

# Policy, Legal and Institutional Development for Groundwater Management in the SADC Member States (GMI-PLI)



Gap Analysis and Action Plan – Scoping Report (Final)

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## FOREWORD

The Southern African Development Community (SADC) Member States, through the support of International Cooperating Partners have gone through a series of Water Sector Reforms which varied in terms of policy, legal and institutional development. The focus of the water sector reforms has been on Integrated Water Resources Management and aimed at achieving sustainable and equitable distribution of water resources in the respective Member States. To a large extent, the water sector reforms did not comprehensively address the sustainable management of groundwater resources, yet 70% of the population in the SADC region depend on it. Climate change continues to negatively affect the availability of surface water, placing significance reliance on the use of groundwater for both urban and rural supply throughout the region. Human wellbeing, livelihoods, food security, ecosystems, natural habitats, industries and urban centres growth throughout the SADC Region are increasingly becoming more reliant on groundwater. The SADC region in general has an abundance of groundwater resources. However, due to several factors which include the lack of an enabling policy, legal and institutional environment, only an estimated 1.5% of the available renewable groundwater resources are currently being utilised.

It is estimated that there are about 30 Transboundary Aquifers (TBAs) and 15 transboundary river systems and that these systems are central to the water security of the region. There is therefore a need for Members States to establish and strengthen existing policy, legal and institutional frameworks to achieve equitable and sustainable access to water resources through joint management of the transboundary resources. It is in view of the above and in response to the need to strengthen the sustainable use of groundwater resources conjunctively with surface water at both the national and regional level, that the Southern African Development Community – Groundwater Management Institute (SADC-GMI) was established by the SADC Secretariat, on behalf of the Member States.

The vision of the SADC-GMI is, “to be a Centre of Excellence in promoting equitable and sustainable groundwater management in the SADC region”. The key focus areas of SADC-GMI are to 1) advocate, raise awareness and provide technical support in SADC around sustainable management through the dissemination of information and knowledge; 2) create an enabling environment for groundwater management through policy, legal and regulatory frameworks; 3) promote action-oriented research; 4) promote impact-oriented capacity building and training for groundwater management in the region; 5) lead and promote regional coordination for groundwater management; and 6) support infrastructure development for groundwater management.



In pursuance of the focus area of creating an enabling environment, SADC-GMI implemented the project entitled “Policy, Legal and Institutional Development for Groundwater Management in the SADC Member States, (GMI-PLI)”. The methodology for said project included the development of the Desired Future State, conducting a baseline study of best practices, and description of policy, legal and institutional frameworks which promote sustainable groundwater management. Using an in-Country Experts model, a systematic analysis of the existing policy, legal and Institutional frameworks in comparison with the Desired Future State was conducted to identify gaps that required to be addressed in order to fulfil the SADC-GMI mandate – to achieve sustainable groundwater management in all 16 SADC Member States. The analytical assessment of the gaps identified at national level culminated in the production of 16 National Gap Analysis & Action Plan Reports and the higher-level Regional Gap Analysis Report. The latter summarises the findings across the SADC region.

This National Gap Analysis for Namibia provides an overview of the existing gaps in policy, legislation, strategy, guidelines and the institutional frameworks and further suggests enablers required to unlock the identified gaps/challenges. The report provides a clear guidance for Namibia to develop an implementation roadmap through a process of prioritising the Strategic Actions in close liaison and in consultations with all relevant stakeholders. It is hoped that these National/Regional Gap Analysis and Action Plan Reports will aid Namibia to develop their own Roadmap which will ultimately advance the groundwater narrative and bring it at par with surface water in terms of policy, legal and institutional frameworks which will no doubt enhance sustainable groundwater management at a national and regional level in the SADC Region.

James Sauramba  
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	Gap Analysis and Action Plan – Scoping Report: Democratic Republic of Congo	1.3
	Gap Analysis and Action Plan – Scoping Report: Kingdom of Eswatini	1.4
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## LIST OF ACRONYMS

ACRONYM	DEFINITION
<b>BMA</b>	Basin Management Approach
<b>BMCs</b>	Basin Management Committees
<b>CAN</b>	Central Area of Namibia
<b>CEB</b>	Cuvelai - Etosha Basin
<b>CIWA</b>	Cooperation in International Waters in Africa
<b>CMA</b>	Catchment Management Agency
<b>DWAF</b>	Department of Water Affairs
<b>DWSSC</b>	Directorate of Water Supply and Sanitation Coordination
<b>EIA</b>	Environmental Impact Assessment
<b>KBMC</b>	Kuiseb Basin Management Committee
<b>KWMB</b>	Karst Water Management Body
<b>GCMs</b>	Global Circulation Models
<b>GEF</b>	Global Environment Facility
<b>GESI</b>	Gender Equity and Social Inclusion
<b>GMI-PLI</b>	Groundwater Management Institute – Policy, Legal and Institutional
<b>GoN</b>	Government of Namibia
<b>GROWAS</b>	National Groundwater Database
<b>GW</b>	Groundwater
<b>IGRAC</b>	International Groundwater Resources Assessment Centre
<b>IWRM</b>	Integrated Water Resources Management
<b>MAWF</b>	Ministry of Agriculture, Water and Forestry
<b>NamWater</b>	Namibia Water Corporation
<b>PLI</b>	Policy, Legal and Institutional



<b>NWP</b>	National Water Policy
<b>SADC GMI</b>	Southern African Development Community Groundwater Management Institute
<b>TDS</b>	Total Dissolved Solids
<b>WPC</b>	Water Point Committee
<b>WRMA</b>	Water Resources Management Act, No 24 of 2004
<b>WSASP</b>	Water Supply and Sanitation Sector Policy

## 1. INTRODUCTION

### 1.1 Background to the GMI-PLI Project

The critical role of groundwater in building the region's resilience to climate change and improving water security is reflected by the World Bank in their June 2017 online article: *People in Southern Africa are largely dependent on groundwater shared between countries and communities for health and well-being, food production, and economic growth.* As climate variability alters the amount of surface water that is available, people in the region are increasingly turning to groundwater, a resource that is already challenged by threats of depletion and pollution.

The sustainable management of groundwater is a key part of the broader water security for the region, especially in understanding transboundary aquifers. The Southern African Development Community (SADC) has established the Groundwater Management Institute (GMI) to better understand the region's needs and improve their groundwater management capabilities.

The SADC Groundwater Management Institute (SADC-GMI) is the implementing agency of the World Bank funded Sustainable Groundwater Management in SADC Member States Project. This funding is secured through the Global Environment Facility (GEF) and the Cooperation in International Waters in Africa (CIWA) trust. Part of this funding has been dedicated by the SADC-GMI to respond to gaps in the existing policy, legal and institutional (PLI) frameworks for groundwater management in the region towards fulfilling one of four main components of the project –“Enhancing institutional capacity of governments in SADC Member states and transboundary organisations”. The objective is to be met through a series of organised steps which broadly included the development of a benchmark document called the Desired Future State Document, a Gap Analysis and high-level Action plan for all SADC Member States and for the region, development of a suite of guidelines to strengthen groundwater management regionally. To inform the guideline on the development of a groundwater PLI Roadmap, Tanzania was selected as a pilot from which to draw lessons and develop the process.

This report presents the outcomes of the gap analysis for Namibia.

### 1.2 Socio-economic drivers for Namibia

Namibia is located on the western side of Southern Africa and covers a land area of 824,300 km<sup>2</sup> (Heyns, 2004). The country has a population of 2.3 million people of which an average of 52% lives in the rural areas, deriving their livelihoods directly from natural resources (Namibia Statistics Agency, 2017)). The national population is increasing steadily (at a rate of about 3% a year, whilst urban centres are growing at a rate of over 5% a year). The country has one of the highest income inequalities in the world, with a Gini coefficient of 0.57 (New Era Live, 2017). In 2015, about 18% of the population was classified as poor and 11% as extremely poor (ibid). Poverty and unemployment are highest in rural areas. Rural unemployment was standing at 30.2% in 2014 (32.0% of women and 39.2% of the youth respectively). Recent years has shown an increase in rural to urban migration in search of employment. The majority of low skilled people moving into urban areas settle in informal settlements with limited services such as

proper sanitation facilities and water supply. A combination of social inequity and economic marginalisation forces people living in poverty to overexploit land and other natural resources, with damaging impacts on water resources (NamWater, 2017).

### **1.3 Water resources**

#### **1.3.1 Status of water resources (surface water, groundwater and transboundary)**

Namibia is the most arid country in Sub Saharan Africa with low and varied precipitation. As a result, the mean annual rainfall of the country approximately amounts to 250 mm per annum with varied precipitation levels between the north eastern side of the country and areas along the coast (Nehemia, 2008). The former receives a maximum of  $\pm 650$ mm while the latter receive less than 50mm per year annum (Government of Namibia, 2010). It is estimated that only 2% of Namibia's the annual rainfall ends up as surface run-off and a mere 1% becomes available to recharge groundwater. The balance of 97% is lost through evaporation and evapotranspiration (ibid). The total assured safe yield of Namibia's water resources is 660 million  $m^3/a$ , distributed as follows: groundwater 300 million  $m^3/a$  (estimated long-term sustainable safe yield), ephemeral rivers 200 million  $m^3/a$  (full development at 95 % assurance of supply), perennial rivers 150 million  $m^3/a$  and unconventional sources 10 million  $m^3/a$  (FAO, 2005).

Figure 1 and Figure 2 below, indicate the water use master plan of Namibia and the status of groundwater quality as the highest used water resource.

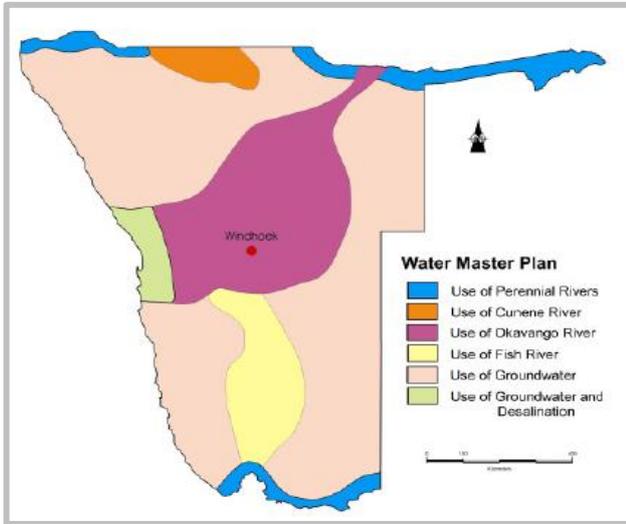


Figure 1: Water use master plan (Nehemia, 2008)

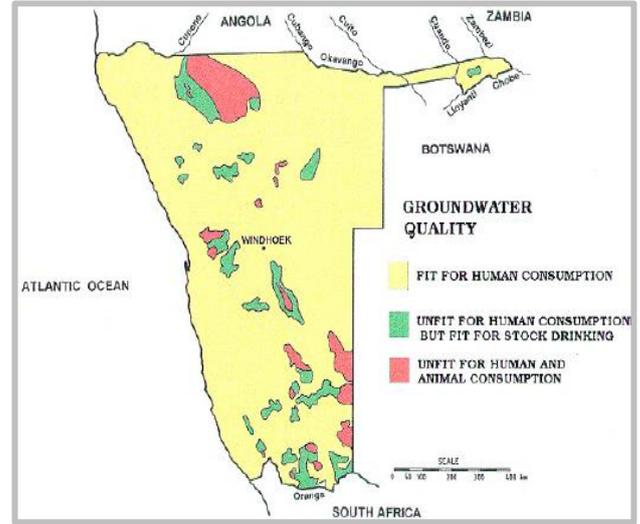
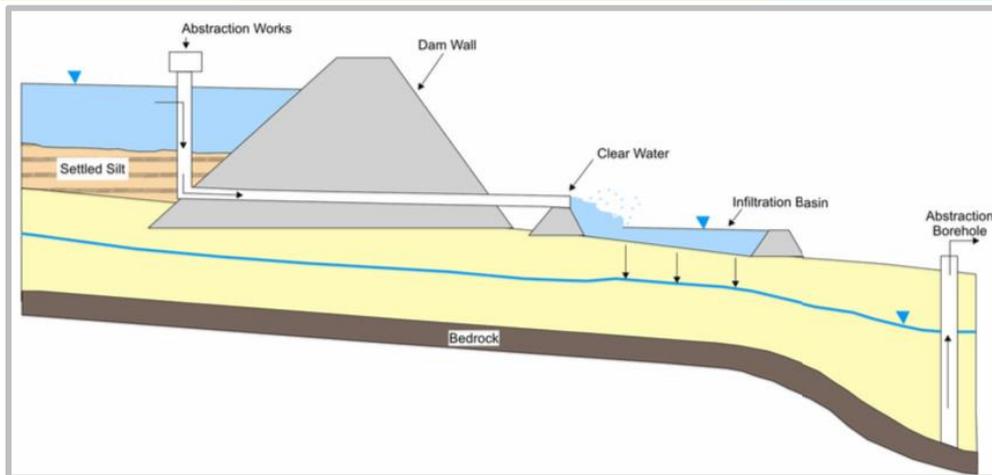


Figure 2: Groundwater quality (Nehemia, 2008)

**Conjunctive Water Use:** The conjunctive use of surface water from perennial and ephemeral rivers, groundwater and unconventional water sources, such as reclaimed effluent, is an important management tool to conserve water, to increase resource efficiency and to reduce water supply costs in Namibia (GoN, 2010).

**Artificial recharge:** Namibia has adopted conjunctive water use with the aim to minimise evaporative losses (GoN, 2010). In central Namibia the Ministry of Agriculture, Water and Forestry as well as NamWater have explored the possibilities of using groundwater resources as a reserve or back-up for the abstraction of surface water sources to allow a higher rate of abstraction from the latter (ibid). While maintaining the groundwater as a back-up, surface water is used at a faster rate to reduce evaporation losses and thereby increase the efficiency of the use of the surface water source (GoN, 2010).



**Figure 3: Omdel Dam Artificial Recharge Enhancement Project (Source: GoN, 2010)**

The artificial recharge enhancement project at the Omdel Dam, was established with the aim of impounding surface water runoff and to artificially recharge the Omaruru Delta Aquifer through a system of infiltration basins after the sediments and colloidal material in the water have settled out in the dam (GoN, 2010). The clarified water is passed through a system of infiltration basins to artificially recharge the aquifer as shown in Figure 3 above.

**Artificial recharge:** The technique has been tested in the Windhoek aquifer where surface water from the Von Bach Dam is purified in a water treatment plant and stored underground in the Windhoek aquifer. This results in lower evaporation and overflow losses at the dam and in years that the surface water sources (the three dams providing Windhoek with water) cannot provide enough water, stored underground water can be abstracted (GoN, 2010). This approach uses existing water resources more efficiently and secures a larger supply of water, mainly for Windhoek.



**Figure 4: Artificial Recharge Injection Facility at the Windhoek Aquifer (Source: GoN, 2010)**

**Use of Groundwater Sources to Improve the Efficiency of Surface Water Sources:** The groundwater in the Karst Aquifer, Kombat and the Berg Aukas mine are “available to use on a conjunctive basis as a

back-up for the three dams in the central area of Namibia, the 95% assured safe yield from the integrated use of the three dams can be increased from 20 to 30 Mm<sup>3</sup>/a, without actually having to use the groundwater, unless the dams have dried up” (GoN, 2010).



**Figure 5: Berg Aukas Water Abstraction Facility**

Another example of conjunctive water use in Namibia is the 3-dam system where the pumping of water immediately out of the shallow Omatoko Dam into the deeper Von Bach Dam, where evaporation is reduced, also improves the efficiency of the supply sources.

### ***Transboundary Water Resources***

It is estimated that shared perennial rivers currently provide around one third of the water consumed in Namibia and in 1999 the total abstraction from the shared perennial rivers was estimated at almost 100 million m<sup>3</sup>. The perennial rivers to which Namibia has access lie on its northern and southern borders and are shared with neighbouring countries (GoN, 2000). The northern border follows the Kunene River in the extreme north-west, and the Kavango River, Zambezi River and Kwando/Linyanti/Chobe River system along part of its north-eastern stretch (GoN, 2000). A significant proportion of the population (70%) depend on the Kunene and Kavango watercourses or on boreholes, which they recharge (ibid). The sources of both these rivers lie in Angola. The country’s only other perennial source, the Orange River, forms the southern border with South Africa.

As a result, Namibia is highly dependent on cooperation with its neighbouring countries to ensure its equitable share for water supply, particularly South Africa and Angola due to the large portion of the country’s population living near or along the banks of the rivers shared with these countries. The fact that all the perennial rivers to which Namibia has access are shared with neighbouring states means that international agreements are required regarding their use and management, adding a political and diplomatic dimension to water resources management (GoN, 2000). In addition to the transboundary river basins, Namibia has a number of shared aquifers illustrated in Figure 6 below while

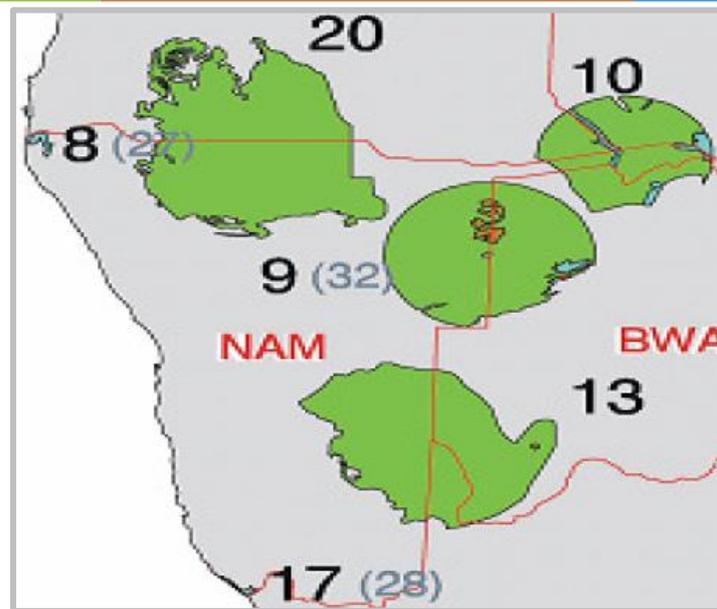


Figure 6: Namibia Transboundary Aquifers (Nehemia, 2008)

The Global Circulation Models (GCMs) indicate that Namibia will become drier with more variability in rainfall (Reid et al, 2007). Rainfall reductions of 10 % to 30 % relative to the present are predicted for the entire country by 2050 and 2080, with reductions expected to be greatest in the northwest and central regions (GoN, 2010). The predicted increase in both temperature and rainfall variability will increase Namibia’s reliance on groundwater, since ephemeral surface water resources will become even more temporary, and will be subjected to higher evaporative losses (NamWater, 2017).

The climate change predictions are also likely to have consequences for groundwater quantity and quality. The impacts on groundwater recharge are unclear, but one confirmed consequence is that bush encroachment, which will accelerate due to carbon fertilisation, reduces groundwater recharge rates (Bockmühl, 2009). This will be magnified by reduced rainfall and its erratic nature at times as predicted by the Global Climate Models. This will likely reduce the overall capacity and recharge of aquifers (NamWater, 2017).

With regard to water quality, decreased recharge will likely lead to increased concentrations of solutes, which in turn will impact on groundwater sources in terms of quantity and quality (NamWater, 2017). As it stands, many parts of the country experience high levels of total dissolved solids, and elevated concentrations of fluoride and nitrates (Christelis & Struckmeier, 2001). It is thus expected that the situation will worsen with chemical contaminants reaching higher concentrations as a result of climate change (ibid).

### 1.3.2 Groundwater environment and ecology

According to Griebler & Avromav (2015) groundwater ecosystems deliver services that are of immense societal and economic value , such as: a) purification of water and its storage in good quality for decades

and centuries, (b) active biodegradation of anthropogenic contaminants and inactivation and elimination of pathogens, (c) nutrient recycling, and (d) mitigation of floods and droughts.

