DETERMINATION OF WATER RESOURCE CLASSES, RESERVE AND RESOURCE QUALITY OBJECTIVES IN THE KEISKAMMA AND FISH TO TSITSIKAMMA CATCHMENTS WITHIN THE MZIMVUBU-TSITSIKAMMA WATER MANAGEMENT AREA (WP11354)

PUBLIC MEETING 1

MTHATHA

Presented by: GroundTruth and Collaborators
Directorate: Classification

Date: 10 February 2026

WATER IS LIFE - SANITATION IS DIGNITY

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

2030 NDP

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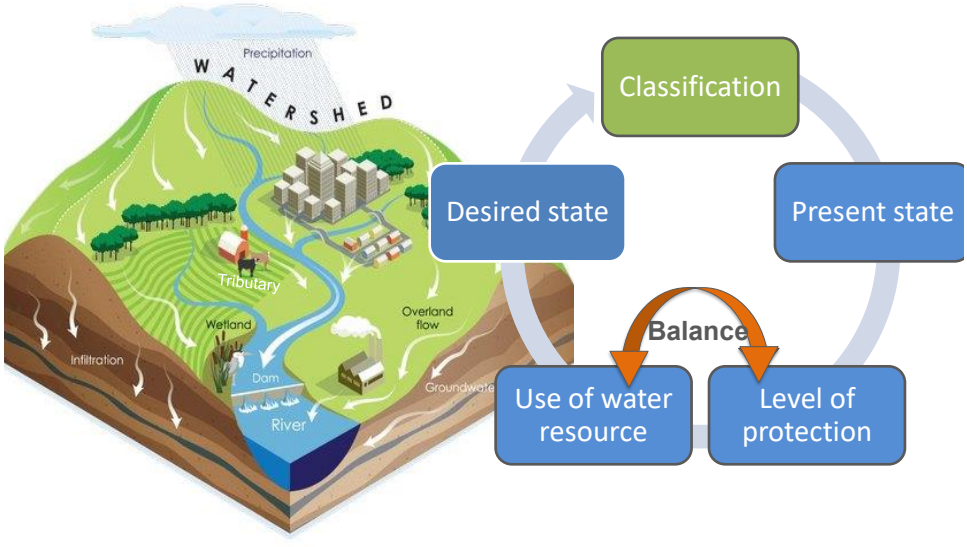
CLASSIFICATION OF WATER RESOURCES

Integrated Water Resources Management (IWRM)



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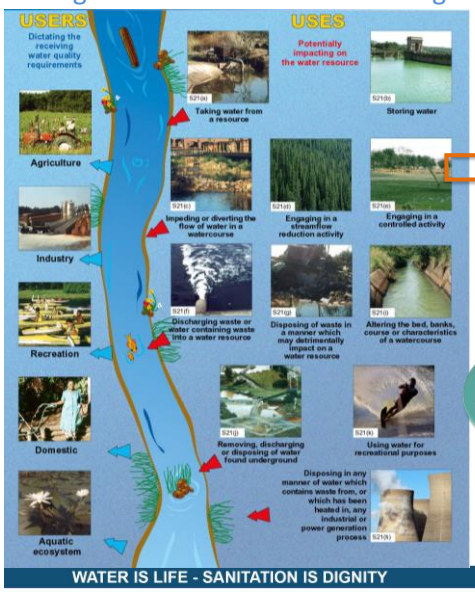
BALANCING USE AND PROTECTION

Integrated Water Resources Management (IWRM)



We all live downstream

Resource Management

- Source Control
- Resource Protection

- Setting requirements in water resources – WR Class
- Resource requirements:
  - Setting the Reserve
  - **RQOs**

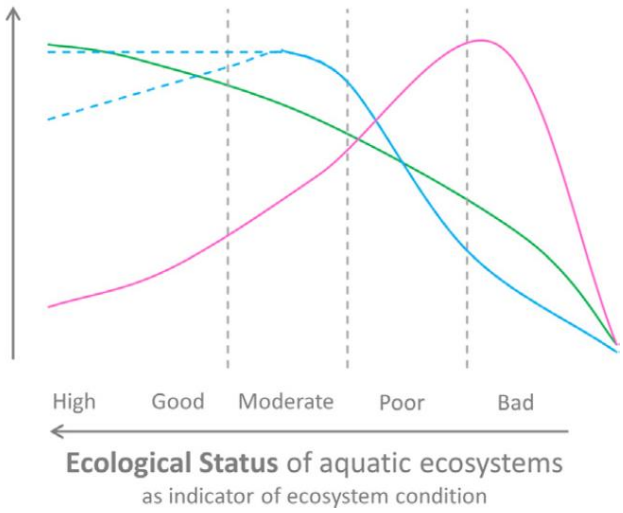
ECOSYSTEM GOODS AND SERVICES 101 & THE RESERVE

Ecosystem services (flow)

Provisioning
- water abstractions

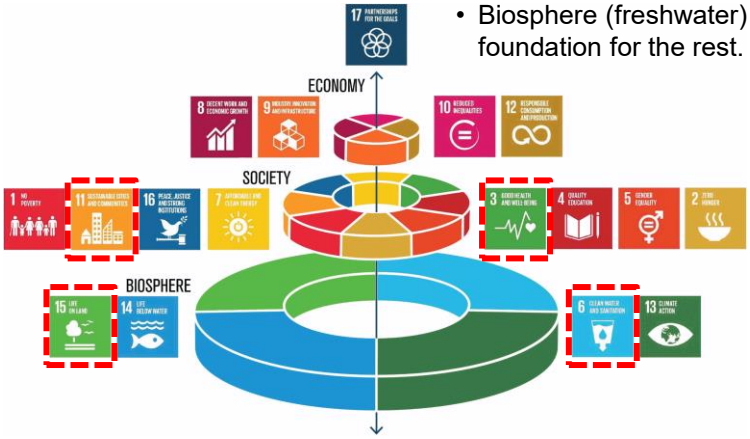
Regulating
- water purification
- erosion retention
- flood protection
- coastal protection

Cultural
- recreation



HOW DOES THIS WORK RELATE TO SUSTAINABLE DEVELOPMENT GOALS?

