water & sanitation

Department:
Water and Sanitation
REPUBLIC OF SOUTH AFRICA

2030 NDP

A GLIMPSE OF A SCIENTIST'S ROLES AND DUTIES IN WATER RESOURCE PROTECTION

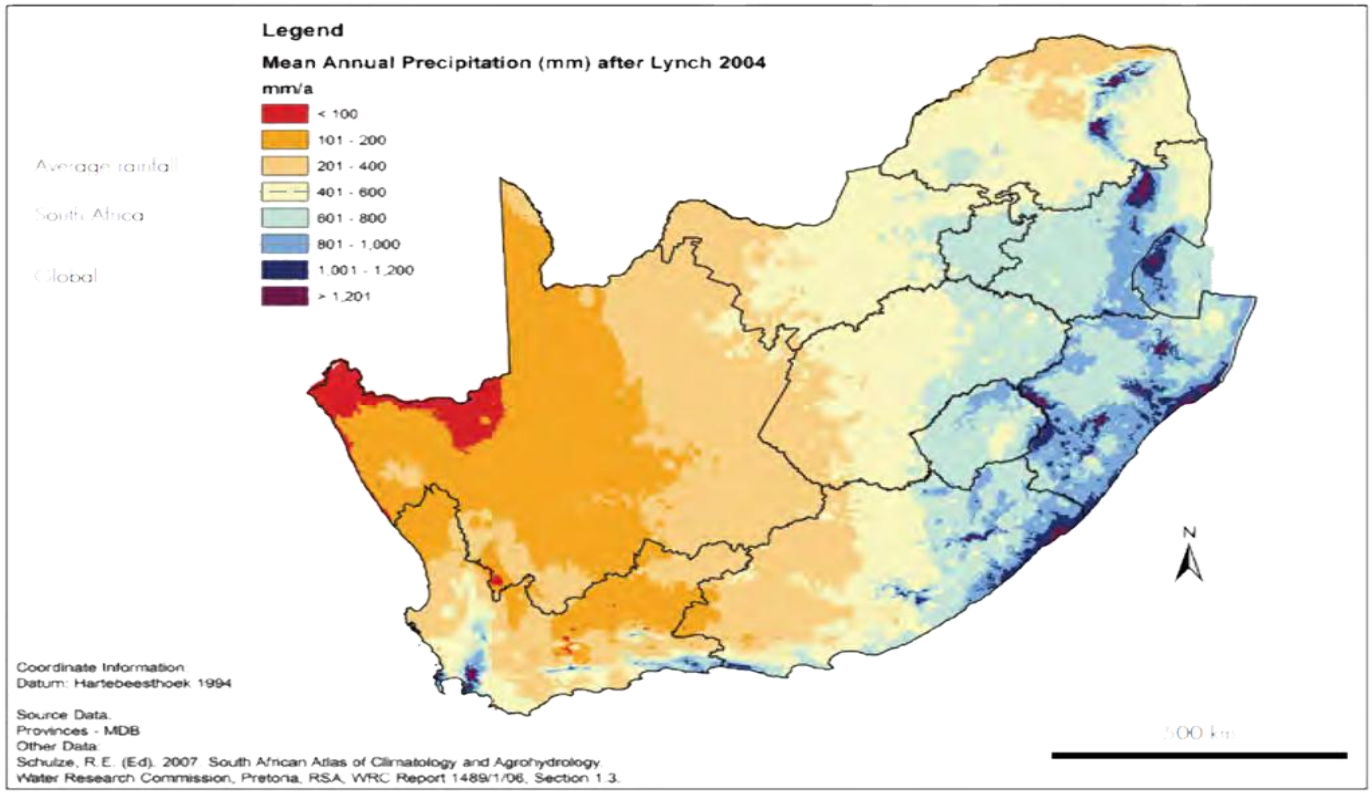
Academic knowledge versus workplace environment for Environmental and Water Scientists: Reflection

Date: 18 August 2020

PRESENTATION OUTLINE

1. Background on Water Resource Protection
2. Role of a Scientist in WRP
3. Qualifying as a WRP Scientist
4. Career Opportunities
5. Conclusion with Question

1. BACKGROUND ON WRP



- South Africa has little water
- Water unevenly distributed
- Population growth

- Spatial location of water
- Temporal location of water
- Water quality

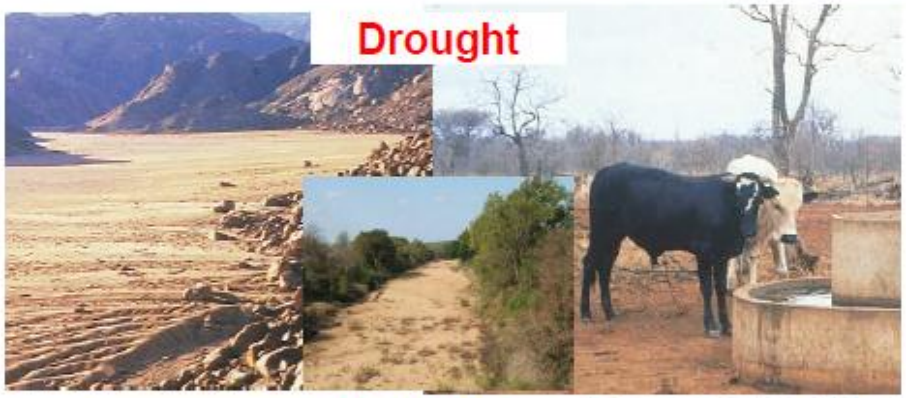
1. BACKGROUND ON WRP

Agriculture

Groundwater

Floods

Vaal River: January / February 2010



Drought

Urbanisation

Pollution

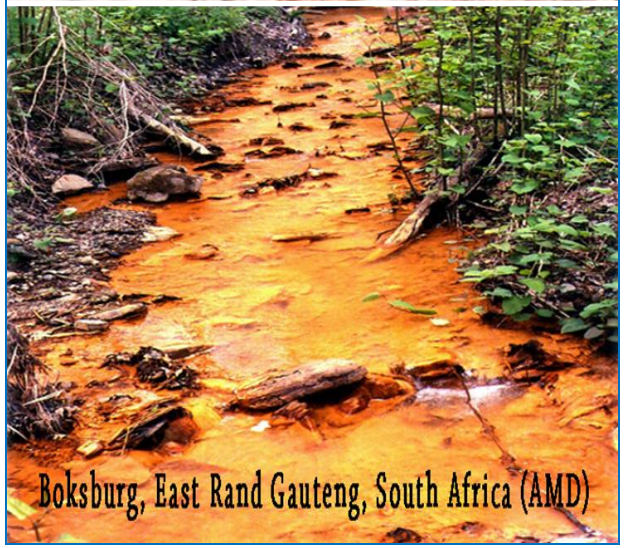
1. BACKGROUND ON WRP

River portraying normal flow regime

1. BACKGROUND ON WRP

River portraying negatively impacted flow regime

1. BACKGROUND ON WRP

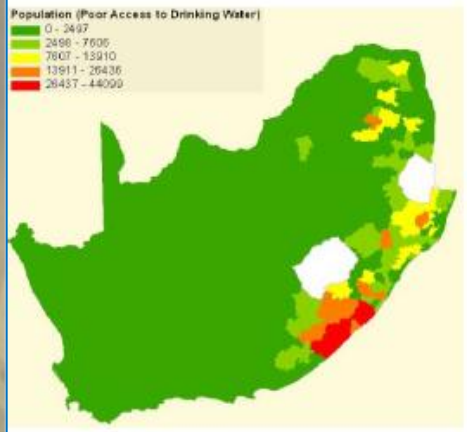


Acid Mine Drainage [AMD]

1. BACKGROUND ON WRP

1. BACKGROUND ON WRP

DWS Mandate



Equity:

Access to

Drinking Water

Bill of Rights: SA Constitution [Act 108 of 1996]

- Equal Access to sufficient food and water
- Sustainable development/use of water – to benefit ALL

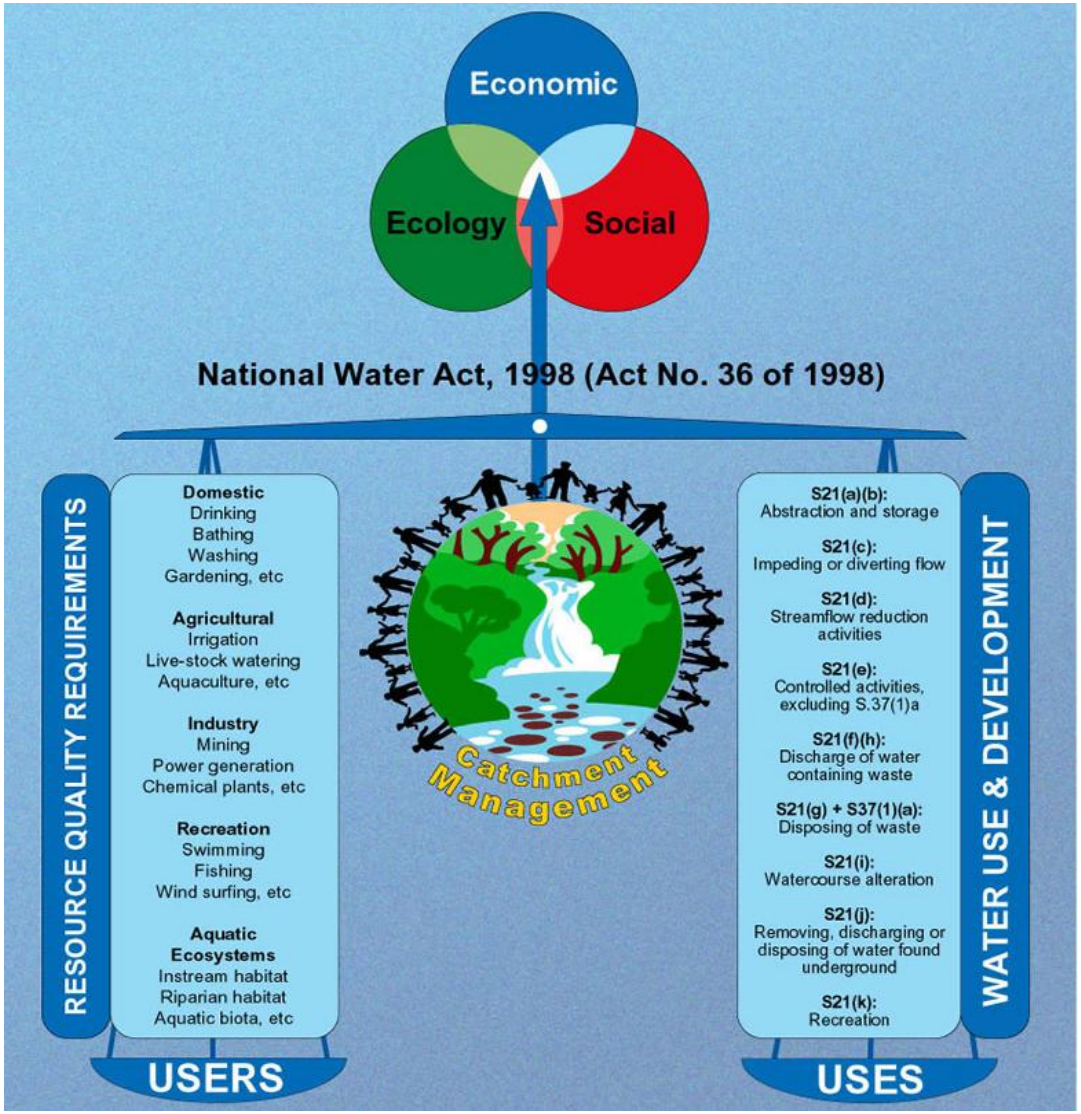
National Water Act (NWA) [Act 36 of 1998]

- Scarce, uneven Distribution – **Belongs to all**
- Riparian & Discriminatory **XX** - **Equal Access, Redress**
- **Govt. is the Custodian** – Water Resource Management
- Delegated: Catchment/Regional – **stakeholder participation**
- Quantity, quality, reliability – **sustainable, use to benefit ALL**
- Internationally shared rivers
  - – mutual co-operation
  - - allocations **downstream countries respected**
- **Reserve** – Basic Human Needs; Protect Aquatic ecosystems
  - all other water uses -subject to authorisation

