliable or inadequate quality or where water related hazards are present there will be drags on growth. In the context of South Africa the issues of inequality are intricately linked to spatial planning and until this is addressed as an integral part of the interventions the problems will persist. Spatial planning and water is covered as a separate them in the framework.

An assessment of in-country economic water security, highlighting priorities, is recommended taking into account that although some assessments done show South Africa being among the top in terms of this, it is among the highest in terms of inequality.

5.3. THEMATIC AREA 2: ENSURING FINANCIAL SUSTAINABILITY

This theme addresses the issue of financial sustainability from a point of view of financial flows and sustainability with some emphasis on investment on infrastructure and the associated interdependency with socio-economic development in the water sector.

Water is an expensive commodity irrespective of the mode of mobilisation of funding resources. Water projects tend to be indivisible and capital-intensive, and South Africa like many countries has major backlogs in developing water infrastructure. There is a need for innovative and smart national and international financing approaches as well as appropriate incentives to achieve development goals. Financial resources need also be allocated to public sector financing e.g. for the management of the resource, not only the water services. Therefore full value chain of infrastructure requirements, financing, including its impact on institutional alignment, financial flows etc. need to be clearly articulated as part of planning for water security. This includes the NEXUS and interdependency nature of the water projects to other sectors and subsectors. Currently the financing for infrastructure is largely project-driven and not sufficiently focussed on the “spill over effect” of other sectors. This has largely been addressed through the Government’s outcomes and SIPs. However, the overall long-term implications remain largely unclear, and in many cases impacting negatively on the economic development.

Ensuring that projects are funded effectively from conception to execution through to outcome and impact needs to be clearly articulated to ensure effective implementation. Most importantly the financial flows and sustainability are critical as the projects on water tend to be interconnected with almost every other sector, especially in context of South Africa where water availability challenge is a reality due to the centrality of water.

As stated in the NWRS2⁶⁷, water infrastructure in South Africa is mainly funded by a combination of loans on the basis of user charges (water tariffs) and government grants (primarily through the municipal infrastructure grants). Presently there is little private equity and investment in the water infrastructure generally.

Figure 41 shows financial flows and water institutional value chain and infrastructure in South Africa.

⁶⁷ Source. National Water Resources Strategy 2nd Edition. 2013. DWA, 2013.

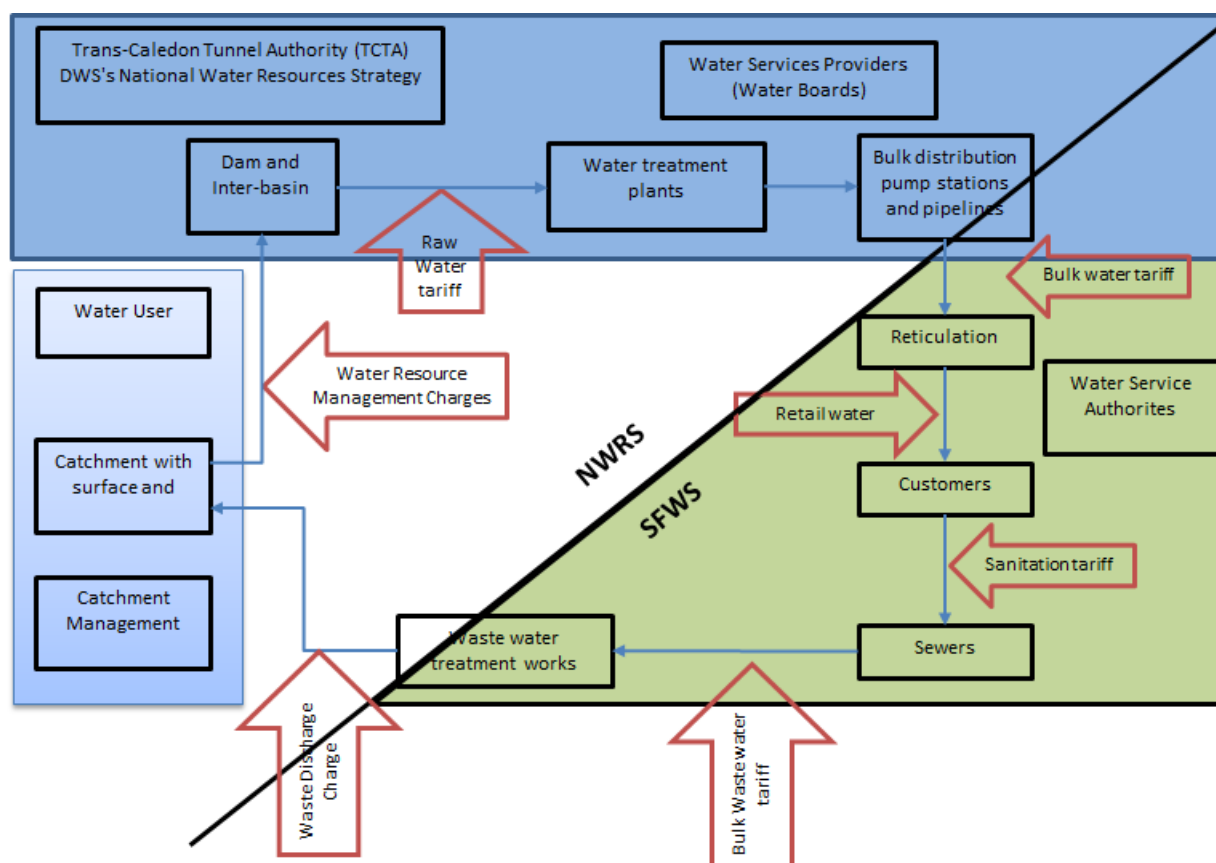


Figure 41. Financing for water resources and water services components⁶⁸.

From a funding perspective, National Treasury allocates funds in different ways, as explained above. The categories of funding are as follows:

- National Treasury in form of grants
- National Department
- Catchment management charges
- Raw water tariff
- Bulk water tariffs
- Water Services tariff
- Sanitation tariff
- Waste discharge.

It is now common cause that many municipalities do not ring-fence their revenue and costs for water and sanitation services leading to inadequate and inconsistent provisioning for the full lifecycle cost of infrastructure. As a result, maintenance is neglected and there is mostly under-provisioning of depreciation capital. Further, maintenance challenges are experienced as a result of lack of standardisation and use of appropriate technology. To this end, it is argued that independent regulation of pricing and tariff setting is required as the current model is not effective⁶⁹.

Municipalities distribute water and charge for water, but still get support from the fiscus through National Treasury. The stepped-up tariffing done by the Municipalities does not cascade up to benefit bulk water

⁶⁸ Source: Ruiters and Matji, 2015

⁶⁹ Source: Ruiters, C and Matji, MP. 2017. Funding and financing for wastewater and sanitation infrastructure in South Africa: Pricing, tariffs and operational efficiency.

providers (water boards/utilities) whose tariffs are based on a flat rate. This is critical in that in the end the customers or end user suffers. Further, risk of the gains brought about by water conservation and demand management resulting in building revenue that does not end up funding water infrastructure.

From the NDP perspective, bottom up plans based on the full cycle and value chain and supported by proper funding are needed. Innovative ways of funding need to be found. Financial flows and decisions must be monitored and regulated appropriately with emphasis on accountability.

The above also have implications for proper configuration of water (resources and services) management institutions across the value chain. Such configuration must include regional bulk water provision based on “big picture” planning.

Current experience in Cape Town to some extent demonstrates the need for a bulk supplier. Further, privatisation of reticulation is not an answer because a situation should not be created where protection of the source is undermined. The interdependencies linked to water are too high to be left to independent unregulated environment. At the same time, government has to be efficient enough to make this all work.

The impact of water infrastructure and associated financial flows on the economy can best be understood by considering the complex ways in which critical infrastructures are interconnected and mutually dependent both physically and through a host of information and communications technologies. **Figure 42** shows depicts a broad range of interrelated factors and system conditions representing six dimensions which include technical, economic, business, social/political, legal/regulatory, public policy, health and safety, and security concerns that affect infrastructure operations. The degree to which the infrastructures are coupled or linked strongly influences their operational characteristics, and will determine impact or domino effect resulting from failure of a particular dimension or type of infrastructure. It is primarily for this reason why in the case of water we chose to look specifically into infrastructure and financial flows as a complex system constituting or constituted by small part(s) of the intricate web that forms the whole beyond a simple sum of its parts rather than discreetly looking at water infrastructure in isolation.

Like energy, aggregating components of the water value chain in an *ad hoc* fashion will not ensure reliable water supply. Rather a careful creation of an intricate set of services will yield a system that reliably and continuously supplies water- hence water security not being a linear supply and demand process.

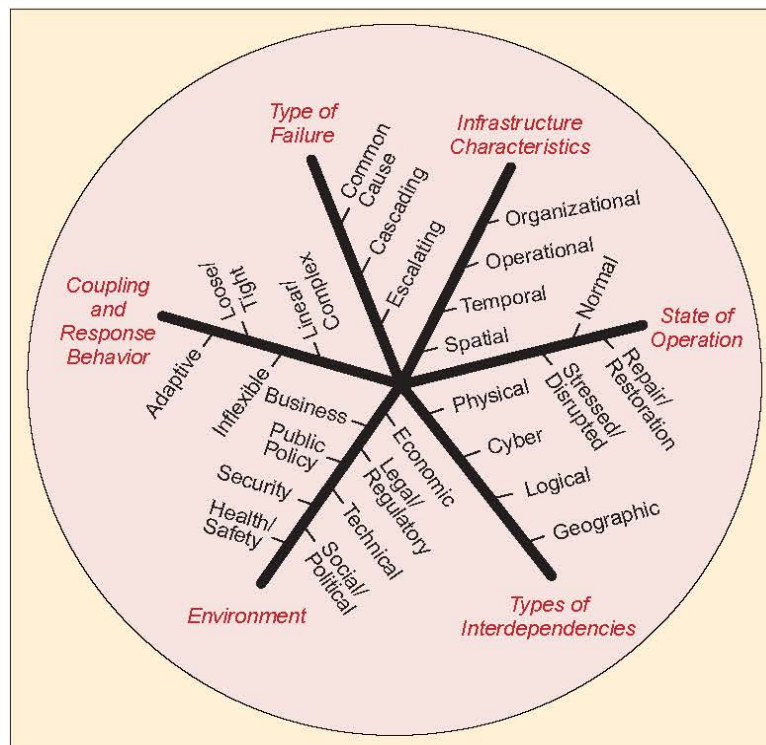


Figure 42. Dimensions for describing infrastructure interdependencies⁷⁰.

Like other types of infrastructures, water related infrastructure has specific characteristics such as spatial and temporal scale, operational factors and organisational considerations. Critical to note is that what happens to one infrastructure or portion thereof, can directly and indirectly affect other infrastructures, impact large geographic regions, and create a domino effect throughout the national and some cases regional or global economy. It is therefore critical to note that a simple action or non-action such as delaying implementation of creation of a national agency to manage water resource infrastructure will have significant impact on the economic development and growth of the country. From a scale perspective, scaling a project on water resource development at quaternary compared to quinary⁷¹ catchment level will determine how much funding is required and the time it requires to finish a project from conception to outcome/impact.

So what does all this imply?

The following need to be considered among others:

- Build or re-build capability to do proper systems analysis to ensure effective water infrastructure development and management with strong emphasis on financial flows;
- Create an enabling environment by ensuring proper water governance from institutional arrangements through to clear role and responsibilities with identifiable accountability and authority at all levels;
- Strengthen legal and regulatory regime in the water space starting with separation of regulation from implementation. The NDP proposes assessing independent regulatory environment. However this needs to be looked at in totality and not in isolation, particularly in view of an “unfinished” institutional model or lack of implementing the current one.
- Promote innovative funding models that are based on the true cost of water development and management, including recognition of the contribution of ecological infrastructure to the balance sheet. Such models should be able to attract private funding for various components of the value chain without compromising the total system.

⁷⁰ Source: Rinaldi, SM, Peerenboom JP and Kelly, TK. 2001. Critical Infrastructure Interdependencies. IEEE Control Systems Magazine.

⁷¹ Fifth in order or rank

5.4. THEMATIC AREA 3: DIVERSIFYING WATER SOURCES

In general, surface water from impoundments or dams as well as direct abstraction from the river systems account for all water available for use, 74 per cent of all water available in South African context taking into account that a proportion of this is transboundary or from shared rivers in nature). There is still opportunity for surface development, but this theme looks at what can be regarded as “non-conventional water sources”, which although currently seen as comprising a smaller proportion (up to 25 per cent) are critically important for socio-economic development and indications are that there is substantive opportunity for growth towards contributing to water security. These sources include the following:

- Groundwater;
- Return flows and re-use;
- Desalination;
- Rainwater and stormwater Harvesting;
- Water Conservation and Demand Management;
- Transboundary water transfers.

In considering these sources cognisance of South Africa’s stated goal in the recent past of a “water mix” approach is recognised.

The primary purpose of the theme is not to repeat the current national strategies on these source types but to look into integrating them from a point of view of strategic socio-economic development in the context of water.