- All countries obligated to report on SDGs.
- Biosphere (freshwater) the foundation for the rest.



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STUDY OBJECTIVE

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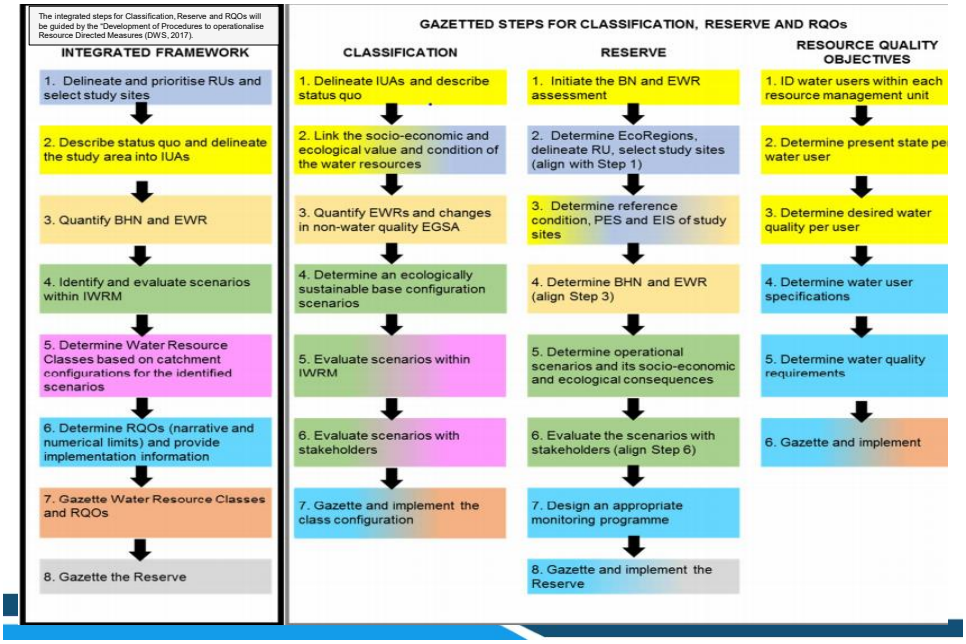
KEY AIM OF THIS STUDY

- The main objectives of the study are to determine
  - (i) the Water Resource Classes (current phase)
  - (ii) the Reserve (completed – gazette template next)
  - (iii) associated Resource Quality Objectives (RQOs) (next phase)
- Rivers, wetlands, estuaries and groundwater have been assessed and where applicable, integration/ linkages between these components were considered
- Consultative processes, with continual communication and liaison, with stakeholders in the study area continues to ensure the successful determination of the Water Resource Classes, Reserve and RQOs

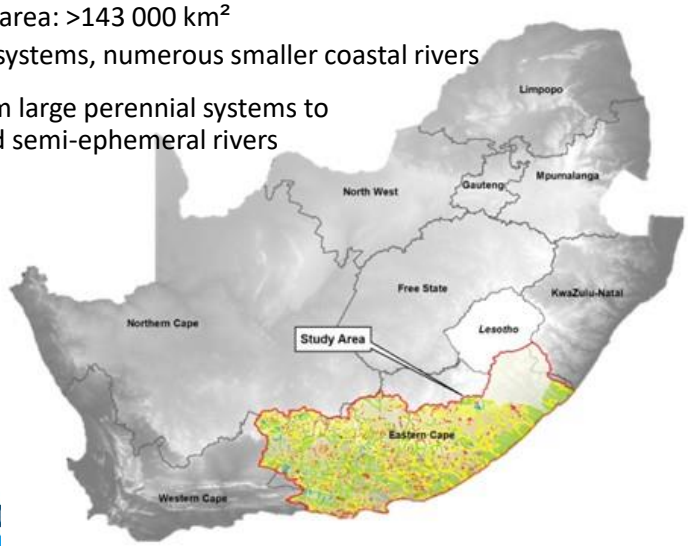
STUDY INTEGRATED APPROACH



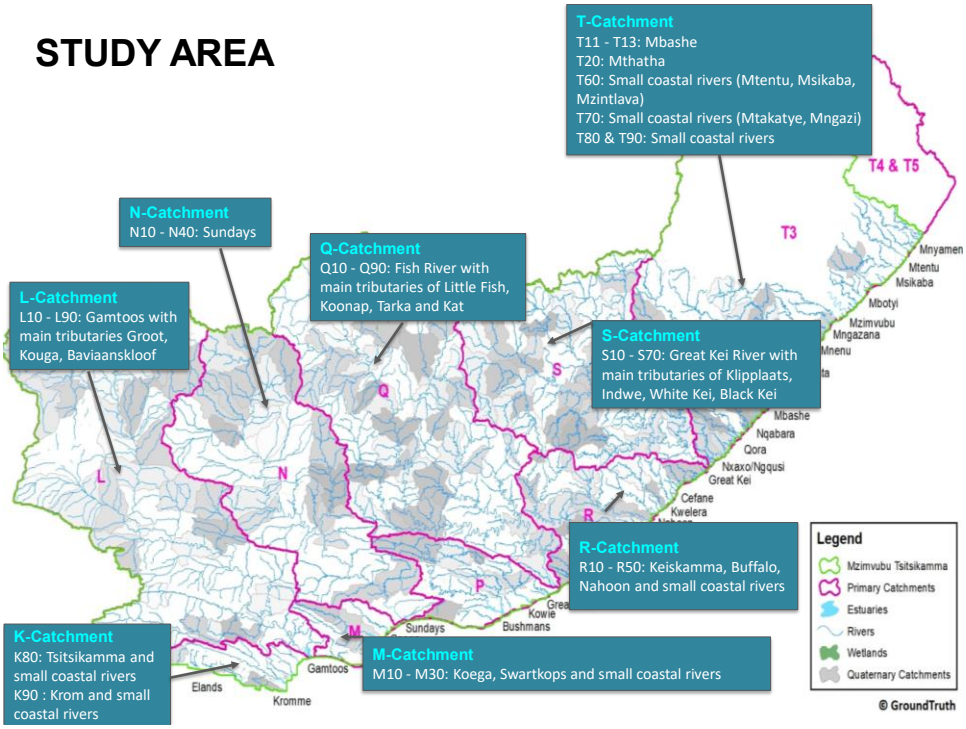
STUDY AREA

STUDY AREA

- Part of the Mzimvubu to Tsitsikamma WMA7
  - Excluded Mzimvubu catchment (T31-T36)
- Total catchment area: >143 000 km²
- Five major river systems, numerous smaller coastal rivers
- Rivers range from large perennial systems to small coastal and semi-ephemeral rivers