In Namibia, groundwater is a vital for sustaining ecosystem health as it constitutes the basic flow to wetlands and watercourses. The interaction between surface water and the groundwater strongly influences the structure and function of wetland ecosystems. The cycling of seasonal flood water through the groundwater reservoir plays a key role in creating and maintaining the biological and habitat diversity of selected wetlands. In the Cuvelai-Etосha Basin, shallow groundwater and groundwater dependent ecosystems cover around 5% of the area. Groundwater in Coastal Basins often feeds estuaries along the coastline, forming prominent ecosystems, such as at Sandwich Harbour south of Walvis Bay, and the Orange River estuary on the border with South Africa (Earthwise: British Geological Survey , 2018). In the Namib Desert, springs allow vegetation and wildlife to flourish in certain areas (Christelis & Struckmeier; 2001). Table 1 below shows organisms endemic to Namibia’s groundwater ecosystems.

**Table 1: Examples of organism’s endemic to Namibia’s groundwater ecosystems (Christelis & Struckmeier, 2001)**

Name of Organisms	Habitats
Otjikoto tilapia	sinkhole lakes
<i>Tilapia guinasana</i>	sinkhole lakes
blind cave catfish, <i>Clarias cavernicola</i>	Aigamas Cave in the Karst area

Despite being a hidden resource, groundwater in Namibia is threatened by several factors, human use being the greatest threat to springs and riparian zones. Christelis & Struckmeier (2001) argue that human impact on spring-fed wetlands includes a reduction in their natural resource value and decreased biodiversity. In addition, studies have shown that over-abstraction of groundwater can negatively impact permanent springs either by reducing them to temporary springs and consequently leading to the destruction of the floodplain vegetation, reduction in the size of the wetland and subsequently loss of biodiversity (ibid). In addition, potential pollutants to springs and pools in Namibia include diesel from diesel pump leaks, faecal contamination and pollution from insecticides. Small wetlands and riparian zones are also at risk of destruction from grazing and trampling from livestock which consequently can lead to loss of habitats (Christelis & Struckmeier, 2001). Furthermore, untreated waste water in some communities causes degradation of quality. There are some cases of increased nitrate concentration linked to cattle farming, and some natural occurrences of elevated nitrate. The main groundwater quality problem is naturally high TDS and fluoride (Pietersen and Beekman, 2016).

### 1.3.3 Status of groundwater infrastructure

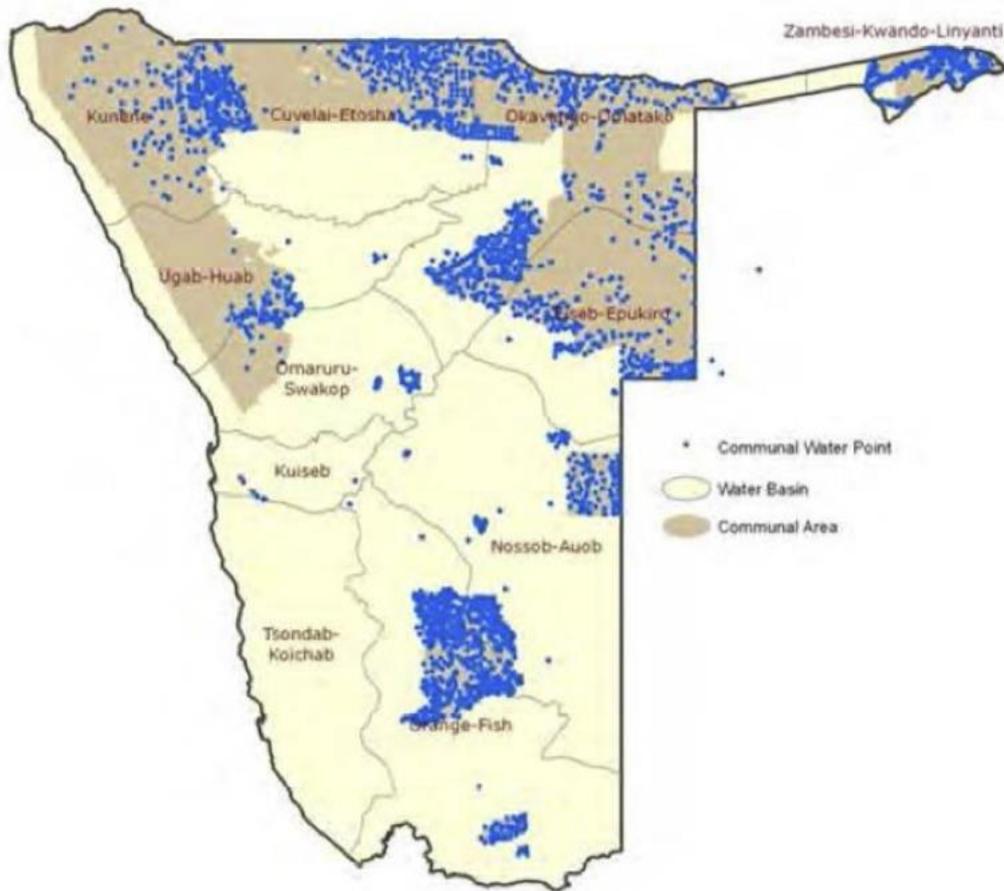
Namibia relies upon groundwater to provide 60% of its bulk water. This is not matched by a commensurate level of investment in groundwater research, infrastructure<sup>1</sup> and development; the bulk of investment in raw water procurement has been in surface water schemes to service the central area of the country (World Bank 1999, NamWater 2017). As a result, lack of investment is impacting on the sustainability of groundwater schemes.

According to IGRAC (2013), over 100.000 boreholes have been drilled for groundwater exploration. However, a significant number of these boreholes have either come up dry or dried up over time (ibid). It is estimated that there are more than 50,000 production boreholes in use, as the country does not have any perennial rivers within the country apart from those that form the border with neighbouring countries. Most of these boreholes are in rural areas (groundwater supplies 60% of urban water supply and 70% of rural water supply).

According to the Climate Technology Centre and Network (2017), groundwater in rural Namibia is accessed via boreholes. Of the 50,000 boreholes in the country, roughly 5,000 are under Rural Water

<sup>1</sup> Groundwater infrastructure used include borehole spiral pump with diesel generator, borehole submersible electrical pump (grid or solar power), borehole wind pump, hand dug well in rural areas and borehole hand pump

Supply's remit (Climate Technology Centre and Network, 2017). These boreholes supply water to communal areas, shown in Figure 7, and are used for both rural domestic and agricultural (primarily livestock) purposes (ibid).



**Figure 7: Map of Rural Water Supply Boreholes in Namibia**

The Climate Technology Centre and Network (2017, pg 7), argues that “some regions are significantly more dependent on groundwater than others with Kavango, Hardap, Kunene, Zambezi and Omaheke all with between 15-20% of households dependent on boreholes as their primary source of water”.

Remmert (2016), cautions that “without good governance, existing infrastructure will not be properly maintained and planning for the future will likely be weak and ad-hoc”. This is true for groundwater infrastructure as well. Consultations with stakeholders revealed that the economic recession has led to a growing maintenance backlog on the existing, increasingly inadequate infrastructure.

Namibia has a relatively high number of monitoring points when compared with the rest of SADC Member States, but they are not necessarily regionally representative, and this matter needs attention (GoN, 2010). As of 2010, there were 771 monitoring points and 566 (73.4%) of the monitoring points were in the water basins located in the Karst (that contains 51.5 % of the monitoring points), Omdel,

Kuiseb and Otjiwarongo aquifers with the remainder of the 205 monitoring points being scattered across the rest of the country (GoN, 2010).

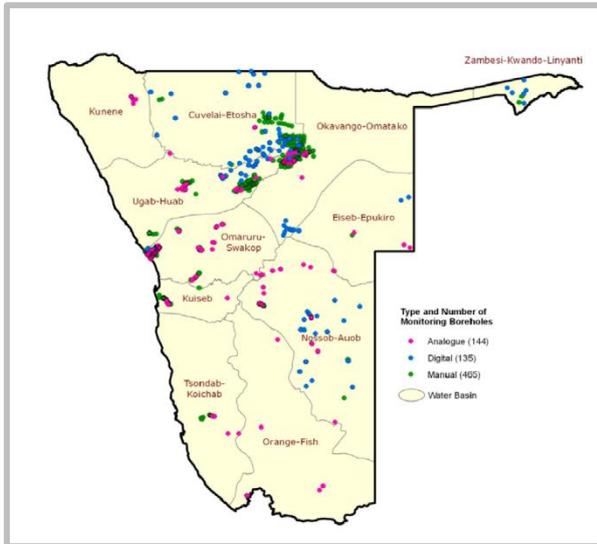


Figure 8: Monitoring Boreholes (GoN, 2010)

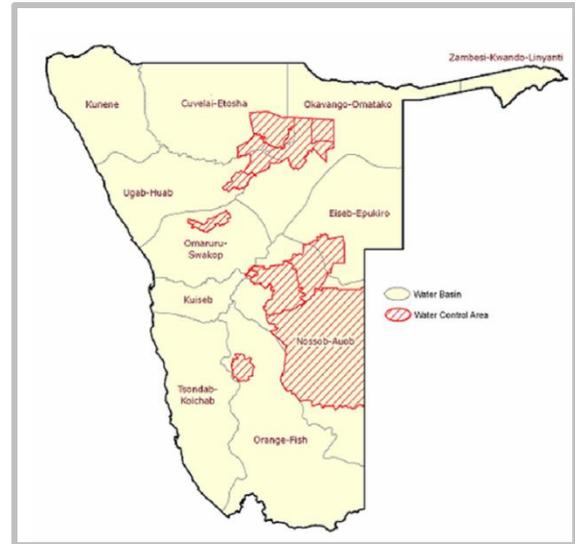


Figure 9: Water Controlled Areas (GoN, 2010)

IGRAC (2013) reports that monitoring of groundwater in 2013 was done on a quarterly basis in all basins through manual measurement and downloading of digital loggers (ibid). However, consultations with stakeholders revealed that due to financial constraints the Geohydrology division is no longer adhering to the quarterly monitoring visit schedule. Figure 10 shows that the highest number of monitoring boreholes are in the Okavango-Omatako, the Cuvelai-Etoshia as well as the Nossob-Auob Basins.

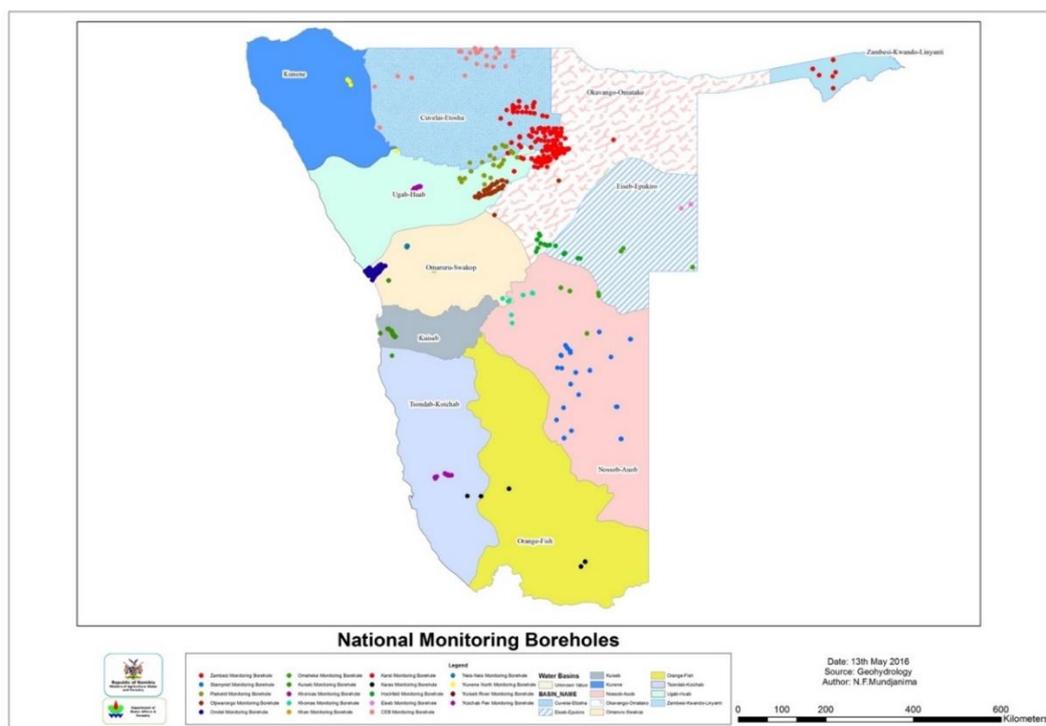


Figure 10. National Monitoring Boreholes in Namibia

The country has over the years invested in digital loggers that are installed in most of the existing observation wells. Even though groundwater quality monitoring is in its early elementary stages it is being established (IGRAC, 2013). In addition to the groundwater monitoring network, Namibia has a National Groundwater database called GROWAS (IGRAC, 2013). This database includes information on groundwater levels, quality, permits for abstraction and hydrogeological data in the country (ibid). The Division of Geohydrology hosts the national groundwater database GROWAS II. The database features a GIS based graphical user interface (GUI) with a vast range of query functions, a modular system including time series tools, hydrochemistry, licenses for abstraction application and groundwater status reporting functions among others” (Pietersen and Beekman, 2016, p65). Groundwater data is available to all upon request. A formal request needs to be submitted to the Ministry of Agriculture Water and Forestry

In addition to the above mentioned, significant funding is spent on groundwater infrastructure development (drilling of boreholes, borehole construction, submersible pumps and diesel generators) for rural water supply in Namibia. Boreholes remain the main groundwater infrastructure for rural water supply in Namibia. To a limited extent, communities in remote rural locations access groundwater through hand dug wells. However, there is no special strategy to link this to improved groundwater resources management, which has a direct bearing on the sustainability of these supplies. In summary, discussions with the Ministry of Agriculture Water and Forestry - Directorate of Water Resource Management, NamWater and the City of Windhoek highlighted that there is need to invest in more groundwater infrastructure to aid effective monitoring of groundwater resources across the country. The consultations revealed that operation and maintenance of groundwater infrastructure remains a key challenge and by implication the sustainable management of groundwater is also compromised. The Climate Technology Centre and Network (2017, pg 3) in a recent study identified challenges that are currently faced by rural water supply boreholes leading to their earlier - than - expected need for costly rehabilitation or re - drilling. These challenges include:

- i. Poor construction of asset leading to earlier - than - expected degradation;
- ii. Expensive and polluting diesel pumps being used above recommended levels resulting in over - abstraction of boreholes, resulting in environmental and borehole infrastructure degradation;
- iii. Inappropriate business models resulting in insufficient revenue collection to cover maintenance costs and made worse by willingness - to - pay issues; and
- iv. Lack of public funding for maintenance leading to a substantial back log of boreholes needing rehabilitation in the country.

#### **1.3.4 Groundwater supply and demand**

Namibia is highly dependent on groundwater, in both shallow alluvial and deeper aquifers (GoN, 2000). Consultations with NamWater revealed that in periods of acute drought, increasing dependency has turned into absolute reliance. Other key informants expressed that groundwater resources are providing the principal buffer against annual drought and in some instances, are being progressively over utilised.

In addition, with no effective control over pollution to groundwater, strategic aquifers are threatened with degradation.

In the more arid, western part of the country, groundwater held in the alluvial aquifers underlying the ephemeral streams provides the only reliable source of water, but the recharge process related to these alluvial aquifers is still only partially understood. Many alluvial aquifers are at present used beyond their "sustainable/safe yield" limits - abstraction exceeds recharge (GoN, 2000). In some other parts of the country where groundwater resources are critical to supply, for example in the north-eastern Kalahari area, there is limited understanding of the flow systems (GoN, 2000). In yet other areas where irrigated agriculture is practised from groundwater sources, there is little effective control or protection of the resources and doubts must be raised about the wisdom of using such a precious resource for water-intensive activities.

Additionally, Namibian groundwater is highly saline over large areas of the north where the majority of the population lives. Over 400,000 people – one-quarter of the country’s population are entirely dependent on surface water for domestic and agricultural supplies, and on renewable wetland resources on surface water, because of the high salinity of groundwater. Traditionally, the majority of this population relied on seasonal and ephemeral flows, which until the relatively recent past provided a vulnerable but usually sufficient supply.

Groundwater resources in Namibia are vital for domestic water supply, mining, industrial operations, agriculture and the sustainability of vital ecosystems including rivers and wetlands. With specific reference to agriculture, more than 50% of land is covered by farms that all depend on groundwater; either for watering livestock or irrigation (with more irrigation taking place in the Karst and Stampriet area). The average depth of boreholes depends on the aquifer system, In the Kara Basement, for example, the borehole depth is less that 130m with the majority less than 50m.

**Table 2: Groundwater Resource Use by Sector (IGRAC, 2013)**

Sector	Water Use
Domestic	52%
Agriculture (inc. irrigation)	38%
Industry (inc. mining)	10%
Total	100%

As shown in Table 1Table 3Table 2, the domestic sector is the largest water user (52%), followed by the agriculture sector (38%), and 10% is used by industry. However, groundwater use is only 7 per cent of the total available groundwater resources which leaves an opportunity for further development (IGRAC, 2013).

**Table 3: Rural Groundwater Consumption Per Water Basin**

Basin	Population	Groundwater Consumption (m <sup>3</sup> /a)
Cuvelai-Etoshia	679 254	6 507 594
Eiseb-Epukiro	32 538	348 146
Kuiseb	1 011	27 777
Kunene	32 699	321 428
Nossob-Auob	40 613	647 857
Okavango-Omatako	211 584	2 002 719
Omaruru—Swakop	29 845	117 421
Orange-Fish	25 116	374 882
Tsondab-Koichab	1 053	26 171
Ugab-Huab	22 303	234 275
Zambesi-Kwando-Linyanti	53 051	521 010
<b>Total</b>	<b>1 129 077</b>	<b>11 129 279</b>

Table 3 above shows the estimated rural groundwater consumption for Namibia. An assumed per capita consumption of 25 litres per day for the rural population was used to estimate rural groundwater consumption (GoN, 2010).

## 2. METHODOLOGY

### 2.1 Overview

The methodology for the gap analysis included conducting a desktop review of available literature. This was coupled with the development of a desired future state to provide a baseline for groundwater management and is discussed in more detail below. Key stakeholders were also identified during the early stages of the gap analysis and multiple engagements were held whereby a questionnaire was administered to evaluate the current state of groundwater management in the country. Based on the desktop review, stakeholder engagements and results from the questionnaire, a draft gap analysis report and action plan was developed which was then validated at Validation Workshops. These workshops involved key groundwater actors from the Member State and provided an opportunity to obtain buy-in and support for the gap analysis reports as well as obtaining further inputs. The draft report was also circulated to broader stakeholders i.e. Water User Associations, Water Service Providers etc. whereby written comment was received. The draft gap analysis report was then finalised based on the comments received from the Validation Workshops and broader stakeholders. The methodology outline is illustrated in the figure below.



Figure 11: Methodology Outline

The full list of documents reviews is presented in **Appendix A** and the list of stakeholders is presented in **Appendix B**. The structured questionnaire is based on the Desired Future State and is elaborated on below.

The desired future state has been contextualised for the SADC region, taking into account:

- The high levels of groundwater dependency in many SADC countries, in rural areas in particular;
- The variety of geohydrological contexts;
- High levels of poverty, gender disparities, social exclusion and pollution; and

- Relatively low levels of state capacity – skills, infrastructure and finance.

It sets out the **minimum** requirements that support the delivery of national, regional and international developmental goals, including the Sustainable Development Goals, meeting basic human needs to water, energy and food (the WEF nexus), and the protection of ecosystems that are dependent on groundwater.

The sections below describe, at a high level, what is considered to be the minimum best practice for policy, legislation and subsidiary legislation, regulations and standards for effective groundwater management. For a more detailed description of the desired future state, see **Appendix C**.