1. BACKGROUND ON WRP

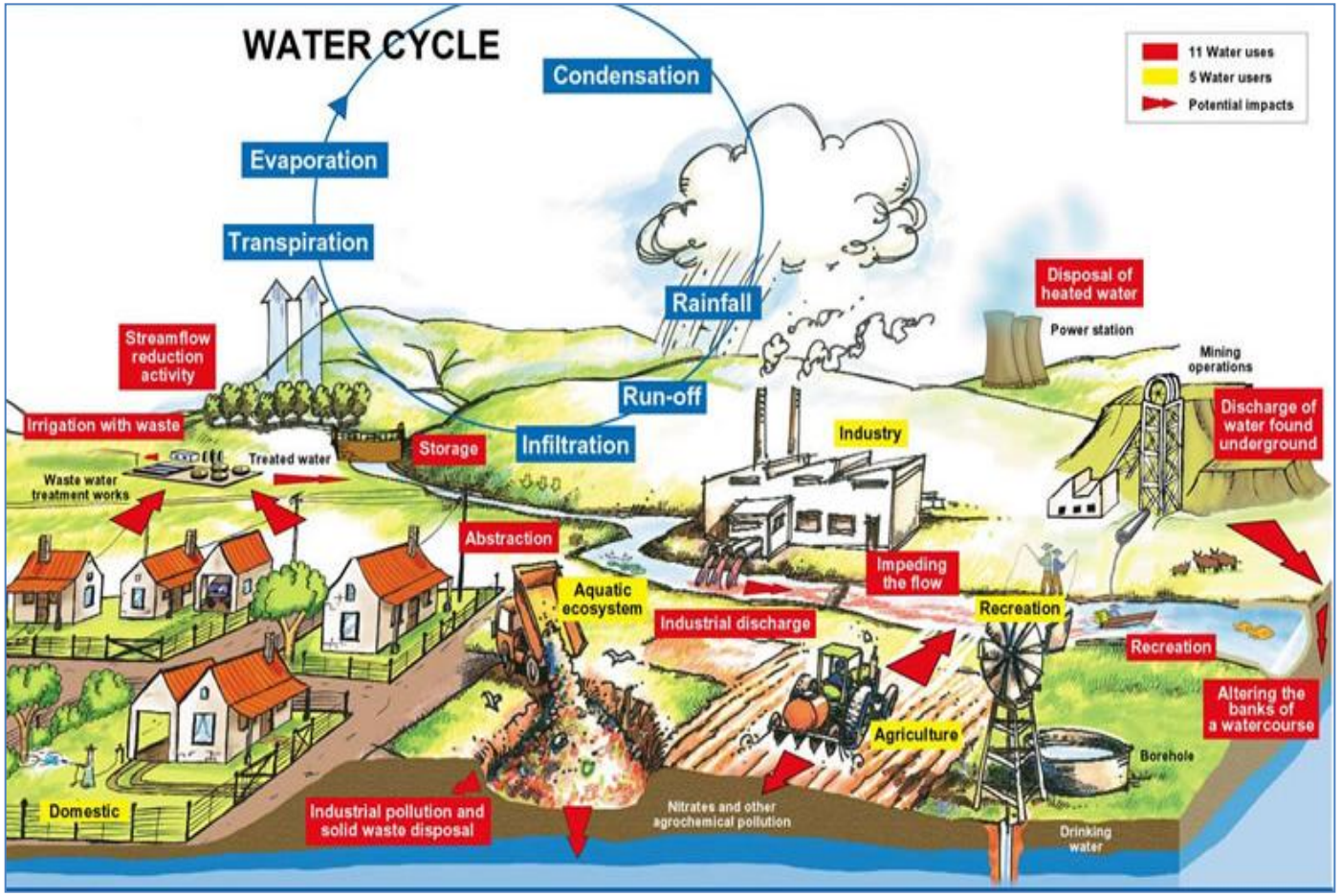
- 5 Types of water users
- 11 Types of water uses
- S21[c,d,f,i,k] *SW*
- S21[g,j] *GW*
- S21[a,b,e,h] *SW & GW*

1. BACKGROUND ON WRP



- Sustainable development
- The balancing act between, *economic*, *environmental*, and *Social* development

1. BACKGROUND ON WRP

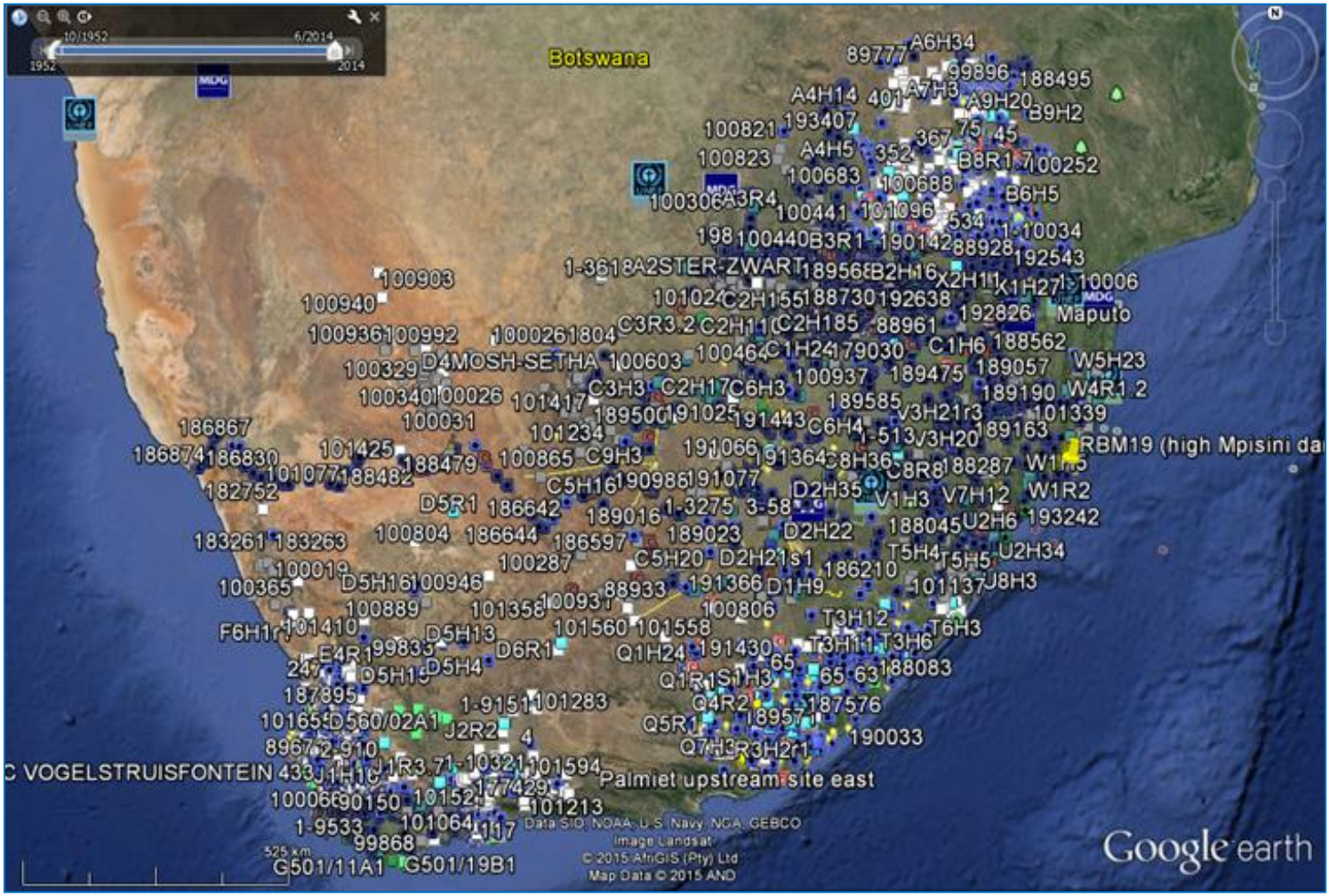


Recognise that water resources availability and quality are influenced by various water uses and conditions, thus *IWRM Approach*

1. BACKGROUND ON WRP

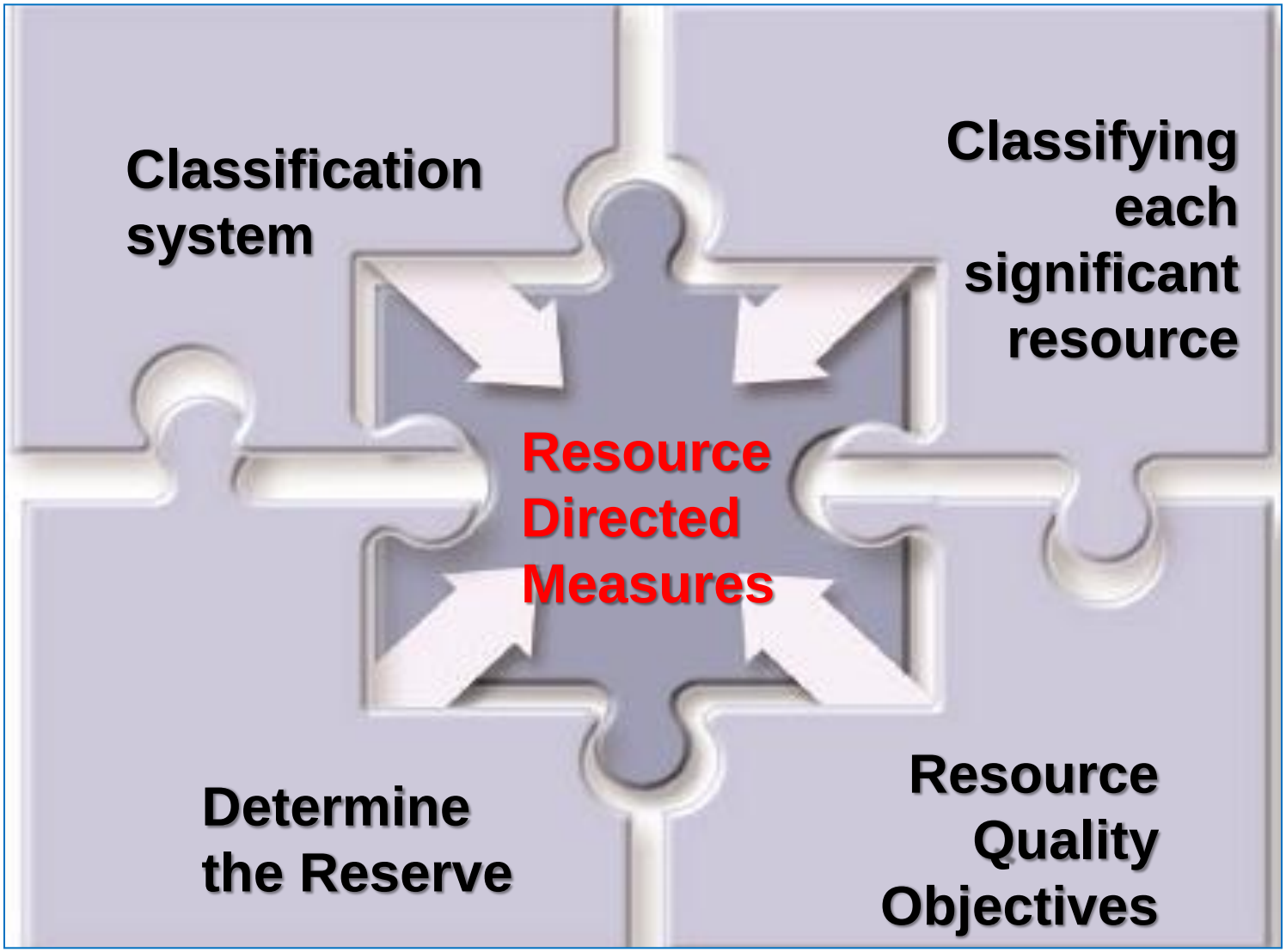
Water Balance through Inter-basin Transfers

1. BACKGROUND ON WRP



Water quality monitoring and assessment

2. ROLE OF A SCIENTIST IN WRP [N-LEVEL]



2. ROLE OF A SCIENTIST IN WRP [N-LEVEL]

[Water Resource Classification]

WR CLASSIFICATION 7-STEP PROCEDURE
Step 1: Delineate the units of analysis and describe the status quo of the water resources
↓
Step 2: Link the socio-economic and ecological value and condition of the water resources
↓
Step 3: Quantify the ecological water requirements and changes in non-water quality ecosystem goods, services and attributes
↓
Step 4: Determine an ecologically sustainable base configuration scenario
↓
Step 5: Evaluate scenarios within the integrated water resource management process
↓
Step 6: Evaluate the scenarios with stakeholders
↓
Step 7: Gazette and implement the class configuration