STUDY AREA



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STUDY AREA

- Various major dams

Dams	DWS Dam No.	Dams	DWS Dam No.
Churchill Dam	K9R001	Rooikrantz Dam	R2R002
Mpofu Dam	K9R002	Bridledrift Dam	R2R003
Kouga Dam	L8R001	Nahoon Dam	R3R001
Groendal Dam	M1R001	Maden Dam	-
Nqweba Dam	N1R001	Xonxa Dam	S1R001
Darlington Dam	N2R001	Lubisi Dam	S2R001
Korhaansdrift Weir	N4H001	Ncora Dam	S5R001
Kat River Dam	Q9R001	Waterdown Dam	S3R001
Sandile Dam	R1R001	Oxkraal Dam	S3R003
Cata Dam	R1R002	Gcuwa Dam	S7R001
Binfield Dam	R1R003	Xilinxa Dam	S7R002
Laing Dam	R2R001	Mthatha Dam	T2R001

Wetland systems scattered throughout

Catchment	Sub-catchment	Primary catchment	Hectares	%
Fish to Keiskamma	Gamtoos	L	1274	4.2
	Sundays	N	899	3.0
	Fish	Q	3,296	10.9
	Tsitsikamma	K	3,236	10.7
	Algoa	M	2,357	7.8
	Bushmans	P	634	2.1
Mzimvubu to Keiskamma	Kei	S	9,329	30.9
	Amatola	R	1,827	6.1
	Mbashe	T	4,304	14.3
	Mtata	T	1,102	3.7
	Wild Coast	T	1,913	6.3
Grand Total			30,171	100

- 154 estuaries and 97 coastal microsystems, many located adjacent to Marine Protected Areas, reflecting high ecological importance of the region
- Groundwater mainly in fractured aquifers associated with the Cape and Karoo Supergroups, limited intergranular aquifers in sands and alluvium

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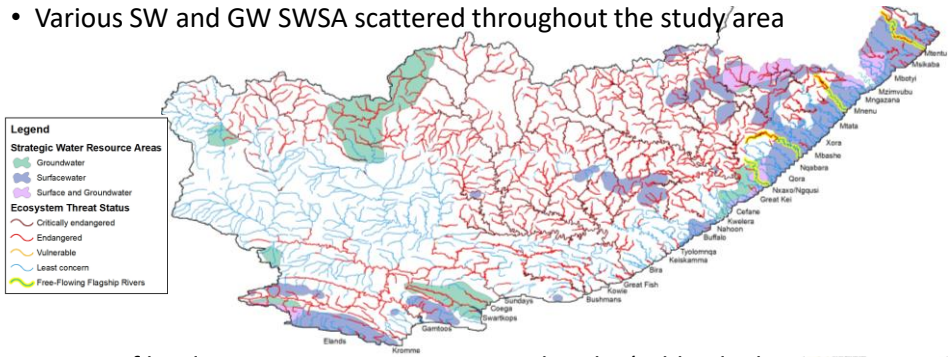
STATUS QUO AND INTEGRATED UNITS OF ANALYSIS AND RESOURCE UNITS SUMMARY

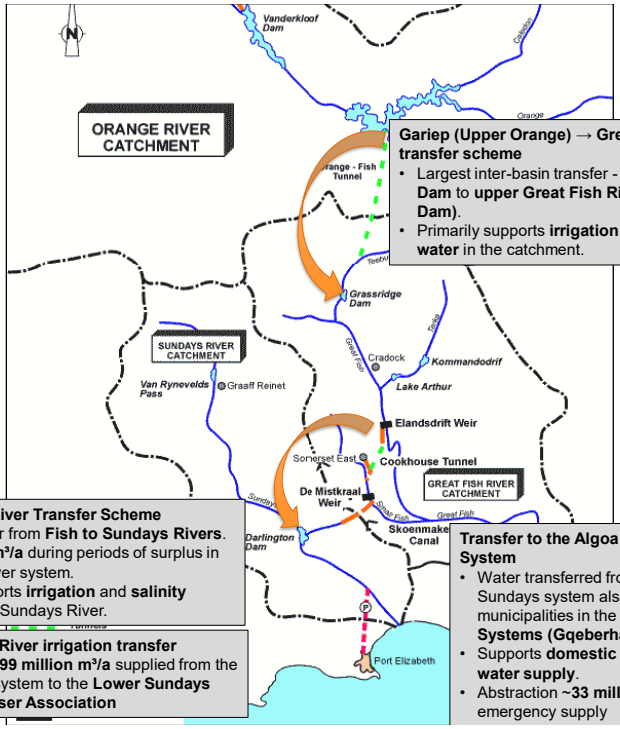
STRATEGIC WATER SOURCE AREAS PROTECTED AREAS

- Various SW and GW SWSA scattered throughout the study area



- Range of biodiverse, conservation, national parks *(Addo Elephant, Tsitsikamma, Mountain Zebra)*, nature reserves *(Hamburg, Great Fish, Mpofu, Groendal, Baviaanskloof, Formosa)*, protected areas, heritage sites *(Cape Floral Region- L Catchment)*: thus high tourism (economic gain)

MAJOR TRANSFER SCHEMES



Gariep (Upper Orange) → Great Fish River transfer scheme
- Largest inter-basin transfer - water from **Gariep Dam** to **upper Great Fish River (Grassridge Dam)**.
- Primarily supports **irrigation** and **domestic water** in the catchment.