The **minimum policy requirements** that should be in place are:

- A long-term policy to protect groundwater by preventing pollution and overuse.
- The social, economic and environmental values of groundwater are all recognised.
- The human right to water is recognized and a rights-based approach to groundwater management is taken.
- Groundwater is recognised as a highly important source of domestic and agricultural water supply and a key resource for poverty alleviation, food security, and the sustainable economic development of rural areas.
- The biophysical and ecological linkages between ground and surface water for their use, protection and management are recognised, including land use zoning for groundwater protection and recharge (conjunctive use).
- The importance of the maintenance of the ecological integrity of wetlands in groundwater management is recognised (recharge zones).
- Intersectoral collaboration is promoted and facilitated.
- The need for adaptive management is recognised.
- The roles of various stakeholders and water users in groundwater management is recognised and participation of stakeholders is promoted and facilitated.
- An apex body that is responsible explicitly for GW management and playing the role of custodian/trustee on the part of the state is clearly defined.
- Effective institutional arrangements are coordinated at transboundary, national and local levels.
- Public access to geohydrological data held by the state is promoted and facilitated.
- Additional environmental principles necessary to protect and sustain groundwater are mandated, including: the precautionary principle, the principle of gender equity and social inclusion (GESI), the principle of subsidiarity, and the principle of intergenerational equity.

The **minimum legislative requirements** that should be in place are those that explicitly addresses the use, management, and protection of groundwater and provides the necessary tools for the state to regulate, manage, control, protect and develop groundwater resources in conjunction with surface water resources. At a minimum, legislation and/or subsidiary regulations should:

- Provide the status of groundwater noting that all water has a consistent status in law, irrespective of where it occurs, and there is explicit reference to groundwater and conjunctive

use management; and recognise the human right to water recognized in groundwater legislation, facilitating prioritization of drinking water and basic human needs, as well as small-scale users.

- Regulate groundwater quantity by providing conditions for accessing groundwater through water use authorisations system that does not discriminate (especially against the rural poor), is not tied exclusively to land tenure and enables effective compliance monitoring and enforcement.
- Provide groundwater protection mechanisms that includes regulating pollution (point source and non-point source), regulates depletion, regulates abstraction and recharge (usually via permitting) and provides for the sustaining wetlands;
- Enables integrated planning through specifying the need for long term plans (at catchment or basin level) to ensure the sustainable use of groundwater, including drought management plans and cross-sectoral coordination.
- Make provision for institutional arrangements including the mandate, competence and power of the relevant authorities, enabling the integrated management of groundwater and surface water resources, engaging in the arbitration of competing demands and diverging interests regarding groundwater abstraction and use, and support the collaborative engagement with other sector authorities, competent for public health, land-use planning, soils management, and waste management.
- Support effective stakeholder engagement through specifying when and how stakeholders, the public and/or other water users are to be engaged in the development of laws and regulations, planning, decision making and self-management regarding groundwater and should specifically address the issue of the involvement of women and youth in decision-making and the implementation of groundwater supply schemes.
- Provide for Monitoring and data collection to support regulation including protocols for data collection, management, exchange and dissemination, including standardization and harmonization of data, as well as national monitoring and information systems for the management of data and information.
- Regulate to ensure water conservation and efficiency of use.
- Support compliance and enforcement through clear mechanisms for promoting compliance with groundwater regulations through enforcement provisions that enable inspections, the imposition of fines and/or additional administrative penalties and other instruments to address failure to comply with the law.
- Conflict resolution mechanisms and/or the right to appeal.
- Enable the development of regulations on any relevant matter in the legislation to regularise aspects of groundwater management and incentivise appropriate use of groundwater resources.

The actual **requirements for subsidiary regulation** will differ from country to country, according to their own National Legislation. However, it is important to understand the extent to which critical issues around groundwater management have been translated into regulations. Below are some examples of how this could look.

- Subsidiary legislation or regulations pertaining to use, protection including on-site sanitation, borehole drilling, and appropriate financial and economic regulatory tools e.g. water pricing.



- Clear protocols and standards on data collection and storage.
- Templates for municipal by-laws.
- Community management of groundwater and community participation in groundwater management.

From an **institutional perspective**, it is critical that countries have as a minimum, a dedicated Ministry for water resource management, which is also the custodian for ground water management. Noting that the groundwater is a localised resource, decentralised institutions at trans-boundary, catchment and local government level are crucial, where groundwater management fits into overall mandate for water resource management

### 3. POLICY

#### 3.1 Evolution

Prior to gaining independence in March 1990, Namibia did not have a sovereign government, thus laws of other countries were imposed and were applicable (Heyns, 2005, pg 93). As of 1990, the then South West Africa Administration (present day Namibia) did not have any formal, generic water policy and most of the water policy decisions remained in the minutes of the water board meetings or the institutional memory of the board members” (Heyns, 2005, pg 94).

Post-independence (March 1990), the government of Namibia implemented a new public service (Heyns, 2005). This saw the merging of the Department of Water Affairs (DWA) and the Department of Agriculture into the Ministry of Agriculture, Fisheries, Water and Rural Development (Heyns, 2005). However, the primary functions of DWA remained the same as before independence, specifically to control and conserve water resources, as well as bulk water supply. The Namibian Constitutions provides for all South African laws applicable in Namibia to remain in force until changed by parliament. Thus, the Water Act of 1956 remained in force until new legislation was developed in 2004 and 2013 respectively.

Post-independence, Namibia developed new policies which advocate for Integrated Water Resources Management. These include the **National Water Policy White Paper, 2000** (which focuses on resource management), the **Water Supply and Sanitation Policy, 1993** and reviewed in 2008 (focusing on water supply, sanitation and community-based management of rural water supply infrastructure). However, Namibia does not have a specific Policy for Groundwater Management. Neither does the **National Water Policy White Paper of 2000** differentiate between surface or groundwater management. The policy is also silent on the conjunctive use of surface and groundwater sources. Nevertheless, Namibia has over the years relied on conjunctive use of surface and groundwater to supply economic hubs such as the Central Area of Namibia (CAN), (Namibia Water Augmentation, 2018). The CAN area has been developed and its nearing the limits of its supply potential (ibid). Since 1988, the Von Bach, Swakoppoort, and Omatako Dams have been operated conjunctively via operating rules to reduce evaporation losses and optimise yields (commonly referred to as the three-dam system). The three-dam system has since 1988 been backed up by and used in conjunction with sources such as Karst IV groundwater, water from Kombat and Berg Aukas mines, and the Windhoek Aquifer to increase yield and assurance (Namibia Water Augmentation, 2018).

#### 3.2 Policies to support groundwater management

The table below reflects the policies supporting groundwater management in Namibia.

**Table 4: Policies supporting groundwater management**

<p><b>Water Supply and Sanitation Policy (WASP) of 1993</b></p>	<ul style="list-style-type: none"> <li>▪ The Water Supply and Sanitation Policy (WASP) was adopted in 1993. However, this policy was replaced by the Water Supply and Sanitation Policy (2008) with the pledge to ensure availability of essential water supply and sanitation services to all Namibians at affordable costs.</li> </ul>
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<p><b>Water Supply and Sanitation Policy (WASSP) of 2008</b></p>	<ul style="list-style-type: none"> <li>▪ The WASSP is the main policy regarding water use and conservation in Namibia. This policy replaces the Water Supply and Sanitation Policy of 1993.</li> <li>▪ Its principles are in line with the Integrated Water Resources Management Plan, including a strong focus on water demand management.</li> <li>▪ The primary objectives of the policy are twofold, (i) “To improve the provision of water supply”, and (ii) ‘To improve the provision of sanitation services” (GoN, 2008).</li> <li>▪ The Policy is silent about groundwater protection. Save for section 2.5 which provides a summary of the water supply principles.</li> <li>▪ Groundwater is only referred to as source of water to meet competing demands in areas with water shortages. However, this policy is significant as it provides priorities for allocation of water in the face of shortages. The two key priorities being domestic use followed by the provision of water for economic activities.</li> <li>▪ The policy also acknowledges the economic value of water. It specifies that, “in determining priorities, the cost to provide water, as well as the economic value added from the water used, should be carefully calculated and considered” (GoN, 2008). By extension, the same principles apply to both surface and groundwater resource allocation.</li> </ul>
<p><b>The National Sanitation Strategy for the 2010/11 – 2014/15</b></p>	<ul style="list-style-type: none"> <li>▪ The National Sanitation Strategy for the 2010/11 – 2014/15 period provides a framework that outlines the approaches and activities that the Sanitation Sector intends to take in order to achieve sustainable success in the medium term (GRN, 2009).</li> </ul>
<p><b>National Water Policy White Paper (2000)</b></p>	<ul style="list-style-type: none"> <li>▪ The policy provides a framework for equitable, efficient and sustainable water resources management and water services, and stresses sectoral coordination, integrated planning and management as well as resource management aimed at coping with ecological and associated environmental risks.</li> <li>▪ The National Water Policy is based on the country’s physical and climatic setting, particularly its aridity, the legacy of water resources management.</li> <li>▪ The policy clearly states that water concerns extend beyond human needs for health and survival, that water is essential to maintain natural ecosystems and that in a country as dry as Namibia,</li> <li>▪ The policy also acknowledges that social and economic activity depends on healthy aquatic ecosystems.</li> <li>▪ This policy further recognises the need for inter-sectoral coordination between all stakeholders involved in using and managing water resources.</li> </ul>
<p><b>Draft Wetland Policy (2004)</b></p>	<p>The policy objectives are</p> <ul style="list-style-type: none"> <li>▪ to protect and conserve wetland diversity and ecosystem functioning to support basic human needs,</li> <li>▪ the Policy recognises that over abstraction of groundwater poses a threat to wetlands as this can lead to the loss of springs and other surface waters, underground aquifers and riparian vegetation.</li> <li>▪ to provide a framework for sustainable use of wetland resources,</li> <li>▪ to promote the integration of wetland management into other sectoral policies, and</li> <li>▪ to recognise and fulfil Namibia’s international and regional commitments concerning shared wetlands and wetlands of international importance.</li> </ul>

### 3.3 Gaps and challenges identified

#### Lack of explicit policies on groundwater

- Namibia does not have a stand-alone policy for groundwater management to inform the planning, management and protection of the resource. The Water Policy of 2000 tenets thus apply to surface water and groundwater. The Policy in its totality is comprehensive and is sufficiently backed up by the Legislation (Water Resources Management Act, 2013). However, it's use is limited as a result of the absence of regulations to give effect to the 2000 Water Policy.
- Although Section 85 of the Water Resources Management Act No 11 of 2013 does allow for the declaration of a water protection area, there is the absence of protection zoning of groundwater sources.
- The policies and strategies for water management do not take into account the uniqueness of the subsurface of water resources
- Absence of subsurface characterisation in policies
- Absence of protection zoning of groundwater sources

#### Limited institutional coordination and integration within and across line ministries

- Even though the Water Policy supports integrated resource management approaches of both surface and groundwater resource, limited institutional coordination and integration within and across line ministries remains a big constraint to the protection of groundwater resources. This challenge can also be attributed to limited institutional capacities.
- Poor inter-sectoral coordination has also undermined implementation of the National Water Policy White Paper (2000) when it comes to groundwater management.

#### Weak stakeholder participation in groundwater management

- The provisions for stakeholder participation in groundwater management at the Basin scale have not been enabled even where Basin Management Committees have been established. With the exception of the Cuvelai Basin where the Karst Water Body serves as a pressure group in support of the sustainable management of the aquifers in the Karst Areas.

#### Limited human resources to support groundwater management

- IGRAC (2013) observed that human capacity is lacking to carry out the groundwater monitoring in all basins. As such, groundwater quality monitoring is lagging behind as well as data processing. The IWRM Plan states that any efforts to strengthen groundwater management should address the human resources challenge (GoN, 2010). Similar sentiments were echoed by the Directorate of Water Resources Management in the Ministry of Agriculture Water and Forestry during the broad consultations informing the development of this report.

#### Delayed establishment of key institutions

- The Policy states that “social equity, sustainable economic development and environmental stewardship will be entrenched in the water sector through a regulatory framework that will bestow a long-term stream of benefits to Namibia and Namibians, using economic instruments, where appropriate, to foster economic activity, to implement policy actions, and to ensure

sustainability”. However, implementation has been delayed and the Water Regulator was only established in 2017, 10 years after the policy came into effect.

**Limited awareness of the groundwater protection provisions and rights by broad stakeholders**

- The tenets of the Water Policy need to be widely understood not only by the water sector actors and well mobilised pressure groups. In addition, the profile of groundwater outside the water-controlled areas is low

**3.4 Enablers required to unlock these gaps/challenges**

The table below reflects the enablers required to unlock the identified gaps and challenges being experienced.

**Table 5: Enablers required to unlock the policy gaps and challenges**

Groundwater gap/ challenges	Enablers
Namibia does not have a stand-alone policy for groundwater management. Groundwater management is informed by several policy documents which include the 2000 National Water Policy (NWP) and the 2008 Water Supply and Sanitation Sector Policy (WSASP). However, cross-sector policy coordination is weak.	<ul style="list-style-type: none"> <li>▪ Aligning and harmonising the National Water Policy White Paper (2000) and the Water Supply and Sanitation Sector Policy (2008) with other related policies affecting groundwater such the agricultural policy, environmental policy, as well as regional and urban development policies.</li> <li>▪ Awareness amongst decision-makers</li> <li>▪ Coordination agreements</li> <li>▪ Strengthening current policies to have clear groundwater management objectives.</li> <li>▪ Protection zoning of threatened groundwater point</li> </ul>
Although Section 85 of the Water Resources Management Act No 11 of 2013 does allow for the declaration of a water protection area, there is the absence of protection zoning of groundwater sources.	<ul style="list-style-type: none"> <li>▪ Strengthen policy to include protection zoning of groundwater resources.</li> </ul>
Absence of subsurface characterisation in policies	<ul style="list-style-type: none"> <li>▪ Policies and science-based methodologies to regulate the multiple uses of the subsurface space</li> </ul>
The provisions for stakeholder participation in groundwater management at the Basin scale have not been enabled even where Basin Management Committees have been established.	<ul style="list-style-type: none"> <li>▪ In line with the principles of IWRM, there is need to ensure the policies informing the sustainable management of groundwater are properly devolved to the lower levels and sufficiently rolled out to the Basin level structures.</li> <li>▪ There is merit in strengthening the Basin Management Offices in order for them to meaningfully support the Basin Management Committees. Furthermore, there is merit in continuously mapping the emerging stakeholders, widening representation of the Basin Forum in order to ensure broad representation of stakeholders in the Basin Management Committees.</li> <li>▪ The participation of water point committees responsible for communal water points is very weak.</li> </ul>

Groundwater gap/ challenges	Enablers
	<p>Thus, stakeholder engagement efforts have to be enhanced in order to raise awareness of the Basin Management Committees amongst broad water sector users.</p>
<p>The Department of Water Affairs is heavily understaffed and by extension, the Geohydrology Division does not have the full human capacity to deliver on its mandate. The situation is exacerbated by the absence of sufficient financial resources.</p>	<ul style="list-style-type: none"> <li>▪ Groundwater policy implementation requires capacity of the Geohydrology Division to be strengthened in order for the Division to adequately drive the whole process forward. Overall, the approved organogram for the Directorate of Water Resource Management have not been filled due to financial constraints.</li> </ul>
<p>The Policy states that social equity, sustainable economic development and environmental stewardship will be entrenched in the water sector through a regulatory framework that will bestow a long-term stream of benefits to Namibia and Namibians, using economic instruments, where appropriate, to foster economic activity, to implement policy actions, and to ensure sustainability.</p>	<ul style="list-style-type: none"> <li>▪ The Water Regulator of Namibia was established in 2017, 10 years after the National Water Policy White Paper (2000). However, there remains delays in implementation mainly as a result of the outstanding regulations which should give effect to the Water Resources Management Act of 2013.</li> </ul>
<p>The tenets of the Water Policy need to be widely understood not only by the Department of Water Affairs. In addition, the profile of groundwater outside the water-controlled areas is low.</p>	<ul style="list-style-type: none"> <li>▪ Social consensus is necessary and required for effective implementation of policy instruments. To this end, there is a need to systematically raise awareness about groundwater management to the general public and in so doing raising the profile of groundwater across all levels of society. In the same light, there is need to enhance the understanding of different stakeholders, such as traditional institutions, cumulatively ensuring the influence of stakeholders on the planning and decision-making process for the use and management of groundwater.</li> </ul>

## 4. LEGISLATION

### 4.1 Evolution

The development of water law in Namibia is closely linked to the history of water law in South Africa due to Namibia’s colonial history. Article 140 of the Namibian Constitution provides that all law in force immediately before the date of Independence shall remain in force until repealed or amended by Act of Parliament. Thus, South African legislation (prior to 1994) plays a significant role even after Namibia’s Independence. The Water Act, no 54 of 1956, was passed by South Africa’s apartheid government as a means of controlling access to water according to principles of the apartheid regime. The Act was “selectively applied to what was then South West Africa,”. In view of the shortcomings of the Water Act of 1956, **the Water Resources Management Act, No 24 of 2004** (“WRMA”) was signed and Gazetted in 2004. The Act was developed in a consultative manner and it was informed by a sound understanding of Namibia’s resources and development aspirations. The WRMA corrects the private ownership problem by declaring that “ownership of water resources in Namibia below and above the surface of the land belongs to the State” and commits the Government to “ensuring that water resources are managed and used to the benefit of all people in furtherance of” responsible management practices and following the 14 progressive principles meant to guide the Act’s enforcement. However, the Act was revised before it commenced. This WRMA of 2004 ushered the way for the Water Resources Management Act (Act No. 11, 2013).

### 4.2 Legislation to support groundwater management

The table below reflects the legislation supporting groundwater management in Namibia.