Table 2. Forms of "unconventional" water sources from a national perspective

Source	Description	Strategic implications
Groundwater	<p>Stored in aquifers with potential yield estimated at 7500 million m³ per annum (2000 million m³ per annum in use and 5500 million m³ per annum estimated to be available). Generally widely distributed and available in isolated individual use, small towns, villages farming community, tourism fraternity etc.</p> <p>South Africa shares 9 transboundary aquifers: Karoo sedimentary aquifer, Coastal Sedimentary basin V, Coastal Sedimentary basin VI / Coastal Plain Sedimentary Basin Aquifer, Rhyolite-Breccia aquifer, South Stampriet Artesian Aquifer System, Khakhea/Bray Dolomite, Zeerust / Lobatse / Ramotswa Dolomite Basin Aquifer, Limpopo basin and Tuli Karoo Sub-Basin.</p>	<p>Utilisation in small towns and individual user requirements, emergency use during drought (Also note its use in few larger cities, such as Pretoria and increasingly Cape Town)</p> <p>Possibility for artificial recharge as storage for later or future use.</p> <p>Conjunctive use with surface water has been recommended for many years in South African context</p>
Desalination	<p>Involves removal of salts from seawater and/or brackish groundwater to potable levels. May include brackish inland water or mine waste water for more local usage.</p>	<p>Technological advances are enabling this method of making water available possible, especially in respect of reduced energy requirements.</p>
Rainwater and	<p>An old human activity involving the collection and storage of rainwater for</p>	<p>Key strategic issue is to see rainwater harvesting beyond social and cultural</p>

Source	Description	Strategic implications
stormwater Harvesting	immediate use of making water available during off-season.	<p>activity to seeing it as an economic which can be used as part of conjunctive use. For instance, a province like Gauteng which sits at the top of the watershed with its average rainfall just above 600mm p.a. can be a good candidate for encouraging rainwater harvesting by individual households and private sector as a way of conjunctive use.</p> <p>Where possible, in rural areas rainwater harvesting could be an additional source of water where big infrastructure is geographically or financially not viable.</p> <p>Water sensitive settlements and water sensitive cities</p>
Water Conservation and Demand Management (WC/WDM)	<p>This refers to minimisation of loss or waste, care and protection of water resources and the efficient and effective use of water.</p> <p>From a planning perspective, it reduces the need for additional sources of water which forms part of the reconciliation of the water balance.</p>	<p>With up to 35per cent of water in the country not accounted for (losses), this becomes critically important in order to ensure that causes whether management or ageing infrastructure must be addressed at all levels.</p> <p>Efficiency measures in any form need to be properly planned, funded and executed. With more than 60 per cent of water in the country used for irrigation, even the smallest saving in the agricultural sector become significant. Such savings can then be utilised for further economic development in the agriculture space⁷²</p>
Return flows and re-use	<p>Return flows include approximately 10 per cent irrigation water which seeps back into streams and rivers and up to 50 per cent or more from urban setting.</p> <p>Re-use refers to beneficial use of previously used water from a range of sources like irrigation return flow, mine dewatering, industrial effluents and sewage discharges with or without further treatment.</p>	<p>This type of water use, though to strictly speaking “new water” it has been taken seriously enough to be included in the planning as a separate strategy due to its significance.</p>
Transboundary water transfers	<p>More than 60 per cent of South Africa’s surface water is shared with neighbouring countries and contribute more than 45 per cent of the total river flow. Four major river systems are shared, viz.,</p> <p>Orange/Senqu - shared with Lesotho and Namibia</p> <p>Limpopo River System - shared with</p>	<p>Given the nature of the social and economic interconnectedness within the SADC region, further work needs to be done to address the need for water security from a regional perspective, including going beyond riparian states consideration (see reference to Zambezi River Development and the Inga project as reflected in Figure 39. Zambezi inter-</p>

⁷² DWS, 2010. Integrated Water Resources Planning for South Africa – A situation Analysis. Report No. P RSA 000/00/12910

Source	Description	Strategic implications
	Botswana and Zimbabwe; Incomati System – shared with Swaziland and Mozambique; Usutu/Pongola-Maputo system – shared with Mozambique and Swaziland. These areas support more than 60 per cent of the GDP and similar proportion of population.	basin transfer project and Figure 40. Inga I dam, with the feeding canal for Inga II in the foreground)

There are 216 major dams (>3 million m³) and the total dam capacity is 31 022 million m³. South Africa shares four transboundary river basins and 9 transboundary aquifers (**Error! Reference source not found.**).

The international inter-catchment transfers and inter-country systems (including LHWP) form part of a sophisticated national water resource management system that is meant to ensure water security. The positioning of South Africa in respect of international water transfer is critical as a risk that needs to be assessed against the other options for sources given that the country's water endowments are significantly low and pressure due to demand is very high. The concept of virtual water needs to be fully explored at the highest level. Virtual water can be described as the volume of water required to produce a commodity or service. Virtual water will generally flow from water-rich to water-poor regions. Also known as embedded or embodied water, it refers to the hidden flow of water if food or other commodities are traded from one place to another. In South Africa, this will require shifting the economy to a more water-wise regime given the water scarcity in the country. The risks associated with transboundary cooperation are real, although opportunity within SADC is greater than many parts of the world given the high regional peace index⁷³.

5.5. THEMATIC AREA 4: WATER RESEARCH, MONITORING AND INFORMATION

This theme mainly focuses on Chapter 14 of the National Water Act, Chapter 10 of the Water Services Act and the Water Research Act provisions as well as associated legislative mandates related to water.

The water policy developed since the dawn of democracy and subsequent legislation envisaged the need for information and made provision for this. However as evident from the decisions taken or not taken, implementation has been found wanting. For instance, the water management as a system with tools such as National Water Resource Strategy (NWRS) and the associated Catchment Management Strategies (CMSs), Water Services Development Plans (WSDPs) as well as integrated Development Plans (IDPs) is premised on the ability to assess the water resource base and the needs or demands every five years based on the information that is collected and assessed regularly. However, the ability to do this has significantly declined over time and most of the assessment is no longer systematic but *ad hoc*, disparate and largely under the control of consultants. To this end, an urgent need to create a sector-wide “*water intelligence*⁷⁴” capability through reorganisation of current configuration is critical. Such a facility must devote its time and resources to analysing the information and support the national planning and decision making across the board. This will limit the silo and piece meal approach that seems to have prevailed over the years. It will also address the loss of capacity to do regular assessments which have become systemic and endemic. The framework themes make provision for this.

In developing the water intelligence facility, it is critical to note that the information required for regulatory functions including compliance monitoring and enforcement with associated tools such as

⁷³ State of peace as a measure of relative positions of nations and regions peacefulness (Institute of Economics and Peace)

⁷⁴ This includes traditional hydrological services covering all water quality, quantity and related information

waste discharge charge system, water authorisation and management system are enhanced to effective use.

Positioning monitoring, information and research to enable water security planning in South Africa will reduce barriers to implementation that need to be tackled at the highest possible level within government such as:

- Cost (both capital and operations and maintenance);
- Buy-in from decision makers and will to implement that may be a result of lack of understanding the impact in medium to long-term;
- Financial flows in relation to institutional roles and responsibilities as well as quantum of funds dealt with in this space that tends to look little but has higher impact if not provided;
- Human resources – most of the key professionals are retiring in the next few years or have retired (many less than 5 to 10 years);
- Procurement arrangements – e.g. if purchasing of fairly small quantities of supply like sample bottles take too long the impact on data gaps become real, etc.

5.5.1. The Water Information and research situation in South Africa

State of play and current assessment as seen from a national perspective such as:

- Disconnect between chapter 14 of the National Water Act and the rest of the sector;
- Outcomes of the review of national monitoring network and deterioration of hydrological data monitoring;
- Funding position and capacity implication going into the future.

5.5.2. Pathway to water security through water intelligence centre

A recommendation for the formation of an agency to specifically focus on research, monitoring and Information on water to be funded through fiscus up to 75 per cent and consolidated from current government activities – this option was investigated and conceptually tested when the idea of a shared service was put on the table but not proceeded when the priority was placed on the establishment of the National Water Resource Infrastructure Agency.

5.5.3. Policy and legislative provision for Water Research, Monitoring and Information Management

The foundational aspects of the modern South African Water Policy developed during the post-Apartheid period was in 1996 and had envisage a strong emphasis on the sectoral capability to monitor water and provide information to support the sector. This was articulated in the National Water Act 36 of 1998 (Chapter 14) and the Water Services Act 108 of 1997. In addition the Water Research Act 34 of 1971 (as amended) was left intact as a result of the recognition of the unique and special nature of the model that was developed as part of the outcome of the 1971 Commission on Water Matters. Modifications of these aspects in these pieces of legislation have been minimal and only focussed on enhancement and keeping up with the times.

Monitoring, recording, assessing and disseminating information- on water resources has been embedded in the legislation as important for enhancing water resource management and achieving the objectives of the NWA as well as achieving the objectives of the WS Act. The policy and legislative provision is based on the principle of that the quality of ground water and surface water is inextricably interrelated and that

decisions can only be made if informed by reliable, relevant and up-to-date information which reflect the integrated nature of the water resources⁷⁵.

This includes the role of knowledge generating institution/ organisations in producing national research that addresses mega-nexus challenges in the medium to long-term. The focus will be more on action/ applied kind of research. The institutional space in water research requirements will be looked into in terms of enhancement of all the institutions within the National System of Innovation and the national Research and Development Strategy.

Knowing what we know, with improved data and information, at national level it should be possible to achieve the vision of reduced inequality by 2030 and poverty eradicated to globally acceptable levels from the perspective of both implementation and monitoring.

Research and development must be aimed at technological and systems improvement to help with improved water security and management in general.

Positioning Water and Sanitation Monitoring, Information and Research to enable Water Security Planning in South Africa include the role of knowledge generating institution/ organisations in producing national research that addresses mega-nexus challenges in the medium to long-term. The focus is meant to be on water monitoring, research and information management. The institutional setting for water knowledge and information requirements must be investigated further and looked at in terms of enhancement of all the institutions within the National System of Innovation and the national Research and Development Strategy.

5.6. THEMATIC AREA 5: FOCUS ON KEY NEXUS ASPECTS OF WATER SECURITY

In this theme, special focus will be applied to agriculture, energy, climate change and mining in relation to access, cost or investment, economic and environmental foot print among others.

The WEF nexus could form an integral part of the IWRM approach, although more emphasis on the interrelationships needs to be given. IWRM includes a multi-sectoral approach, hence the “I” for integrated.

In response to the global trend in adopting the WEF nexus approach, the Water Security Framework considers the WEF nexus as part of the SDGs. As a country we have a responsibility to drive alignment of our national agenda or focus areas linked with national priorities such as the NDP and other policies. This also extends to alignment with regional initiatives such as the SADC Secretariat’s programme 8 on the WEF nexus and the African Union’s (AU) Vision 2063 among others.

As a country, South Africa has a responsibility to champion the WEF nexus. The challenges that South Africa is facing make it urgent for the country to adopt sustainable development approaches such as the WEF nexus. These include, but not limited to:

- (i) the poverty-unemployment-inequality nexus
- (ii) rapid population growth,
- (iii) rural to urban migration due to lack of job opportunities in rural areas,
- (iv) water scarcity, which is being exacerbated by climate variability and change,
- (v) increasing demand for food due to population growth and dietary transitions and increasing food insecurity among the rural poor,
- (vi) increasing energy demand to meet South Africa’ economic development goals, and
- (vii) focus on agriculture, specifically expansion of irrigation, as a driver of rural economic development and employment creation

⁷⁵ Thompson, H. 2006. Water Law: A practical Approach to Resources Management and the provision of services

Tackling these challenges will require coordinated efforts among different economic sectors, mostly water, energy and agriculture. The WEF nexus emphasises the inextricable linkages between the three sectors and that actions in one area often have impacts in one or both of the others. There are key challenges that are being faced across these three sectors. For example, conversion of productive agricultural land for industrial or residential use threatens food security. Other examples include the expansion of coal mining activities linked to energy generation in Mpumalanga, which threatens both water resources and food security. Other examples include the drive to increase irrigated agriculture, which places pressure on available water resources and creates new demand for energy for pumping water. What these highlight is that, while all these initiatives have good intent to develop the country, lack of WEF nexus trade-offs could threaten their ability to translate into meaningful and sustainable development. The Water Security Plan therefore has a responsibility to raise awareness about the WEF nexus interlinkages and to create a platform for discussion of practical solutions that include the negotiation of synergies and trade – offs linked to the WEF nexus issues. The WEF nexus presents an opportunity to promote integrated planning in a sustainable manner. It also presents a framework for directly achieving some of the SDGs such as Goals 2, 6 and 7 with indirect potential to achieve SDGs 1, 8 and 9 through job creation and innovations linked to the WEF nexus sensitive planning. As a country we will continue to drive research, development and innovation linked to knowledge generation on the WEF nexus. The translation of this knowledge into an actionable plan that can be adopted by policy makers remains the next frontier. Keeping it simple and practical will ensure that complexity does not further delay implementation!