Fish–Sundays River Transfer Scheme
- Transfers water from **Fish to Sundays Rivers**.
- **~560 million m³/a** during periods of surplus in the Orange River system.
- Primarily supports **irrigation** and **salinity dilution** in the Sundays River.

Lower Sundays River irrigation transfer
- Approximately **99 million m³/a** supplied from the Orange River system to the **Lower Sundays River Water User Association**

Transfer to the Algoa Water Supply System
- Water transferred from the Fish–Sundays system also serves municipalities in the **Algoa and Amatole Systems (Gqeberha and EL)** .
- Supports **domestic and industrial water supply**.
- Abstraction **~33 million m³/a** as an emergency supply

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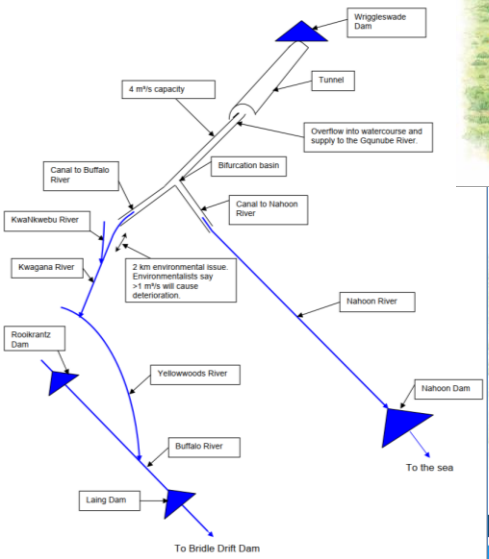
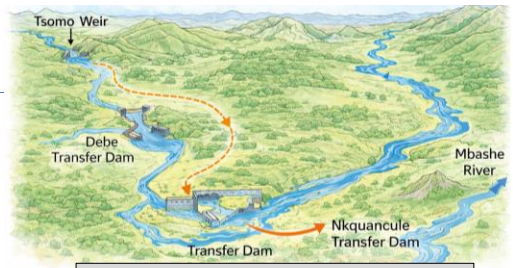
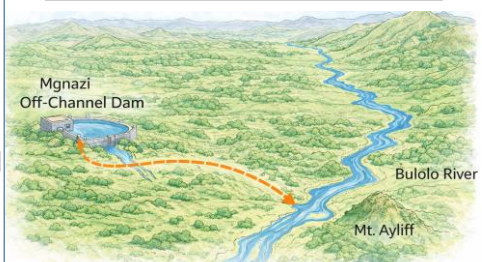
MAJOR TRANSFER SCHEMES

Transfer from Wriggleswade Dam (Kubusi) to Buffalo and Nahoon rivers





Tsomo River (upper Great Kei catchment) transfer to tributary of the Mbashe River.



Smaller transfers: Mngazi off-channel dam to Bulolo River

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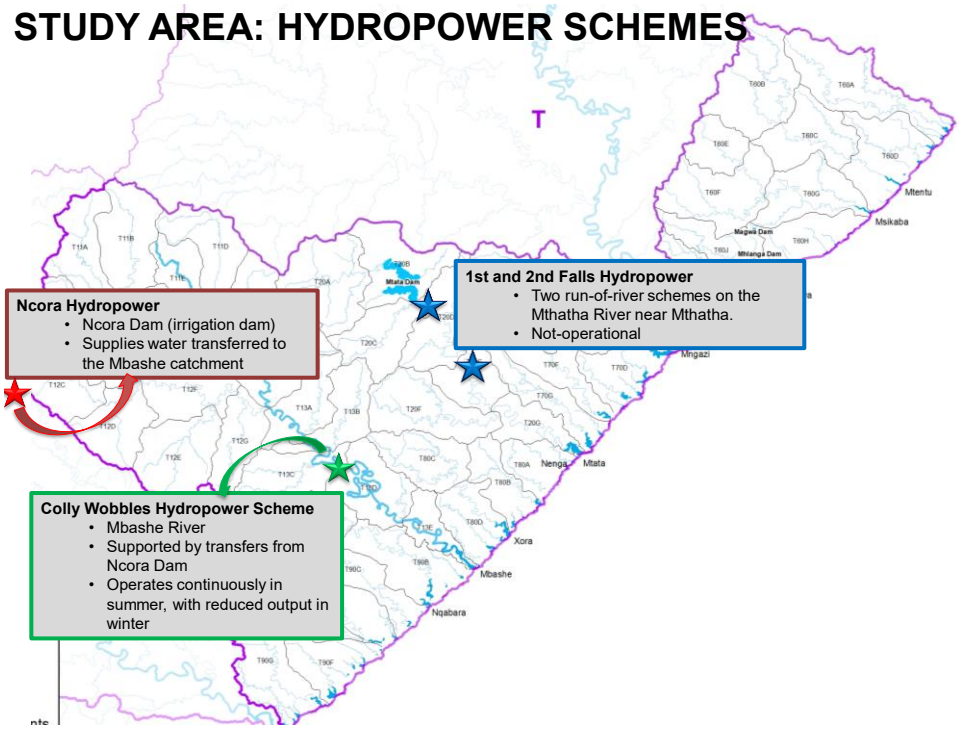
STUDY AREA: HYDROPOWER SCHEMES