**Table 6: Legislation supporting groundwater management**

<p><b>The Water Act, No. 54 of 1956</b></p>	<ul style="list-style-type: none"> <li>▪ The Act provides for the protection of groundwater. It states that wilful or negligent acts which could pollute public or private water, including underground water, or sea water in such a way as to render it less fit is a criminal offence.</li> <li>▪ The central flaw of the Act is that it “ignores the hydrological reality of Namibia” as it is based on a model that “applied the rules of well-watered countries of Europe, notably seventeenth century England and Holland, to the arid climactic conditions of Namibia” (GoN, 2000).</li> <li>▪ The Act included a system of riparian water rights and the private ownership of water resources that are inconsistent with Article 100 of the Constitution of Namibia.</li> <li>▪ Section 5 of the Water Act of 1956 distinguishes ‘public’ and ‘private’ water, vesting ‘the sole and exclusive use and enjoyment of private water in the owner of the land on which such water is found’ (GoN, 2000). In so doing, the Water Act effectively excludes the majority of the population that do not own land from having adequate and equitable access to water.</li> <li>▪ In 1971, legal provision was made to bring groundwater under state control by establishing ‘water control areas’ by government declaration. The declaration states that no one may sink, deepen or alter a borehole or well in such an area without a permit.</li> </ul>
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<p><b>The Water Resources Management Act, (WRMA) No. 24 of 2004</b></p>	<ul style="list-style-type: none"> <li>▪ The Water Resources Management Act, (WRMA) No. 24 of 2004 (GRN, 2004b) replaced the Water Act, No. 54 of 1956.</li> <li>▪ The WRMA (2004) further states that integrated planning and management of surface and underground water resources should incorporate the planning process, economic, environmental and social dimensions.</li> <li>▪ The WRMA (2004) was viewed as being deficient with respect to clarifying the responsibilities for implementation of these goals. The Water Resources Management Act of 2013 was therefore promulgated by the Namibian government in December 2013 and the WRMA (2004) was repealed.</li> </ul>
<p><b>Water Resources Management Act (Act No. 11, 2013)</b></p>	<ul style="list-style-type: none"> <li>▪ Provides for the management, protection, development, use and conservation of water resources.</li> <li>▪ Provides for the regulation and monitoring of water services and incidental matters.</li> <li>▪ States that groundwater is public property, with control vested in the State.</li> <li>▪ It includes provisions for a licencing system to control and protect water resources from over-abstraction and pollution.</li> <li>▪ However, regulations are yet to be developed to support the policy and legislation relating to groundwater management.</li> <li>▪ The licence to abstract and use water is regulated in terms of Sections 38 and 40, 44 to 55 of the Water Resources Management Act (Act No. 11 of 2013), while the control and protection of groundwater is regulated in terms of Sections 56 to 67 of this Act (ibid).</li> <li>▪ The water protection areas are regulated in terms of Section 85 to 87 while water related emergency for pollution threats is regulated in terms of Sections 88 to 89 of this Act.</li> <li>▪ The Groundwater Licensing Guidelines of 2014 set out procedures to enable the Geohydrology and Law Administration Divisions to respond effectively to applications to obtain access to groundwater for the intended use of the aquifer while satisfying the requirements of the Water Act (Groundwater Licensing Guidelines, 2014).</li> <li>▪ The Act recognizes that the natural environment is a user of water and an important provider of vital processes and services.</li> <li>▪ It also emphasises the importance of planning tools such as environmental assessments so that water pollution from future development activities is controlled and prevented through proper planning, design and management and monitoring.</li> </ul>
<p><b>Namibia Water Corporation Act, No. 12 of 1997</b></p>	<p>The Act establishes NamWater as a parastatal corporation, fully owned by the Government, and responsible for the distribution of large water supplies to customers throughout the country. The Act does not include explicit provisions for groundwater management. However, the provisions have implications that obligate the parastatal to protect, conserve, monitor surface and groundwater levels, quality and report on the same to the Department of Water Affairs.</p> <ul style="list-style-type: none"> <li>▪ The Act imposes on the Corporation a “duty to conserve and protect water resources” by using available resources “on a long-term sustainable basis” and “taking appropriate steps to ensure that those water resources are protected from pollution caused by its operations”.</li> <li>▪ Furthermore, a “duty to conserve and protect the environment” is mandated; the Corporation must “take appropriate steps to conserve and protect the environment from damage, destruction or degradation.</li> <li>▪ Section 13 of the Act imposes a recordkeeping and information sharing duty on</li> </ul>

	<p>the Corporation. Because it is owned by the Government, the Corporation must collect and share with the Ministry of Agriculture, Water and Forestry its data on rainfall, river flows, groundwater, water abstraction, and the quality of water (GoN, 1997).</p>
<p><b>Local Authorities Act (1992),</b></p>	<ul style="list-style-type: none"> <li>▪ The Act has provisions for the supply, distribution and use of water in its local authority area subject to the provisions of the Water Resources Management Act, the prohibition, restriction, regulation and control of the sinking, maintenance or use of boreholes or wells.</li> <li>▪ The Act also provides for the protection of watercourses. Even though the Act is silent on groundwater management, subsidiary legislation has provisions for the protection of groundwater resources.</li> <li>▪ For example, the City of Windhoek Municipal Council Resolution 231/07/2005, incorporated groundwater protection provisions into the town planning scheme. This was in an effort to avoid danger or injury to health, or excessive expenditure of public funds due to pollution of the City’s groundwater.</li> <li>▪ The Council resolution designated a conservation zone (groundwater protection) whose primary uses are limited to indigenous flora and fauna, and nature conservation. Consent uses in the conservation zone include “municipal purposes and public infrastructure, hotel or other accommodation establishment designed to promote environmental protection with adequate provisions that ensure no groundwater pollution will occur.</li> <li>▪ Other uses include park, playground, pasture land and associated agricultural building but excluding any concentration of domesticated animals, bee-keeping”. With regard to industrial use zone, “no noxious industrial buildings may be erected, no noxious activities may be undertaken and no hazardous substances may be stored in combined quantities exceeding 200 litres on land located South of the Southern edges of Academia, Windhoek, Olympia and Klein Windhoek Townships”.</li> </ul> <p>The Council Resolution <b>231/07/2005</b> called for the amendment of the following clauses:</p> <ul style="list-style-type: none"> <li>▪ <b>Clause 29</b> of the Scheme to include paragraphs providing for protection of groundwater.</li> <li>▪ <b>Clause 26 of the Scheme (danger to life, health and amenity)</b> to make reference to additional conditions contained in Clause 29.</li> <li>▪ <b>Clause 27 of the Scheme (removal of injurious conditions)</b> to make explicit mention of environmental impact and groundwater.</li> <li>▪ <b>Clause 44</b> (submission of drawings and particulars) to add paragraphs to explicitly identify threats to groundwater.</li> <li>▪ <b>Clause 45 (Council may impose conditions on granting consent)</b> to specify conditions of approval relating to environmental management and groundwater protection.</li> <li>▪ <b>Clause 48 dealing (Contraventions of the Scheme)</b> be expanded to include compensation for damages and rehabilitation of polluted land and to assign responsibility in this respect.</li> </ul>
<p><b>Environmental Management Act, No. 7 of 2007</b></p>	<ul style="list-style-type: none"> <li>▪ The Act “requires that all ecosystems be provided with sufficient water to meet their ecological requirements or that adequate environmental flows are available to sustain water dependent ecosystems”.</li> <li>▪ Furthermore, the Act provides for environmental impact assessments to be done for certain activities guided by the provisions of the Environmental Impact Assessment Regulations: Environmental Management Act, 2007.</li> </ul>

	<p>Subsidiary legislation has provisions focused on Water Resources Developments. The activities that require an environmental clearance certificate include:</p> <ul style="list-style-type: none"> <li>▪ The abstraction of ground or surface water for industrial or commercial purposes.</li> <li>▪ The abstraction of groundwater at a volume exceeding the threshold authorised in terms of a law relating to water resources.</li> <li>▪ Any water abstraction from a river that forms an international boundary.</li> <li>▪ Construction of canals and channels including the diversion of the normal flow of water in a riverbed and water transfer schemes between water catchments and impoundments.</li> <li>▪ Construction of dams, reservoirs, levees and weirs.</li> <li>▪ Construction of industrial and domestic wastewater treatment plants and related pipeline systems.</li> <li>▪ Irrigation schemes for agriculture excluding domestic irrigation.</li> <li>▪ Construction and other activities in water courses within flood lines.</li> <li>▪ Construction and other activities within a catchment area.</li> <li>▪ Reclamation of land from below or above the high-water mark of the sea or associated inland waters.</li> <li>▪ Alteration of natural wetland systems.</li> <li>▪ The release of brine back into the ocean by desalination plants.</li> <li>▪ The Act does not make particular reference to groundwater contamination or abstraction. However, subsidiary legislation has provisions focused on Water Resources Developments. The activities that require an environmental clearance certificate include: <ul style="list-style-type: none"> <li>○ The abstraction of ground or surface water for industrial or commercial purposes.</li> <li>○ The abstraction of groundwater at a volume exceeding the threshold authorised in terms of a law relating to water resources.</li> <li>○ Any water abstraction from a river that forms an international boundary.</li> <li>○ Construction of canals and channels including the diversion of the normal flow of water in a riverbed and water transfer schemes between water catchments and impoundments.</li> <li>○ Construction of dams, reservoirs, levees and weirs.</li> <li>○ Construction of industrial and domestic wastewater treatment plants and related pipeline systems.</li> <li>○ Irrigation schemes for agriculture excluding domestic irrigation.</li> <li>○ Construction and other activities in water courses within flood lines.</li> <li>○ Construction and other activities within a catchment area.</li> <li>○ Reclamation of land from below or above the high-water mark of the sea or associated inland waters.</li> <li>○ Alteration of natural wetland systems.</li> <li>○ The release of brine back into the ocean by desalination plants.</li> </ul> </li> </ul>
<p><b>Minerals Act, No. 33 of 1992</b></p>	<ul style="list-style-type: none"> <li>▪ The Act has several provisions relevant to groundwater abstraction. First, after exploration has been completed and an enterprise wishes to commence mining operations, it must apply for, and receive, a mining license.</li> <li>▪ In considering whether to grant a mining license, the Minister “shall not grant an application by any person for a mining license” unless the Minister is “on reasonable grounds satisfied” that the operation will ensure “adequate protection of the environment”.</li> </ul>

	<ul style="list-style-type: none"> <li>▪ Furthermore, should a license holder seek “to obtain a supply of water or any other substance in connection with such mining operations,” the license holder must apply for special permission to do so from the Minister.</li> <li>▪ While the Minerals Act provides for some protection for groundwater resources, its primary focus is naturally on mineral extraction.</li> </ul>
<p><b>Traditional Authorities Act, No. 25 of 2000</b></p>	<ul style="list-style-type: none"> <li>▪ The Act mandates that each member of a Traditional Authority must act “to ensure that the members of his or her traditional community use the natural resources at their disposal on a sustainable basis and in a manner, that conserves the environment and maintains the ecosystems for the benefit of all persons in Namibia”.</li> <li>▪ The WRMA requires that the Ministry of Agriculture, Water and Forestry consider “the existence of any traditional community and the extent of customary rights and practices in, or dependent upon, the water resource to which an application for the licence relates” before deciding to grant or deny a permit for water abstraction.</li> </ul>

Other legal instruments that cover issues of water quality and pollution control include the Water Act (1956), the Public Health Act, Municipal Drainage Regulations.

### 4.3 Gaps and challenges identified

#### Limited implementation of legislation

- The Water Resources Management Act of 2013 is a very comprehensive piece of legislation. However, its implementation has been hampered by the delay in gazetting the regulations. As such, the regulations in force are for the Water Act of 1956.
- Basin Management Committees do have functions to help resolve conflicts relating to water resources and resource quality in its management area but it is not always effective in resolving disputes between competing users concerning over-abstraction or interception of groundwater resources

#### Limited capacity to enforce permit conditions

- The establishment of ‘water control areas’ brought groundwater management under state control. Legislation states that no one may sink, deepen or alter a borehole or well in water-controlled areas without a permit (1956 Act, which is still valid). However, the implementation of this permit system is currently inadequate. Over 50 % of the returns are received from the users within the Grootfontein – Otavi – Tsumeb Karst area.
- The majority of permit holders do not comply with the permit conditions and due to capacity constraints, DWAF is unable to monitor compliance sufficiently as well as enforce the permit conditions. Consultations confirmed that DWAF has records of the allocated volumes for each groundwater abstraction application that was approved. However, the Department has very little information about the actual abstraction volumes or water levels (GoN, 2010). The exception is the Karst irrigation areas where there is a significant amount of data available. This may be a direct consequence of an operational management body, the Karst Water Management Body (KWMB), that is recognised by the MAWF and that is actively involved in monitoring water use.

- Linked to the above, legislation only provides for licenced regulation when irrigating more than one hectare in controlled areas. By extension, areas outside of the controlled areas are not regulated. This challenge will be resolved if and when regulations that give effect to the Water Resources Management Act of 2013 are operationalised. The new declares the whole country as water-controlled areas.

**Fragmented legislation**

- Policy, legislation and regulations pertaining to the protection of groundwater resources is scattered through various legislative articles. This fragmentation of legislation and poor coordination between entities mandated with the protection of groundwater resources remains a challenge to be addressed. For example, Environmental Clearance Certificates have been issued for some activities that cause harm to groundwater as a result of poor coordination and lack of consultation between Local Authorities, the Ministry of Agriculture Water and Forestry, the Ministry of Environment and Tourism as well as NamWater.

**Capacity Gaps**

- The IWRM Plan and consultations with selected key informants pointed to capacity gaps within the key line ministries. Capacity to investigate, manage and monitor groundwater resources need to be addressed moving forward.
- Groundwater monitoring in rural areas is lagging behind and the same is true for large groundwater users. As such, there is need for effective regulation of borehole drilling, abstraction control and waste discharge.
- Consultations revealed that there is legislation in place to prevent pollution. However, there is insufficient capacity to monitor groundwater pollution threats and to enforce the legislation.

**4.4 Enablers required to unlock these gaps/challenges**

The table below reflects the enablers required to unlock the identified gaps and challenges being experienced.

**Table 7: Enablers to unlock gaps and challenges**

Challenges	Enablers
<b>Limited implementation of legislation</b>	<ul style="list-style-type: none"> <li>▪ The finalisation of regulations needs to be expedited in order for the Water Resources Management Act of 2013 to be effectively operationalised and enforced.</li> </ul>
<b>Limited capacity to enforce permit conditions</b>	<ul style="list-style-type: none"> <li>▪ The Department of Water Affairs needs to establish a more robust system to monitor actual abstraction volumes or water levels and to verify information submitted by permit holders.</li> <li>▪ There is need to strengthen the capacity of Basin Management Offices to provide groundwater monitoring support at the Basin level.</li> <li>▪ In addition, there is need to establish Groundwater Management Bodies such as the Karst Water</li> </ul>

Challenges	Enablers
	<p>Management Body to verify permit applications and groundwater abstraction reports by permit holders. These bodies can serve as sub-committees of the Basin Management Committees.</p> <ul style="list-style-type: none"> <li>▪ There is a need to substantively increase the human resources for more effective groundwater monitoring and enforcement.</li> </ul>
<p><b>Fragmentation of legislation and poor coordination between entities mandated with the protection of groundwater resources.</b></p>	<ul style="list-style-type: none"> <li>▪ There is need to strengthen inter-sectoral planning. There is merit in developing a groundwater management Policy and Strategy to enable a more coordinated approach to the protection of groundwater resources in Namibia.</li> </ul>
<p><b>No regulation in areas outside the water-controlled areas – illegal water use</b></p>	<ul style="list-style-type: none"> <li>▪ The Water Resources Management Act of 2013 addresses this challenge. However, until the regulations are gazetted the new water act will remain moribund.</li> <li>▪ Appropriate penalties for illegal water use</li> </ul>
<p><b>Low capacity to investigate, manage and monitor groundwater resources.</b></p>	<ul style="list-style-type: none"> <li>▪ The human capacity to investigate, manage and monitor groundwater resources needs to be strengthened across all levels. However, the current economic challenges limits governments’ ability to fill all the vacant positions required for this purpose.</li> </ul>
<p><b>Groundwater monitoring in rural areas is lagging behind and the same is true for large groundwater users</b></p>	<ul style="list-style-type: none"> <li>▪ There is need for effective regulation of borehole drilling, abstraction control and waste discharge.</li> <li>▪ The Water Resources Management Act (2013) states that the whole country will be declared water-controlled areas. This means the Department of Water of Affairs will be required to permit water users throughout the country. However, to achieve this the Geohydrology division will require additional human resources and a decentralised system to allow permitting across the country. There is merit in strengthening the role of the Basin Management Committees in managing local groundwater resources. The Karst Water Management Body in the Cuvelai - Etosha Basin has been instrumental in verifying permit applications.</li> </ul>
<p><b>Limited uploading of groundwater data and licenses</b></p>	<ul style="list-style-type: none"> <li>▪ Regulations for capturing, processing, reporting and sharing of data (including private held groundwater data)</li> </ul>
<p><b>Insufficient capacity to monitor groundwater pollution threats and to enforce the legislation.</b></p>	<ul style="list-style-type: none"> <li>▪ Gazetting of the regulations will be a first step towards addressing pollution in a meaningful way. This should be coupled with more punitive penalties for repeat offenders.</li> <li>▪ In addition, strengthening of human and technical capacity will enable the Geohydrology Division to effectively monitor, police and enforce the regulations.</li> </ul>
<p><b>Absence of gazetted regulations</b></p>	<ul style="list-style-type: none"> <li>▪ Technical regulations for drilling, borehole construction and completion, pumping tests and water quality tests</li> <li>▪ Regulations for operation and maintenance of groundwater supply schemes</li> <li>▪ Regulations for groundwater monitoring including provision and exchange of groundwater data and information</li> </ul>



Challenges	Enablers
	<ul style="list-style-type: none"><li data-bbox="646 302 1412 409">▪ Regulations and standard operating procedures for compliance monitoring and enforcement (including groundwater metering)</li></ul>

## 5. STRATEGY AND GUIDELINES

### 5.1 Evolution

The Integrated Water Resources Management Plan and the related eight thematic reports are very comprehensive guiding documents, if implemented will yield desired developmental outcomes as envisaged in the water policy and other key policy documents that inform the planning, development and management of both ground and surface water in Namibia. The thematic reports have dedicated chapters on groundwater in Namibia and provide key actions to guide implementation by the state and non-state actors.

**Table 8: Theme reports compiled in the process of developing the IWRM Plan for Namibia**

Integrated Water Resources Management Plan for Namibia	
<b>Theme Report 1</b>	Review and Assessment of Existing Situation
<b>Theme Report 2</b>	The Assessment of Resources Potential and Development Needs
<b>Theme Report 3</b>	Formulation of Water Demand Management Strategy
<b>Theme Report 4</b>	The Formulation of Information and Knowledge Systems
<b>Theme Report 5</b>	Long-Term Monitoring and Evaluation Framework for the IWRM Plan
<b>Theme Report 6</b>	Integrated Framework for Institutional Development and Human Resources Capacity Building
<b>Theme report 7</b>	Strategy for Funding the Implementation of the Integrated Water Resources Management Plan for Namibia
<b>Theme Report 8</b>	National Water Development Strategy and Action Plan

It was clear from the consultations with key informants, that the Integrated Water Resources Management Plan is not fully operational with some key informants expressing that they do not have copies of these key strategic documents. In this light, there is merit in reviving, endorsing and implementing the Integrated Water Resource Management (IWRM) Plan for Namibia.

### 5.2 Strategies and guidelines to support groundwater management

According to the Water Resources Management Act (Act no. 11 of 2013), groundwater is public property, with control vested in the State. The Water Resources Management Act (Act no. 11 of 2013), has provisions for a licencing system to control and protect water resources from over- abstraction and pollution. However, regulations are yet to be gazetted to support the policy and legislation relating to groundwater management.

- The licence to abstract and use water is regulated in terms of Sections 38 and 40, 44 to 55 of the Water Resources Management Act (Act No. 11 of 2013), while the control and protection of

groundwater is regulated in terms of Sections 56 to 67 of this Act (ibid). The water protection areas are regulated in terms of Section 85 to 87 while water related emergency for pollution threats is regulated in terms of Sections 88 to 89 of this Act.

- The Groundwater Licensing Guidelines of 2014 set out procedures to enable the Geohydrology and Law Administration Divisions to respond effectively to applications to obtain access to groundwater for the intended use of the aquifer while satisfying the requirements of the Water Act (Groundwater Licensing Guidelines, 2014).

### 5.3 Gaps and challenges identified

The IWRM Plan (2010) highlights the following challenges:

#### Limited Capacity

- The biggest limitation is human capacity. Although the Department of Water Affairs has a dedicated monitoring team to collect data, the vastness of the national monitoring network is simply too great to collect data as frequently as required to be more optimal.
- Another limitation is an apparent “uncertainty” in terms of monitoring responsibility. The general perception is that Geohydrology is responsible for all monitoring of non-production boreholes, while service providers, in particular NamWater, only monitor groundwater response to abstraction in production boreholes. A sensible sharing of responsibilities can largely alleviate capacity pressures.
- The Geohydrology Division has limited capacity to effectively provide oversight over permit compliance. Where users are in violation of their abstraction permit conditions the penalties do not deter large-scale commercial enterprises. For example, some of the penalties include a fine not exceeding N\$500 and/or imprisonment for no more than three months.
- In the absence of regulations for groundwater management, implementation of the legislation remains a challenge.

#### Delayed gazetting of regulations

- The Water Resources Management Act, of 2013 based on IWRM principles, provides overall guidance in the sector. The overarching goals for the water sector are fully aligned to meeting the National Development imperatives as espoused in Vision 2030 and the Fifth National Development Plan. The key challenges relate to the operationalisation and implementation of the Act by addressing the technical, institutional, financial, socio-economic issues under a consolidated National IWRM Plan within the time framework of Vision 2030.

#### Inadequate monitoring infrastructure

- Consultations pointed to the need to extend the coverage of monitoring boreholes in order to ensure the quality and quantity of the groundwater is known and closely monitored. It’s reported that there is no continuous sampling of water quality at production boreholes and limited monitoring of abstraction volumes, water levels and groundwater quality.

**Inadequate monitoring, policing and enforcement of permit conditions**

- Only a small amount of the abstraction returns is forwarded to DWAF by the users. Quite a significant number of permit holders simply do not comply with the permit conditions and the currently the DWAF does not have the capacity to enforce the permit conditions.
- There is currently low monitoring if permit holders are in compliance with their permit conditions. This particularly true for many local authorities, they are said not to provide abstraction figures in line with requirements of their abstraction permits. Overall, it is estimated that only 50-60% of permit holders report their abstraction figures to the Department of Water Affairs.
- Due to the self-reporting system in place. There is no certainty that allocated abstraction volumes and actual abstraction figures reported by permit holders are accurate.
- This challenge is intricately linked to the capacity and resource limitations referred to in preceding sections.