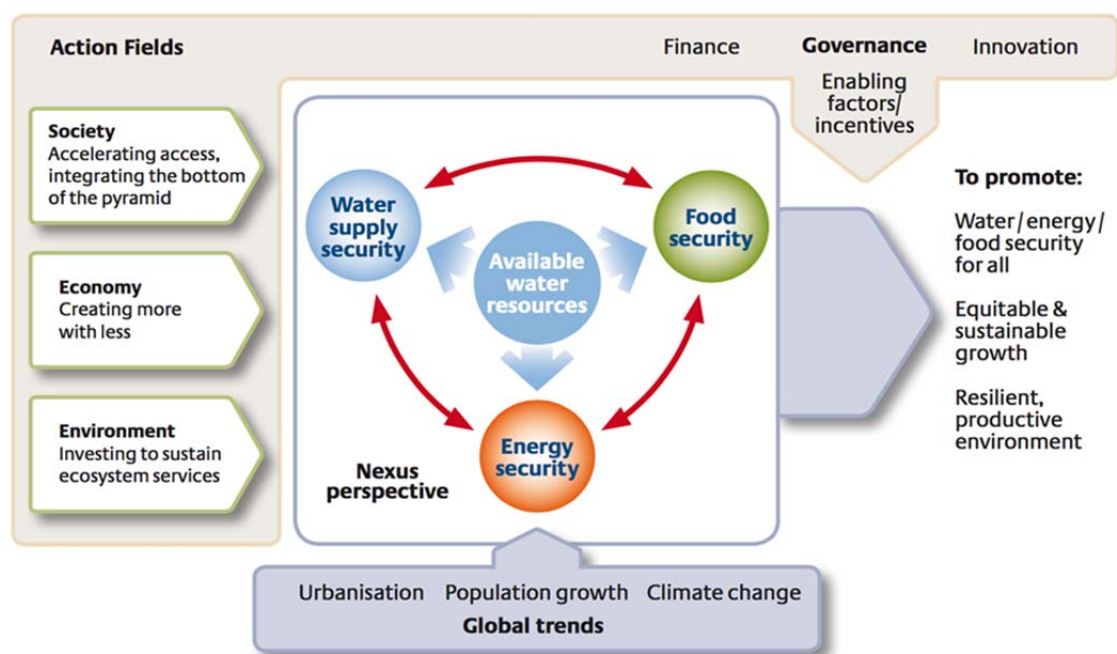


Figure 43. Water-Energy-Food Nexus

5.7. THEMATIC AREA 6: ECOLOGICAL INFRASTRUCTURE

This theme focuses on the aspects of environmental infrastructure and flow in relation to environmental goods and services, socio-economic benefits and impact. From a policy development and implementation perspective, this was among the most important aspects of water policy and legislative reforms of the early 1990s which brought about the realisation that the National Water Act was way ahead of its time. To this end, recently even SIP 19 was conceptualised with the intention to elevate the environmental considerations from a beneficial perspective.

Quality of life is inescapably linked to environmental conditions and how they are affected by human activities. A key concept is that of ecosystem services – defined as the benefits people derive from natural processes, such as the delivery of clean water and air, the habitat for biodiversity and the provisioning of food and fibre. As the land surface and water bodies are progressively transformed due to climate change, land use change, resource extraction and pollution, the plotting of a sustainable path

requires a deep and predictive knowledge of the underlying processes and their limits. Climate variability, including phenomena such as El Nino-induced drought, is an on-going and probably increasing feature of the South African environment. Poorer rural communities are particularly vulnerable to environmental hazards. Understanding how to increase societal resilience to such disturbances, and protect the natural resource base ('natural capital' and 'ecological infrastructure' are key notions here) from damage during extreme events, is crucial.

UN's UNEP highlights that "The Environment at the Heart of the Agenda" for 2030 indicating that the 2030 Agenda is a fundamental shift from today's growth-based economic model to a new way that targets sustainable and equitable economies and societies worldwide, and greater public participation in decision-making, in line with Principle 10 of the [1992 Rio Declaration](#). It is an agenda that aims to replace unsustainable consumption and production patterns with sustainable lifestyles and livelihoods that benefit all. Central to the agenda is the understanding that a healthy, well-functioning environment is crucial for humankind to prosper.

Ending poverty (SDG 1) can be achieved by integrating economic development, social protection and environmental health. Environmental poverty – resulting from lack of access to natural assets, inadequate management of resources and exposure to ecosystem degradation and pollution – leads to greater vulnerability and a loss of resilience in communities. An increasing world population will make it even more challenging to provide basic services to the poor.

UNEP's International Resource Panel⁷⁶ estimates that consumption of natural resources will triple by 2050. Sustainable development will need to maintain, enhance and, where necessary, rebuild natural capital as a critical economic asset and as a source of public benefits.

⁷⁷Human rights and the environment are inextricably linked through the right of every citizen to a clean, healthy and productive environment. Sustainable development implies universally meeting basic needs and extending everyone the opportunity to fulfill their aspirations to live in dignity. In the 2030 Agenda, meeting those basic needs is linked to access to natural resources. For example, in Goal 2, access to food is linked to access to land, which in turn is linked to poverty reduction (Goal 1) and gender equality (Goal 5). Goal 6 addresses the natural resource 'water' in terms of the environment (water quality, restoration of ecosystems), social (access to safe drinking water) and economic aspects (water-use efficiency across all sectors). This emphasis on the links between the three dimensions exists in all 17 goals, making the agenda truly integrated.

What does this mean in terms of SA's Water Security Framework? In this context the integrated catchment management which is a holistic approach focusing on both water and land management, as the two are inextricably connected, is necessary to ensure the integrity of the ecosystems. Whilst substantive work has been done such as determination of the reserve at national level, implementation of working for water programme, programmes run by individual organisations and institutions such as Cape Nature, the South African Environmental Observation Network (SAEON) among others, integrated catchment management has largely been hampered by lack of coordinated effort resulting from catchment management agencies not being created and catchment strategies not properly developed.

In order to ensure water security, valuing (measuring) ecosystems services as an economic part of water infrastructure has become essential and must be incorporated in the assessment of the extent to which the water security is achieved. This will also incentivize the private sector as has been the case with commitments made by the National Business Initiative (NBI)⁷⁸.

⁷⁶ <http://www.resourcepanel.org/>

⁷⁷ Source: <http://www.unep.org/post2015/heart.php>

⁷⁸ National Business Initiative. 2016. Business Action in support of the NDP. Action Plan v1.

5.8. THEMATIC AREA 7: WATER AND SPATIAL PLANNING

This theme considers the key elements of spatial planning and how this is intricately linked to water security both historically and into the future. This is also related to the movement of people, goods and services and in turn socio-economic development. In considering this theme questions need to be asked regarding the extent to which we are able to seriously look into developmental planning such as:

- Going beyond the scarcity and basic services and look into potential for economic growth;
- Ensuring that the spatial planning is deconstructed and reconfigured to unlock new growth potential;
- A mix of various sources that encourage optimal and sustainable provision of water;
- That looks systematically into
 - all national, regional and institutional planning and assessments;
 - Research and development needs;
 - Water allocation, use and regulation.

Recent pronouncement indicating that up to 40 per cent of the municipalities are not financially viable has implication on the ability of water boards to recover their money from water sales and thus battling with Municipalities non-payment. The question that needs to be asked is whether the current configuration of local government as presented by the demarcation process is the best outcome taking into account historical spatial configuration. From a water perspective, serious consideration should be taken to relook at the current configuration to ensure that municipalities and any other institution meant to address implementation of the country's development agenda is a "going concern". This will come with reconsideration of COGTA space versus that of water institutions.

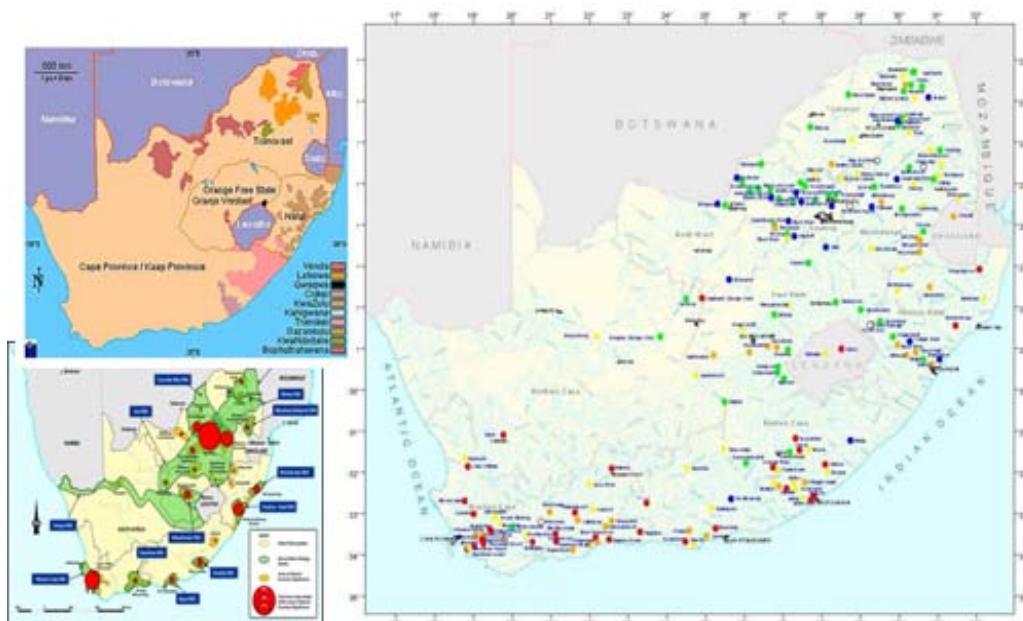


Figure 44. Distribution of major dams in South Africa (Source: DWS) vs. development nodes and former homelands

Figure 45 shows that major water sources in South Africa cover some of the areas that are known to have high level of poverty. This must be contrasted with the development nodes/zones that currently characterise the current spatial planning as reflected in Figure 33.

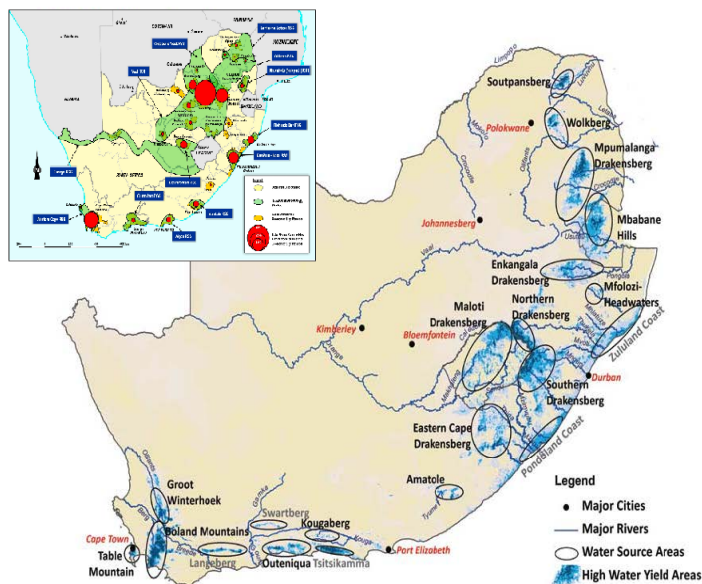


Figure 45. Water Source Areas showing major Rivers, and cities⁷⁹

In going forward, bold decisions need to be made in respect of spatial planning and find a way to highlight issues as they relate to water especially given the many examples within the water sector in respect of flaws brought by apartheid spatial planning. The silo approach must be broken and institutional arrangements made to foster complementarity in terms of mandates and the ability for cross-subsidisation.

Policy instruments created to change the water access landscape such as decoupling of water licencing from land ownership as well as the policy principle of “use it or lose it” and the commitment to move away from water trading must be implemented taking into account the problem of spatial planning. Current debates on land appear to resonate with this.

5.9. THEMATIC AREA 8: ENABLING THE WATER SECURITY PLANNING, IMPLEMENTATION AND MANAGEMENT

This **theme** has been identified to focus on, among others, issues of governance, policy and legislation, investment in human capital as well as institutional setting in terms of country readiness to ensure water security, especially within the NEXUS context. For the NWSF implementation to be successful, institutions must be created urgently without delay. In order to enable planning for and implementing programmes to ensure water security, mechanisms need to be in place to address institutional, regulatory and policy requirements and implications.

5.9.1. Institutional framing and geopolitical boundaries

Institutionally speaking the water sector management is generally based on multilevel governance and relations between water resources on one hand and provision of water and sanitation services on the other. The interdependencies of various levels make water management a seemingly straightforward set up yet it is highly complex despite globally accepted general practices. Institutional configuration can often make or break the implementation of the water programmes as evident from recent developments in South Africa where policy and legislation are regarded as among the very best and at cutting edge, yet implementation remains elusive. Recent parliamentary proceedings through the Portfolio Committee on Water and Sanitation as well as Standing Committee on Public Accounts (SCOPA) are a case in point where

⁷⁹ Source: WWF, 2013

issues of poor governance became apparent when corruption, incompetence and lack of accountability were identified as key problems currently. It is for this reason that the Water Security Framework must as a matter of course seek to clarify the institutional framing and ensure that the roles and responsibilities are articulated upfront at different levels of scale and across the full water value chain. That will ensure a focussed intervention that takes into account the respective roles in the value chain. Figure 46 illustrates the global configuration.