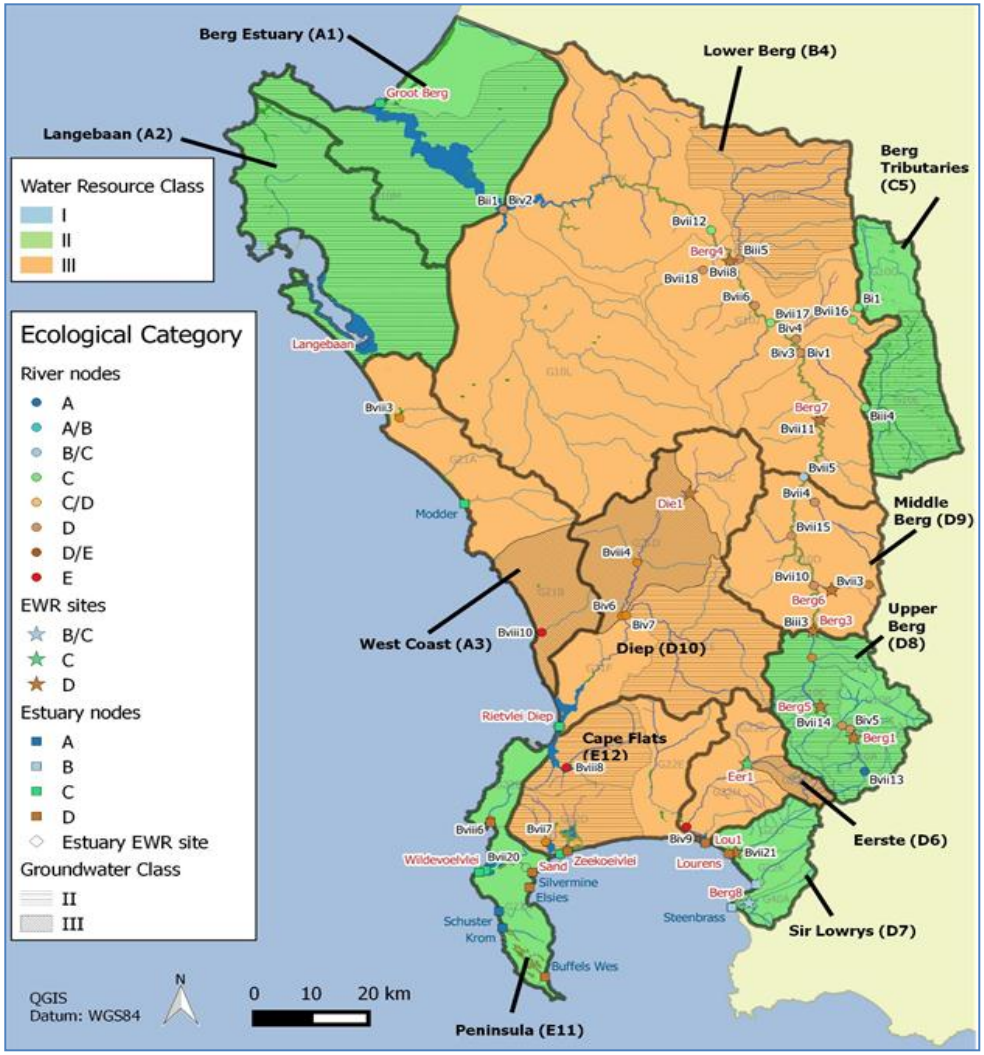
2. ROLE OF A SCIENTIST IN WRP [N-LEVEL]

[Water Resource Classification]

- Water Resources Class I – Minimal Change
- Water Resources Class II – Moderate Change
- Water Resources Class III – Heavily Changed

2. ROLE OF A SCIENTIST IN WRP [N-LEVEL]

[Water Resource Classification]



Proposed Water Resource Classes for the Berg Catchment

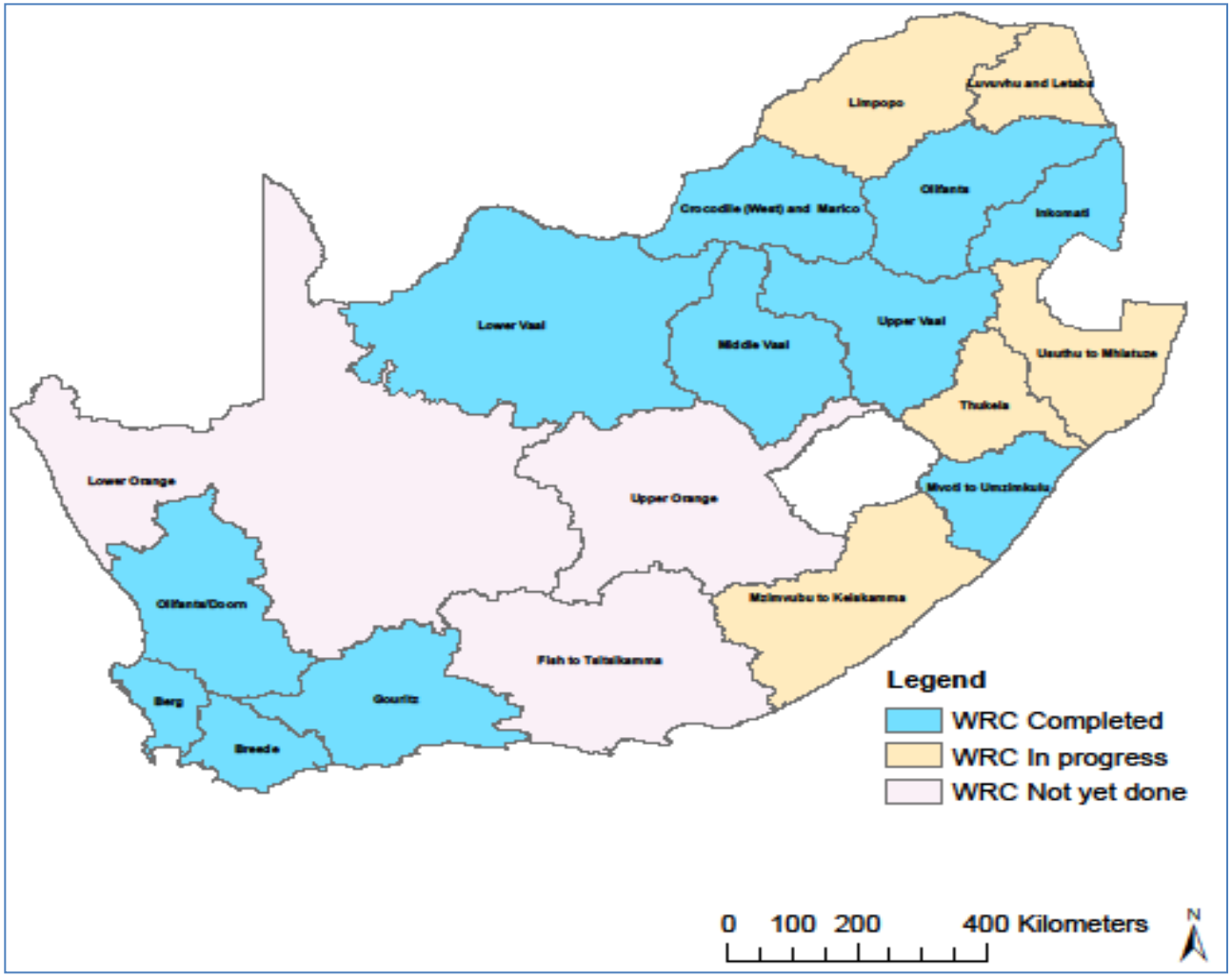
2. ROLE OF A SCIENTIST IN WRP [N-LEVEL]

[Water Resource Classification]

Integrated Unit of Analysis (IUA)	Water Resource Class for IUA	Quaternary Catchment	RU	Resource Name	Biophysical Node Name	TEC	% nMAR
A1 Berg Estuary	II	**G10M**	**A1-E01**	**Berg (Groot)**	**Bxi1**		
A2 Langebaan	II	**G10M**	**A2-E04**	**Langebaan**	**Bxi3**		
D8 Upper Berg	II	G10A	D8-R01	Berg	Bvii13	A	98.2
		G10A	D8-R02	Berg	Bviii1	B/C	27.4
		G10C	D8-R03	Berg	Biii3	E	53.9
D9 Middle Berg	III	G10C	D9-R04	Pombers	Bviii11	D	366
		G10D	D9-R05	Kromme	Bvii3	D/E	89.9
		G10D	D9-R06	Berg	Bvii5	C	49.7
C5 Berg Tributaries	II	G10E	C5-R07	Klein Berg	Biii4	C	82
		G10G	C5-R08	Vier-en-Twintig	Bi1	B/C	23.6
B4 Lower Berg	III	G10J	B4-R09	Berg	Bvii6	D	52.3
		G10K	B4-R10	Berg	Bvii12	D	51.1
D10 Diep	III	G21D	D10-R11	Diep	Bv1	E	66.8
		G21D	D10-R12	Diep	Biv6	D	68
		G21F	**D10-E03**	**Rietvlei/ Diep**	**Bxi7**		
E11 Peninsula	II	G22B	E11-R13	Hout Bay	Bviii6	D	97.6
		G22A	E11-R14	Silvermine	Bvii20	C	98.2
		G22A	**E11-E04**	**Wildevöelvlei**	**Bxi14**		
E12 Cape Flats	III	G22D	E12-R15	Keysers	Bvii7	D	93.4
		G22D	E12-R15	Keysers	Bvii7	D	93.4
		G22K	**E12-E05**	**Zandvlei**	**Bxi9**		
D6 Eerste	III	G22F	D6-R16	Eerste (Jonkershoek)	Biii6	C	77.6
		G22G	D6-R17	Klippies	Biv9	D	90
		G22H	**D6-E06**	**Eerste**	**Bxi3**		
D7 Sir Lowry's	II	G22J	D7-R18	Lourens	Bvii21	D	84.6
		G22K	D7-R19	Sir Lowry's Pass*	Bviii9	C	81.5
		G40A	D7-R20	Steenbras	Bvii22	B/C	47.5
		G22J	**D7-E07**	**Lourens**	**Bxi4**		

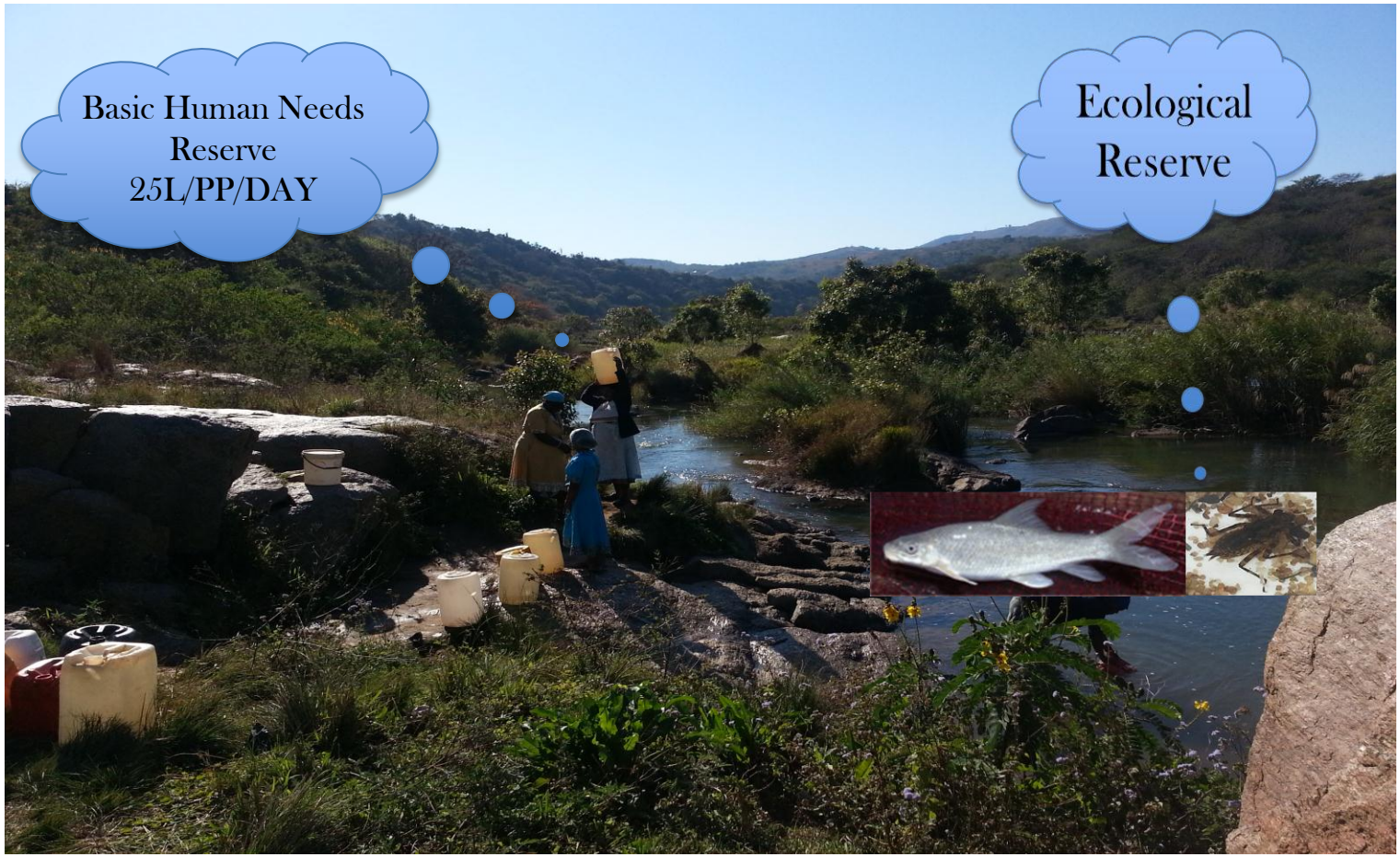
2. ROLE OF A SCIENTIST IN WRP [N-LEVEL]