**Inadequate groundwater monitoring coverage**

- The major aquifers are all well covered, particularly when manual monitoring points are considered. Digital monitoring, especially in the major and most significant aquifers such as the Kuiseb, Omdel, Koichab and Windhoek are considered insufficient (GoN, 2010).

**5.4 Enablers required to unlock these gaps/challenges**

The table below reflects the enablers required to unlock the identified gaps and challenges being experienced.

**Table 9: Enablers required to unlock gaps and challenges**

Gaps/ Challenges	Enablers
<b>Limited Capacity</b>	<ul style="list-style-type: none"> <li>▪ There is need for additional competent staff to be recruited in the Geohydrology Division. For purposes of monitoring, this limitation can be remedied by installing more digital logging devices, but this will have a significant financial implication. Digital logging will in any case require the physical capturing of the data at intervals tailored to the human capacity in the Department (GoN, 2010).</li> </ul>
<b>Delayed gazettement of regulations</b>	<ul style="list-style-type: none"> <li>▪ There is merit in developing specific groundwater legislation supported by the requisite regulations and strict implementation of the legislation thereof. The IWRM Plan (2010) recommends the development of a groundwater protection strategy and management plan amongst some of its key recommendations aimed at enhancing groundwater planning and management.</li> </ul>
<b>Inadequate monitoring infrastructure</b>	<ul style="list-style-type: none"> <li>▪ There is urgent need for capital injections to allow the Department of Water Affairs to extend the coverage of monitoring boreholes in order to ensure the quality and quantity of the groundwater is known and closely monitored. This should be coupled with strengthened</li> </ul>

Gaps/ Challenges	Enablers
	<p>human resources to carry out continuous sampling of water quality at production boreholes.</p>
<p><b>Inadequate policing and enforcement of permit conditions</b></p>	<ul style="list-style-type: none"> <li>▪ Key Informants expressed that Namibia could strengthen policing of permit compliance and policing of pollution by drawing lessons from the Blue Scorpions in South Africa and other countries where policing and compliance monitoring is advanced.</li> </ul>
<p><b>Insufficient remote monitoring coverage in remote and far-off areas</b></p>	<ul style="list-style-type: none"> <li>▪ Better remote monitoring coverage in remote and far-off areas could also be increased, which will result in a more cost-effective monitoring network.</li> </ul>
<p><b>Equipment failure</b></p>	<ul style="list-style-type: none"> <li>▪ The Department of Water Affairs and Forestry should in a phased manner replace the sub-standard digital loggers with reliable logging systems, the same applies for the analogue loggers that are out-dated.</li> </ul>

## 6. INSTITUTIONAL FRAMEWORK

### 6.1 Evolution

Namibia became independent in 1990. Institutional reforms in the water sector were undertaken with an overall aim of introducing integrated water resources management as a long-lasting solution to the water challenges of the arid environment prevailing in Namibia. The reforms included the development of a new national water policy, the preparation of draft legislation, and new organizational changes to develop, manage and regulate activities in the water sector (Heyns, 2005). Based on a comprehensive review of the water sector, institutional reform took place in the early 1990s. A government owned water bulk water supply institution, Namibia Water Corporation Ltd, (NamWater) was established in 1997. The Directorate of Rural Water Supply was also established in 1993, tasked with water supply to rural communal areas. The establishment of Rural Water Supply led to a significant increase in access to water services for rural communities. The overall water resource management function remained with the Directorate of Water Affairs. In 2008, the Directorate of Rural Water Supply was converted into the Directorate of Water Supply and Sanitation Coordination, so as to take on sanitation functions. The Directorate of Water Supply and Sanitation Coordination does not have separate divisions for rural water supply and another for sanitation.

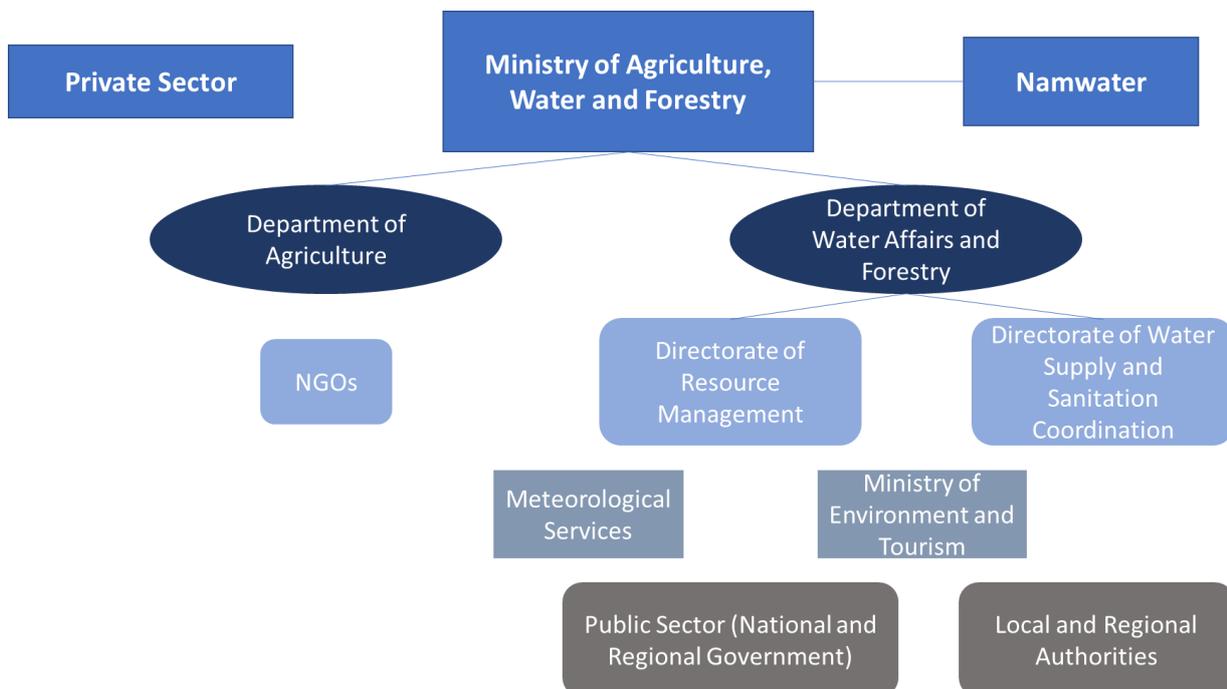


Figure 12: Key Actors in the Water Sector (Department of Water Affairs, n.d)

### 6.2 Institutional arrangements to support groundwater management

As provided for by Article 100 of the Namibian Constitution, the State, in its capacity as owner of the water resources of Namibia has the responsibility to ensure that water resources are managed and used

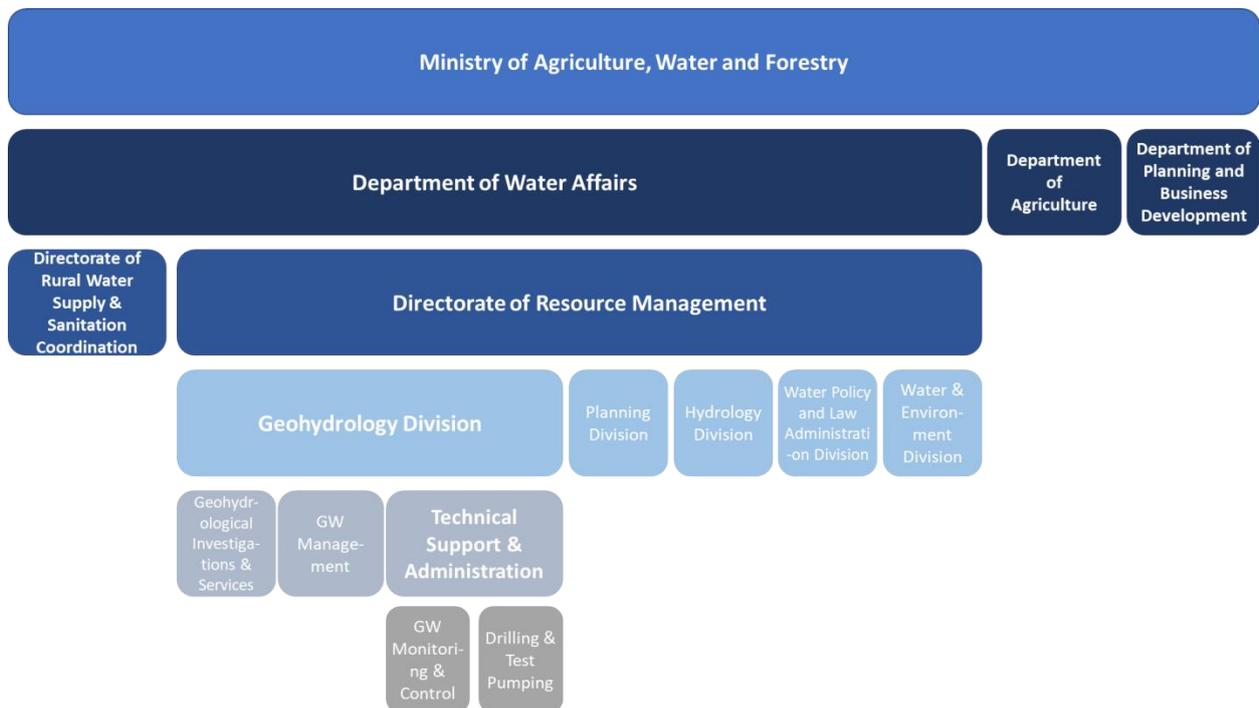
to the benefit of all people in furtherance of the objects of the Water Resources Management Act (Act No. 11 of 2013). This mandate is delegated to the Minister of Agriculture Water and Forestry (ibid).

The key institution concerned with assessment and management of the resource base is the Directorate of Resource Management in the Department of Water Affairs of the Ministry of Agriculture Water and Forestry (MAWF). The Directorate of Water Resource Management is one of the two Directorates in the Department of Water Affairs, the second one being the Directorate of Rural Water Supply and Sanitation Coordination (DWSS). The Directorate of Water Resource Management has a total of five Divisions as shown in Figure 8 below. The principal water resource management divisions in the Directorate are the Hydrology, Geohydrology and Water Environment and Basin Management Divisions. The latter deals with water quality, pollution control, ecological and technical research. The Water Policy and Law Administration Division is responsible for administering the regulatory regime concerning abstraction permits, prospecting, licensing of boreholes where appropriate, and other matters related to abstraction and allocation of the resource (GoN, 2000). The Planning Division performs *inter alia* strategic planning.

**Table 10: Roles and Functions of the DWAF Divisions**

<p><b>The Directorate of Water Resource Management is one of the three Directorates within the Department of Water Affairs and Forestry.</b></p>	<p>The Directorate is guided by the Water Resources Management Act of 2013 and the National Water Policy White Paper 2000.</p> <p>Objectives:</p> <ul style="list-style-type: none"> <li>▪ To promote sustainable socio-economic development through effective management, control and use of water resources and securing equitable access of water resources to all sectors of the Namibian population.</li> <li>▪ To act as guardian over the water resources of Namibia, administering water legislation, controlling water abstraction and facilitating the equitable allocation of water resources to all users.</li> <li>▪ To assume the responsibility for determining the potential of the water resources of Namibia and to implement measures to ensure the protection on and sustainable utilisation on of water resources in the country.</li> <li>▪ To execute strategic water resource development planning as well as regulating and controlling activities in the water sector.</li> </ul>
<p><b>Geohydrology</b></p>	<ul style="list-style-type: none"> <li>▪ To investigate and manage the groundwater resources of the country, thus ensuring sustainable use of the national groundwater resources.</li> </ul>
<p><b>Hydrology</b></p>	<ul style="list-style-type: none"> <li>▪ To investigate and manage the surface water resources of the country, thus ensuring sustainable use of the national groundwater resources.</li> </ul>
<p><b>Policy and Water Law Administration</b></p>	<p>The Division is responsible for:</p> <ul style="list-style-type: none"> <li>▪ Ensuring the utilisation of the country's water resources are controlled and managed in accordance with existing water legislation and policy.</li> <li>▪ Drafting regulations for the Water Resources Management Act 2013.</li> <li>▪ Issues permits for borehole drilling, groundwater and surface water abstraction and wastewater discharge in accordance with the water law.</li> </ul>
<p><b>Water Environment</b></p>	<p>The Division is responsible for:</p> <ul style="list-style-type: none"> <li>▪ Monitoring and management of ecological and environmental aspects of water resources in the country.</li> <li>▪ Pollution control surveys and compliance monitoring.</li> </ul>
<p><b>Water Basin Management</b></p>	<ul style="list-style-type: none"> <li>▪ Integrated Water Resources Management and Planning at basin and national level.</li> </ul>

The organogram below focuses primarily shows the positioning of the Geohydrology Division with the main mandate to investigate and manage the groundwater resources



**Figure 13: Geohydrology Organogram within the Ministry of Agriculture Water and Forestry**

The Geohydrology Division is responsible for assessing, managing, monitoring and regulating the quantity and quality of groundwater available and utilised in all possible underground aquifers, countrywide, in order to maintain a sustainable source of water, and to assist rural water supply and other agencies with the development of new and the rehabilitation of existing groundwater sources. The Division comprises three subdivisions namely; (i) Geohydrological Investigations and Services, (ii) Groundwater Management, and (iii) Technical Support and Administration with two sections: Groundwater Monitoring and Control and Drilling and Test Pumping.

**Table 11: Institutions involved in groundwater monitoring in Namibia (GoN, 2010)**

Institution	Input to groundwater management	Strengths and weaknesses relating to groundwater monitoring
<b>Directorate of Water Resource Management</b>	The Geohydrology Division is responsible for assessing, managing, monitoring and regulating the quantity and quality of groundwater available and utilised in all possible underground aquifers, countrywide, in order to maintain a sustainable source of water, and to assist rural water supply and other agencies with the development of new and the rehabilitation of existing groundwater	<ul style="list-style-type: none"> <li>▪ Limited human and financial capacities.</li> <li>▪ Limited financial resources to support its monitoring function.</li> <li>▪ Limited coverage of monitoring boreholes.</li> </ul>

Institution	Input to groundwater management	Strengths and weaknesses relating to groundwater monitoring
	sources.	
<b>Directorate of Rural Water Supply and Sanitation Coordination (DWSSC)</b>	A significant number of production boreholes are in operation to supply water to the rural communities in Namibia. Considering the distribution of the boreholes, it is evident that they cover significant areas where neither the DWAF nor NamWater currently have proper monitoring networks.	<ul style="list-style-type: none"> <li>▪ DWSSC does not monitor any groundwater related parameters.</li> <li>▪ No groundwater related data is available that can support a management plan.</li> <li>▪ In terms of monitoring groundwater parameters, there is currently no coverage at all.</li> <li>▪ Groundwater monitoring must be improved across the country.</li> </ul>
<b>NamWater</b>	NamWater monitors the behaviour of all the major aquifers, i.e. their responses to bulk groundwater abstraction on a continuous basis and this information is readily available. This can be used when the long-term sustainable yield of the groundwater sources and the future augmentation of those resources have to be considered in a management plan.	<ul style="list-style-type: none"> <li>• NamWater manually collects data on a monthly basis, but certain schemes are equipped with telemetry, providing real time as well as historic data. The following data is collected: (i) Production or abstraction, (ii) Production hours, (iii) Rest-and pump water levels.</li> <li>• NamWater water supply schemes are distributed across Namibia and give a good coverage for monitoring bulk groundwater abstraction, but it also reflects the regional condition of the groundwater sources fairly well.</li> </ul>
<b>Local Authorities</b>	The local authorities such as the Municipalities of Tsumeb, Grootfontein, Outjo and Omaruru, do their entire water supply on their own while the Municipalities of Okahandja, Usakos and Windhoek supply own water in addition to NamWater supplies.	<ul style="list-style-type: none"> <li>• The municipalities of Omaruru, Usakos and Outjo record abstraction volumes only, but they do not record water levels or groundwater quality.</li> <li>• Data is stored in hard copy format, and although it is available, getting access to the date is actually quite difficult.</li> <li>• The municipalities of Windhoek, Tsumeb and Grootfontein are obliged to have groundwater abstraction permits.</li> <li>• Monitoring of abstraction volumes and water levels are prescribed in terms of their abstraction permit conditions. This data must be collected monthly and submitted to DWAF quarterly, but this is not done regularly and the information is not readily available.</li> </ul>
<b>Mines</b>	Quite a number of mines use groundwater in their operations, and they are all required to collect and submit groundwater monitoring data to the DWAF in terms of the conditions prescribed in their waste water disposal permits.	<ul style="list-style-type: none"> <li>▪ Very little groundwater related data from mines is actually available.</li> <li>▪ Although monitoring data from mines is collected, it is not readily available.</li> </ul>

Other institutions relevant to the sustainable management of groundwater is the Water Regulator. The functions of the Water Regulator are amongst others, to determine the tariffs of fees and charges, or the maximum tariffs of fees and charges -

- i. that may be levied by a water services provider or other supplier of water, including the State, for the supply or distribution of water and the provision of wastewater services and other associated services; and
- ii. that are payable by licence holders for the abstraction of water or the discharge of effluent or the supply or re-use of effluent.

The regulator is also responsible for addressing the development of water service plans and water conservation and water demand management strategies.

#### *Local level basin management structures in support of groundwater management*

The Water Resources Management Act (2013) makes provision for the establishment of basin management committees (BMCs). The BMC is a formal body of stakeholder institutions elected as representatives on the stakeholder forum. The role of a BMC is to provide scope for addressing various issues affecting water resources in the basin, ranging from efficient water use to monitoring the health of the basin (GoN, n.d). According to the Water Resources Management Act (2013), the functions of a basin management committee are -

- a) to advise the Minister on matters concerning the protection, development, conservation, management and control of water resources and water resource quality in its water management area; <sup>[SEP]</sup>
- b) to promote community participation in the protection, use, development, conservation, management and control of water resources in its water management area; <sup>[SEP]</sup>
- c) to prepare or cause to be prepared an integrated water resources management plan for its water management area for submission to the Minister for consideration in developing the Integrated Water Resources Management Plan under section 31; <sup>[SEP]</sup>
- d) to make recommendations to the Minister in relation to applications for licences in respect of its water management area or the amendment, cancellation, or suspension of any such licence; <sup>[SEP]</sup>
- e) to promote community self-reliance, including arrangements for the recovery of costs for the operation and maintenance of any waterwork; <sup>[SEP]</sup>
- f) to monitor and report on the effectiveness of policies and measures in achieving sustainable management of water resources and resource quality in its water management area; <sup>[SEP]</sup>
- g) to collect, manage and share data required for the proper management of its water management area in coordination with the Minister;
- h) to conduct, with the concurrence of the Minister, a water research agenda appropriate to the needs of institutions and water users within its water management area;
- i) to help resolve conflicts relating to water resources and resource quality in its management area;

- j) to report to the Minister the occurrence or threat of serious water or pollution problems within its management area;
- k) to compile and submit an annual report on its activities to the Minister and to assist the Minister in the co-ordination of such activities in Namibia; and
- l) to perform such functions as are delegated or assigned to it by the Minister.

***The Karst Water Management Body, (Source: IWRM Plan for Namibia: Review and Assessment of Existing Situation, 2010)***

The origin of the Karst Water Management Body (KWMB) lies in the existence of the Karst Water Committee that was established when the Grootfontein - Omatako canal component of the Eastern National Water Carrier was under construction with the objective to abstract groundwater from the Karst Area for supply to central Namibia (GoN, 2010).

The KWMB is a unique institution because it deals with the management of a groundwater resource that lies in the headwaters of a number of internationally shared river basins and a national river basin, namely the Cuvelai, Okavango and the Ugab respectively. The area has been declared a groundwater control area by the Government in terms of the Water Act (Act No 54 of 1956) and provides a framework for the efficient and sustainable management of the groundwater resources.

The KWMB represents all stakeholders in the OML, including the regional the local government institutions, the farming community and the mining sector. The KWMB is formally recognised by the Minister of Agriculture, Water and Forestry as an advisory body on water related matters in the Tsumeb – Otavi - Grootfontein water control area. One of its main functions is to optimise the management, and to achieve the most beneficial and sustainable use of the water resources in the Karst Area. The Government will not issue or renew any water abstraction permit without prior consultation with the KWMB and the endorsement of all decisions. The KWMB meets at least twice per year and the Executive Committee meets when necessary to deal with matters that require immediate attention.