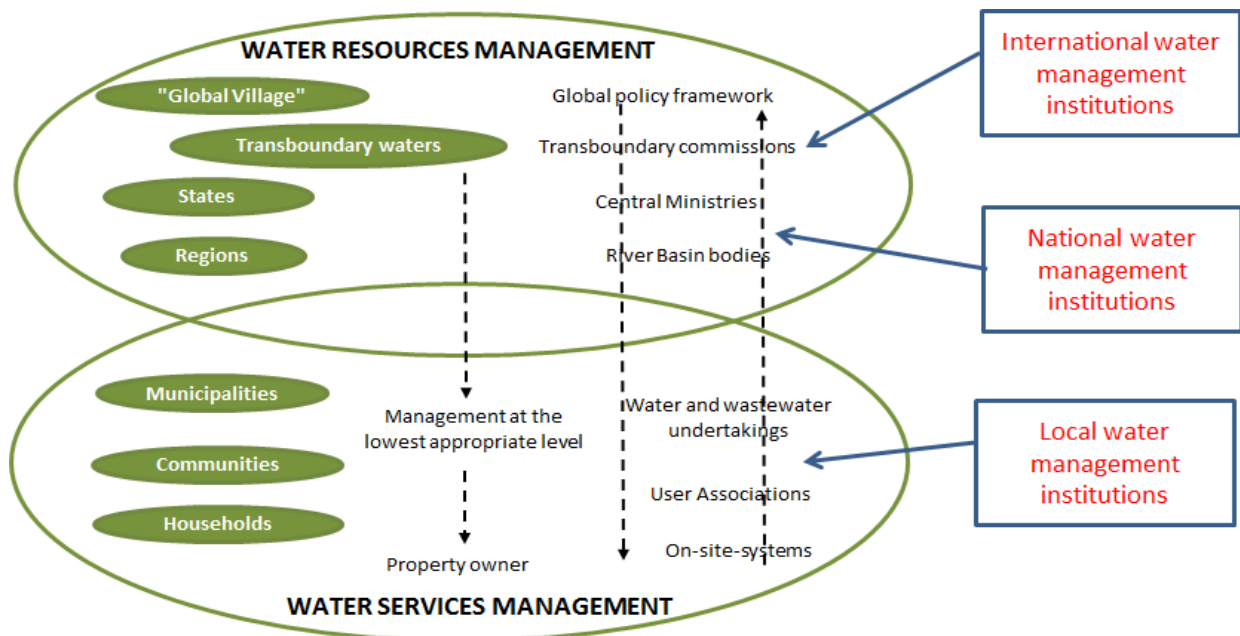


Figure 46. Global configuration of multilevel institutional governance framing for water resources and water services

The above has long been recognised in South Africa as reflected in the National Water Policy of 1996 and to some degree in the earlier RDP Policy framework of the ANC on Water and Sanitation (1994)⁸⁰. The RDP policy framework had already regarded the right to access clean water as a fundamental policy principle of water resources to ensure “**water security for all**”. It recognised the economic value of water and the environment and advocated an economically, environmentally and politically sustainable approach to the management of water resources and the collection, treatment and disposal of waste. Further, the following were already identified as critical:

- Spatial planning and water to recognise geographic limits to water availability and creation of the reserve;
- Long term environmental costs, including as a result of interprovincial and transboundary water sourcing/transfers; and
- Restructuring of the line Department and its role in building local and provincial agencies as well as ensuring effective oversight.

It is clear were consistent, focussed and well considered policies which had a long-term outlook, yet they are still not effectively implemented at least if not for other reason, at least to test them.

Figure 47 shows the geopolitical and sectoral boundaries that need to be fully aligned to ensure national water security.

⁸⁰ African National Congress (1994). The Reconstruction and Development Programme – A policy framework

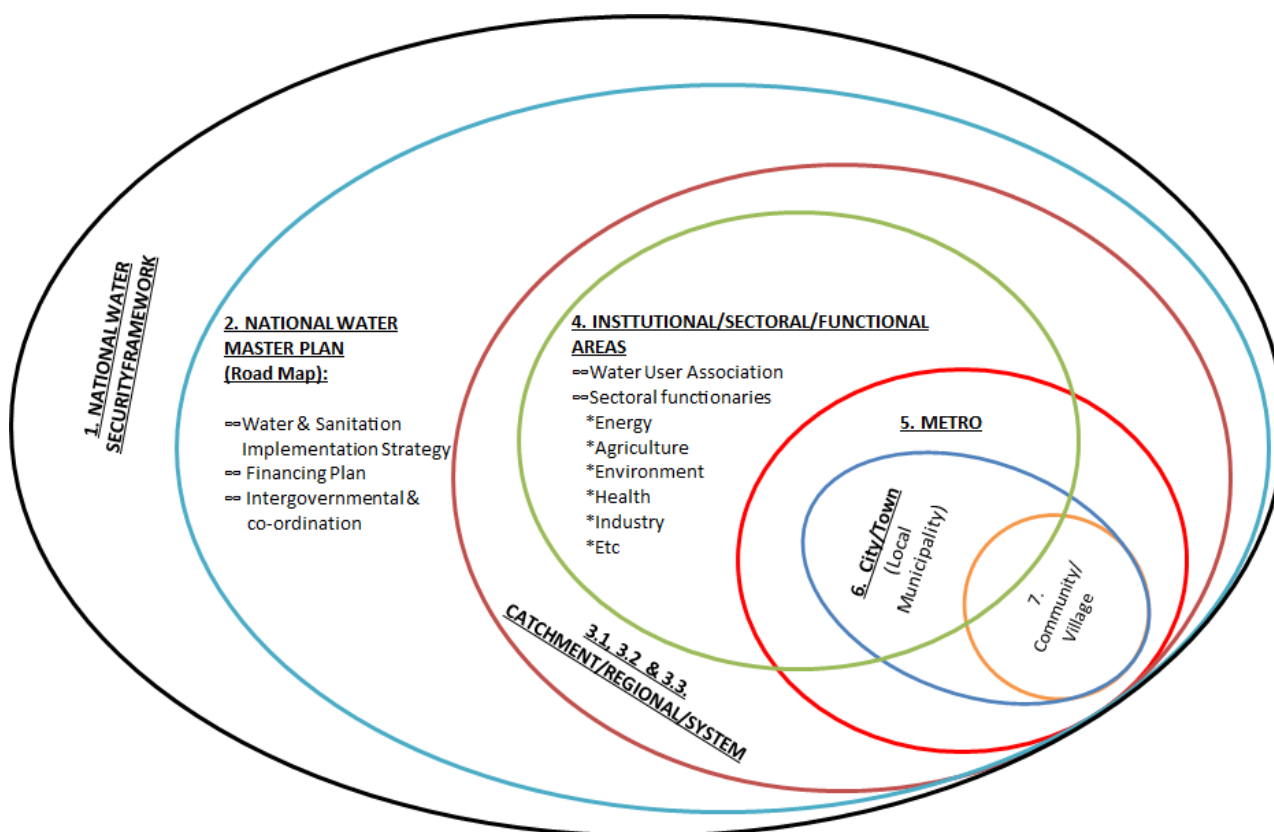


Figure 47 The NWSF in relation to institutional and geopolitical boundaries

Through the Water Security Framework we should be able to ask why the line department is seemingly still at analysis and assessment stages in respect of implementation of institutional arrangements as envisaged in the policy and legislation. For instance, in the case of CMAs, progress has been seriously impacted by decisions that kept changing over time such as recent proposals for one vs. nine CMAs that appeared to be unnecessary in that a debate of that nature was exhausted when the decision was made to bring the CMAs down from 19 to 9 as convincingly presented in the 2013 NWRS2.

On the other hand as reflected in **Error! Reference source not found.** creation of Water Infrastructure Management entity was conceptually accepted during the policy discussions since 1994 and several decisions taken which included gazetting the agency for public debate and commitments through NDP. Yet we are far from establishing this and current estimates are that this will now be gazetted in 2020.

Further, the question to be asked is why as a country are we able to sign up to institutional framing regionally as in SADC and lead the policy debates globally regarding governance and service delivery in water, and yet remain unable to establish the very same policies we advocate nationally? In order to simplify the process, it could be possible to work with existing structures and facilitate implementation. Existing legislation, strategies, guidelines, etc. are already comprehensive.

Legislated tools through which the institutions operate include (Integrated Development Plans (IDPs), Water Services Development Plans (WSDP), Catchment Management Strategies (CMSs), National Water Resources Strategy (NWRS), etc. In addition, non-legislated plans which would form part of input to water security include, provincial local government development plans.

5.9.2. Enabling water security through effective institutional arrangements

South Africa's institutional reform and realignment strategy was published in 2007 and elements of this strategy were articulated in the National Water Resources Strategies (2004, 2013) and the National Development Plan (2011).

Institutional arrangements should be set up so that lower levels of authorities have agency in both: (1) establishing their own respective “rules of the game”; and (2) also give their say in articulating policies at the upper-echelons⁸¹. Along those lines, institutional decision-making processes should be governed by the principle of subsidiarity, that is, a central authority should only perform those tasks that cannot be performed at a more local level. The systems of water governance that are well decentralised are conducive to the practical implementation of policies.

There are several key approaches and principles that are essential foundations to establishing institutional arrangements that support good water governance:

- Institutions should be transparent and open, especially when it comes to policy decision-making and finances;
- Systems of communication and inclusiveness ensuring that stakeholder engagement is maintained and can be enhanced must complement these transparency mechanisms;
- With time water issues seem to only intensify in complexity, policies must therefore be developed in a way that the interconnectedness between different actors and various dimensions is adequately highlighted;
- The different systems involved in water governance should also work towards equitable and ethical solutions. Legal and regulatory frameworks should always aim to be fair to all voices raised by myriad of interest groups and seek for equity between women and men.

Four main institutional functions that are essential to achieving strong institutional arrangements, and thereby, also conducive to good water governance, include:

- **Regulation and enforcement** which deals with institutions that are responsible for the regulatory, implementation and assessment roles;
- Outlining the roles and features of **public, private and community based water supply and sanitation service providers**;
- **Coordination and facilitation bodies** (i.e. transboundary organisations for water resource management, national Apex bodies, civil society organisations, river basin organisations, and impact assessment committees);
- Finally, **capacity building**, dealing with entities and platforms that can help to enhance the institutions themselves, and by the same token, improve water governance at large.

Institutional arrangements are key to social equity, economic efficiency, and ecological sustainability in water management. They rely on an enabling environment to be effective and sustainable, and the necessary management instruments cannot be fully realised without the appropriate system of institutions, particularly regarding stakeholder participation.

In contrast to the traditional vision, institutional arrangements that are founded on IWRM principles work towards a greater long-term goal alongside fulfilling their own respective institutional functions. Institutions should orient their specific individual functions in ways that can best serve the broader shared objectives. When guided by the IWRM paradigm, institutions do not see themselves as separate and/or dominant players but rather as components of a team within a system. As part of this collective, institutions walk alongside each other towards the mutual strategic goal of providing an environment promoting water security for all.

5.9.3. Enabling water security through effective water management and governance

While governance may be seen in narrow political and administrative terms as decision-making by “the government”, good governance actually requires that all institutional actors involved managing water resources, including citizens, organisations and private entities, work in a common direction. Poor governance leads to increased political and social risks, institutional failure and lowered capacities to

⁸¹ http://www.gwp.org/en/learn/iwrm-toolbox/Institutional_Arrangements/

deliver. Therefore, good water governance requires clear legal frameworks, comprehensive water policies, enforceable regulations, institutions that work, smooth execution and citizen-based mechanisms of accountability, as well as strong interconnections between these entities. Water problems are often caused outside of the water sector; it is “good governance” in general rather than simply “good water governance” that is needed.

While operating and performing their respective functions, institutions must be accountable, efficient, responsive and sustainable. To begin with, good institutional governance requires for accountability; which is, in the process of doing, each institution must be able to explain and take responsibility for actions taken in line with their obligations defined by the appropriate legislative and executive powers. With recognition and backing of their legal status, institutions can function properly. Economic efficiency calls for serving more with equity and minimum waste. Appropriate price regulations and standards for limiting the damage to the environment should be specified in that sense. Lastly, in order to be responsive and sustainable, policies must deliver what is needed on the basis of demand, clear objectives, and evaluation of future impact and, where available, of past experience.

In order to ensure good control, South Africa could consider doing so through a functional regulator.

The enabling environment essentially consists of “rules of the game” that are laid out as to achieve a sustainable balance between the social, economic and environmental needs for water. These rules can be defined by the use of: (1) Policies; (2) Legislative Frameworks; and (3) Financing and Investment Structures⁸². The latter is covered in a separate theme on financial sustainability.

The enabling environment is determined by national, provincial and local policies and legislation that constitute the “rules of the game” and facilitates all stakeholders to play their respective roles in the sustainable development and management of water resources. The purpose for such enabling environment is to provide a set of solid foundations establishing the priorities and best ways which can help water governance structures reach their goals, while balancing out the social, economic and environmental demands for water resources. IWRM must be seen as a guiding strategy in creating the Tools of this enabling environment, i.e. policies, legislative frameworks and financing structures. The roles and responsibilities are defined in Table 3. **Management and governance roles for water resources** and Table 4. **Examples of division of typical governance roles**

Setting up a proper enabling environment entails that stakeholder involvement cannot be understood as limited to the realm of government institutions. Since the “rules of the game” apply to everyone, private companies, NGOs, community-based organisations, women and disadvantaged groups in particular, as well as other sections of civil society should all be provided with genuine opportunities to actively participate in formulating these collective baselines. Women play a central part in the provision, management and safeguarding of water and a special effort should be made to consult them in these efforts. All these organizations and agencies have an important role to play as there exist many different perspectives on enhancing access to water, bringing about equilibrium between conservation and development, and treating water as a social and economic good.