[Water Resource Classification]



2. ROLE OF A SCIENTIST IN WRP [N-LEVEL]

[Reserve Determination]



2. ROLE OF A SCIENTIST IN WRP [N-LEVEL]

[Reserve Determination]

Step 1: Initiate the basic human needs and ecological water requirements assessment

Step 2: Determine eco-regions, delineate groundwater resource units, select sites and, where appropriate, align with step 1 of the water resource classification procedures set out in Regulation 2(4)

Step 3: Determine the reference conditions, present ecological status and the ecological importance and sensitivity of each of the selected study sites

Step 4: Determine the basic human needs and ecological water requirements for each of the selected sites and, where appropriate, align with step 3 of the water resource classification procedure set out in Regulation 2(4)

Step 5: Determine operational scenarios and their socio-economic and ecological consequences

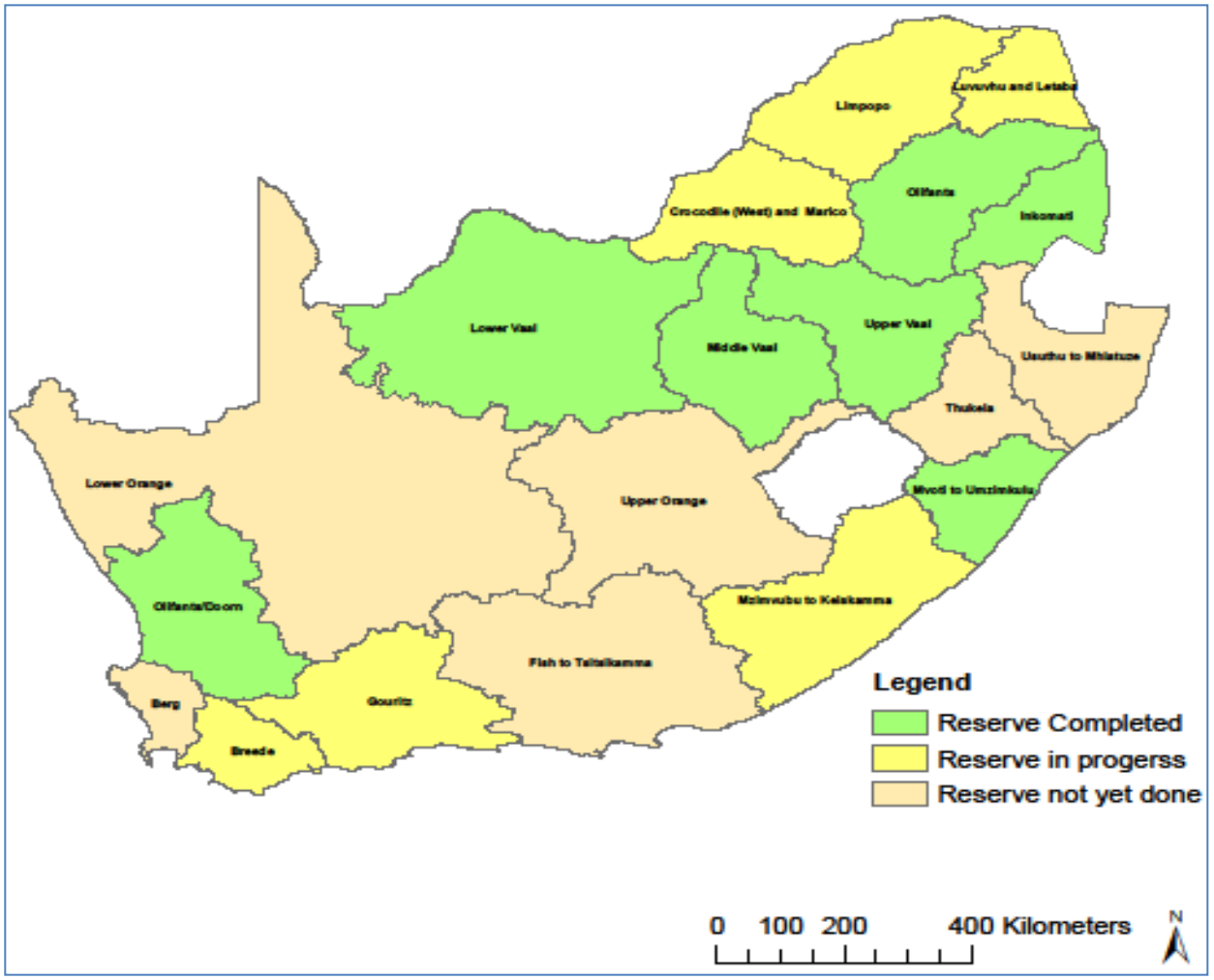
Step 6: Evaluate scenarios with stakeholders and align with Step 6 of the water resource classification procedure set out in Regulation 2(4)

Step 7: Design an appropriate monitoring programme

Step 8: Gazette and implement the reserve.

2. ROLE OF A SCIENTIST IN WRP [N-LEVEL]

[Reserve Determination]



2. ROLE OF A SCIENTIST IN WRP [N-LEVEL]

[Reserve Determination – Preliminary]

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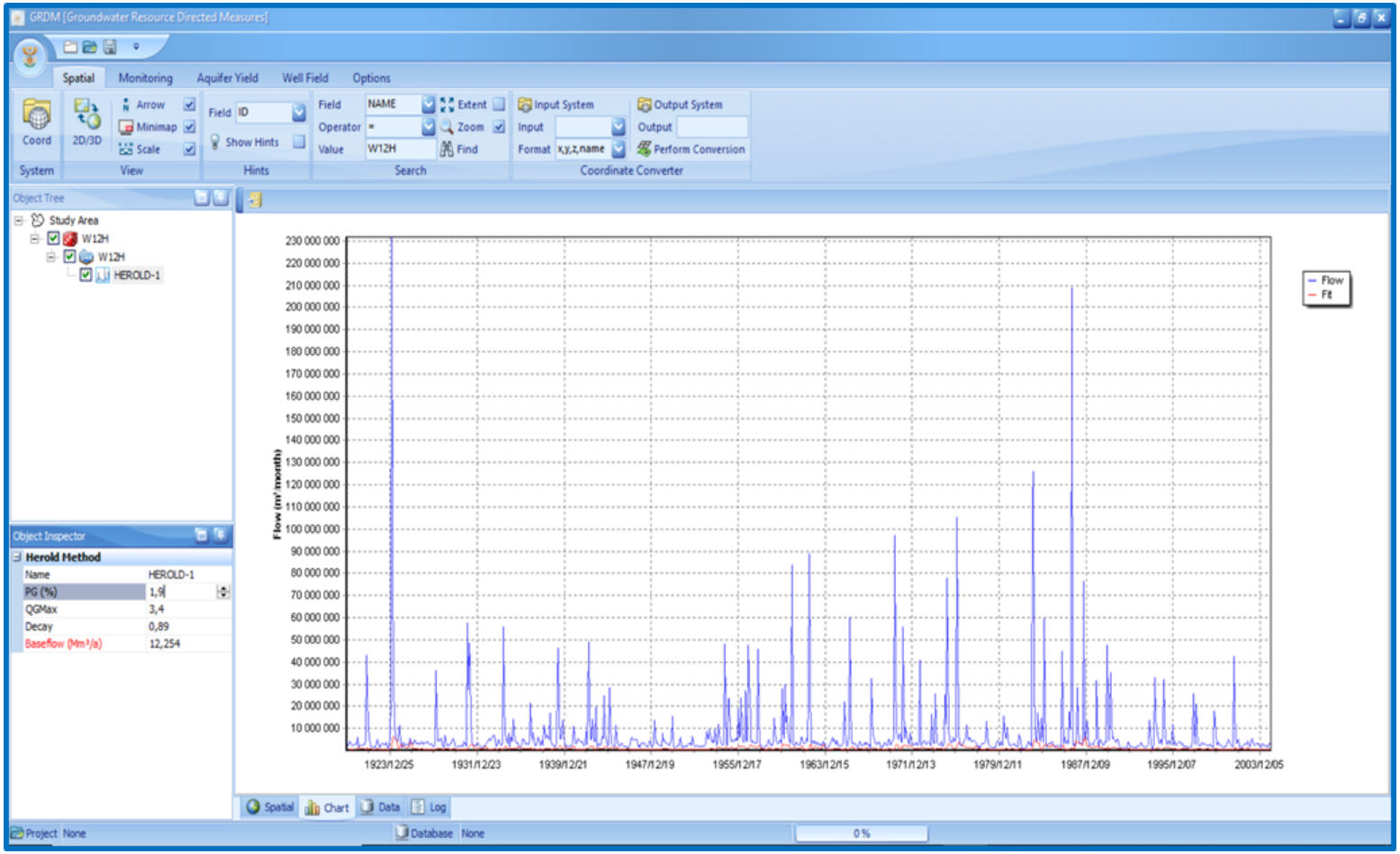


2. ROLE OF A SCIENTIST IN WRP [N-LEVEL]

[Reserve Determination – Preliminary]

Desktop Version 2, Printed on 2018-07-13
Summary of IFR estimate for: W12H WR90 Incr.
Determination based on site specific parameters from SPATSIM database.

Annual Flows (Mill. cu. m or index values):

MAR	=	78.673
S.Dev.	=	78.934
CV	=	1.003
Q75	=	1.730
Q75/MMF	=	0.264
BFI Index	=	0.425
CV(JJA+JFM) Index	=	4.081

ERC = D

Total IFR	=	10.430 (13.26 %MAR)
Maint. Lowflow	=	3.381 (4.30 %MAR)
Drought Lowflow	=	3.381 (4.30 %MAR)
Maint. Highflow	=	7.049 (8.96 %MAR)

Monthly Distributions (cu.m./s)
Distribution Type : Zululand

Month	Natural Flows			Modified Flows (IFR)			
				Low flows		High Flows	Total Flows
	Mean	SD	CV	Maint.	Drought	Maint.	Maint.
Oct	2.334	4.328	0.692	0.104	0.104	0.246	0.350
Nov	2.284	3.014	0.509	0.107	0.107	0.231	0.338
Dec	2.481	5.918	0.891	0.105	0.105	0.302	0.407
Jan	2.046	4.681	0.854	0.099	0.099	0.151	0.251
Feb	3.595	8.199	0.943	0.120	0.120	0.167	0.287
Mar	4.249	12.049	1.059	0.120	0.120	0.984	1.105
Apr	3.177	5.915	0.718	0.117	0.117	0.305	0.422
May	2.492	5.054	0.757	0.110	0.110	0.000	0.110
Jun	2.015	3.434	0.657	0.107	0.107	0.000	0.107
Jul	1.575	3.224	0.764	0.098	0.098	0.000	0.098
Aug	1.239	1.347	0.406	0.094	0.094	0.049	0.143
Sep	2.558	9.226	1.392	0.107	0.107	0.236	0.343

2. ROLE OF A SCIENTIST IN WRP [N-LEVEL]

[Reserve Determination – Preliminary]

Quaternary Catchment	Area (km^2)	Recharge[1] (Mm^3/a)	Population[2] (Human)	Baseflow[3] (Mm^3/a)	EWR_MLF[4] (Mm^3/a)	BHN[5] (Mm^3/a)	Total Reserve (Mm^3/a)	Total Reserve % Recharge
W12H	485	26.78*	84 512**	12.32*	3.38***	0.77****	4.15*****	15.50

*Values obtained from the Mhlathuze Water Management Area: Comprehensive Groundwater Reserve study (February 2009).
**Obtained from the Water Services data set (April 2011). Where not verified, assume that entire catchment population is served with groundwater.
***EWR_MLF estimated from Spatsim-HDSF Software
****BHN Based on a consumption of 25 litres per person per day.
*****Estimated from the sum of EWR_MLF and BHN values.