In addition, the Water Resources Management Act (2013) provides for the establishment of **water point committees and local water committees** to be entrusted with the responsibility of managing and controlling the supply of water at any rural State waterwork. Accredited water point committees are authorised to manage and control the supply of water at the water point specified in the certificate and established for the water supply requirements of water users in the area where the water point is located (Water Resources Management Act, 2013). Whilst local water committees are authorised to manage and control a rural water supply scheme, or part of such a scheme, specified in the certificate and established for the water supply requirements of two or more water user groups at different points served by a water supply scheme (Water Resources Management Act, 2013).

### **6.3 Gaps and challenges identified**

Although institutional reforms in the water sector where a milestone in terms of water resources planning and management, the desired outcomes cannot be fully attained without the required level of skill and capacity both within and outside water administration. Inadequate funding remains a constraint and continues to create a conflict between resource development and capacity building (Heyns, 2005). Other challenges that were identified by Pietersen and Beekman (2016) are outlined below:

**Enact the establishment of water institutions as prescribed in the Water Resources Management Act of 2013 and the IWRM Plan of 2010.**

- Several new institutions are to be established under the Water Resources Management Act of 2013. These include a **Water Advisory Council**, which shall be established to develop advise on water policy development and review; advise on water resources management; advise on water abstraction and use; advise on any matter about water raised by a basin management committee on which the Council considers it advisable to provide advice. In addition, **Basin Management Committees** should be established in all basins (to date only eight Basin Management Committees have been established in the Cuvelai, Kuiseb, Okavango, Omaruru, Orange-Fish, Upper Swakop and Zambezi basins). The Act also provides for a Water Tribunal. This is an appeal body that will be responsible for hearing and deciding on appeals in matters referred to in section 120 of the Water Resources Management Act of 2013.
- Part 6 of the Water Resources Management Act of 2013 is on internationally shared water resources
  - The functions of the Minister in relation to the joint management of internationally shared water resources are –
  - to participate with neighbouring and other riparian states in the establishment, development and maintenance of a common database system to store and provide data and information for the protection, sustainable use and management of shared water resources; <sup>[1]</sup><sub>[SEP]</sub>
  - to engage in the joint management, planning and development of projects concerning shared water resources in furtherance of the objectives of the Southern African Development Community Revised Protocol on Shared Watercourses with regard to regional integration, economic growth and poverty alleviation;
  - to establish and promote institutional relationships between river basin organisations within Namibia and international river basin organisations;
  - to encourage the participation of Namibian stakeholders in discussions concerning the identification and formulation of the interests of Namibia in the development of internationally shared water resources;
  - to protect the international water resource quality, including discussion with upstream states to reduce or prevent the deterioration of water quality resulting from activities in upstream states;
  - to develop and improve human resource capacity to participate in the management of shared water resources, including negotiations, consultations and conflict resolution; and

- to establish mechanisms, or negotiate the revision of mechanisms, for the management, prevention and resolution of disputes relating to internationally shared water resources.
- Consultations revealed that institutional development for groundwater resources development and management has not progressed much beyond the hydrogeological service function at national level. Aquifer management is often uncoordinated and water supply planning does not sufficiently include future developments. This centralised structure presents little opportunity for stakeholder interaction.

**Limited institutional coordination and integration within and across line ministries**

- Weak collaboration between related authorities with the responsibility for environmental management, public health, agriculture, land-use planning and land management, urban and rural water supply continually undermines efforts for comprehensive planning and management of groundwater resources.
- Limited institutional coordination and integration within and across line ministries remains a big constraint when it comes to the integrated management of groundwater resources. This is due to fragmentation of management responsibilities across the line ministries and policies that are not in harmony.

**Limited capacity for local level basin structures to address groundwater management**

- The Basin Management Committees are the first level of decentralization. However, they don't have the capacity to take on groundwater resources management. It is evident from the consultations that the element of groundwater monitoring is rather weak in the basin level governance structures with the exception of the water-controlled area (specifically the Dolomite Karst area). The Stampriet area commitment is clearly there but the Nossob and Auob Basin Management Committee is yet to be established. To date, the stakeholder forum has been constituted. However, the Stampriet Farmers Association is well organised and acts as a pressure group lobbying government to monitor groundwater levels and ensure the protection of the groundwater resources.

**6.4 Enablers required to unlock these gaps/challenges**

The table below reflects the enablers required to unlock the identified gaps and challenges being experienced

**Table 12: Enablers required to unlock the identified gaps and challenges**

Gaps/challenges	Enablers
<b>Low Institutional development for groundwater resources development and management.</b>	<ul style="list-style-type: none"> <li>▪ Establish a Water Advisory Council, Basin Management Committees and a Water Tribunal as per the Water Resources Management Act of 2013.</li> </ul>
<b>Constrained capacity for groundwater management at all levels.</b>	<ul style="list-style-type: none"> <li>▪ Mobilise funding to strengthen key institutions to implement their respective mandates as prescribed by the Resources Management Act of 2013.</li> </ul>

Gaps/challenges	Enablers
	<ul style="list-style-type: none"> <li>▪ Ensure a full staff complement is put in place to support the Geohydrology division, with adequate equipment and resources to implement the Divisions functions of assessing, managing, monitoring and regulating the quantity and quality of groundwater available and utilised in all possible underground aquifers, countrywide.</li> <li>▪ Strengthen capacity of local government, NamWater and the Directorate of Rural Water Supply and Sanitation as these institutions mandates relates to groundwater management.</li> </ul>
<p><b>Absence of decentralised groundwater management units</b></p>	<ul style="list-style-type: none"> <li>▪ Establish a functional groundwater management unit in each basin.</li> <li>▪ Capacitated Local Government (skills and resources)</li> <li>▪ Senior hydrogeologist / head of groundwater in each basin</li> <li>▪</li> </ul>
<p><b>Limited institutional coordination and integration within and across line ministries</b></p>	<ul style="list-style-type: none"> <li>▪ There is need to strengthen communication and cooperation between (i) the Department of Water Affairs and Forestry, responsible for resource management and rural water supply, (ii) NamWater, responsible for bulk water supply, (iii) Regional Authorities, responsible for small scale water supply to small communities, (iv) Local Authorities, some responsible for water supply, water reticulation and sanitation and the Ministry of Environment and Tourism responsible for environmental management.</li> </ul>
<p><b>Limited capacity to take on groundwater resources management in the Basin Management Committees.</b></p>	<ul style="list-style-type: none"> <li>▪ Currently, the Water Basin Management Division is understaffed. There is no Deputy Director appointed to provide senior leadership to the Division. The Basin Management Co-ordinator is thus stretched with limited support in some Basins.</li> <li>▪ There is a need to fully establish Basin Management Committees as well establish Basin Management Offices in all the River Basins in order to fully operationalise the Basin Management Approach as espoused in the Policy and Regulatory framework.</li> <li>▪ Facilitate targeted training of Basin Management Committees. Stakeholders should be capacity through learning from existing high-performance initiatives in surface water and groundwater management such as the Kuiseb Basin Management Committee (KBMC) and the Karst Water Management Body (KWMB).</li> </ul>
<p><b>No transboundary organisation dealing with groundwater</b></p>	<ul style="list-style-type: none"> <li>▪ Transboundary groundwater agreements</li> <li>▪ Groundwater capacity in RBOs</li> </ul>

## 7. CHALLENGES TO IMPLEMENTATION

### **Inadequate Groundwater Resources Monitoring**

With respect to monitoring, evaluation and modification of resource management of groundwater, data and information are inadequate, particularly to generate an understanding of groundwater sources. Overall quantification of resources and prescribing the long term sustainable safe yield are inadequate. In addition, unsustainable use of sensitive resources, e.g. wetlands and aquifers continue unrecorded in most areas as does inequitable allocation of water and inadequate allocation of financial resources.

### **Absence of a standalone groundwater policy and strategy**

- In the absence of a stand-alone groundwater policy and strategy the management of the resource remains without specific or targeted attention.
- The objectives, norms and standards toward groundwater management requires to be strengthened.

### **Inadequate institutional framework**

- The water resources challenges in Namibia can only be addressed through a high degree of efficient water resources management including development of an integrated institutional framework and provisions of infrastructure. It is important for the key institutions outlined in the Water Resources Management Act of 2013 to be established and operationalised.

### **Inadequate human resources**

- Human resources are insufficient, particularly for the geohydrology divisions of the Department of Water Affairs and Forestry and NamWater.
- Human capacity is lacking to carry out the groundwater monitoring in all basins. Groundwater quality monitoring is lagging behind as well as data processing. Four of the monitored aquifers in Namibia are of transboundary nature. For transboundary monitoring it is often politically difficult, and time consuming to amend legal provisions and make organizational arrangements (IGRAC, 2013).

### **Limited conversion of legislation to implementation tools**

- The legislation is comprehensive; however, implementation needs to be supported by regulations for groundwater management.
- There are no incentives for groundwater use

### **Inadequate borehole monitoring network**

- Even though the government has done substantive research on the main aquifers. There is need for more boreholes to be drilled to improve the monitoring network coverage and effective management of aquifers.

- Data to estimate natural recharge is insufficient and most likely inaccurate. Aquifer specific projects are required to identify what data are needed to accurately estimate natural recharge, and then the necessary infrastructure must be established to capture that data. This must be done at least for the strategic aquifers. Although limited operational data are available on the artificial recharge schemes, the exploration and experimental data are sufficient to operate these schemes to its potential. With time, operational data will improve the operation of these schemes.

#### **Limited stakeholder engagement**

- Stakeholder involvement in groundwater management is rather weak. This calls for strengthening the capacity of Basin Offices and Basin Management Committees to monitor groundwater.

#### **Limited resources (finances, capacity and technical skills)**

- Currently there are no economic or financial tools that are being used in support of groundwater management. Thus, there is no incentive for managing its usage.

#### **Limited information and knowledge management**

- Namibia has a National Groundwater database called GROWAS (IGRAC, 2013). This database includes information on groundwater levels, quality, permits for abstraction and hydrogeological data in the country (ibid). However, groundwater quality monitoring is lagging behind as well as data processing. Four of the monitored aquifers in Namibia are of transboundary nature. For transboundary monitoring it is often politically difficult, and time consuming to amend legal provisions and make organizational arrangements (IGRAC, 2013).
- Even though the country has adopted aquifer management plans for major aquifers aimed at ensuring sustainable utilization of groundwater resources. There are still challenges relating to the knowledge about the water balance and recharge versus abstraction due to short historical records of these aquifers (IGRAC, 2013).

#### **Limited protection of water resources**

- The recognition of groundwater as a strategic resource for poverty alleviation, energy and food security, and sustainable economic development is incipient leading to poor protection measures.
- Adaptive management is recognised in policies and plans but poorly implemented.
- There are no systems planning for drought. It is however important to note there is new drought policy that is under formulation.

## **8. ACTION PLAN**

The MoSCoW method of prioritisation has been used to develop the action plan. This method identifies the *Must have*, *Should have*, *Could have*, and *Won't have* elements for the Groundwater Management Regulatory Framework. In 2010, Namibia carried out a review and assessment of the existing water situation in Namibia. This assessment informed the development of the IWRM Plan of (2010). Below are some of the key actions identified and recommended aimed at strengthening groundwater management in the country.

### **Groundwater policy and strategy**

- Despite the admirable efforts of the water resources sector in recent years regarding improved resource management a groundwater protection policy needs to be developed and implemented if the goals towards sustainable resource use must be achieved. Other policies that should be developed to support groundwater protection and conservation include an ephemeral river catchment policy and a pollution control policy.

### **Strengthen institutional arrangements**

- There is merit in aligning functions for groundwater management as a first step to providing accurate groundwater information.

### **Strengthen reporting by water users**

- The human capacity to manage and monitor groundwater resources must be increased significantly. In addition, the Department of Water Affairs should establish a mandatory reporting scheme for service providers and users who abstract their own water (rest water levels and abstracted volumes) including water quality. In addition, DWAF should install groundwater abstraction metering and establish appropriate reporting mechanisms.

### **Establish groundwater management bodies**

- The voluntary establishment of management bodies in all the large groundwater abstraction areas in the country must be advocated and facilitated through adequate training.

### **Strengthen rural groundwater monitoring across the country**

- The accuracy of the groundwater production data collected by NamWater must be improved, and the submission of data to the DWAF must be done regularly.
- NamWater must establish and maintain a routine, annual groundwater quality sampling and analysis programme for every production borehole supplying groundwater to a bulk water supply scheme.
- Large scale groundwater users such as local authorities and tourism ventures such as lodges must be motivated to do water quality monitoring.

### **Determine data requirements**

- Develop and implement a nationwide groundwater level and quality monitoring strategy.
- Establish a mandatory reporting scheme for service providers and users who abstract their own water (rest water levels and abstracted volumes) including water quality aspects.
- Investigations must be conducted to identify what data are needed to accurately estimate natural recharge to especially the strategic aquifers and then the necessary infrastructure must be established to capture that data.
- All water use should be monitored and recorded.
- There is need to enforce metering for all irrigation water use. (At least 41% of the water used in Namibia in 2008 was for irrigation). As part of the Permit conditions, users are required to submit monthly water use returns. However, currently most permit holders have not been adhering to these permit conditions. Thus, enforcement with the aim of ensuring compliance with permit conditions is needed. To achieve this, the geohydrology division requires sufficient financial and human resources – which they currently do not have.
- Establish a mandatory water metering and reporting scheme for service providers and identified users who abstract their own water (rest water levels and abstracted volumes).
- Monitor water quality as prescribed in the Regulations under the WRMA.

#### **Finalise and Promulgate Regulations**

- Apply guidelines for groundwater abstraction registration, licensing (where appropriate) and compliance.
- Finalize and gazette groundwater management regulations.
- Promote the understanding, interpretation and application of the polluter pays principle and of the precautionary principle in water pollution management.
- Formulate or revise appropriate solid waste management plans for all Local Authorities and other institutions to prevent ground water pollution.

#### **Strengthen stakeholder capacity building**

- Strengthen community engagement in BMCs and WPCs.
- Strengthen management capacity of BMC, specifically, train Basin Management Offices to conduct groundwater monitoring spot checks.
- Facilitate targeted training of Basin Management Committees. Stakeholders should be capacitated through learning from existing high-performance initiatives in surface water and groundwater management such as the Kuiseb Basin Management Committee (KBMC) and the Karst Water Management Body (KWMB).

#### **Enhance resource monitoring and data management**

- Develop and implement a nationwide groundwater level and quality monitoring strategy.
- The IWRM Plan asserts that improvements required include increased capacity to analyse and evaluate monitoring data and to improve the reliability of digital logging systems.

- Introduce and implement metering for all irrigation water use (at least 41% of the water used in Namibia in 2008 was for irrigation).
- Establish a mandatory water metering and reporting scheme for service providers and identified users who abstract their own water (rest water levels and abstracted volumes).
- Monitor water quality as prescribed in the Regulations under the WRMA of 2013.

#### Strengthen groundwater resources sustainability and security

- Artificial groundwater recharge should be strengthened in order to form part of any water augmentation and conjunctive use planning.
- Investigate, quantify and manage groundwater resources of transboundary aquifers.
- Establish water quality guidelines and standards for agriculture use to safeguard groundwater quality.
- Plan and implement artificial groundwater recharge schemes.

**Table 13: Action Plan “Must Haves**

Prioritisation	Element	Description
<b>Must have: those elements of the regulatory framework that are critical</b>	<b>Policy</b>	<ul style="list-style-type: none"> <li>▪ Groundwater Policy and Strategy to inform the coordinated planning, development and management of groundwater resources.</li> <li>▪ Harmonise related policies (environmental management, local authorities, mining) to ensure coherent enabling policy framework for groundwater management.</li> </ul>
	<b>Legislative</b>	<ul style="list-style-type: none"> <li>▪ Gazette and operationalise the regulations.</li> <li>▪ Regulations in terms of the Water Resources Management Act of 2013 which can guide the management of groundwater resources are lacking.</li> <li>▪ Legislation to provide continuous financial and managerial support to Basin Management Committees does not exist.</li> </ul>
	<b>Institutional</b>	<ul style="list-style-type: none"> <li>▪ An independent body to advise the Minister on issues relating to the Water Sector still needs to be established. However, a Cabinet Committee on Water Supply Security was established in line with the recommendations of Harambee Prosperity Plan.</li> <li>▪ The Directorate of Water Resource Management approved organigram needs to be fully operationalised by recruiting key staff members in support of the respective Divisions.</li> <li>▪ Fast track the bill for decentralising the Water Resource Management Directorate into the regions. This will enable more responsive monitoring of groundwater in the Basins and enforcement of regulations.</li> <li>▪ Strengthen capacity to investigate, manage and monitor groundwater resources. Human resources, financial resources, currently going to visit once every month. Linked to this, there is need to strengthen the Basin Offices so that they can take up resource monitoring functions.</li> <li>▪ Establishment of management bodies in all the large groundwater abstraction areas in the country drawing lessons from the Karst</li> </ul>

Prioritisation	Element	Description
		<p>Water Management Body.</p> <ul style="list-style-type: none"> <li>Strengthen collaboration with DWSSCs. The boreholes drilled for rural water supply can be used to monitor groundwater levels and quality as well.</li> <li>Ensure systematic collection of groundwater production data collected by NamWater.<sup>[17]</sup></li> <li>Investigate natural recharge, especially for the strategic aquifers.</li> <li>Finalise and apply regulations for groundwater abstraction licensing and compliance.</li> <li>Strengthen real-time monitoring and modelling systems with results accessible to all parties (users, managers, service providers).</li> <li>Build the capacity of Basin Management Offices to conduct groundwater monitoring spot checks.</li> </ul>
	<b>Strategy/ Guidelines</b>	<ul style="list-style-type: none"> <li>Implement treasury regulations, guidelines and procedures to minimise delays in procurement by</li> <li>Setting priorities</li> </ul>

**Table 14: Action Plan “Should Haves”**

Prioritisation	Element	Description
<b>Should have</b>	<b>Policy</b>	<ul style="list-style-type: none"> <li>Establish specific coordination mechanisms in policy for groundwater management</li> <li>Other policies that should be developed to support groundwater protection and conservation include an ephemeral river catchment policy and a pollution control policy.</li> </ul>
	<b>Legislative</b>	<ul style="list-style-type: none"> <li>Establish mediation mechanisms for conflict resolution</li> <li>Provide greater clarity of rights, duties and institutions for consistent jurisprudence</li> </ul>
	<b>Institutional</b>	<ul style="list-style-type: none"> <li>Every DM that is partially groundwater reliant should employ a qualified hydrogeologist, and that person should report quarterly to the DWA</li> </ul>
	<b>Strategy/ Guidelines</b>	<ul style="list-style-type: none"> <li>Need to develop a groundwater strategy.</li> <li>Performance monitoring and reporting</li> </ul>

**Table 15: Action Plan “Could Haves”**

Prioritisation	Element	Description
<b>Could have</b>	<b>Policy</b>	<ul style="list-style-type: none"> <li>▪ Prioritise provisions for groundwater leadership</li> </ul>
	<b>Legislative</b>	<ul style="list-style-type: none"> <li>▪ Amend National existing legislations to include provisions for groundwater management</li> <li>▪ Statutory rules for timeframes of implementation / updates</li> <li>▪ Multi-sectorial participations in local-level institutions</li> <li>▪ Pre-authorisation for groundwater use</li> <li>▪ Priority groundwater management areas for issuing groundwater abstraction permits</li> <li>▪</li> </ul>
	<b>Institutional</b>	<ul style="list-style-type: none"> <li>▪ Establish a scheme for young hydrogeologists to work in the private sector for a year to gain experience and perspective</li> <li>▪ Establish the secondment of experienced private sector staff to DWA</li> </ul>
	<b>Strategy/ Guidelines</b>	<ul style="list-style-type: none"> <li>▪ Awareness creation on the value of groundwater infrastructure including instrumentation</li> <li>▪ Community ownership and acceptance</li> <li>▪ Protection measures</li> <li>▪ Prosecution</li> <li>▪ Incentives</li> <li>▪ Update guidelines and standards with reference to groundwater management regulations</li> <li>▪ National Groundwater Strategy</li> </ul>