Regardless of how they are defined, water management and governance involve different opinions or views, and discussions inevitably add details until the definition becomes cumbersome. From basic concepts perspective, water governance involves a broad set of enabling and regulating functions that support and oversee the organisations that use resources to manage water for human and environmental needs. Governance requires policy setting to create mechanisms to empower and control the functions and outcomes of the water management processes. As in the case of recent developments in South Africa as stated earlier, governance failure manifests in the failure of delivery.

A second concept is that management and governance involves similar set of tasks but they are applied differently and at different levels. Such tasks include setting policy, empowering, planning and organising, directing, financing and controlling. To illustrate, water policy is set by national organisations and by local governing boards, but the policy has different purposes.

⁸² <http://www.gwp.org/en/learn/iwrm-toolbox/The-Enabling-Environment/>

A third concept is that management and governance processes must be applied in appropriate ways to the different sectors of water resources management. For example, to manage and regulate the withdrawal of water supplies is a much different problem than to apply the same task for flood control or hydroelectricity.

Table 3 provides brief comparative roles of management and governance for seven distinct sectors of water management and cross-cutting sector (multi-purpose and area-wide management)

Table 3. Management and governance roles for water resources⁸³

WATER SECTOR	MANAGEMENT ROLES	GOVERNANCE ROLES
Public and industrial supply	Utilities and other systems provide water supply	Ensure access, regulate allocation and quality, empower utilities
Wastewater and environmental water quality	Provision of removal and treatment of wastewater and environmental water quality	Ensures access, regulate dischargers and water quality
Storm water and flooding	Provided by organisations for storm water and flood control from urban areas and sites	Ensure services, regulate flooding and nonpoint sources, ensure preparedness
Irrigation and farm drainage	Provide raw water and drainage systems in irrigated and rainfed zones	Regulate allocation and drainage, empower irrigators, oversee organisations
Instream flow control	Coordinates flows for hydropower, navigation, recreation, fish and wildlife	Establish instream flow, control diversions and discharges
Groundwater management	Manages groundwater development and use	Regulate groundwater withdrawals and protection
Area wide and multi-purpose management	Provides coordination and river basin planning through multi-purpose agencies	Empower and coordinate river basin and other multi-purpose actions

Some examples of division of roles are highlighted below⁸⁴

Table 4. Examples of division of typical governance roles

Local water management	<ul style="list-style-type: none"> ○ Local water policy ○ Urban drainage and flood control ○ Municipal water supply authority ○ Regional water and sanitation authority (large cities) ○ Community water management
National Water Infrastructure	<ul style="list-style-type: none"> ○ New reservoir development ○ Management of existing reservoirs – large dams and conveyance systems ○ Options analysis ○ Intercatchment /interbasin transfer management – systems balance

⁸³ Grigg NS. 2011. Water governance: from ideals to effective strategies. Water International, 36:7, 799-811, DOI: 10.108/02508060.2011.617671

⁸⁴ see also ANNEXURE B - Institutional Roles and Responsibilities Matrix

National policy planning, regulation and oversight	<ul style="list-style-type: none"> ○ National strategic planning ○ Systems operation (by infrastructure perhaps) ○ Development of regulations ○ Policy development and management ○ Licencing and authorisations – supported by strong compliance monitoring and enforcement as well as good catchment management ○ Resource(Land, water & environment) auditing – to assess if reserve determination is achieving intended results ○ Reserve determination and instream flow regulation and control
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A national Water Security Framework is meant to allow policy development and enable empowerment which can lead to the establishment of mechanisms for planning and implementation that are critical for the regional water supply in a growing economy.

While it is difficult to generalise about the requirements for water governance to enable water security, a conceptual framework for it is available; cases and example demonstrate how governance and management must work in tandem with technical approaches to solve water problems. The solutions will inherently involve multiple institutional elements and organisational types, including multipurpose, river-basin and regional organisations, which expand the possibilities for success through integrated water management (IWM).

Desperate situations of water management become evident when viewed through the lens of governance. They illustrate multiple forms of interactions among the functional elements of management and governance at different levels of government.

Principles of effective water governance:

- Multilevel and multidimensional policy;
- Capacity building, empowerment and control;
- At local level, implementation and regulatory responsibilities are not always separated clearly;
- Empowerment and transparency of local communities.

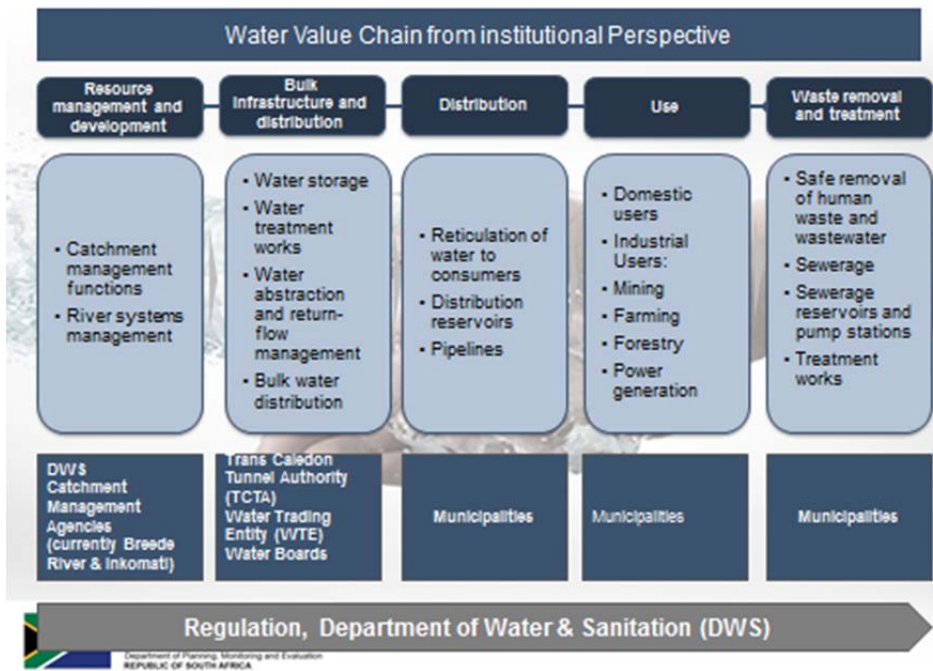


Figure 48. Institutional water value chain

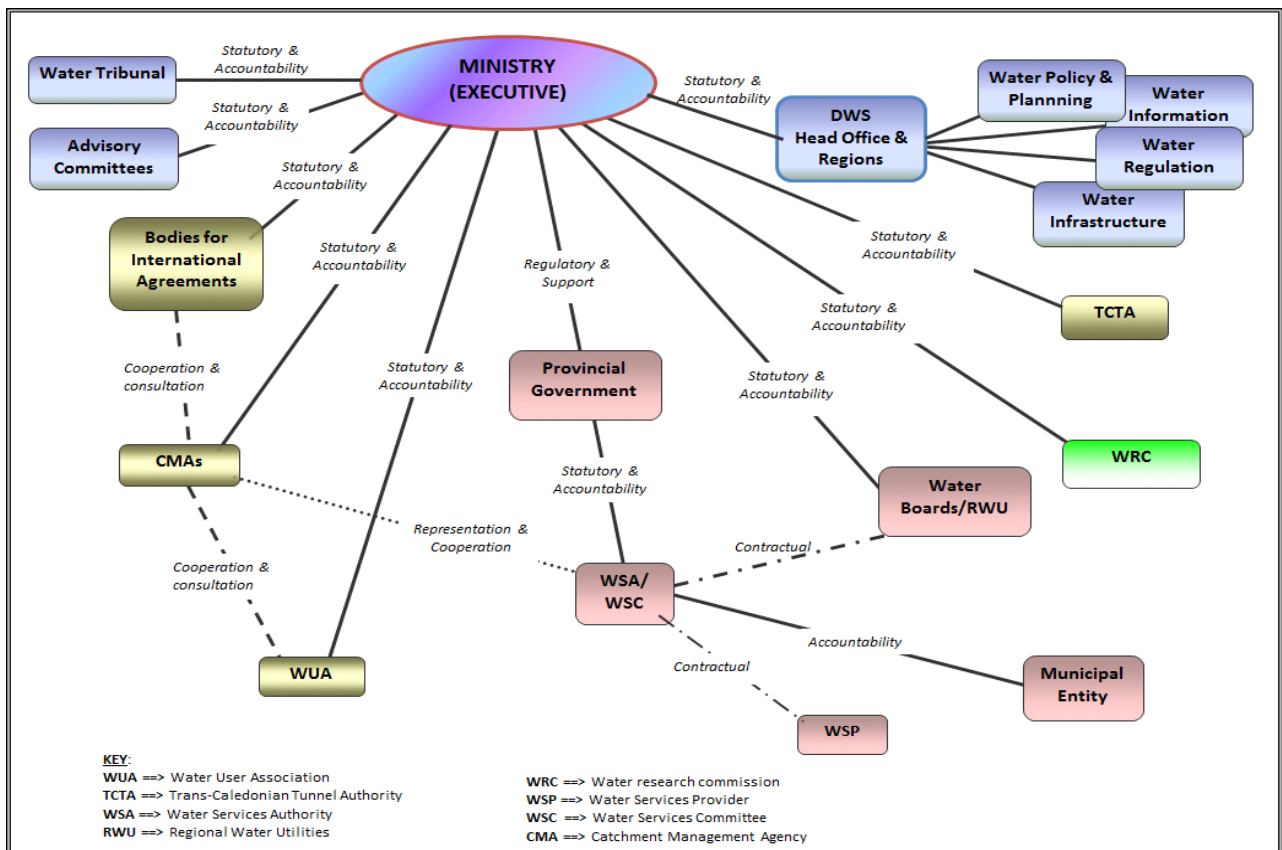


Figure 49. Institutional arrangements under the National Water legislation (NWA, WSA, WRA) reconfigured to reflect legislative and policy prescripts and intent.

Figure 50. Institutional clustering aligned with current understanding and future requirements proposed for immediate implementation (modified from Ruiters and Matji, (2015) (To redraw for visibility) below

shows a logical clustering of the institutional framework that is based on the latest understanding of the policy and legislation as envisaged from initial development through to recent reviews.

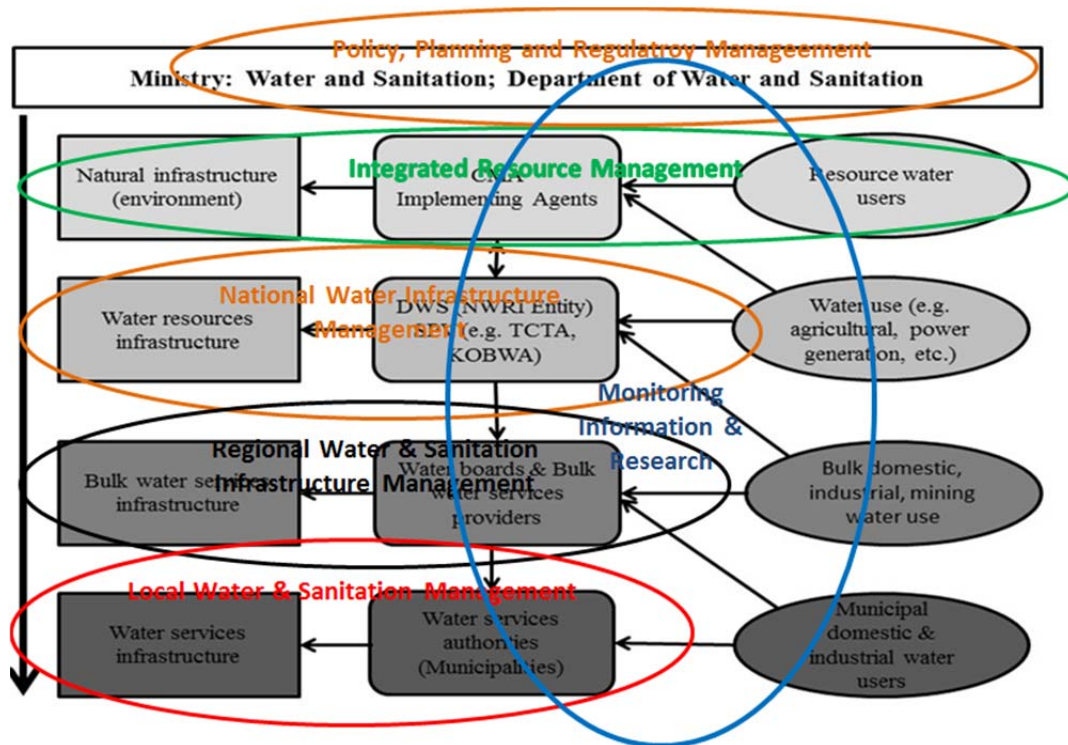


Figure 50. Institutional clustering aligned with current understanding and future requirements proposed for immediate implementation (modified from Ruiters and Matji, (2015) (To redraw for visibility)

Flowing from Figure 49. Institutional arrangements under the National Water legislation (NWA, WSA, WRA) reconfigured. and institutional arrangements reflected in Figure 49 for the purpose of the Water Security Framework institutions proposed for immediate implementation or strengthening are highlighted in Table 5 below.