Total Reserve (Mm3/a) = BHN (Mm3/a) + EWR_MLF (Mm3/a)

Definitions

- **Recharge:** Water reaching the aquifer directly from precipitation and the infiltration of surface water. [1)]
- **Population:** The number of people per catchment relying on the water resource for their basic water needs. [2)]
- **Baseflow:** Baseflow is that part of stream flow that is derived from groundwater and shallow subsurface storage. During the dry season, the stream flow is typically composed entirely of baseflow. [3)]
- **EWR_MLF:** The volume of baseflow required by the ecological water requirements set for the surface water component of the Reserve. [4)]
- **Basic Human Needs (BHN) Reserve**: The least amount of water required to satisfy basic water requirements. This volume is currently set at 25 litres per person per day. [5)]
- **The Reserve** constitutes the sum of the baseflow required by EWR plus the BHN Reserve expressed as a percentage of the Recharge.

2. ROLE OF A SCIENTIST IN WRP [N-LEVEL]

[Reserve Determination – Preliminary]

Chemical Parameter	Target Water Quality Ranges per Water Quality Class			
	Class 0	Class I	Class II	Class III
pH	6 – 9	5 – 6 & 9 – 9.5	4 – 5 & > 9.5 – 10	<4 & >10
Electrical Conductivity	< 70	70 - 150	150 – 370	> 370
Calcium as Ca	< 80	80 - 150	150-300	> 300
Magnesium as Mg	< 70	70 - 100	100 – 200	> 200
Sodium as Na	< 100	100 - 200	200 – 400	> 400
Chloride as Cl	< 100	100 - 200	200 – 600	> 600
Sulphate as SO_4	< 200	200 - 400	400 – 600	> 600
Nitrate as NO_x-N	< 6	6 - 10	10 – 20	> 20
Fluoride as F	<0.7	0.7 – 1.0	1.0-1.5	> 1.5

2. ROLE OF A SCIENTIST IN WRP [N-LEVEL]

[Reserve Determination – Preliminary]

Water Quality Class (WRC, 1998)	Ca mg/l	Cl mg/l	EC mS/m	F mg/l	Mg mg/l	NO_3 mg/l	Na mg/l	SO_4 mg/l	pH	
Class 0	80	100	70	0.7	70	6	100	200	6-9	
Class I	150	200	150	1	100	10	200	400	5-6 & 9-9.5	
Class II	300	600	370	1.5	200	20	400	600	4-5 & 9.5-10	
Class III	>300	>600	>370	>1.5	>200	>20	>400	>600	<4 & >10	Study Area Water Quality Class
No of samples	81	81	81	81	81	81	81	81	81	
Median	36.50	187.40	103.80	0.28	14.90	3.24	164.00	27.20	8.10	
Average	43.63	263.32	123.73	0.35	20.09	5.14	187.44	39.93	8.05	
95th percentile	107.70	588.90	251.00	0.72	51.10	18.26	402.80	87.80	8.50	
5th percentile	8.10	57.10	42.10	0.13	1.80	0.02	61.80	6.20	7.30	
Reserve Limits (Median + 10%; provided the sum does not exceed Class I limits)	40.15	187.40	114.18	0.31	16.39	3.56	180.40	29.92	8.00 – 8.91	Class I

2. ROLE OF A SCIENTIST IN WRP [N-LEVEL]

[Reserve Determination - Preliminary]

- Groundwater quality in the W12H quaternary catchment falls in Class I which indicates water suitable for life time domestic use

- Groundwater in the W12H quaternary catchment is able to meet maintenance for low flows for ecological ecosystem sustainability

- After consideration of the estimated Reserve, groundwater is still available for other water uses

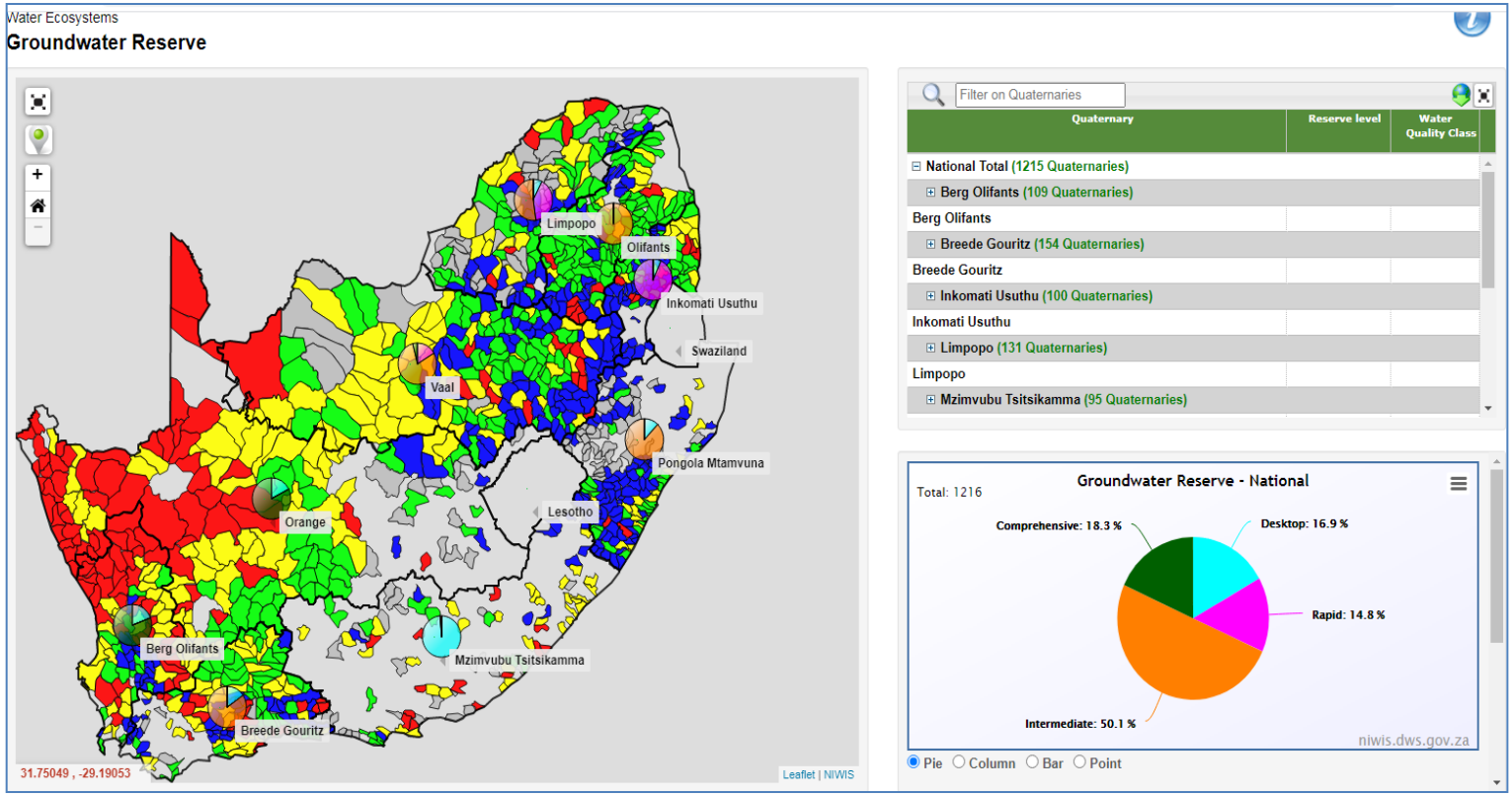
2. ROLE OF A SCIENTIST IN WRP [N-LEVEL]

[Reserve Determination - Preliminary]

- An indication was made that any development in the catchment should not be at the expense of the determined Reserve
- Monitoring of depth to groundwater level was recommended
- Groundwater quality compliance assessment for the set Reserve limits was recommended
- Groundwater quality monitoring especially for Chloride, EC, and Sodium was recommended

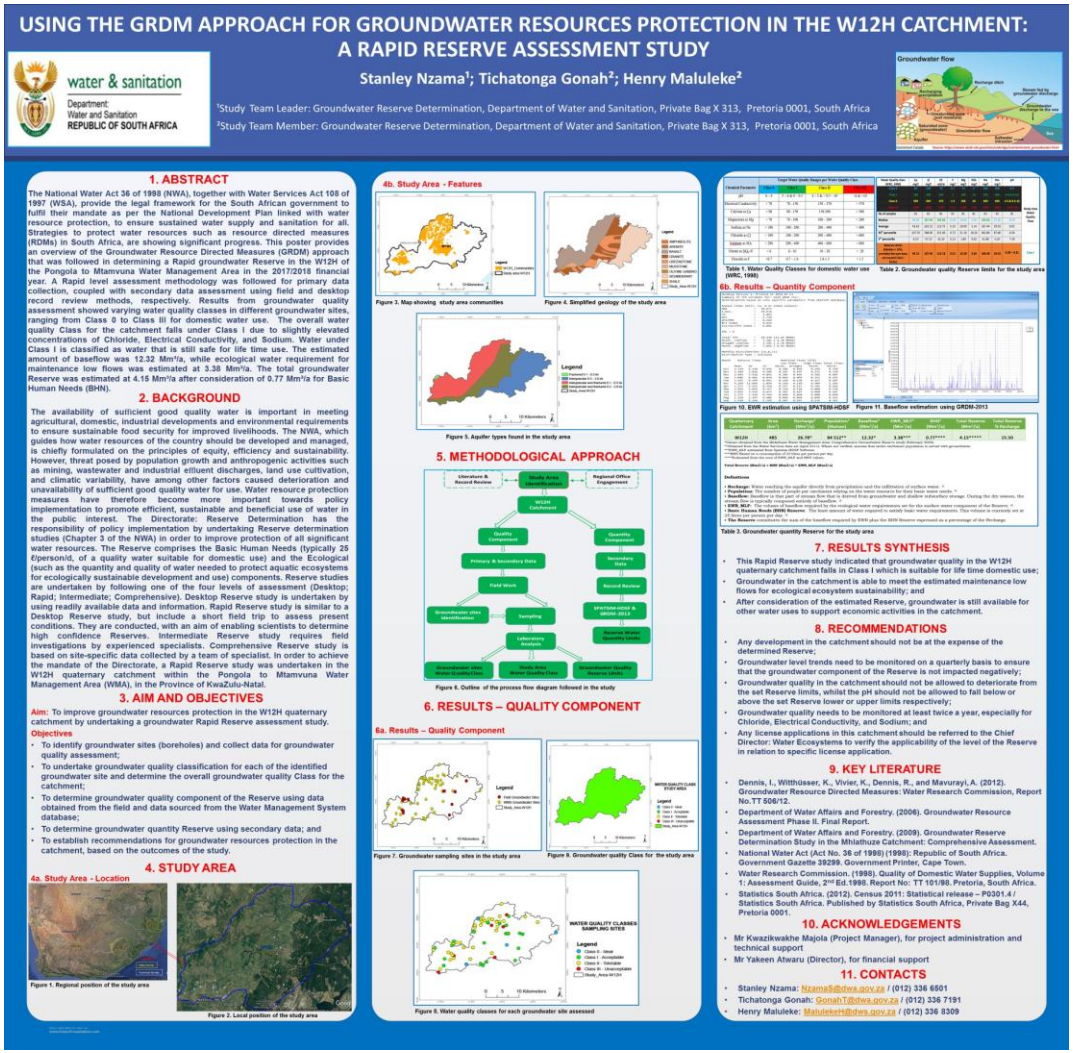
2. ROLE OF A SCIENTIST IN WRP [N-LEVEL]