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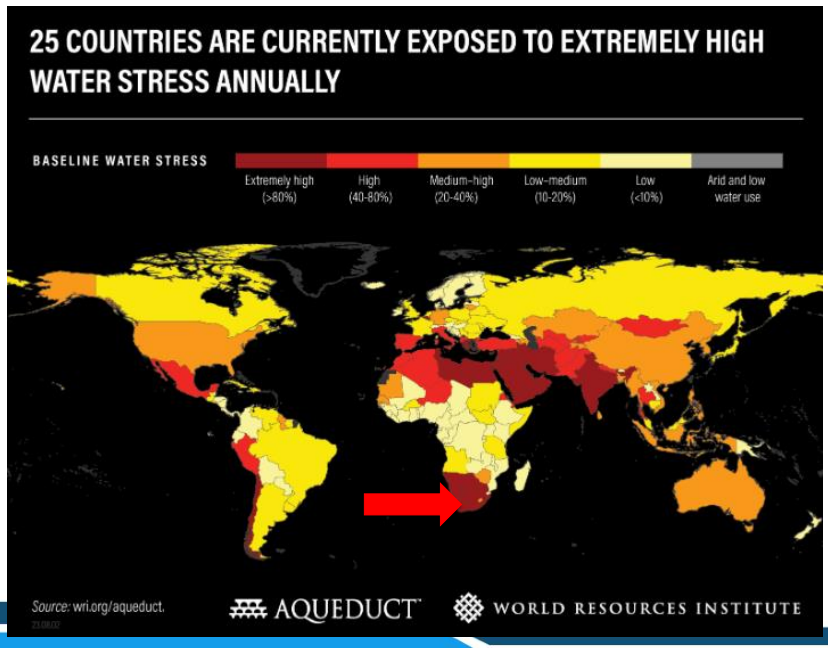
PRIMARY WATER DEMAND AND USERS



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PRIMARY WATER DEMAND AND USERS

- Assessed the primary water demand and users in the study area
- Registered and estimated water use by sector, using data from the WARMS and WR2012 databases

Registered Volume / Estimated water use	Agriculture	Million m³/a	1180393327
	Industry		5917345
	Domestic		549069054
	Afforestation		116900000
	Alien Veg		165708000
	Irrigation		797226000
Contributing Area	Afforestation Area	Km²	1169
	Alien Vegetation Area		1381
	Irrigation Area		1329

All 3 contributing areas are large and similar in their spatial extents

Agriculture and irrigation is the largest water user, accounting for the highest annual water demand.

Domestic water use is also significant, but notably lower than agricultural use.

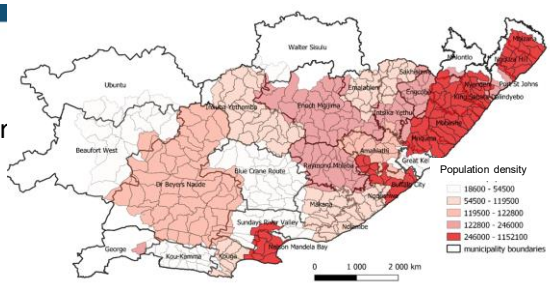
Water use associated with alien invasive vegetation comparable to other major non-industrial sectors.

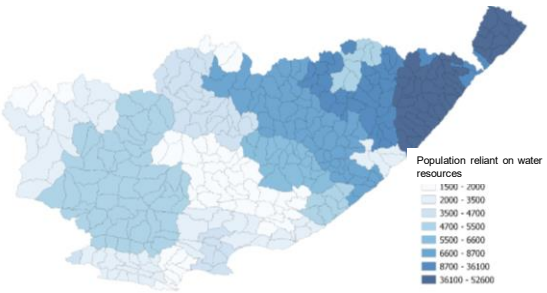
Industrial water use relatively small proportion of total registered and estimated use.

- Overall, water demand is primarily driven by agricultural and land-use-related activities rather than industrial use.

SOCIO-ECONOMICS

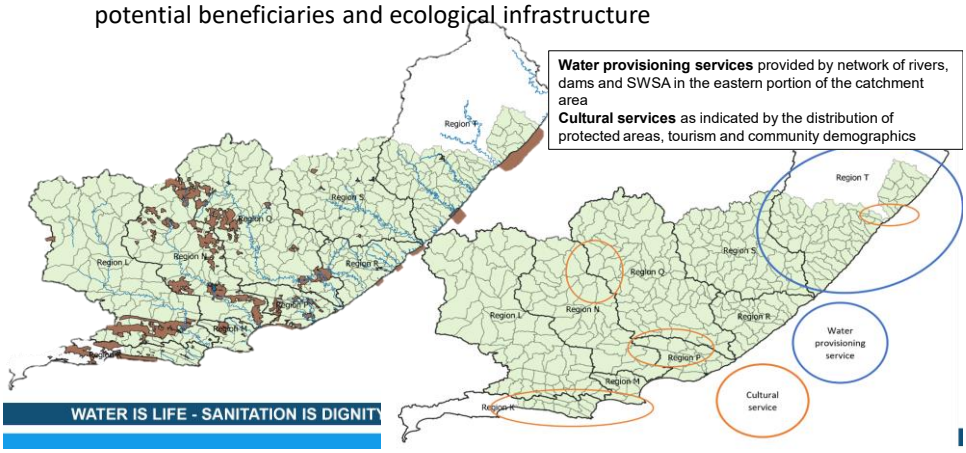
- The study area supports major urban, rural, and communal populations - strong dependence on surface and groundwater resources.
  - Livelihoods strongly linked to water-dependent activities
  - Subsistence farming, small-scale agriculture, informal economies
- The province has the highest households with no access to piped water (24.9%) compare to nationally (10.1%).
- High socio-economic vulnerability: unemployment ~42% out of a population of ~5.9 million





ECOLOGICAL INFRASTRUCTURE AND ECOSYSTEM SERVICE SENSITIVITY

- Ecosystem Service Sensitivity areas are identified at a high level through:
  - Knowledge of benefits received through ecological infrastructure
    - Extensive water resources (major river/dam systems) and high conservation value/protected landscapes
  - Inferring the flow of ecosystem service through the spatial relationship of potential beneficiaries and ecological infrastructure