Table 5. Institutions according to water and other relevant legislation requiring immediate implementation to enable water security in South Africa

ENTITY/INSTITUTION	OVERALL FUNCTION	COMMENTS/REMARKS
Ministry of Water and Sanitation	<ul style="list-style-type: none"> Executive and oversees all entities. Set Policy framework and link to overall national executive mandate as custodian of the water resources and overall processes. First line of appeal when allocation or regulatory disputes occur 	In recent times the specific role of the executive has become blurred as a result of overreach into the operations of the Department as an Entity and the entities reporting to the Minister through the respective governing boards.
Water Tribunal	<ul style="list-style-type: none"> Established in terms of sec 146 of the NWA as an independent body with jurisdiction over the whole country to appeal administrative decisions taken in terms of the legislation. It is meant to reconsider administrative decisions on merits of the case and should not apply the law to disputes. Disputes on 	The functioning of the water tribunal has been hampered by level of control that different ministers of Water have wanted have over the years and appears to have lost its original intent.

ENTITY/INSTITUTION	OVERALL FUNCTION	COMMENTS/REMARKS
	application of the law should be dealt with at the High Court	
Advisory Committees on Water	<ul style="list-style-type: none"> Established to advice on particular issues and could exercise and perform powers, duties and functions assigned during establishment or by delegation. 	
Department of Water and Sanitation	<ul style="list-style-type: none"> Planning, policy and regulatory management. Water governance and leadership 	<p>It is assumed that the regulation function will fully be located within the Department with national (decompose allocation - recall spatial planning as well) water allocation, compliance monitoring and enforcement as well as long-term strategic planning and sector leadership/oversight.</p> <p>The Department's function will retain a national function with a regional footprint.</p> <p>The original plan was to have a streamlined Department with team of about 3500 staff complement focusing on high level activities both regionally and nationally playing a more regulatory and oversight/leadership role</p>
Catchment Management Agencies (9)	<p>Integrated catchment management ensuring democratisation and subsidiarity.</p> <p>Emphasis on local level integrated water resources planning and allocation – limit regulatory function to National Department and possible delegation to provinces and local government through ordinances/bylaws.</p> <p>Possibly overseeing Water User Associations as localised interest based organisations envisaged in the national water policy and legislation.</p> <p>Key challenge is that the Department got caught up in the problems associated with transformation of irrigation boards which was a transitional issue at the expense of deconstructing and reconstructing the local water management in line with the policy and legislative principles and intent</p>	<p>It is important to note that although these are funded through user charges, their primary purpose is integrated catchment management.</p> <p>Further, the argument that they are costly to run does not hold water because their footprint and activities are such that some of their activities are in general covered under the fiscus (recall 50 per cent).</p> <p>The current argument may be based on the assumption of bloated regional offices which is a result of resistance to change in terms of letting go by regional incumbents!</p>
National Water and Sanitation Infrastructure Management Agency	<p>National Infrastructure Development and Strategic Asset Management.</p> <p>Funding from the balance sheet and ensuring cross subsidisation across the full value chain at national level</p>	<p>Important to leverage the infrastructure;</p> <p>Take into account the interconnectedness of the water systems in the country</p> <p>Include national systems planning and analysis (Current location in the DWS create a cumbersome and ineffective</p>

ENTITY/INSTITUTION	OVERALL FUNCTION	COMMENTS/REMARKS
		situation. National Department should focus on scenario and long-term planning)
Regional Water Utilities	Regional Water & Sanitation Infrastructure Management involving infrastructure of a regional nature	Relate to the National Infrastructure agency. How do they form a unitary system?
Water and Sanitation Monitoring, Information and Research ⁸⁵	<p>Data and Information management in line with Chapter 14 of the National Water Act, Act 36 of 1998 as well as Chapter 10 of Water Services Act, Act 108 of 1997, and Water Research Act.</p> <p>Key functional areas:</p> <p>Knowledge generation and linking all water and sanitation institutions with institutions within the National System of Innovation and the national Research and Development Strategy</p> <p>Management of monitoring and assets such as national laboratories and hydrological and geohydrological monitoring infrastructure;</p> <p>Monitoring information systems development</p>	<p>Initial assessment indicate that an agency to deal with this functional cluster indicate that funding will come from existing programmes and activities and savings from functional and institutional optimisation.</p> <p>Economic and business model – financing</p> <p>Water value capture – see French & Dutch models in terms of link to developing countries</p>
Water User Associations	A cooperative association of individual water users or persons receiving water services or undertaking water related activities for mutual benefit ⁸⁶	In the past difficulty has been cited as transformation of irrigation boards. The momentum for creation of these may have been hampered by change in leadership and lack decisiveness.
Institutions for international water issues	Institutional bodies to implement an international agreement between South Africa and a foreign government.	These have been functioning and may need only strengthening in respect of capacity within South Africa. Consideration could be given to involve experts in support of government officials.
<p>Local Water and Sanitation Infrastructure Management</p> <p>e.g. Water Services Authorities</p> <p>Link to IDPs</p> <p>See NERSA</p> <p>Model which allows for lower levels</p>	Remaining local activities that may be seen as “off the grid” type water and sanitation management which could be consolidated under local government sphere context – e.g. MISA with an expanded mandate.	<p>This cluster needs to be further developed to address issues of alignment with national imperatives and potential operational jostling between national oversight and local service delivery</p> <p>Regulating through licensing to cover everything</p>

⁸⁵ This should be linked with land resources research which linked to other line areas such as Agriculture and Environment.

⁸⁶ Thompson, H. 2006. Water Law: A practical Approach to Resources Management and the provision of services

ENTITY/INSTITUTION	OVERALL FUNCTION	COMMENTS/REMARKS
Water Services Committees	Established in certain or for communities where there is no effective or well-organised water services authority (WSA) or water service providers to provide the necessary water services in the area of concern.	Not to be confused with community-based organisations ⁸⁷ . It appears that these have never really been utilise effectively, if at all.

5.9.4. Enabling water security through capacity building

A secure water future will not be achieved without addressing the issue of capacity – the skilled people required to undertake the work. A skills gap analysis conducted by the WRC in 2015, looking at numbers of staff and their skills relative to required skills, showed significant skills gaps in water sector institutions, including DWS, CMAs, water boards and municipalities.

The Energy and Water Sector Education and Training Authority (EWSETA) is the skills development authority serving the water sector.

Implementing the NW&SMP requires the right mix of skills and expertise in the water sector. This includes the capacity expressed as number of persons and skills expressed by qualification and experience required to fulfil the requirements in water resources and water services planning, management and operations. A critical need is to use the expertise of experienced water managers to mentor and develop younger and less experienced managers in the water sector including, but not limited to, the municipal sector.⁸⁸

Building capacity from an institutional and sectoral perspective is critical for enabling water security as well. Skills sets need to be accommodative of the variability of needs, complexities as well as geographical positioning and future needs. The skills needs and strategy need to be re-evaluated in context of the NDP's commitment to building capable state. From the water sector perspective there has not been a careful assessment of skills needs other than commitment made in the NWRS2.

5.10. THEMATIC AREA 9: COMMUNICATION AND STAKEHOLDER ENGAGEMENT

A **theme** on a key communication strategy will be generated to be aligned with the needs of other streams and to ensure that the necessary paradigm shift on planning for water security is internalised throughout the value chain and across various role players.

The strategy must enable key stakeholders to engage with each other, with the wider public and with organisations that have the responsibility for carrying out activities related to water security at different institutional levels. In context of Water security framework, this must be seen to be more than exchanging and sharing information, knowledge experience and views but also involve debate, negotiation and joint learning that has the potential to build trust and social capital away from anecdotal to evidence-based decisions. Key to this is that ensuring water security will require serious and difficult trade-offs that will ensure proper pathways to a water secure South Africa.

The communication and stakeholder engagement, whilst a separate process at NDP level, efforts must be made for messages not to be crossed with the line Department

⁸⁷ Thompson 2006

⁸⁸ National Water and Sanitation Master Plan Volume 1: Call to Action v 9.4 27 March 2018

6. OVERSIGHT, MONITORING AND EVALUATION OF PERFORMANCE

6.1. MONITORING AND EVALUATION

As presented earlier in this document, water security has spatial and temporal dimensions. Spatially it can range from individual family unit to a community or village, town, district, province, country level or continentally. It can vary from spatial unit to another or seasonally to a year, a decade or century. The framework for monitoring must take these dimensions into account.

From a water security perspective, immediate interventions needed include aspects such as development of a **Monitoring and Evaluation System**- that will include development of indicators at outcome and impact level in order to monitor and evaluate programmes beyond processes and focus on whether:

- Policy and legislation are producing the correct enabling environment including its regional and local dimensions;
- The national objectives articulated through the NDP and the Water Security Framework are being achieved;
- Delegation of powers within the sector (national, regional, CMA, local government etc.) Is effective;
- Responsibilities that the president delegates to the minister, who in turn delegates to the institutions that report to his/her are performed.

Three key criteria are to drive the monitoring of water related planning and implementation at NDP level, namely

- Economic Growth measured by GDP growth contributed by or through water and
- Eliminating or reducing the inequality gap measured in terms of the HDI, focusing on livelihoods locally through to national and reflective of addressing past imbalances in a measurable manner.
- Poverty alleviation, addressing inequality and unemployment

Table 6. Framework for Water Security Assessment for South Africa

IDEA/AREA/KEY DIMENSION		ISSUE	RESOLUTION/AT WHAT POINT (WHEN) TO BE ADDRESSED	WHAT IS THE CHANGE WE NEED TO SEE – WHAT RESULTS IN TERMS OF IMPACT LEVEL	HOW DO WE MEASURE THAT, I.E. WHAT IS/ARE THE INDICATOR(S)	RESPONSIBLE AGENCY
1.	National Water Security	Extent to which the country has progressed towards national water security. A snapshot at any given time needs to be developed. Peace and stability at national and regional level	Continuous assessment and development of the water security situation (every 5 years with selected regular reporting at every level from national through to local community – ref. Figure 47)	Improved water security in SA – to address the current status of freshwater stress; Resilience in respect of water security; Alternative water sources optimally utilised	State of water security (national, provincial, local); See example of items measured Lautze et al	DPME, DWS, Stats SA
2.	Water					

IDEA/AREA/KEY DIMENSION	ISSUE	RESOLUTION/AT WHAT POINT (WHEN) TO BE ADDRESSED	WHAT IS THE CHANGE WE NEED TO SEE – WHAT RESULTS IN TERMS OF IMPACT LEVEL	HOW DO WE MEASURE THAT, I.E. WHAT IS/ARE THE INDICATOR(S)	RESPONSIBLE AGENCY
Endowments (Water Resources?)					
2.1 Natural resource and infrastructure stock/system)	Scarcity, availability of resources, shortage frequency; Biogeophysical limitations/parameters (resource variability and stress); Virtual water etc	Opportunities and risk assessment; “water stock”; Assess choices favouring water security (e.g. hydropower in terms of INGA and not water transfer)	Optimally operated water resource infrastructure; Sufficient water available or secured – storage and conveyance systems in relation to ensuring water security; Level of ability to implement or implementation in and of itself – planning and asset management included.	State of water endowment (“water stock”)	DWS
2.2 Natural and Ecological Infrastructure/ Environmental flows (Environmental Water Security)	Ecosystems degradation and pollution; ecological goods and services (Link to endowment)	Opportunities and risk assessment; valuing ecosystems goods and services and impact on balance sheet	Reduced degradation level; Restoration & rehabilitation; Natural resources sustainability – link to ensuring integrated catchment management.	Cost-benefit analysis Price value of ecological goods and services (In relation to restoration and rehabilitation); To what extent does this impact on the balance sheet?	DWS, DEA, DAFF, DPME, DED
3. Water-related Extremes and triggers for change (Floods, droughts, pollution, climate change etc)	Flood, drought, climate change; triggers for change; Resilience to water-related extremes.	Risk assessment on flood, drought and impact of climate change; analysis of triggers & water security pathways	High level resilience; “drought proofing”; “water banking”; protection of infrastructure; Link to desertification etc. disaster	Impact studies and assessment of pathways to water security (Space & time)	DPLG, DEA, DAFF, DWS, LG, SAWS, ARC