[Reserve Determination]



2. ROLE OF A SCIENTIST IN WRP [N-LEVEL]

[Reserve Determination]



USING THE GRDM APPROACH FOR GROUNDWATER RESOURCES PROTECTION IN THE W12H CATCHMENT: A RAPID RESERVE ASSESSMENT STUDY

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water & sanitation
Department: Water and Sanitation
REPUBLIC OF SOUTH AFRICA

1. ABSTRACT

The National Water Act 36 of 1998 (NWA), together with Water Services Act 108 of 1997 (WSA), provide the legal framework for the South African government to fulfil their mandate as per the National Development Plan linked with water resource protection, to ensure sustained water supply and sanitation for all. Strategies to protect water resources such as resource directed measures (RDMs) in South Africa, are showing significant progress. This poster provides an overview of the Groundwater Resource Directed Measures (GRDM) approach that was followed in determining a Rapid groundwater Reserve in the W12H of the Pongola to Mtamvuna Water Management Area in the 2017/2018 financial year. A Rapid level assessment methodology was followed for primary data collection, coupled with secondary data assessment using field and desktop record review methods, respectively. Results from groundwater quality assessment showed varying water quality classes in different groundwater sites, ranging from Class 0 to Class III for domestic water use. The overall water quality Class for the catchment falls under Class I due to slightly elevated concentrations of Chloride, Electrical Conductivity, and Sodium. Water under Class I is classified as water that is still safe for life time use. The estimated amount of baseflow was 12.32 Mm³/a, while ecological water requirement for maintenance low flows was estimated at 3.38 Mm³/a. The total groundwater Reserve was estimated at 4.15 Mm³/a after consideration of 0.77 Mm³/a for Basic Human Needs (BHN).

2. BACKGROUND

The availability of sufficient good quality water is important in meeting agricultural, domestic, industrial developments and environmental requirements to ensure sustainable food security for improved livelihoods. The NWA, which guides how water resources of the country should be developed and managed, is chiefly formulated on the principles of equity, efficiency and sustainability. However, threat posed by population growth and anthropogenic activities such as mining, wastewater and industrial effluent discharges, land use cultivation, and climatic variability, have among other factors caused deterioration and unavailability of sufficient good quality water for use. Water resource protection measures have therefore become more important towards policy implementation to promote efficient, sustainable and beneficial use of water in the public interest. The Directorate: Reserve Determination has the responsibility of policy implementation by undertaking Reserve determination studies (Chapter 3 of the NWA) in order to improve protection of all significant water resources. The Reserve comprises the Basic Human Needs (typically 25 ℓ/person/d, of a quality water suitable for domestic use) and the Ecological (such as the quantity and quality of water needed to protect aquatic ecosystems for ecologically sustainable development and use) components. Reserve studies are undertaken by following one of the four levels of assessment (Desktop; Rapid; Intermediate; Comprehensive). Desktop Reserve study is undertaken by using readily available data and information. Rapid Reserve study is similar to a Desktop Reserve study, but include a short field trip to assess present conditions. They are conducted, with an aim of enabling scientists to determine high confidence Reserves. Intermediate Reserve study requires field investigations by experienced specialists. Comprehensive Reserve study is based on site-specific data collected by a team of specialist. In order to achieve the mandate of the Directorate, a Rapid Reserve study was undertaken in the W12H quaternary catchment within the Pongola to Mtamvuna Water Management Area (WMA), in the Province of KwaZulu-Natal.

3. AIM AND OBJECTIVES

Aim: To improve groundwater resources protection in the W12H quaternary catchment by undertaking a groundwater Rapid Reserve assessment study.

Objectives

- To identify groundwater sites (boreholes) and collect data for groundwater quality assessment;
- To undertake groundwater quality classification for each of the identified groundwater site and determine the overall groundwater quality Class for the catchment;
- To determine groundwater quality component of the Reserve using data obtained from the field and data sourced from the Water Management System database;
- To determine groundwater quantity Reserve using secondary data; and
- To establish recommendations for groundwater resources protection in the catchment, based on the outcomes of the study.

4. STUDY AREA

4a. Study Area - Location

Figure 1. Regional position of the study area

Figure 2. Local position of the study area

4b. Study Area - Features

Figure 3. Map showing study area communities

Figure 4. Simplified geology of the study area

Figure 5. Aquifer types found in the study area

5. METHODOLOGICAL APPROACH

Figure 6. Outline of the process flow diagram followed in the study

6. RESULTS – QUALITY COMPONENT

6a. Results – Quality Component

Figure 7. Groundwater sampling sites in the study area

Figure 8. Water quality classes for each groundwater site assessed

Figure 9. Groundwater quality Class for the study area

Table 1. Water Quality Classes for domestic water use (WRC, 1998)

Table 2. Groundwater quality Reserve limits for the study area

6b. Results – Quantity Component

Figure 10. EWR estimation using SPATSIM-HDSF

Figure 11. Baseflow estimation using GRDM-2013

Table 3. Groundwater quantity Reserve for the study area

7. RESULTS SYNTHESIS

- This Rapid Reserve study indicated that groundwater quality in the W12H quaternary catchment falls in Class I which is suitable for life time domestic use;
- Groundwater in the catchment is able to meet the estimated maintenance low flows for ecological ecosystem sustainability; and
- After consideration of the estimated Reserve, groundwater is still available for other water uses to support economic activities in the catchment.

8. RECOMMENDATIONS

- Any development in the catchment should not be at the expense of the determined Reserve;
- Groundwater level trends need to be monitored on a quarterly basis to ensure that the groundwater component of the Reserve is not impacted negatively;
- Groundwater quality in the catchment should not be allowed to deteriorate from the set Reserve limits, whilst the pH should not be allowed to fall below or above the set Reserve lower or upper limits respectively;
- Groundwater quality needs to be monitored at least twice a year, especially for Chloride, Electrical Conductivity, and Sodium; and
- Any license applications in this catchment should be referred to the Chief Director: Water Ecosystems to verify the applicability of the level of the Reserve in relation to specific license application.

9. KEY LITERATURE

- Dennis, I., Witthüsser, K., Vivier, K., Dennis, R., and Mavurayi, A. (2012). Groundwater Resource Directed Measures: Water Research Commission, Report No.TT 506/12.
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10. ACKNOWLEDGEMENTS

- Mr Kwazikwakhe Majola (Project Manager), for project administration and technical support
- Mr Yakeen Atwaru (Director), for financial support

11. CONTACTS

- Stanley Nzama: NzamaS@dwa.gov.za / (012) 336 6501
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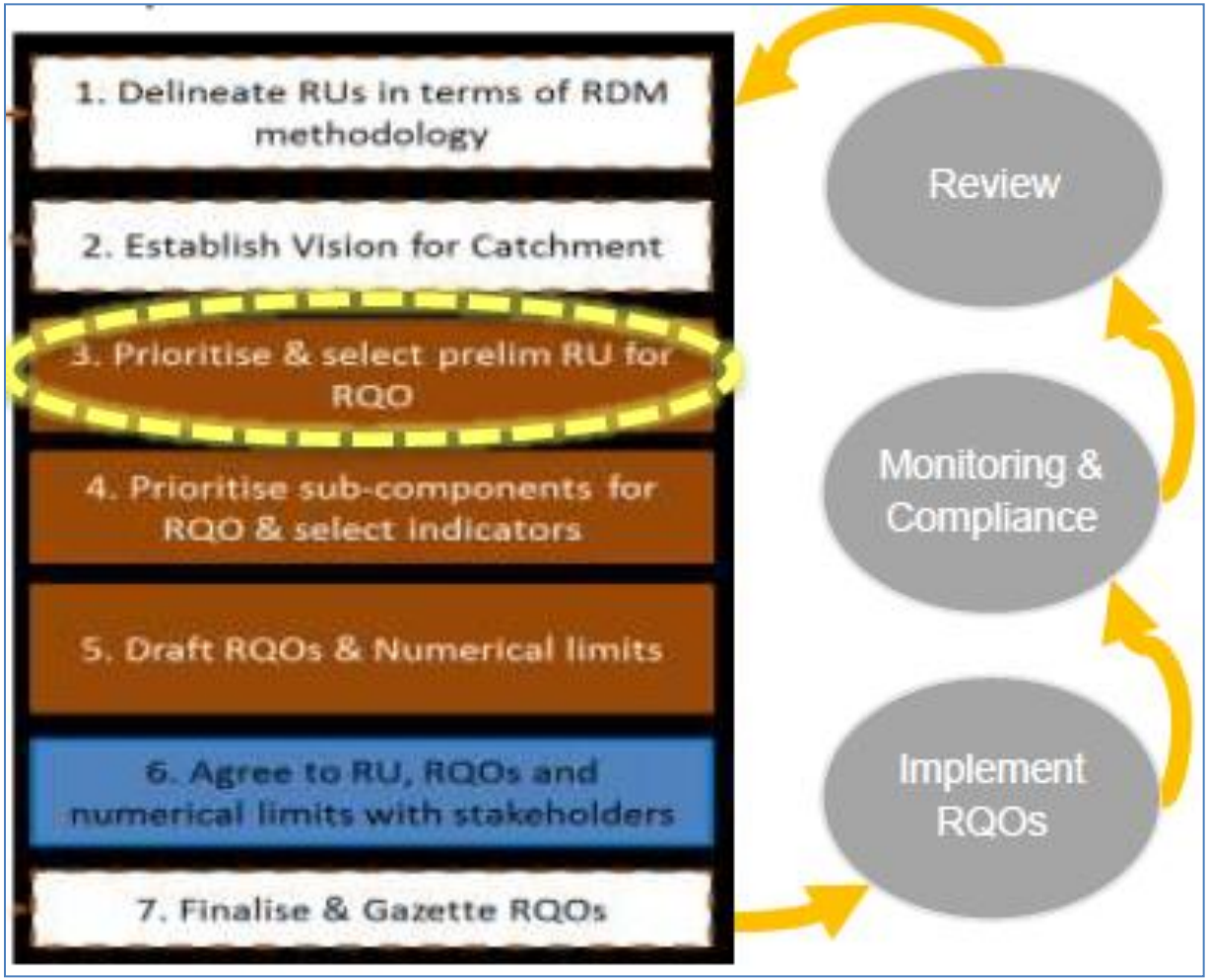
- Henry Maluleke: MalulekeH@dwa.gov.za / (012) 336 8309