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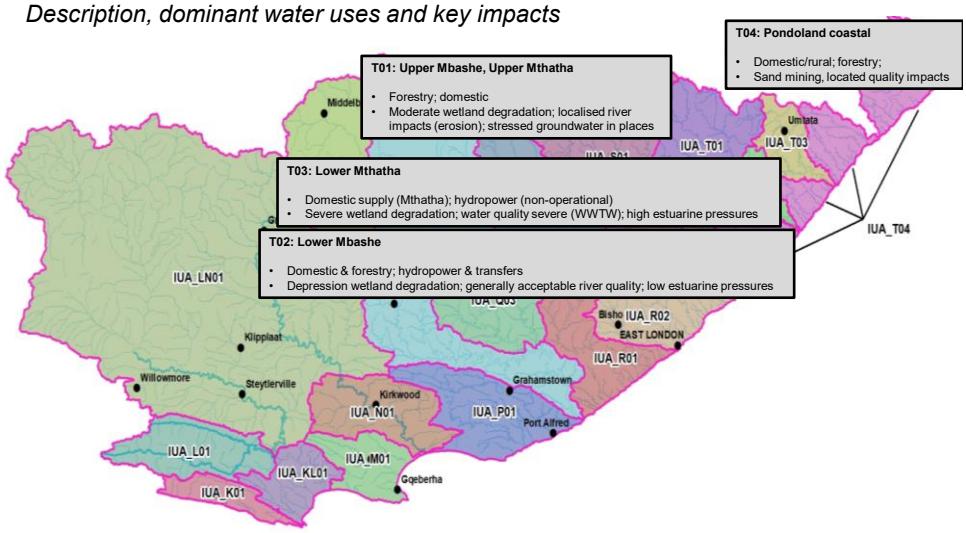
DELINEATED INTEGRATED UNITS OF ANALYSIS

Description, dominant water uses and key impacts



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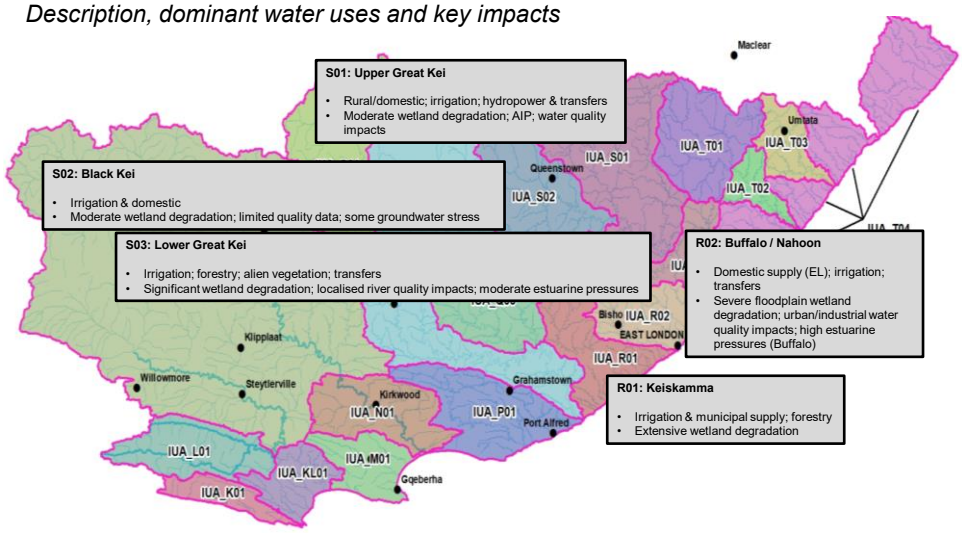

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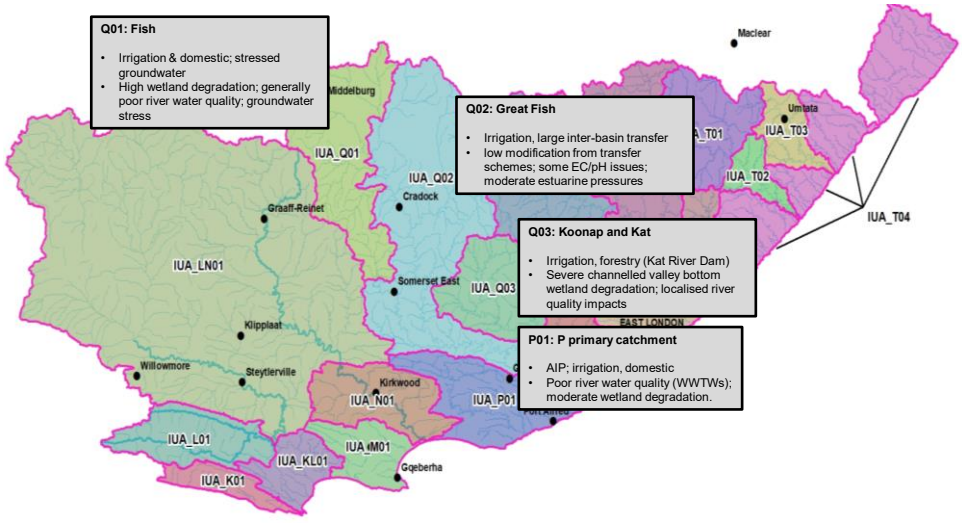