IDEA/AREA/KEY DIMENSION	ISSUE	RESOLUTION/AT WHAT POINT (WHEN) TO BE ADDRESSED	WHAT IS THE CHANGE WE NEED TO SEE – WHAT RESULTS IN TERMS OF IMPACT LEVEL	HOW DO WE MEASURE THAT, I.E. WHAT IS/ARE THE INDICATOR(S)	RESPONSIBLE AGENCY	
				management issues		
4.	Water utilisation and socio-economic development					
4.1	Human-water system (Water utilisation)	Water Supply and Sanitation Livelihood and wellbeing; urban water systems; regime shifts as a result of <u>anthropogenic</u> influences and implications for water security; Water use	Water vulnerability atlas; water accounting etc.		Water use per unit economic activity; Water use efficiency change over time Human well-being (HDI), Composite indicators for this.	DRDLA, DWS, HEALTH, HOUSING, STATS SA
4.2	Water finance and investment)	Infrastructure development, O&M, financing; water pricing Challenges of cross-subsidization (Financial sustainability of sector, raising funds for infrastructure) Need to have self-sufficient institutions to leverage its own asset base	Investment modelling; risk assessment; long-term planning; Tracking financial flows	Financial Sustainability	Return on investment both from fiscus and funding from elsewhere What the line Dept. is to achieve line by line.	
5.	Water intelligence (data, information & research)	Research, monitoring and information Data curatorship/banking	Water accounting, innovation, water data and information National information systems; Valuing water	Verification of 98per cent allocation; Both services and water resources; MPN to add!! Sectoral water use vs. allocation vs actual needs.	Investment levels; Cost-effectiveness of data Information & knowledge flows (sharing, access, etc)	DWS, WRC, DST, CSIR, ARC, SANBI, SAEON

IDEA/AREA/KEY DIMENSION	ISSUE	RESOLUTION/AT WHAT POINT (WHEN) TO BE ADDRESSED	WHAT IS THE CHANGE WE NEED TO SEE – WHAT RESULTS IN TERMS OF IMPACT LEVEL	HOW DO WE MEASURE THAT, I.E. WHAT IS/ARE THE INDICATOR(S)	RESPONSIBLE AGENCY	
				Availability of data and information (including adequacy); Data quality innovation		
6.	Water governance (administrative and institutional system)	Enabling water planning and management for security; institutional and sectoral capacity; Effective policies & legislation; Enforcement of regulations	Institutional model; Establishment of institutional arrangements; policy and legislation development, implementation and review; Building capacity across the water value chain	See example from OECD 12 principles – efficiency, effectiveness etc.	Degree of policy implementation; Effectiveness and efficiency of institutions; Institutional capacity development across the value chain	DWS

6.2. DATA AND INFORMATION SOURCES FOR ACHIEVING WATER SECURITY

National water monitoring, research and information must provide the primary data and information as well as first line assessments that will form input to secondary and tertiary requirements from regulatory regime (compliance monitoring and enforcement), accounting for water (see Stats SA programme) through to operational and national planning needs.

6.3. PROCESSES AND SPECIFIC INTERVENTIONS

The Water Security Framework needs to be produced regularly as a living document to be revised as new information and knowledge is obtained and NDP is implemented;

The Master plan or implementation plan should aim specifically at addressing the questions in the NWSF – Not to be confused with “normal” run of the mill strategies like NWRS and other mandated strategies.

6.4. APPROACH TO ASSESSMENT

6.4.1. OECD risk based approach

OECD’s approach is based on the “know”, “target” and “manage” water risks summarised in Figure 51. Of importance to note is that the approach is meant to manage the trade-offs beyond the technical or hydrology-based risks (hence value and evidence-based considerations). Water risks can be catastrophic whether quick like flash flood or an insidious drought whose impact can be cumulative over time.

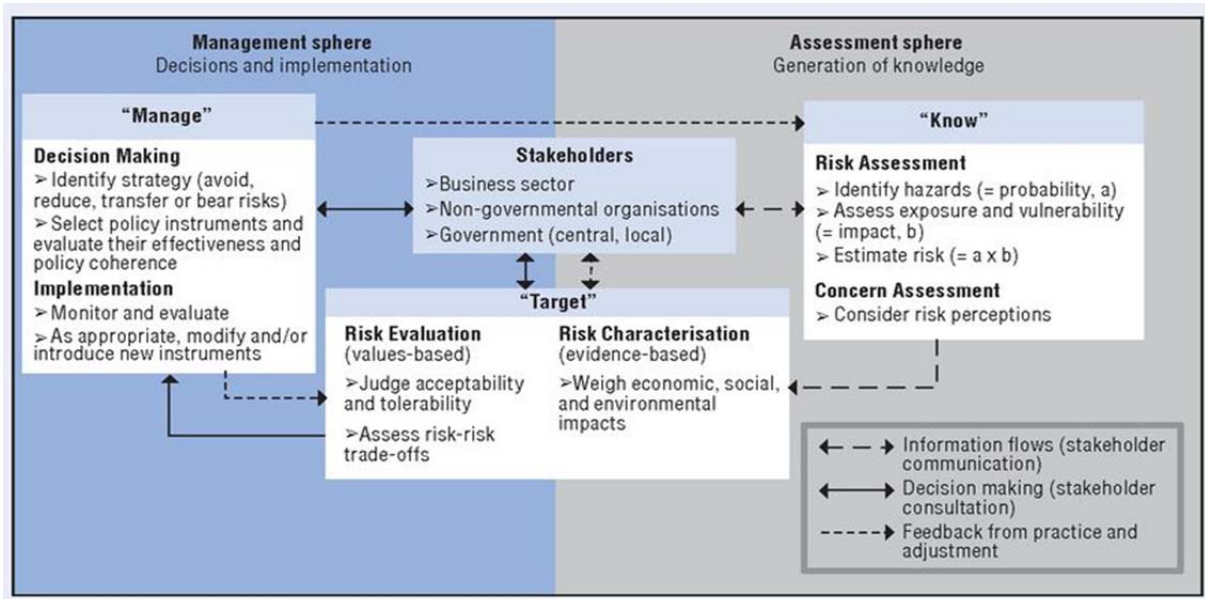


Figure 51 The OECD's "know" target and "manage" water risk management approach.

6.4.2. Gap Analysis

There is a large number of methodologies, tools and indicators for assessment and measurements used in the water sector in general. However one of the key principles is that of ensuring alignment between the national goals of the NDP to the global measurements, particularly as this will ensure the required transparency and allows for international best practice. These tools need to be robust enough to address the national assessment of impact of various programmes.

In addition to the risk based approach mentioned earlier in this document, the OECD has developed 12 "must haves" water governance principles for governments to get economic, social and environmental benefits which apply to all levels of government regardless of water management functions, water uses and ownership models. These approaches can be modified and adapted for use at all scales from National, line Department/sector leader through to local level. They must be carefully tested against commitments made in addition to the key tests of improved livelihood measured in terms of GDP per capita and narrowing the inequality gap.



Figure 52. Water governance to be applied at all institutional levels

The approach to gap analysis and bridging the gaps involves taking the above 12 principles and iteratively test them using the OECD methodology below with NPC constantly monitoring the outcome and impact in line with the NDP aspirations and goals.

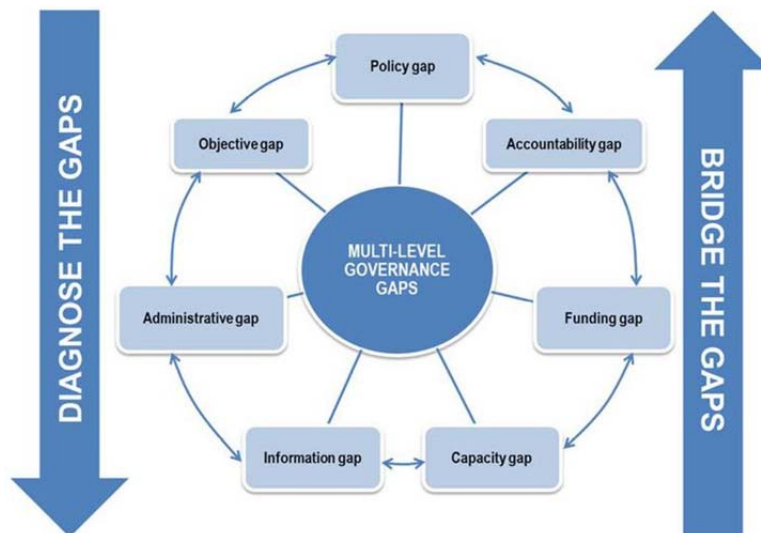


Figure 53. Iterative gap identification and interventions

It is anticipated that the assessment will need to be systematically done across the sector from national through to local. As indicated in the section under challenges, the assessment tool is important in that it will address the serious concern of governance and leadership issues.

7. CONCLUDING REMARKS, RECOMMENDATIONS AND NEXT STEPS

While many of the concepts embedded in water security are consistent with past water planning in the country, explicit formulation and use of Water Security Framework for South Africa reflects a departure from past approaches. This is informed by the developments over the years regarding focus on water security. The Water Security Framework is meant to capture in various ways our capacity to ensure availability and access to water by responding to various risks, vulnerabilities, insecurities, inequities and policy challenges that societies and ecosystems face in the short medium and long-term in line with the NDP vision.

The framework is the first of its kind in South Africa and meant to bring a fresh, internationally-legitimized, and inclusive approach to assessing and addressing South Africa's challenges and opportunities for managing its water resources and provision of services to harness benefits and mitigate risks. It also provides an encompassing perspective that provides several value-adds/comparative advantages over approaches utilized previously. These include among others the following:

- Serving as a guide to all other strands linked to water across the system in terms of long-term planning and support;
- Strengthening implementation and ensure that it is driven at a level that allows for holistic oversight and fostering cross-departmental integration;
- Ensuring national accountability linked to authority across the system, especially in areas where the value chain is driven from outside the line sectoral mandates;
- Providing greater recognition and emphasis on practical terms to dealing with the risk of the line Department getting caught up in relationship management and not carrying out its mandate;

In order to address the various dimensions presented, thematic areas where identified to guide the framing and implementation, namely,

1. Narrowing the inequality gap – water as an enabler
2. Ensuring financial sustainability
3. Diversifying water sources
4. Water research, monitoring and information
5. Focus on key nexus aspects of water security
6. Ecological infrastructure
7. Water and spatial planning
8. Enabling the water security planning, implementation and management
9. Communication and stakeholder engagement

An assessment framework is proposed with six indicators aimed at addressing the full spectrum of water security consideration that are in line with the identified key apex priorities, particularly in relation to growing and transforming the economy. Water is seen as cross-cutting in all aspects of human life and the NWSF is set to address this.

In ensuring the implementation of the framework, some general issues to be considered are restated, namely:

- a) That the framework is meant to be based on the full water value chain and informed by empirical evidence;
- b) It needs to be futuristic in nature and not reactive to short term needs only. It must answer the questions beyond 2030 yet ensure that what happens now is aligned to the long-term;
- c) The framework must be clear and instructive ... addressing the Source-to-Sea concept and contributed to by all institutions across the value chain.

- d) It should not be confused with the line Department plans which largely only cover the area where the line Minister has direct control over the various role players. It must be sufficiently authoritative to get all and sundry obligated to follow in line with identified priorities as articulated and recommended by the NPC. The department's master plan must be confined to putting into effect the country's water security requirements and specifically respond to the questions as articulated in the Water Security Framework.
- e) In recognising the delays in implementing the policy and legislative model for water sector management reflected in incomplete implementation processes as well as lack of strategic and technical skills, a team at the highest level and independent of line department needs to be urgently put together to monitor the progress made to date and to lead a process of further refinement of the Water Security Framework especially given that great amount of time has been lost over the past few years. The team must be multidisciplinary in nature and able to strategically analyse and assess the implementation regime with the aim of unlocking all bottlenecks that may not be easily dealt with from line Department perspective and level within its jurisdictional mandate. This may include connecting the interdependency dots across the system and value chain such as energy-water-food nexus both horizontally and vertically. The team will lead the process of further development of the framework benchmarking with approaches done elsewhere like in Asia and OECD countries.
- f) Decisions that have been delayed for technical or administrative reasons such as creation of a National Water Infrastructure Agency must be re-visited with the aim of clearing intended and non-intended consequences of such delays and focus on implementation.

Specific recommendations that form part of the next steps include aligning local government legislation and the national legislation including Water Services Act timing and positioning in respect of legislative regime post establishment. Section 139 of the Constitution⁸⁹ provides for intervention and needs to be looked at in terms of effective implementation taking into account that the challenges are beyond financial.

Roles and responsibilities need to be immediately unpacked taking into consideration respective roles and responsibilities reflected by the AG and NT and how these are listened to by the political space.

Given the lessons over the past 20 years since the National Water Policy and subsequent individual work done by the Department and researchers from across the country as well as internationally, further detailed assessments need to be done within 12 to 24 months. The key for this would be to consolidate what has been learnt and ensure that the amendments address the shortcomings.

It is evident that one of the key risks in the sector is the enabling environment for water security. It is therefore important to immediately implement the institutional framework by establishing the institution for water management without delay. A series of steps are thus recommended which include:

- Assessing and taking stock of current difficulty in implementing policies and programmes;
- Building a national framework that will guide the national processes and provide a long-term view of ensuring water security;
- Positioning of the effective implementation by creating a centre of water intelligence beyond the narrow water business as usual, taking into account the importance of water in all aspects of human life, especially for the South African condition. This will further involve development and refinement of national indicators on water security and redirecting the various institutions mandated to carry out the water business, including stakeholders, public and private sectors as well as citizens;
- Creating a planning and monitoring framework that is robust to ensure that water related risks are avoided or mitigated; and

⁸⁹ <https://www.gov.za/documents/constitution-republic-south-africa-1996-chapter-6-provinces#139.%20Provincial%20intervention%20in%20local%20government%20>

- Consultation process both during the development of framework and execution taking all role players and stakeholders along through a participatory process without losing focus.