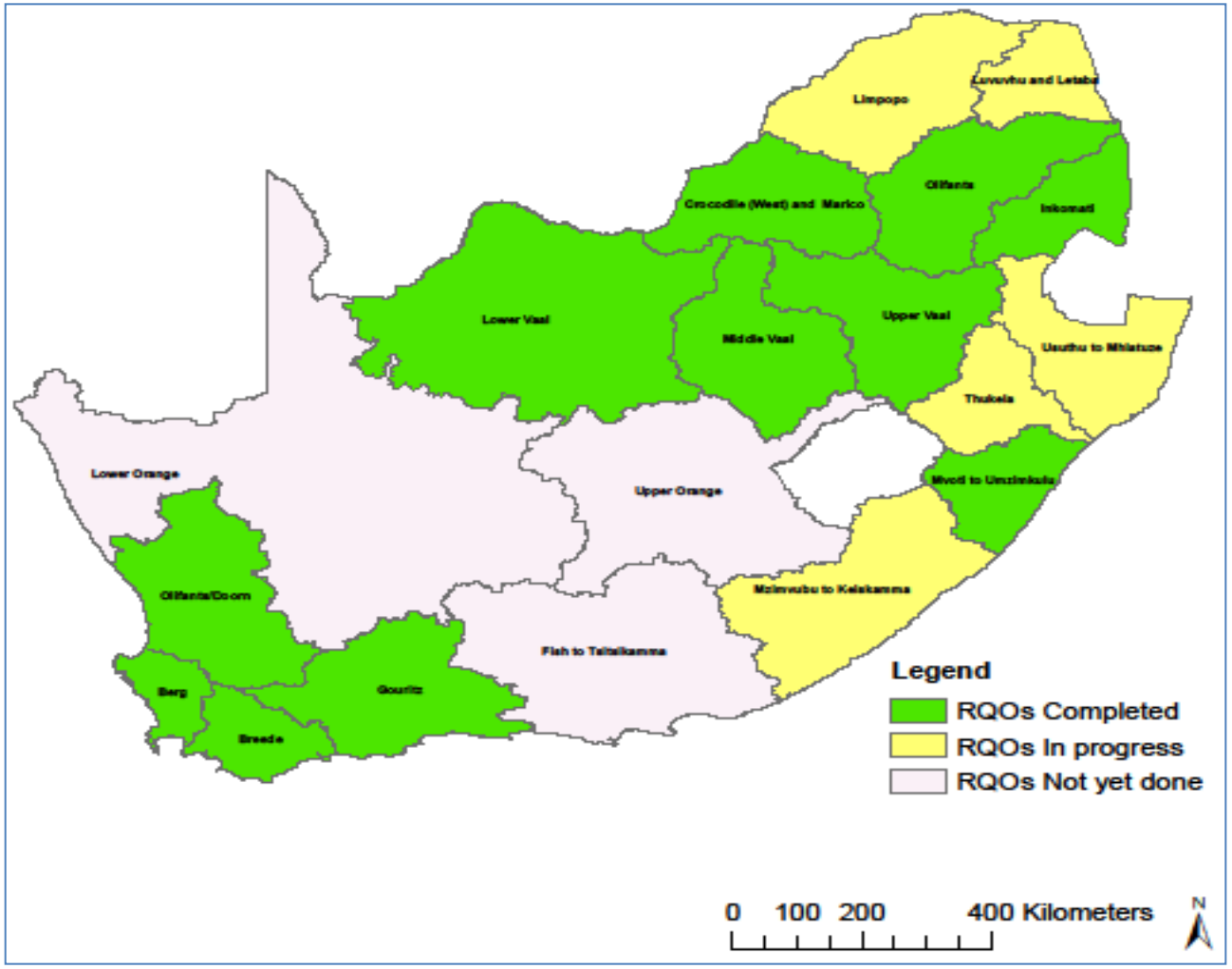
2. ROLE OF A SCIENTIST IN WRP [N-LEVEL]

[Resource Quality Objectives]



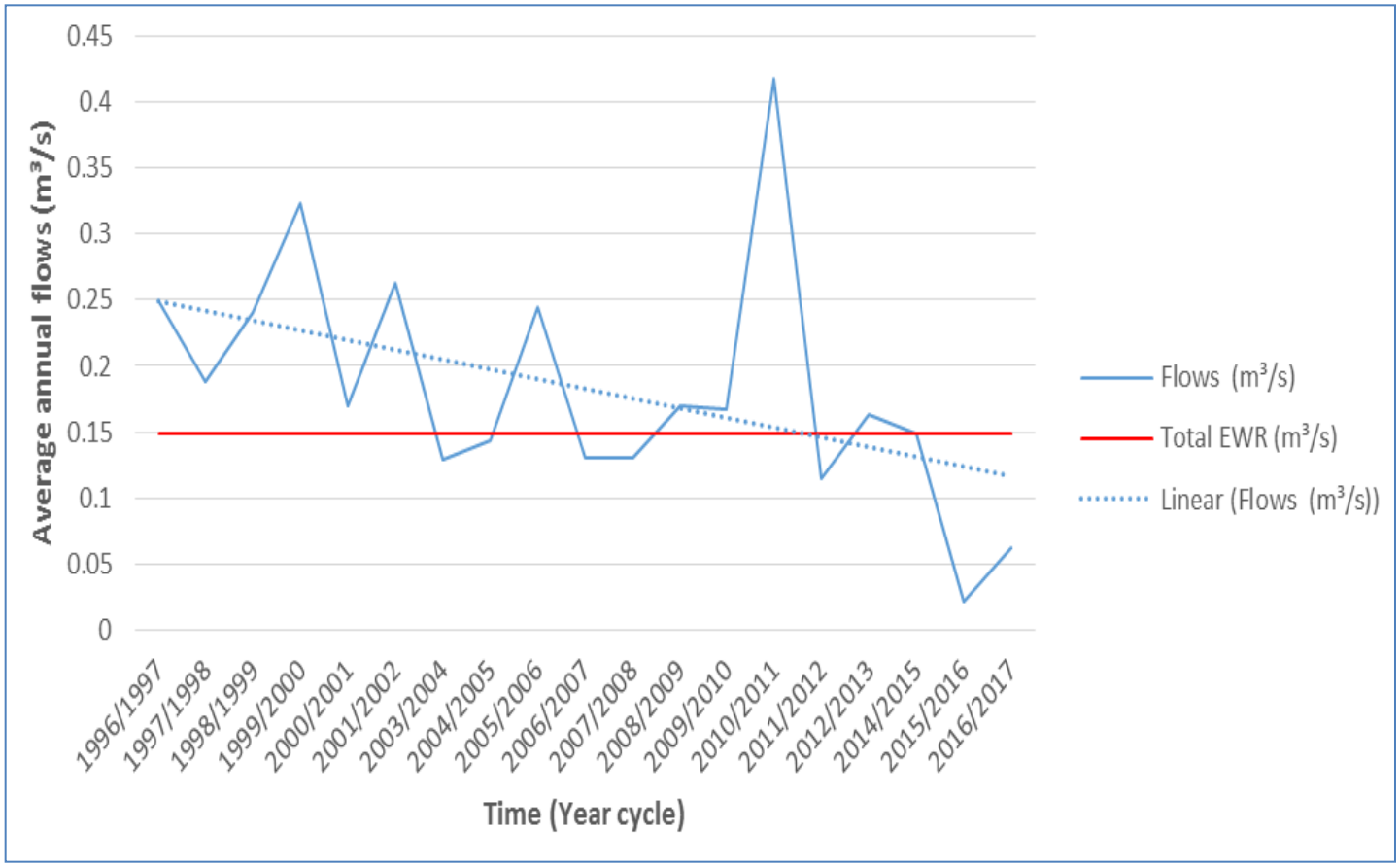
2. ROLE OF A SCIENTIST IN WRP [N-LEVEL]

[Resource Quality Objectives]



2. ROLE OF A SCIENTIST IN WRP [N-LEVEL]

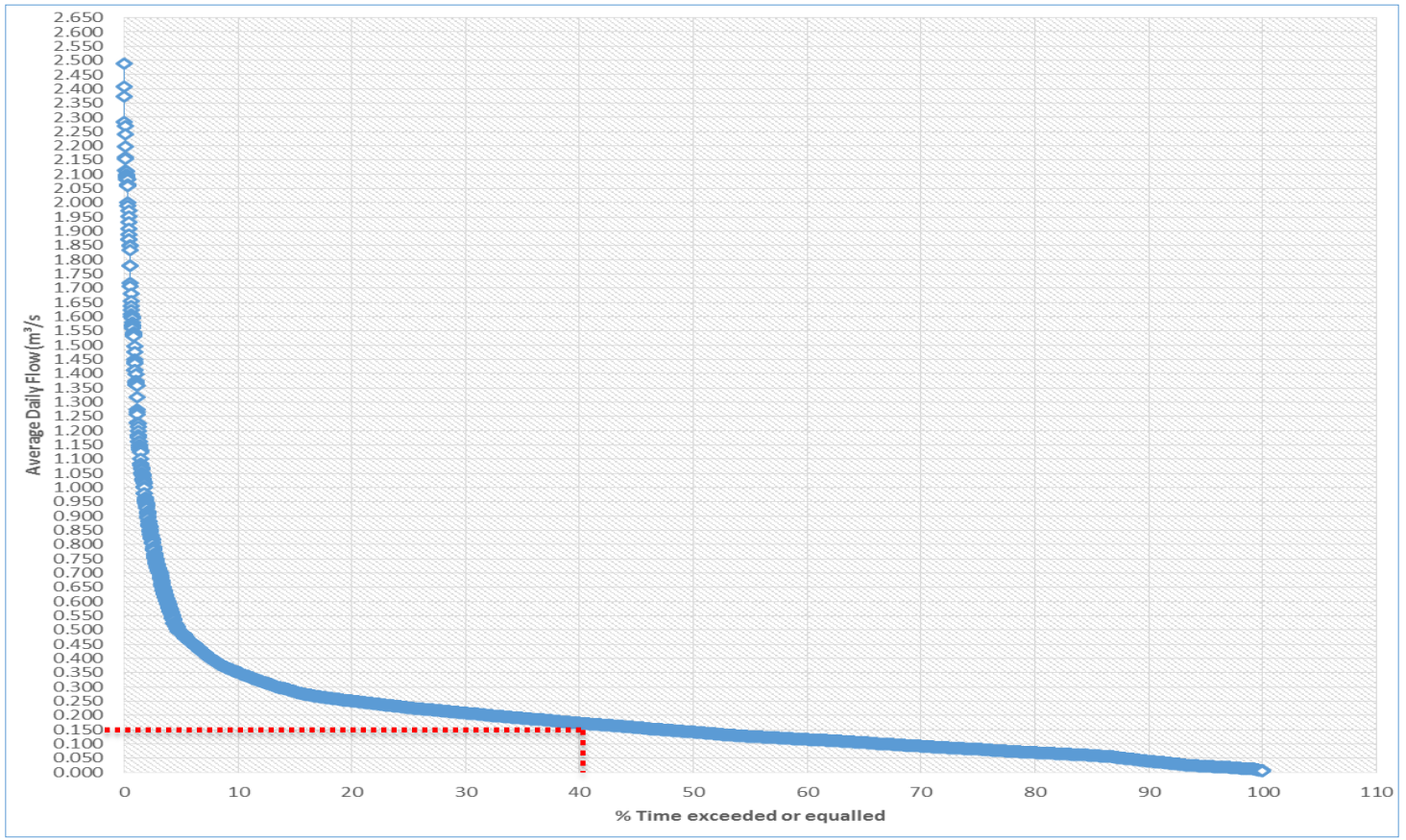
[Resource Quality Objectives - Compliance Assessment]



Average annual flow variability at the C2H139Q01 monitoring site from 1996 to 2017

2. ROLE OF A SCIENTIST IN WRP [N-LEVEL]

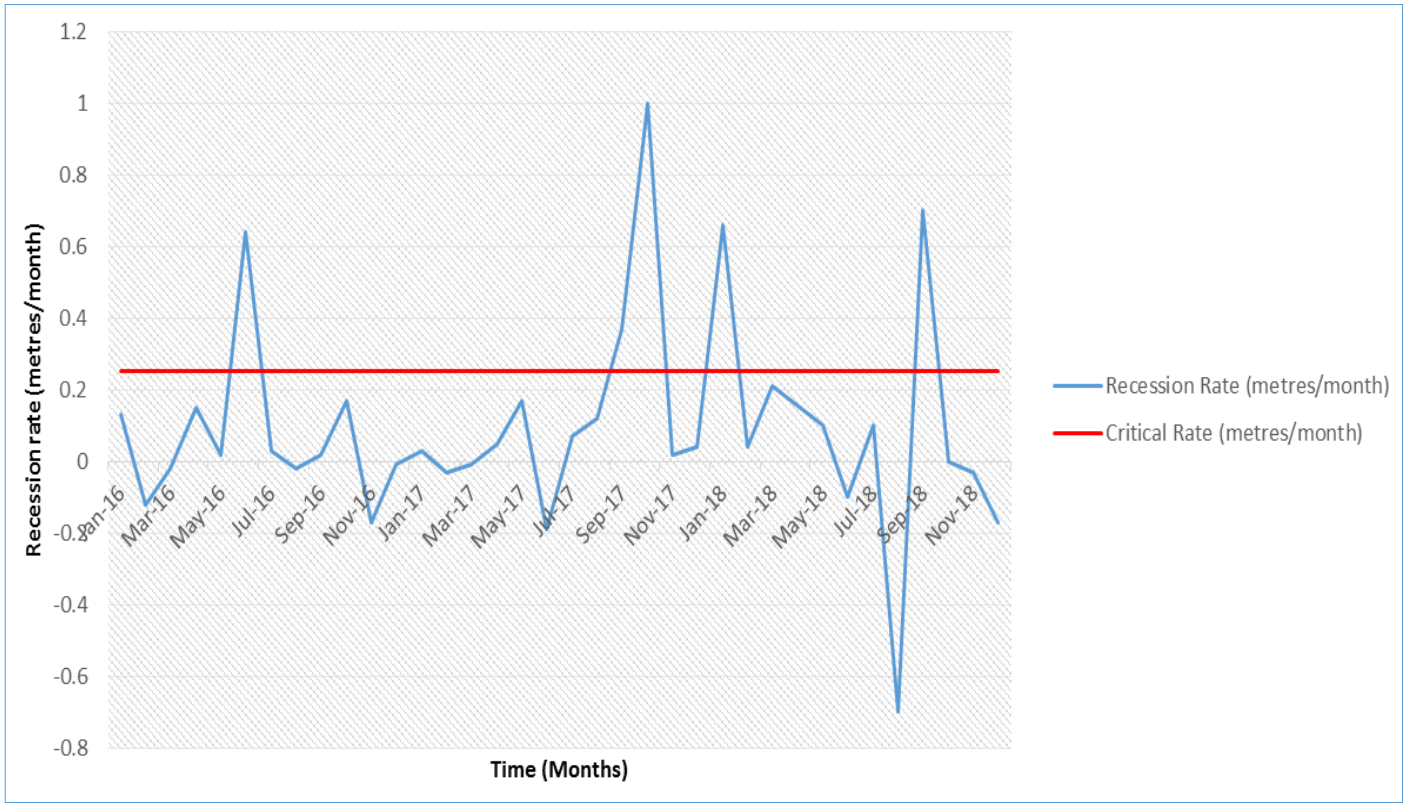
[Resource Quality Objectives - Compliance Assessment]