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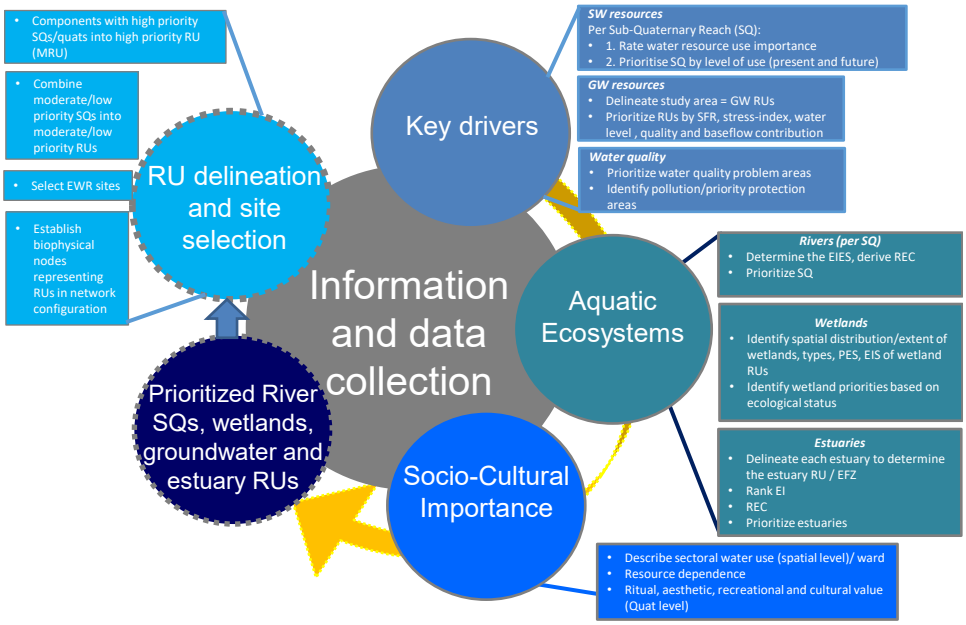
RESOURCE UNITS

DELINEATION AND PRIORITISATION



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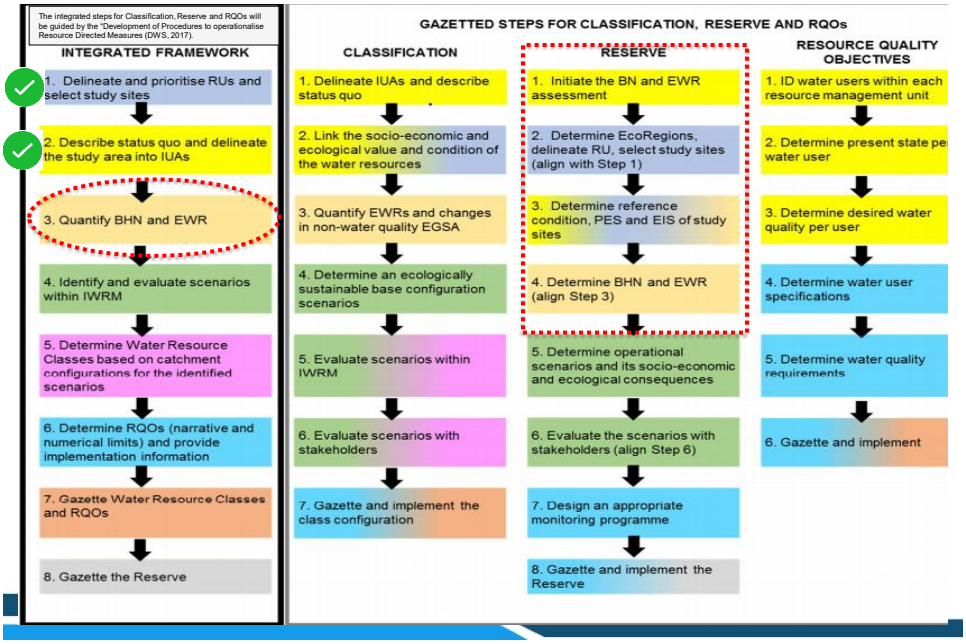
THE RESERVE



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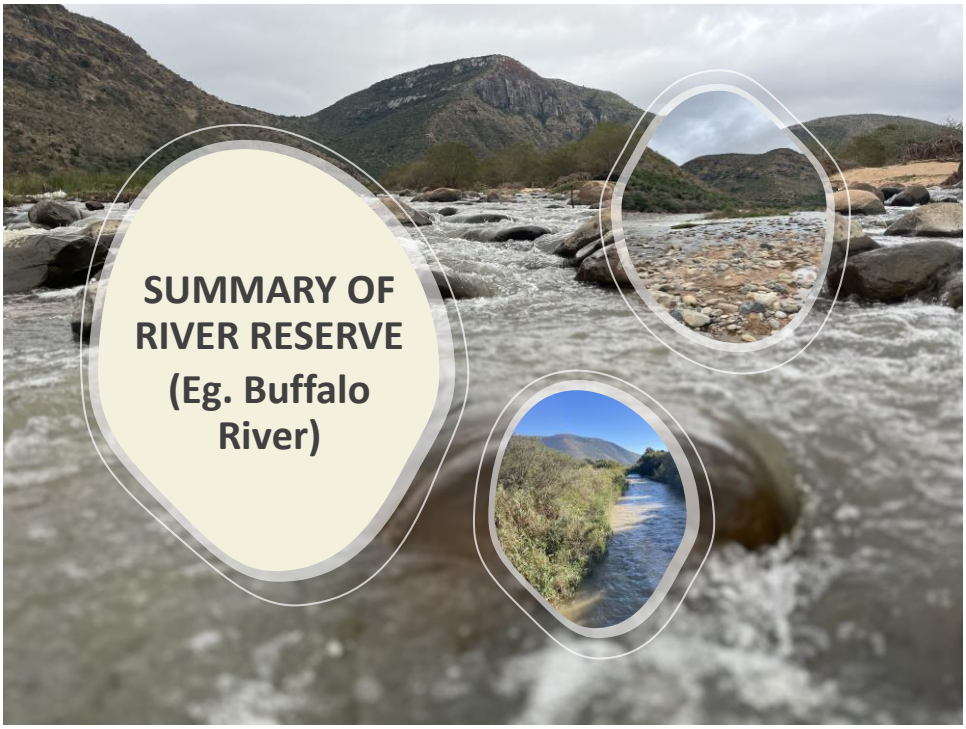