8. ANNEXURES

ANNEXURE A - Fundamental Principles and Objectives for a New Water Law in South Africa

The fundamental principles and objectives for the South African Law approved by Cabinet in November 1996 remain a good point of departure. These are grouped according to:

Principles	Explanation
<ul style="list-style-type: none"> • Legal aspects of the water (Principles 1-4) 	Reflecting on commonality of ownership, right only to environment, basic service and authorisation to use. Most importantly ensuring that the law is consistent with the Bill of Rights.
<ul style="list-style-type: none"> • The water cycle (Principles 4-6) 	Reflecting on and recognising the unity of the water cycle and the interdependence of its elements as well as the variability, unpredictability and uneven distribution of water.
<ul style="list-style-type: none"> • Water resource management priorities (Principles 7-11) 	<p>Key priority principles of “the Reserve” (environmental and basic human needs) as a right are introduced and focus is placed on the sustainable use and economic development. Further the international obligation is seen as one of the key aspect of mutual cooperation.</p> <p>A key observation to date is that it appears the planning regime plan around these as a norm rather than a minimum, hence the challenge of “stunted” growth.</p>
<ul style="list-style-type: none"> • Water resource management approaches (Principle 12-21) 	The principle of National Government as the custodian of all water resources is introduced and the need to manage all water holistically in broader context of integrated land management emphasised. It is further reflected that regulatory regime will include economic and other punitive mechanisms to avoid deterioration of water. Authorisation is to be timely and predictable and recognise infrastructure investment.
<ul style="list-style-type: none"> • Water institutions (Principles 22-24) 	Institutional framework was seen as simple, pragmatic and understandable. It was envisaged that most of the activities will be delegated to the water management institutions such as Catchment Management Agencies or regional entities in a manner that allows participation locally hence subsidiarity principle
<ul style="list-style-type: none"> • Water services (Principles 25-28) 	<p>Basic water services, defined as the provision of potable water supply and the removal and disposal of human excreta and waste water are a right.</p> <p>Provision of water services is seen as functionally distinct from water resource management but is expected to be provided in a manner consistent with the goals of water resource management.</p> <p>Regulation of water services is to be consistent with and supportive of the aims and approaches of the broader local government framework</p>

Principle 1 The water law shall be subject to and consistent with the Constitution in all matters including the determination of the public interest and the rights and obligations of all parties, public and private, with regards to water. While taking cognisance of existing uses, the water law will actively promote the values enshrined in the Bill of Rights.

Principle 2 All water, wherever it occurs in the water cycle, is a resource common to all, the use of which shall be subject to national control. All water shall have a consistent status in law, irrespective of where it occurs.

Principle 3 There shall be no ownership of water but only a right (for environmental and basic human needs) or an authorisation for its use. Any authorisation to use water in terms of the water law shall not be in perpetuity.

Principle 4 The location of the water resource in relation to land shall not in itself confer preferential rights to usage. The riparian principle shall not apply.

The water cycle

Principle 5 In a relatively arid country such as South Africa, it is necessary to recognise the unity of the water cycle and the interdependence of its elements, where evaporation, clouds and rainfall are linked to underground water, rivers, lakes, wetlands and the sea, and where the basic hydrological unit is the catchment.

Principle 6 The variable, uneven and unpredictable distribution of water in the water cycle should be acknowledged.

Water resource management priorities

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.

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

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 The water required to meet the basic human needs referred to in Principle 8 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.

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 cooperation. Allocations agreed for downstream countries shall be respected.

Water resource management approaches

Principle 12 The national government is the custodian of the nation's water resources, as an indivisible national asset. Guided by its duty to promote the public trust, the national government has ultimate responsibility for, and authority over, water resource management, the equitable allocation and usage of water and the transfer of water between catchments and international water matters.

Principle 13. As custodian of the nation's water resources, the national government shall ensure that the development, apportionment, management and use of those resources is carried out using the criteria of public interest, sustainability, equity and efficiency of use in a manner which reflects its public trust obligations and the value of water to society while ensuring that basic domestic needs, the requirements of the environment and international obligations are met.

Principle 14 Water resources shall be developed, apportioned and managed in such a manner as to enable all user sectors to gain equitable access to the desired quantity, quality and reliability of water. Conservation and other measures to manage demand shall be actively promoted as a preferred option to achieve these objectives.

- Principle 15. Water quality and quantity are interdependent and shall be managed in an integrated manner, which is consistent with broader environmental management approaches.
- Principle 16 Water quality management options shall include the use of economic incentives and penalties to reduce pollution; and the possibility of irretrievable environmental degradation as a result of pollution shall be prevented.
- Principle 17 Water resource development and supply activities shall be managed in a manner which is consistent with the broader national approaches to environmental management.
- Principle 18 Since many land uses have a significant impact upon the water cycle, the regulation of land use shall, where appropriate, be used as an instrument to manage water resources within the broader integrated framework of land use management.
- Principle 19 Any authorisation to use water shall be given in a timely fashion and in a manner which is clear, secure and predictable in respect of the assurance of availability, extent and duration of use. The purpose for which the water may be used shall not arbitrarily be restricted.
- Principle 20 The conditions upon which authorisation is granted to use water shall take into consideration the investment made by the user in developing infrastructure to be able to use the water.
- Principle 21 The development and management of water resources shall be carried out in a manner which limits to an acceptable minimum the danger to life and property due to natural or manmade disasters.

Water institutions

- Principle 22. The institutional framework for water management shall as far as possible be simple, pragmatic and understandable. It shall be self-driven and minimise the necessity for state intervention. Administrative decisions shall be subject to appeal.
- Principle 23 Responsibility for the development, apportionment and management of available water resources shall, where possible and appropriate, be delegated to a catchment or regional level in such a manner as to enable interested parties to participate.
- Principle 24 Beneficiaries of the water management system shall contribute to the cost of its establishment and maintenance on an equitable basis.

Water services

- Principle 25 The right of all citizens to have access to basic water services (the provision of potable water supply and the removal and disposal of human excreta and waste water) necessary to afford them a healthy environment on an equitable and economically and environmentally sustainable basis shall be supported.
- Principle 26 Water services shall be regulated in a manner which is consistent with and supportive of the aims and approaches of the broader local government framework.
- Principle 27 While the provision of water services is an activity distinct from the development and management of water resources, water services shall be provided in a manner consistent with the goals of water resource management.

Principle 28 Where water services are provided in a monopoly situation, the interests of the individual consumer and the wider public must be protected and the broad goals of public policy promoted.

ANNEXURE B - Institutional Roles and Responsibilities Matrix⁹⁰⁹¹

COMPONENT	REQUIREMENTS	TOOLS FOR INTERVENTIONS/MANAGEMENT ⁹²	INSTITUTION/ORGANISATION/BODY										
			DWS-Policy	DWS-Planning and Information	DWS-Regulatory	DWS-NWRI	Information Monitoring and Research	TCTA	Water board/utility	WSA	CMA	WUA	OTHER
Natural System (Rain, Rivers, Wetlands, Aquifers, Estuaries, Sea)	Secure sustainable use Reserve determination	Policies, legislation, frameworks, strategic/operational plans											
Raw water supply to Dam	Dam construction Inter-basin transfer scheme Infrastructure Trans-disciplinary skills & capability	EIAs Authorisations/licences Consultation/participatory processes		Integrated planning & allocation	Regulatory	Financing (Guarantee) Project conceptualisation oversight Construction		Off-budget funding and project management					
Water abstraction from Dam to user or treatment facility	Authorisation	Water Use Licence Information Systems (e.g. WARMS)				Regulation			Financing & construction				
Bulk Water conveyance to Treatment Facility													
Water Treatment facility													
Wastewater management/treatment	Blue drop status	Regulations, strategy Compliance monitoring											
Water use -													
• Raw (Rain, River, Groundwater, Wetland, Estuary, Sea water)	Environmental protection	EIA, Licence, information systems											
• Treated													
• Reuse													
• Wastewater disposal/discharge	Green drop status	Regulations, operational strategy Compliance monitoring Information systems											
• Non-abstractive													
• Instream requirements													
Urban (local) water management													
Reticulation from bulk	Balancing storage Energy for pumping Infrastructure Skills and capability	Regulatory standards											
Urban runoff													
• Storm water													
• Flash floods													
• Rainwater													
Meteorological aspects													
Catchment management													
• Hydrological (quality, quantity, biogeophysical, groundwater/surface water)													
• Aquatic ecosystems and environmental flows													
Research and knowledge capital development	Coordination and funding water research and development	Legislation (Water Research Act)	Policy and national strategy development	Policy and regulatory oversight			Funding through levy						

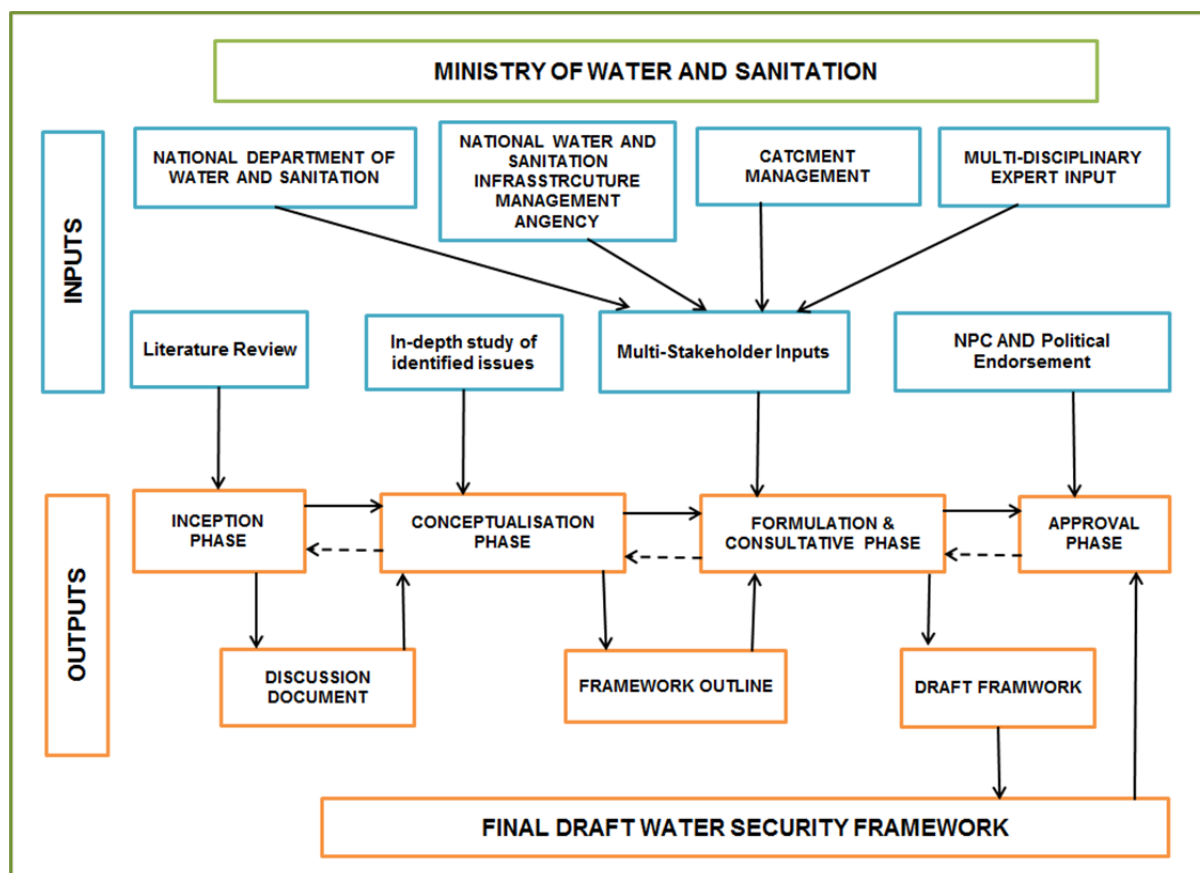
⁹⁰ Cross-check with sections on institutional arrangements and governance in the main document

⁹¹ Table to be completed as part of consultation process.

⁹² Mainly approved and authorised tools through policy, legislation, regulation and institutional mandates

COMPONENT	REQUIREMENTS	TOOLS FOR INTERVENTIONS/MANAGEMENT ⁹²	INSTITUTION/ORGANISATION/BODY											
			DWS-Policy	DWS-Planning and Information	DWS-Regulatory	DWS-NWRI	Information Monitoring and Research	TCTA	Water board/utility	WSA	CMA	WUA	OTHER	
Monitoring and information	Coordination, systems development, monitoring programmes development	Legislation (CH14 NWA, Ch10 WSA), regulation, monitoring programmes Institutional coordination mechanisms, operational strategies	Policy and national strategy development	Policy and regulatory oversight Funding from fiscus				Long term monitoring & information						

ANNEXURE C – Process flow for Water Security Framework Development⁹³



⁹³ Expected to be iterative process and producing a living document