Flow duration curve based on flow data from 1996 to 2017 at station C2H139Q01

2. ROLE OF A SCIENTIST IN WRP [N-LEVEL]

[Resource Quality Objectives - Compliance Assessment]



Groundwater recession rate as compared to RQO critical rate at C2N1150

3. QUALIFYING AS A WRP SCIENTIST

- Environmental Officer
  - BSc
  - Varying tears of experience
- Environmental Scientist:-
  - BSc / Honors Degree
  - Varying tears of experience
- Control Environmental Scientist
  - Honors Degree
  - 6 Years post-qualification experience

3. QUALIFYING AS A WRP SCIENTIST

POST 41/143	:	**ENVIRONMENTAL OFFICER SPECIALISED PRODUCTION: INSTREAM WATER USES AUTHORISATION) ADMINISTRATION REF NO: 291119/17 (X2 POSTS** Branch: Chief Operations Office Gauteng SD: Water Use Licensing
SALARY	:	R402 045 per annum (OSD)
CENTRE	:	Gauteng Provincial Office (Pretoria)
REQUIREMENTS	:	A relevant Honours Degree in Environmental Management, Hydrology, Botany or related field. Experience in integrated water resource management and water resource protection will serve as an added advantage. A valid driver's licence (Attach certified copy). Ability to work flexibly on a range of assignments, and adjust to and prioritize a variety of complex evolving tasks. Strong interpersonal skills and ability to develop effective relations within and outside the DWS. Sound knowledge of integrated water resource management and water resource protection. Knowledge and understanding of the water sector: relevant legislations (NWA, CARA and NEMA, MPRDA) together with the related policies, regulations, principles, guidelines, tools and procedures; policy development, implementation and monitoring. Skills and experience in management of human resources. Excellent communication skills including verbal, report writing, presentation skills. Sound interpersonal skills as well as the ability to work in a multi-disciplinary team. Willingness to work abnormal hours and under pressure as well as travel country-wide. Proven liaison and networking skills especially as they relate to Corporative Governance and stakeholder engagement.
DUTIES	:	Assess the costs and benefits of various activities, policies, or regulations that affect the environment or natural resource stocks to balance the politics of environmental rights with economics needs. Collect and analyze data to compare the environmental implications of economic policy or practice alternatives. Conduct research on economic and environmental topics, such as alternative fuel use, public and private land use, soil conservation, air and water pollution control, and endangered species protection to inform water use authorization and communicate outcomes of such research. Develop economic models, forecasts, or scenarios to predict future economic and environmental outcomes. Develop programs or policy recommendations to promote sustainability and sustainable development, and to achieve environmental goals in cost-effective ways. Develop systems for collecting, analyzing, and interpreting environmental and economic data. Examine the exhaustibility of natural resources or the long-term costs of environmental rehabilitation specifically on mining and industrial facilities in as so as it affects water use. Perform complex, dynamic, and integrated mathematical modeling of ecological, environmental, or economic systems and write social, legal, or economic impact statements to inform decision-makers for natural resource policies, standards, or programs. Demonstrate or promote the economic benefits of sound environmental regulations. Interpret indicators to ascertain the overall health of an environment. Prepare and deliver presentations to

3. QUALIFYING AS A WRP SCIENTIST

- Candidate Scientist

  - Honors Degree
  - No Experience required

- Professional Scientist

  - Honors Degree
  - 3 Years post-qualification experience
  - SACNASP Registration

- Scientific Manager

  - Masters Degree
  - 6 Years post-qualification experience (Honors Degree)
  - SACNASP Registration

3. QUALIFYING AS A WRP SCIENTIST

POST 41/138	:	**SCIENTIST PRODUCTION GRADE A-C REF NO: 291119/12** Branch: Chief Operations Office Western Cape
SALARY	:	R618 732 - R939 621 per annum (OSD) (Offer will be based on proven years of experience)
CENTRE	:	Bellville
REQUIREMENTS	:	A Science degree (BSc) (Hons) in Geohydrology or relevant qualification. Compulsory registration with SACNASP as a professional Natural Scientist (proof of registration must be attached). Three (3) years post qualification natural scientific experience. Knowledge and experience in groundwater resources assessment/exploration, aquifer characterizations, acid mine drainage, development and use of information management products/tools. Ability to analyze and interpret hydrogeological data. Good report writing and knowledge of groundwater information systems. Knowledge and experience of computer based groundwater assessments programs. Knowledge of guidelines, protocol, standards and norms for groundwater developments, protection and management. Understanding of Integrated Water Resources Management. Knowledge of the National Water Act, Water Services Act, Environmental Management Act, Operational Knowledge of eWULAAS, National Groundwater Strategy and National Water Resources Strategy. Valid driver's license (certified copy must be attached).
DUTIES	:	Evaluate and assess geohydrology reports and related information in support of Water Use License Applications. Assist WULA assessors and managers in drafting implementable water use license conditions. Provide and upload geohydrological related comments /inputs on eWULAAS. Provide scientific and technical expertise in the field of geohydrology and / earth sciences in order to assess, develop, protect, use, conserve and manage groundwater resources within the Water Management Area/Catchment or Proto Catchment Management Area. Support the implementation of groundwater protection strategies and related protocols at the regional/provincial level. Provide groundwater extension services to stakeholders within the Water Management Area/Catchment or Proto Catchment Management Area. Provide inputs to the environmental impact assessment and related groundwater protection issues. Participating to planning and implementation of regional groundwater monitoring and information programs.

3. QUALIFYING AS A WRP SCIENTIST

POST 07/59	:	**SCIENTIFIC MANAGER GRADE A REF NO: 060320/07** Branch: Planning and Information Dir: Courses Directed Control
SALARY	:	R898 569 per annum (All-inclusive OSD salary package)
CENTRE	:	Head Office Pretoria
REQUIREMENTS	:	An MSc degree or relevant qualification. Six (6) years post qualification natural scientific experience. Compulsory registration with SACNASP as a Professional Natural Scientist. (Proof of registration must be attached). A valid driver's license (Attach a copy). A clear understanding and experience in the field of Integrated water resource management (IWRM). Knowledge of scientific, managerial, project management, technical report writing, data analysis, stakeholder engagement, co-ordination and organisational skills. Understanding and knowledge of the National Water Act and related legislation. Strong leadership skills and the ability to promote transformation and service delivery excellence. Creativity, initiative and well-developed skills in strategic and innovative thinking. Written and verbal communication skills. Advanced computer literacy. The incumbent may be required to travel extensively.
DUTIES	:	The incumbent will be part of a team with the primary responsibility of sources directed control which includes the coordination of the development of policies and national strategies for the management of water quality, rehabilitation and remediation of water resources. Review and recommend scientific projects. Align projects to organisational strategies; implement PMDS. Monitor progress on the implementation of projects related to water resources protection; compile and manage budgets and control cash flows. Managing a multidisciplinary scientific team; guiding the development of strategies, procedures and guidelines for sources directed control of water resources. Interfacing with line function water resource managers in the implementation of water resource protection requirements and providing technical service with regards to water resource protection to the Department of Water and Sanitation as part of the Chief Directorate: Water Ecosystems.

3. QUALIFYING AS A WRP SCIENTIST

POST	:	SCIENTIFIC MANAGER (GRADE A): INTEGRATED WATER STUDIES REF NO: 140220/03
BRANCH	:	PLANNING AND INFORMATION
SALARY	:	R 898 569 (all inclusive OSD package)
CENTRE	:	Pretoria Head Office
REQUIREMENTS	:	An MSc Degree in Earth, Numerical, Environmental Sciences, Natural Sciences or relevant qualification. Six (6) years post qualification natural scientific experience in the field of Water. Compulsory registration with the South African Council for Scientific Professions (SACNASP) as a Professional Scientist(Attach copy). A valid driver's licence(Attach copy). Good experience in modelling technologies. Proven ability to communicate scientific information in a brief and clearly expressed manner in writing and verbally including good technical report writing skills. Sound knowledge of the National Water Act and other related legislation. Computer literacy and ability to use software packages..The ability to integrate and interpret water quality data and draw scientifically sound conclusions based on fundamental data. A proven ability to manage a multidisciplinary group of scientists and other professionals. Good conceptual thinking skills are essential. Knowledge of aquatic sciences and geographical information systems (GIS). Sound knowledge of project management.
DUTIES	:	Coordinate and undertake integrated water resource studies (quality, quantity ecology surface and groundwater) with focus on impact of land based activities on water. Coordinate the development of integrated water resource modelling methodologies and analysis tools. Coordinate the reporting on the state of water for the country. Provide water resources expertise to all stakeholders including the water sector and any other interested parties. Liaise with other Government Departments, local authorities, the public and other clients on water issues. Mentor and develop personnel. Lead and manage projects.

3. QUALIFYING AS A WRP SCIENTIST

- Specialist Scientist

  - PhD
  - 10 Years post-qualification experience (Honors)
  - SACNASP Registration

3. QUALIFYING AS A WRP SCIENTIST

POST 34/10	:	**SPECIALIST SCIENTIST: CHEMICAL OCEANOGRAPHY REF NO: OC35/2019**
SALARY		R1 245 842 per annum (All inclusive remuneration package, conditions apply)
CENTRE		Cape Town
REQUIREMENTS		An appropriate recognized PhD degree in Chemistry (Inorganic Chemistry/Biogeochemistry) or equivalent qualification At least 10 years post qualification experience Sound knowledge of the application of chemistry to the marine environment A proven record of scientific research output and human capital development Proven strategic management and leadership skills Extensive experience in establishing research programmes the successful incumbent must pass a medical examination for seafarers (Act No.57 of 1951) Registration with SACNASP as a Professional/Certificated Natural Scientist is compulsory Willingness and ability to go to sea regularly and for extended periods A valid code 08/EB driver's license The following will be an advantage: Proven extensive experience with marine chemistry research A sound understanding of ecosystem processes and functioning in the oceans surrounding Southern Africa and impacts of global change.
DUTIES	:	Manage research activities and perform final review and approval of scientific projects Establish research projects on chemical oceanography as applied to/within the marine environment Conduct basic and applied research Give scientific advice and advocacy in respect of the marine environment including the issues of climate change and ocean acidification Provide strategic leadership at national, regional and international research activities Publish and present research findings in local and international conferences Mentor, train and develop junior scientists, technical support and students to promote skills/knowledge transfer and adherence to sound scientific principles and code of practice.

4. CAREER OPPORTUNITIES

- DWS – Learning Academy
  - Graduate Training
  - Internship Programme
- DWS – Careers
  - Experienced Professionals
  - Government Departments [http://www.dpsa.gov.za/]
- Private Companies
  - E.g. Sasol, Eskom, DBSA
  - Mining Companies
  - Research Organizations
  - Own company through collaboration with experienced people professionals

For your assignments and tests or examinations, check the requirements for various posts in the adverts versus duties to that need to be performed and then reflect on your academic knowledge, practical skills and workplace-based requirements then prepare accordingly

THANK YOU!!!

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ANY QUESTIONS???