**Table 16: Action Plan “Won’t Haves”**

Prioritisation	Element	Description
<b>Won’t have</b>	<b>Policy</b>	<ul style="list-style-type: none"> <li>▪ Continued institutional dominance of surface water in a country where the majority relies on groundwater, and where surface water resources are mostly ephemeral</li> </ul>
	<b>Legislative</b>	<ul style="list-style-type: none"> <li>▪ Continued legal and policy uncertainty regarding groundwater institutions and local governance</li> <li>▪ No regulations strengthening groundwater management</li> </ul>
	<b>Institutional</b>	<ul style="list-style-type: none"> <li>▪ Consolidation and dominance of interim and relatively weak local groundwater governance organisations</li> <li>▪ Stagnated institutional development</li> </ul>
	<b>Strategy/Guidelines</b>	<ul style="list-style-type: none"> <li>▪ No clear strategies and guidelines on groundwater management and monitoring</li> </ul>

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## APPENDIX A: LITERATURE INVENTORY LIST

No.	Year	Title of Document	Author	Publisher	Report Number	Link (if it is a website document)
1	2000	National Water Policy White Paper	Ministry of Agriculture, Water and Rural Development. Windhoek, Namibia.	Government of the Republic of Namibia (GRN)		Google drive
2	2004	Namibia Vision 2030: Policy Framework for Long - Term National Development	Office of the President	Government of the Republic of Namibia (GRN)		Google drive
3	2008	Water Supply and Sanitation Policy	Ministry of Agriculture, Water and Forestry Namibia, Windhoek.	Government of the Republic of Namibia (GRN)		Google drive
4	2013	Water Resources Management Act 2013	Government Gazette of the Republic of Namibia, Windhoek, Namibia.	Government of the Republic of Namibia (GRN)		Google drive
5	2014	Groundwater Licensing Guidelines in Namibia	Ministry of Agriculture, Water and Forestry Namibia, Windhoek.	Government of the Republic of Namibia (GRN)		Google drive

## APPENDIX B: STAKEHOLDER LIST

### Full Stakeholder List

No.	Title:	Name:	Surname:	Affiliation	Position:	Role	Sector Group	Telephone	Cell Number	Email:	Priority (yes/no)
1	Mr	Abraham	Nehemia	Ministry of Agriculture Water and Forestry	Deputy Permanent Secretary	Policy making	Government	+264612087227			
2	Ms	Maria	Amakali	Ministry of Agriculture Water and Forestry	Director: Resource Management	Policy making	Government	+264 61 208 7266		Maria.Amakali@mawf.gov.na	Yes
3	Mr	Bertram	Swartz	Ministry of Agriculture Water and Forestry	Deputy Director of Geohydrology	Assess, manage, monitor & regulate the quantity & quality of groundwater	Government		+264812020710	Bertram.Swartz@mawf.gov.na	Yes
4	Ms	Paulina	Mufeti	Ministry of Agriculture Water and Forestry	Deputy Director of Hydrology	Assess, manage, monitor & regulate the quantity & quality of surface water	Government	+264 61 208 7191		Paulina.Mufeti@mawf.gov.na	Yes

No.	Title:	Name:	Surname:	Affiliation	Position:	Role	Sector Group	Telephone	Cell Number	Email:	Priority (yes/no)
5	Mr	Franciskus	Witbooi	Ministry of Agriculture Water and Forestry	Deputy Director of Policy and Water Law Administration	Policy and legislation	Government	+264 61 208 7226		Franciskus.Witbooi@mawf.gov.na	Yes
6	Ms	Aune Amwaama		Ministry of Agriculture Water and Forestry	Coordinator: Basin Management Committees	Coordination of Basin Management Committees	Government	+26461208 7212	+264812 777855	<a href="mailto:Aune.Amwaama@mawf.gov.na">Aune.Amwaama@mawf.gov.na</a>	Yes
7	Mr	Moses	Mpareke	Ministry of Agriculture Water and Forestry	Directorate of Water Supply and Sanitation Coordination	Supply of safe water of rural communities in communal areas	Government	+26461208 7333		<a href="mailto:Moses.Mpareke@mawf.gov.na">Moses.Mpareke@mawf.gov.na</a>	Yes
8	Mrs	Theopolina	Nantanga	Ministry of Agriculture Water and Forestry	Directorate of Water Supply and Sanitation Coordination	Supply of safe water to rural communities in communal areas - Northern Central Division	Government	+26461208 7339		<a href="mailto:Theopolina.Nantanga@mawf.gov.na">Theopolina.Nantanga@mawf.gov.na</a>	Yes
9	Mr	Victor	Slinger	Ministry of Agriculture Water and Forestry	Directorate of Water Supply and Sanitation	Infrastructure development - Supply of safe water to rural	Government	+26461208 7266		<a href="mailto:Victor.Slinger@mawf.gov.na">Victor.Slinger@mawf.gov.na</a>	Yes

No.	Title:	Name:	Surname:	Affiliation	Position:	Role	Sector Group	Telephone	Cell Number	Email:	Priority (yes/no)
				Forestry	Coordination	communities in communal areas				<u>na</u>	
10	Mr	Luther	Rukira	Ministry of Agriculture Water and Forestry	Water Regulator of Namibia	Determine and levy tariffs for water supply	Government		+264811 247461	<u>Luther.Rukira@gmail.com</u>	Yes
11	Mr	Johannes	Sirunda	Namwater	Head: Research Development and innovation	Manage and direct corporate research and development programmes at NamWater	Bulk water supplier			<u>johannes.sirunda@namwater.com.na</u>	Yes
12	Mr	Henry	Mukendwa	Namwater	Manager: Geohydrology Division	Groundwater planning and management	Bulk water supplier			<u>henry.mukendwa@namwater.com.na</u>	Yes
13	Mr	Ludwig	Narib	City of Windhoek	Strategic Executive: Infrastructure, water and Technical Services	Municipal services: Infrastructure, water and technical services	Department of Infrastructure, Water and Technical	+26461290 2334	+264811 223924	<u>Ludwig.Narib@windhoekcc.org.na</u>	Yes

No.	Title:	Name:	Surname:	Affiliation	Position:	Role	Sector Group	Telephone	Cell Number	Email:	Priority (yes/no)
							Services				
14	Mr	Sebastian	Husselmann	City of Windhoek	Chief Engineer: Bulk water and waste water	Municipal services: Bulk water and waste water	Division of Bulk Water and Waste Water	.00264612 902345	+264811 243305	<a href="mailto:sebastian.husselmann@windhoekkcc.org.na">sebastian.husselmann@windhoekkcc.org.na</a>	Yes
15	Mr	Johan	DeVos	City of Windhoek	Chief Engineer: Engineering Services Division	Municipal services: Engineering support	Division of Engineering Services	+26461290 2346	+264811 273675	<a href="mailto:johan.DeVos@windhoekkcc.orf.na">johan.DeVos@windhoekkcc.orf.na</a>	Yes
16	Mr	Roderick	April	UNESCO - NATCOMM			UNESCO			<a href="mailto:roderick.april@meti.gov.na">roderick.april@meti.gov.na</a>	Yes
17	Mr	Jürgen	Otto Gustav Kirchner	Namibian Hydrogeological Association	Member	Research	Research	+26461241 577			Yes
18	Prof	Ben	Mapani	UNAM	Associate Professor	Research	Academia and	+26481298 7534		<a href="mailto:bmapani@unam.">bmapani@unam.</a>	Yes



## GROUNDWATER MANAGEMENT INSTITUTE

No.	Title:	Name:	Surname:	Affiliation	Position:	Role	Sector Group	Telephone	Cell Number	Email:	Priority (yes/no)
							Research			<u>na</u>	
19	Prof	Nnenesi	Kgabi	NUST	UNESCO Professorial Chair	Research	Academia and Research	+264612072609		<u>nkgabi@nust.na</u>	Yes

## Stakeholders Engaged

Name	Organisation
<b>Ms Maria Amakali</b>	Ministry of Agriculture: Water and Forestry Resource Management,
<b>Mr Bertram Swartz</b>	Ministry of Agriculture Water and Forestry: Geohydrology Division
<b>Mr Johan DeVos</b>	City of Windhoek
<b>Mr Henry Kumwenda</b>	NamWater
<b>Mr Luther Rukira</b>	Aqua Services and Engineering
<b>Prof. Ben Mapani</b>	University of Namibia
<b>Ms Aune Amwaama</b>	Water Basin Management

## Stakeholders that completed the questionnaires

Name	Organisation	Stakeholder Group
<b>Ms Maria Amakali</b>	Director: Resource Management, Ministry of Agriculture Water and Forestry	Government
<b>Mr Bertram Swartz</b>	Deputy Director: Geohydrology Division, Ministry of Agriculture Water and Forestry and President of the: Namibia Hydrogeological Association	Government Civil Society
<b>Mr. Johan DeVos</b>	City of Windhoek	Local Authority
<b>Mr. Henry Kumwenda</b>	NamWater	Bulk water supplier
<b>Mr Luther Rukira</b>	Managing Director: Aqua Services and Engineering Chairperson: Water Regulator of Namibia	Private Sector Government
<b>Prof Ben Mapani</b>	Professor: University of Namibia	Academia
<b>Ms Aune Amwaama<sup>2</sup></b>	Water Basin Management	Government

## Validation Workshop

Name	Position	Stakeholder Group
<b>Mr Don Louw</b>	Geohydrologist at City of Windhoek	Government (Validation Workshop)
<b>Mr Mikael Ndongo</b>	Namibia Representative	Government (Validation Workshop)
<b>Mr Bertram Swartz</b>	Deputy Director - Geohydrology at Ministry of Agriculture, Water and Forestry	Government (Validation Workshop)
<b>Mr Henry</b>	Hydrogeologist at Namibia Water	Government (Validation Workshop)

<sup>2</sup> Focus was on the Basin Management Committees and their role in groundwater management.



Name	Position	Stakeholder Group
<b>Mukendwa</b>	Corporation	

## APPENDIX C: DESIRED FUTURE STATE SUMMARY

### Reflection of Policy Framework as per the minimum requirement for the Desired Future State

Minimum requirement for desired future	Status	Comment
A long-term policy to protect groundwater by preventing pollution and overuse. This policy is comprehensive, implemented at all appropriate levels, consistent with other water management policies and be duly taken into account in other sectorial policies;	Partially achieved	Namibia does not have a stand-alone policy for groundwater management to inform the planning, management and protection of the resource. The Water Policy of 2000 tenets thus apply to surface water and groundwater. The Policy in its totality is comprehensive, and is sufficiently backed up by the Legislation (Water Resources Management Act, 2013). However, it's use is limited as a result of the absence of regulations to give effect to the 2000 Water Policy.
The social, economic and environmental values of groundwater are all recognised;	Achieved	The Policy recommends that Namibia adopts a systematic approach to water resources management, using an integrated, multi-sectoral framework that considers issues of decentralization, social equity, ecological protection, and economic growth. The above applies to both surface and groundwater resources.
The human right to water is recognized and a rights-based approach to groundwater management is taken, <i>inter alia</i> , through:	Partially	The provision of safe drinking water is a key policy imperative. The Policy explicitly states that <i>"to facilitate Government ownership and control over the entire national resource base. The State, acting through the Government, will ensure that water resources are protected, developed, managed, and used in an equitable and sustainable manner for the benefit of all, recognising every citizen's right of access to water in sufficient quantity to meet basic human needs and the legitimacy of the environment as a water user"</i> . However, there is no specific reference to groundwater but rather water resources in general.
Prioritization of drinking water/basic human needs in water legislation;	Achieved	The National Water Policy White Paper of 2000 acknowledges that water is essential to life, and adequate supply of safe drinking water is a basic human need.  One of the fundamental principles of the Water Resources Management Act No. 11, 2013 states that <i>"equitable access for all people to safe drinking water is an essential basic human right to support a healthy productive life"</i> .

Minimum requirement for desired future	Status	Comment
Ensuring that land-based rights cannot entitle unlimited access/use of freshwater, including groundwater;	Achieved	The National Water Policy White Paper of 2000 states that the power to regulate all uses of water will correspondingly reside in the State and be exercised by the State, acting through the Government. All rights to access and use water will derive from a legislation which will exclude the exercise of ultimate control over water rising in or flowing through private property (the riparian principle), notwithstanding previous interpretations of existing law. The above applies to both surface and groundwater.
Ensuring groundwater is legally recognized as a public good;	Achieved	The National Water Policy White Paper (2000) states that Namibia's limited and vulnerable water resources are an indivisible national asset, whose ownership is vested in the state on behalf of the whole society. This position applies to all water resources in Namibia (surface and groundwater).
Recognising the role of groundwater in meeting basic human needs for food security;	Achieved	The National Water Policy White Paper (2000) acknowledges that Namibia is dependent on groundwater, in both shallow alluvial and deeper aquifers.
Legal recognition of customary rights to freshwater, including groundwater;	Achieved	The National Water Policy White Paper (2000) is silent on customary rights to freshwater. However, the Water Resources Management Act (2013) states that in considering an application for a borehole licence the Minister must have regard to the effect that the abstraction of water from the borehole or well to which the application relates is likely to have any customary rights and practices related to the water resource concerned or the needs of any community dependent on that water resource.
Legal mechanisms to ensure gender equity in access, use and management of freshwater, including groundwater;	Partially Achieved	The National Water Policy White Paper (2000) is informed by the Dublin principles. The second principle states that <i>“water resources development and management should be based on a participatory approach, involving users, planners and policy-makers at all levels”</i> . The third principle states that <i>“women play a central part in the provision, management and safeguarding of water”</i> . <sup>[SEP]</sup>  The National Water Policy White Paper (2000) acknowledges the importance of balancing equity and efficiency. In allocating and re-allocating water resources for different and possibly competing uses, the need to ensure

Minimum requirement for desired future	Status	Comment
		<p>equity of access to the resource and, in particular, the need to re-dress the effects of past racial and gender discrimination, will be given due prominence.</p> <p>The Water Resources Management Act No. 11, 2013 provides for the redress of the effects of past racial and gender discrimination in considering an application for a licence to abstract and use water.</p> <p>However, the practical implementation of these provisions is yet to be realised.</p>
Provision of pricing mechanisms that incentivize equitable distribution of rights to access and use of groundwater, as well as prioritization of small-scale users' livelihoods and food security needs, especially youth and women.	Partially	The Economic and Financial Principles underpinning the National Water Policy White Paper (2000) emphasise that the pricing regime will take account of the social imperative to facilitate access of all Namibians to a minimum water supply as a necessity, recognising that 'ability to pay' is constrained by low income.
Groundwater is recognised as a highly important source of domestic and agricultural water supply and a key resource for poverty alleviation, food security, and the sustainable economic development of rural areas;	Partially achieved	The Policy acknowledges the value of groundwater in meeting the domestic and agricultural water demand in Namibia. Furthermore, it acknowledges that some parts of the country, groundwater resources are critical to supply, for example in the north-eastern Kalahari area. In other areas where irrigated agriculture is practised from groundwater sources such as the Stampriet area. Lastly, the Policy takes cognisance of the critical role that water plays in economic development and poverty alleviation. However, there is no explicit separation of the contribution of ground water vis- vis surface water to economic development and poverty alleviation.
The biophysical and ecological linkages between ground and surface water for their use, protection and management are recognised, including land use zoning for groundwater protection and recharge (conjunctive use);	Achieved	The National Water Policy White Paper of 2000 subscribes to the principles of Integrated Management of Water Resources. The Policy explicitly acknowledges that the legislative framework for managing the nation's water resources including shared domestic and international rivers will ensure that such resources are managed and developed in an integrated manner, i.e., by reflecting the interrelationship between surface water and groundwater, and between allocation of water resources for use and the protection of its quality from pollution.
The importance of the maintenance of the	Partially	The National Water Policy White Paper (2000)

Minimum requirement for desired future	Status	Comment
ecological integrity of wetlands in groundwater management is recognised (recharge zones);	achieved	<p>emphasises the need to protect the environment in general, and the aquatic ecosystems in particular, including their biodiversity. In addition, it adds that the nation's wetlands will be factored into the allocation of water.</p> <p>The IWRM Plan recognises the importance of the maintenance of the ecological integrity of wetlands in groundwater management.</p> <p>Local Authorities such as the City of Windhoek issued a Council Resolution 231/07/2005, which incorporated groundwater protection provisions into the town planning scheme. The Council resolution designated conservation zones (groundwater protection) whose primary uses are limited to indigenous flora and fauna, and nature conservation.</p> <p>In addition, the country has designated 'water control areas' with the purpose of protecting and enhancing key aquifers.</p>
Intersectoral collaboration is promoted and facilitated so that the needs and impacts of different sectors (e.g., land, agriculture, mining, municipal, and environment) are taken into account in groundwater management and the impacts of developments in those sectors on groundwater are accounted for;	Partially achieved	<p>The National Water Policy White Paper (2000) recognises that the management, conservation and utilisation of water resource needs to be planned in a co-ordinated fashion, all sectoral strands should be interwoven. It is safe to assume this position applies to both ground and surface water.</p> <p>Even though this ideal is reflected in policy, integrating the work of all the relevant institutions remains a challenge.</p>
The need for adaptive management is recognised due to the inherent limitations in the nature of scientific information in conjunction with the widely occurring dynamic processes of climate, social and institutional change;	Partially achieved	<p>The National Water Policy White Paper (2000) puts forward that robust research should be used to inform local, regional and national planning initiatives and water-related decision-making, and for the regulation and use of the resource base.</p> <p>The IWRM Plan emphasises the need for research to inform planning and management of groundwater resources.</p>
The roles of various stakeholders and water users in groundwater management is recognised and participation of stakeholders in decision-making and groundwater management is promoted and facilitated;	Partially achieved	<p>The National Water Policy White Paper (2000) provides for stakeholder participation. It explicitly states that institutions will be designed to facilitate the participation of all stakeholders relating to water, especially rural communities, and to facilitate feedback to high levels of government.</p> <p>To achieve this end, Namibia has adopted the</p>

Minimum requirement for desired future	Status	Comment
		<p>Basin Management Approach and facilitated the establishment of Basin Management Committees in line with the Water Resources Management Act No. 11, 2013.</p> <p>In addition, there are groundwater management bodies that have been established. The Karst Water Management Body (KWMB) is a unique institution because it deals with the management of groundwater resource that lies in the headwaters of a number of internationally shared river basins and a national river basin, namely the Cuvelai, Okavango and the Ugab respectively.</p>
An apex body that is responsible explicitly for GW management and playing the role of custodian/trustee on the part of the state is clearly defined;	Partially achieved	The key institution concerned with assessment and management of the resource base is the Directorate of Water Resource Management in the Department of Water Affairs of the Ministry of Agriculture Water and Forestry (MAWF). However, the Geohydrology Division within the Directorate of Water Resource Management of the Department of Water Affairs is responsible for assessing, managing, monitoring and regulating the quantity and quality of groundwater available and utilised in all possible underground aquifers, countrywide.
Effective institutional arrangements are coordinated at trans boundary, national and local levels;	Partially achieved	<p>The National Water Policy White Paper (2000) recognises the importance of effectively participating in international watercourse bodies and consultative processes. Namibia is thus party to several Agreements that have informed the establishment of Transboundary River Basin Organisations.</p> <p>However, the establishment of a special institutional home with appropriate expertise devoted to shared watercourse issues and negotiations is yet to be fully achieved.</p>
Public access to geo-hydrological data held by the state is promoted and facilitated	Achieved	Geo-hydrological data is available to the public upon submission of an official request to the Ministry of Agriculture Water and Forestry.
Additional environmental principles necessary to protect and sustain groundwater are mandated, including: the precautionary principle, the principle of gender equity and social inclusion (GESI), the principle of subsidiarity, and the principle of intergenerational equity.	Partially achieved	<p>The National Water Policy White Paper (2000) recognises the precautionary principle with the aim of protecting the resource base from contamination or pollution.</p> <p>The subsidiarity principle is recognised as well. The Policy states that “the operational management of water resources and water services shall be decentralised to the lowest</p>

Minimum requirement for desired future	Status	Comment
		<p>practicable level, focusing the role of the government on policy/standard setting, regulation and facilitation”.</p> <p>The principle of equity is acknowledged, the Policy demands that the views of all potential stakeholders be canvassed and their participation sought in the design and management of services and in decisions affecting the management of water resources. This is twinned with environmental stewardship in order to bestow long-term benefits to Namibia and Namibians.</p>

### Reflection of Legal Framework as per the minimum requirement for the Desired Future State

Minimum requirement for desired future	Status	Comment
<b>i. Provide Status of Groundwater</b>		
All water has a consistent status in law, irrespective of where it occurs	Achieved	The legislation implies that water has a consistent status in law, irrespective of where it occurs.
Explicit reference to groundwater and conjunctive use management in catchment/water management and development plans and drought/emergency management plans	Achieved	The conjunctive use of surface water from perennial and ephemeral rivers, groundwater and unconventional water sources, such as reclaimed effluent, is an important management tool to conserve water, to increase resource efficiency and to reduce water supply costs in Namibia.
Human right to water recognized in groundwater legislation, facilitating prioritization of drinking water and basic human needs, as well as small-scale users	Partially achieved	<p>The Water Supply and Sanitation Policy (WASSP) of 2008 recognises groundwater as a source of water to meet competing demands in areas with water shortages. However, this policy is significant as it provides priorities for allocation of water in the face of shortages. The two key priorities being domestic use followed by the provision of water for economic activities.</p> <p>The Water Resources Management Act No. 11, 2013 recognises that all Namibians should have the right of access to sufficient safe water for a healthy and productive life. However, it does not distinguish between groundwater or surface water. In addition, legislation does not single out small scale users as a special category of users whose access to water is given higher priority.</p>
<b>ii. Regulate Groundwater Quantity</b>		
<b>a. Provide conditions for accessing groundwater</b>	Partially Achieved	The water protection areas are regulated in terms of Section 85 to 87 while water related emergency for pollution threats is regulated in

Minimum requirement for desired future	Status	Comment
i. Water use authorizations:		<p>terms of Sections 88 to 89 of this Act.</p> <p>The Act recognizes that the natural environment is a user of water and an important provider of vital processes and services.</p> <p>It also emphasises the importance of planning tools such as environmental assessments so that water pollution from future development activities is controlled and prevented through proper planning, design and management and monitoring.</p>
Legislation must enable the authorisation of groundwater use (with a system that does not discriminate, especially against the rural poor);	Partially Achieved	<p>The Groundwater Licensing Guidelines of 2014 set out procedures to enable the Geohydrology and Law Administration Divisions to respond effectively to applications to obtain access to groundwater for the intended use of the aquifer while satisfying the requirements of the Water Act (Groundwater Licensing Guidelines, 2014).</p> <p>Current law does not discriminate against the rural poor.</p>
The permitting of groundwater use should not be tied exclusively to land tenure;	Achieved	The Water Resources Management Act No. 11, 2013 does not include a system of riparian water rights and the private ownership of water resources as this is inconsistent with Article 100 of the Constitution of Namibia.
Legislation should allow for the categorisation of water users;	Achieved	The general categorization of water uses was already included in the legislation and the same are useful for ground water
Groundwater should be declared a public asset and/or authority vested in government to restrict, in the public interest, the rights accruing from its private ownership to prevent over-abstraction or inequitable access/use by landowners;	Achieved	The State, in its capacity as owner of the water resources of Namibia by virtue of Article 100 of the Namibian Constitution has the responsibility to ensure that water resources are managed and used to the benefit of all people in furtherance of the objects of the Water Resources Management Act No. 11, 2013.
New legislation should strive towards changing ownership rights to use (usufruct) rights, subject to a government-controlled, permit system for large scale users with appropriate non-permit systems for addressing the needs of small scale users;	Achieved	<p>The National Water Policy White Paper (2000) states that Namibia's limited and vulnerable water resources are an indivisible national asset, whose ownership is vested in the state on behalf of the whole society.</p> <p>The licence to abstract and use water is regulated in terms of Sections 38 and 40, 44 to 55 of the Water Resources Management Act No. 11, 2013, while the control and protection of groundwater is regulated in terms of Sections 56 to 67 of this Act.</p>
The legislation recognises and legalises	Not	The Water Resources Management Act No. 11,

Minimum requirement for desired future	Status	Comment
affordable, small-scale and indigenous solutions;	Achieved	2013 is silent on small scale and indigenous solutions. However, the 5 <sup>th</sup> National Development Plan recognises affordable local level innovations to address the country's development aspirations.
The legislation should enable the regulation of borehole drillers, regulation for drilling, control of drillers, information from drillers and standards for borehole drilling;	Achieved	The Water Resources Management Act No. 11, 2013 provides that an owner or occupier of land is not permitted to (a) drill or construct a borehole; (b) deepen, enlarge, alter, clean or rehabilitate a borehole; (c) construct a well or insert well-points; or (d) engage in a borehole drilling programme, unless the person is the holder of a borehole licence issued by the designated Minister – in this case the Minister of Agriculture Water and Forestry.
Legislation should give water inspectors the right to enter land with the offenses and associated penalties noted in the legislation (this includes appropriate fines and jail time that needs to be adjusted annually);	Partially Achieved	The Water Resources Management Act No. 11, 2013 provides for authorised persons to enter any land or premises where activities under a licence issued under this Act are carried on for the purpose of (a) inspecting any waterworks or the use of water or the discharge of wastewater effluent or waste; or (b) ascertaining whether this Act or the conditions of the licence are being complied with. However, the legislation is silent on the penalties for contravening these provisions.
The legislation should enable the regulation of exploration;	Achieved	The Water Resources Management Act No. 11, 2013 provides that for purposes of borehole drilling for mining or other operations, “despite any other law, or authorisation granted by a competent authority under any other law, a person who, for the purpose of exploring for or extracting minerals or any other substance, other than groundwater, or for road or other construction work, proposes to drill a borehole, deepen or enlarge an existing borehole, or make or deepen an excavation in the ground to the level or below the level of the water table, may not commence with work in that regard unless the person, in accordance with section 56, has applied for and has been granted a borehole licence by the Minister to undertake such work”.
The legislation should allow for zoning for overused/fragile aquifers;	Achieved	The Water Act of 1956 has designated “water control areas” with the purpose of protecting and enhancing key aquifers.  In addition, Local Authorities such as the City of Windhoek have incorporated groundwater

Minimum requirement for desired future	Status	Comment
		<p>protection provisions into the town planning scheme which designated conservation zones (groundwater protection) whose primary uses are limited to indigenous flora and fauna, and nature conservation.</p> <p>The Water Resources Management Act No. 11, 2013 provides for the Minister, on his or her own initiative or upon application by persons having an interest, may declare, by notice in the Gazette, an area to be a water protection area if the Minister considers it advisable in order to protect and enhance any water resource, riverine habitat, watershed, ecosystem or other environmental resource that is at risk of significant changes to resource quality, depletion, contamination, extinction or disturbance from any source, including aquatic or terrestrial weeds.</p>
Groundwater use organizations should be integrated into existing institutional frameworks (e.g., catchment management, customary institutions)	Partially achieved	<p>Namibia has adopted the Basin Management Approach and facilitated the establishment of Basin Management Committees in line with the Water Resources Management Act No. 11, 2013.</p> <p>In addition, there are groundwater management bodies that have been established. The Karst Water Management Body (KWMB) is a unique institution because it deals with the management of groundwater resource that lies in the headwaters of a number of internationally shared river basins and a national river basin, namely the Cuvelai, Okavango and the Ugab respectively. However, such bodies are not established for all the main aquifers.</p>
<b>iii. Stakeholder engagement</b>		
The legislation should specify when and how stakeholders, the public and/or other water users are to be engaged in planning, decision making and self-management with regard to groundwater;	Partially Achieved	<p>The Basin Management Committees as prescribed in the Water Resources Management Act No. 11, 2013 provides for stakeholder participation in matters relating to the development, management, protection and enhancement of water resources in the basin or part of the basin, in furtherance of the Government's objective of achieving an integrated management of water resources.</p> <p>Nine BMCs have been established to date and there is need to establish these stakeholder participation structures for all the Basins.</p>
There should be specific mechanisms for directly involving stakeholders in the	Partially Achieved	One of the fundamental principles of the Water Resources Management Act No 11, 2013 is that

Minimum requirement for desired future	Status	Comment
development of laws and regulations related to groundwater and decisions that may impact the use or quality of groundwater on which they depend for drinking, livelihoods, food security, economic or cultural well-being; and		<p>“promotion of water awareness and the participation of persons having interest in the decision-making process should form an integral part of any water resource development initiative”. <sup>[SEP]</sup>This principle applies to both ground and surface water.</p> <p>Furthermore, one of the core functions of the Basin Management Committees is to monitor and report on the effectiveness of policies and measures in achieving sustainable management of water resources and resource quality in its water management area.</p>
The legislation should specifically address the issue of the involvement of women and youth in decision-making and the implementation of groundwater supply schemes.	Not Achieved	The Water Resources Management Act No 11, 2013 does not specifically address the issue of the involvement of women and youth in decision-making and the implementation of groundwater supply schemes. However, the legislation is informed by the Dublin principles so the importance of involving women is implied. The Water Supply and Sanitation Sector Policy (2008), however, recognises the need to promote community based social development taking the role of women into special account.
<b>iv. Monitoring and data collection to support regulation</b>		
The legislation should specify the need and parameters for a sustainable system for data collection, management and dissemination, including standardization and harmonization of data. This entails a national monitoring and information system which captures quantity and quality data from key aquifers;	Not Achieved	The Water Resources Management Act No. 11, 2013 makes reference to the need for the development and maintenance of a common database system to store and provide data and information for the protection, sustainable use and management of shared water resources only with respect to shared watercourses. However, the IWRM Plan of 2010 emphasises the need for a national monitoring and information system which captures quantity and quality data for key aquifers.
The legislation should specify the need for drought monitoring systems which extend beyond rainfall, surface water and food security indicators to groundwater and groundwater supply status, including the appropriate prediction of future hydrogeological conditions;	Not Achieved	The National Drought Policy and Strategy (1997) recognises the need for a long term drought programme. However, the Policy is silent on groundwater all together. However, the Policy is under review and this provides for the incorporation of groundwater indicators.
In transboundary basins, legislation should address the need for standardization and exchange of data as well as the establishment of joint inventories;	Partially Achieved	The Water Resources Management Act No. 11, 2013 recognises the need to participate with neighbouring and other riparian states in the establishment, development and maintenance of

Minimum requirement for desired future	Status	Comment
		a common database system to store and provide data and information for the protection, sustainable use and management of shared water resources.
The legislation should enable access by the public to geohydrological data held by the state.	Achieved	The legislation is not explicit on access to geohydrological data by the public. However, this is the current institutional norm. The public is required to make an official request to the Minister of Agriculture Water and Forestry.
<p><b>v. Water conservation and efficiency of use</b></p> <p>Legislation should enable regulation to ensure the efficient use of groundwater, such as the use of economic incentives and imposition of technologies.</p>	Not Achieved	<p>The Water Resources Management Act No. 11, 2013 has the promotion of the sustainable development of water resources based on an integrated water resources management plan which incorporates social, technical, economic, and environmental issues as one of the fundamental principles underpinning it.</p> <p>However in practice, economic and financial tools are not yet being implemented to ensure the efficient use of groundwater and surface water alike.</p>
<b>vi. Compliance and Enforcement</b>		
Clear mechanisms for promoting compliance with groundwater regulations should be included in the legislation	Not Achieved	Regulations are yet to be finalised to support the implementation of the Water Resources Management Act No. 11, 2013.
Enforcement provisions should include, <i>inter alia</i> , inspections authority for groundwater management institutions, the ability to impose fines and/or additional administrative penalties and adjust those as necessary, and enumerate criminal offenses associated with failure to comply with the law.	Not Achieved	Gazetting of the regulations will be a first step and cyclic revision of penalties for non-compliance with permit conditions should be implemented. It is important to ensure the penalties for repeat offenders are punitive.
<b>vii. Conflict resolution mechanisms and/or the right to appeal</b>		
<b>viii. Regulatory measures</b>		
The legislation must enable the relevant authority (Minister) to make regulations on any relevant matter in the legislation	Achieved	The Water Resources Management Act No. 11, 2013 provides for the Minister to make regulations in relation to any matter required or permitted to be prescribed by regulation under this Act. <sup>[1]</sup> <sub>SEP</sub>
Legislation should provide a clear ability for the government to pass regulatory measures, such as abstraction fees and waste disposal charges, to provide revenue to water management institutions and to incentivise appropriate use of groundwater	Partially Achieved	The Water Resources Management Act No. 11, 2013 provides for the establishment of the Water Regulator whose functions include determining tariffs of fees that may be levied by a water services provider or other supplier of water, including the State, for the supply or distribution of water and the provision of

Minimum requirement for desired future	Status	Comment
		wastewater services and other associated services. The Regulator may also determine the tariffs of fees and charges that are payable by licence holders for the abstraction of water or the discharge of effluent or the supply or re-use of effluent.

**Reflection of Strategy and Guidelines Framework as per the minimum requirement for the Desired Future State**

Minimum requirement for desired future	Status	Comment
<b>II. Provide Status of Groundwater</b>		
<b>ix. Groundwater Protection Mechanisms</b> <b>a. Regulating Pollution (Point source and non-point source)</b>		
Water quality targets; Regulation of emissions/wastewater discharge/waste storage including the impact of mines on groundwater quality: Permits can be used to regulate the discharge, disposal and possibly the storage of waste should specifically take into account the vulnerability of the aquifer concerned and the provisions necessary for its protection;	Partially achieved	The Water Resources Management Act No. 11, 2013 recognises that a person may not abstract and dispose of groundwater from a mine or other excavation to facilitate mining or other underground operations except under authority of a groundwater disposal licence issued by the Minister.  The legislation has provisions for the development of standards of effluent quality aimed at the protection of water resources and the environment from pollution. To this end, “the Minister may prescribe: (a) quality standards with which effluent discharges must comply; and (b) requirements for the acceptance, storage, treatment and disposal of solid waste”. <sup>[1]</sup> <sub>SEP</sub>  To date the standards are yet to be finalised and gazetted before coming into effect.
Classification of water bodies; and	Not Achieved	Existing legislation does not classify water bodies.
Reducing and regulating abstraction.	Achieved	The Water Resources Management Act No. 11, 2013 has provisions for the Minister to declare that a water shortage exists and consequently reduce restrict or prohibit the abstraction and use of water from a water resource in the area or a particular water resource.

Minimum requirement for desired future	Status	Comment
Powers of compliance monitoring and enforcement	Partially achieved	Legislation makes provisions for the Minister to collect, compile, analyze and disseminate information for integrated water resources management as well as ensure that water resources are managed and water infrastructures are operated in accordance with the principles of environmental sustainability.
<b>b. Regulating Depletion</b>		
Regulation of abstraction and recharge (usually via permitting);	Partially Achieved	The existing legislation includes provisions for promoting the sustainable use and protection of aquifers. To achieve this end, the Minister may (i) investigate the need or advisability of the construction of works to enhance the natural recharge of aquifers or to facilitate the artificial recharge of aquifers where feasible; (ii) prescribe procedures and conditions for the artificial recharge of aquifers, including standards for the quality of water that may be injected; as well as (iii) prescribe, or impose as licence conditions, special requirements for enhancement of natural recharge to lower the risk of aquifer pollution.
Sustaining wetlands;	Achieved	<p>For the purpose of the protection and enhancement of water resource quality and wetland aquatic ecosystems, the Minister may by regulation prohibit or regulate the use of any wetland or dam for specified purposes or the carrying on of specified activities within any wetland or dam, except under authority of a licence issued, and in accordance with licence conditions as prescribed, including -</p> <p>(a) the commercial recreational use of wetland resources; <sup>[SEP]</sup></p> <p>(b) development on the banks of any wetland or dam; and <sup>[SEP]</sup></p> <p>(c) the removal of rocks, sand or gravel or any other material from a watercourse. <sup>[SEP]</sup></p> <p>In addition, the existing legislation provides for the Minister to limit or prohibit in respect of a water protection area amongst others the removal or harvesting of vegetation, including the felling of trees, the removal of riparian growth, the draining of wetlands or the use of</p>

Minimum requirement for desired future	Status	Comment
		wetland resources.
Land use zoning – prohibition of abstraction in certain zones; cropping or irrigation practices; protection zones for recharge areas; no surfacing/drainage requirements; and	Partially achieved	The Water Resources Management Act No. 11, 2013 provides for declaration of water protected areas in order to protect and enhance any water resource that is at risk of significant changes to resource quality, depletion, contamination.
Legislation must make it mandatory for installation of monitoring equipment of boreholes especially for large-scale users (the information must then be supplied to the state).	Partially achieved	The Water Resources Management Act No. 11, 2013 section 60 emphasises on the duty of the license holder to keep records of the drilling and other operations carried out and to furnish the Minister with information on the findings of such drillings or operations when requested to do so by the Minister in writing. However, compliance by permit holders is quite low.
Powers of compliance monitoring and enforcement		
<b>Planning</b>		
The legislation should specify the need for long term plans to ensure the sustainable use of groundwater, including drought management plans and cross-sectorial coordination;	Not Achieved	The Water Resources Management Act No. 11, 2013 identifies one of the general powers and functions of the Minister to include conducting water resources management planning. The IWRM Plan (2010) specifies the need for long term plans to ensure the sustainable use of groundwater, including cross-sectorial coordination.
Where water legislation provides for catchment level or basin level planning, groundwater should be integrated into those plans (for example through impact assessment requirements);	Not Achieved	<p>The Water Resources Management Act No. 11, 2013 has provisions for the Minister to prepare an Integrated Water Resources Management Plan for the development, conservation, management and control of Namibia’s water resources in furtherance of the object of this Act.</p> <p>The IWRM Plan (2010) specifies the need for groundwater to be integrated into Basin plans. However, to date catchment plans have only be developed for Omaruru and Upper Swakop Basins. In addition, National Action Plans (NAP) for the sustainable use of the resources in the Okavango River Basin and with the Orange-Senqu River Commission were developed for Namibia.</p>

Minimum requirement for desired future	Status	Comment
The legislation should specify that groundwater management planning should take into account and be integrated into land use and environmental planning; and	Partially Achieved	The Water Resources Management Act No. 11, 2013 does not make specific reference to the integration of land use and environmental planning in the development of groundwater management plans. However, the IWRM Plan (2010) emphasis inter-sectoral planning with land and environment as key sectors.
Planning should be cyclical and based on continuous learning from data and stakeholder feedback to ensure adaptive management and effective responses to changing climatic, social, political and institutional contexts/drivers.	Partially Achieved	The Water Resources Management Act No. 11, does not go into that detail but the plans are 10 years. The IWRM Plan also emphasises the need to for cyclical planning in order to respond to changing contexts.

#### Reflection of Institutional Framework as per the minimum requirement for the Desired Future State

Minimum requirement for desired future	Status	Comment
Legislation should contain provision for its effective implementation, including the mandate, competence and power of the relevant authorities in accordance with uniform governance principles;	Achieved	The Water Resources Management Act No. 11, 2013 spells out the powers and functions of the Minister under part 2 - general powers and functions of minister. The follow up section speaks to the delegation of powers and assignment of functions by Minister.
Water authorities or coordinating bodies should have the competence to integrate all aspects of water management and should be rendered competent to arbitrate among various competing demands, and diverging interests regarding groundwater abstraction and use, both in the short-term and in the long-term;	Partially achieved	There is competency but it needs to be strengthened. Key institutions for strengthening capacity to this end include NamWater and City of Windhoek as they are heavily depend on groundwater.
The authority or body should collaborate with other authorities, competent for public health, land-use planning, soils management, waste management;	Partially Achieved	The Water Resources Management Act No. 11, 2013 makes such provisions. However, coordination between such agencies needs to be strengthened.
Water user associations and other appropriate forums (such as municipalities) should be utilized to strengthen the user advocacy role	Partially achieved	The Water Resources Management Act No. 11, 2013 states that the Minister may, by regulation, make provision for the establishment and



Minimum requirement for desired future	Status	Comment
and achieve new partnerships and a joint management of the common resource.		accreditation of (a) water point committees; and (b) local water committees, to be entrusted with the responsibility of managing and controlling the supply of water at any rural State waterwork.



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