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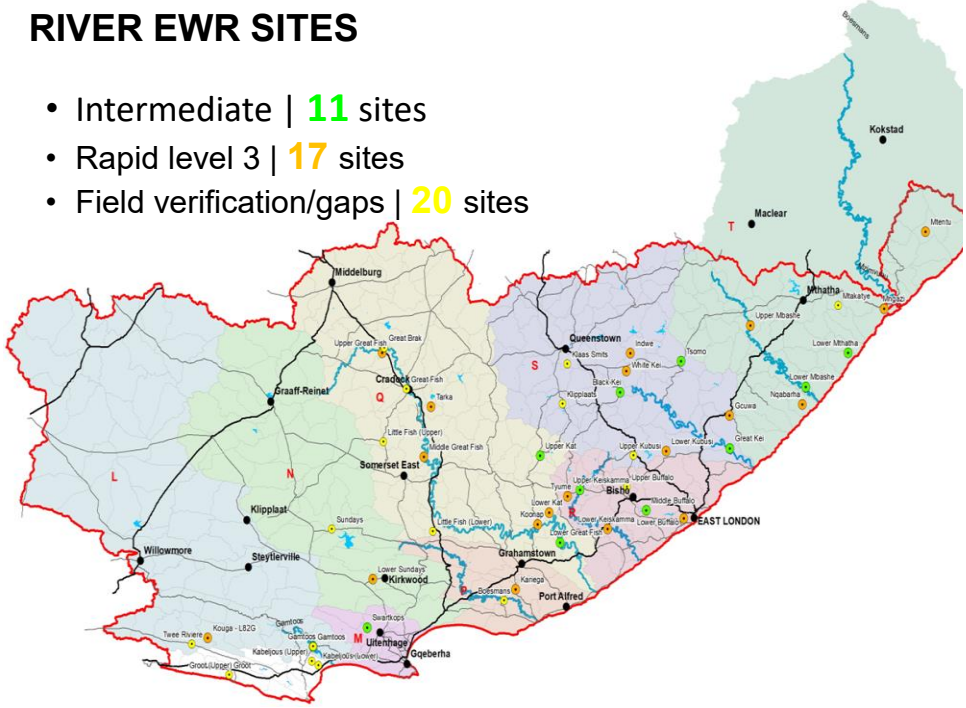
RIVER EWR SITES

- Intermediate | **11** sites
- Rapid level 3 | **17** sites
- Field verification/gaps | **20** sites



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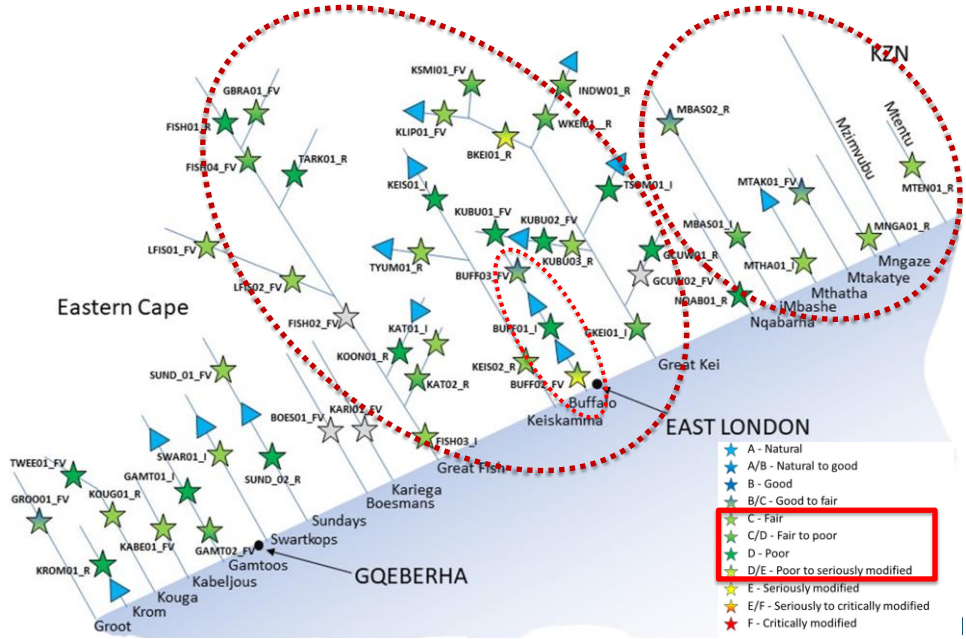
PRESENT ECOLOGICAL STATUS



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BUFFALO RIVER RESERVE

IUA_RO2 (Buffalo/Nahoon)

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BUFFALO RIVER RESERVE

BUFF01_I (R20F)

Driver component	PES
HAI	C
Diatoms	D
GAI	C
Response component	**PES**
FRAI	E
MIRAI	C/D
VEGRAI	D
Ecostatus	**D**
EI	Moderate
ES	Moderate

Key pressures:

- Sedimentation, flow regulation (dams/weirs), nutrient enrichment
- Habitat impacts: Loss of coarse habitats; degraded banks and riparian zones
- Biota response: Reduced native fish diversity; impaired macroinvertebrate communities (quality)
- Riparian condition: Highly disturbed with widespread invasive alien plants

REC	**D**
TEC	**C/D**

The final step was the quantification of the EWR (habitat-flow-stressor-response model) and include the conversion of the EWR flow data for a REC of a D to hydraulic conditions at the EWR site (i.e. depth and flow velocities at discharges measured at the site in m³/s) using a hydraulic model.

Recommended Ecological Category	D
nMAR at EWR site	83.8
Total EWR	28.866 (34.46 %MAR)
Maintenance Low flows	13.521 (16.14 %MAR)
Drought Low flows	4.621 (5.52 %MAR)
Maintenance High flows	15.345 (18.32 %MAR)
Overall confidence	Moderate to high

Floods	Flood size (range)	FINAL
Class 1 (0-5.5 m^3/s)	m^3/s	4
	# days	4
	Months	Oct, Dec, Jan, Apr
	Type	Daily average
Class 2 (10-30 m^3/s)	m^3/s	20
	# days	3
	Months	Nov, Feb
	Type	Daily average
Class 3 (80-100 m^3/s)	m^3/s	40
	# days	3
	Months	Mar
	Type	Peak

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SUMMARY OF ESTUARY RESERVE

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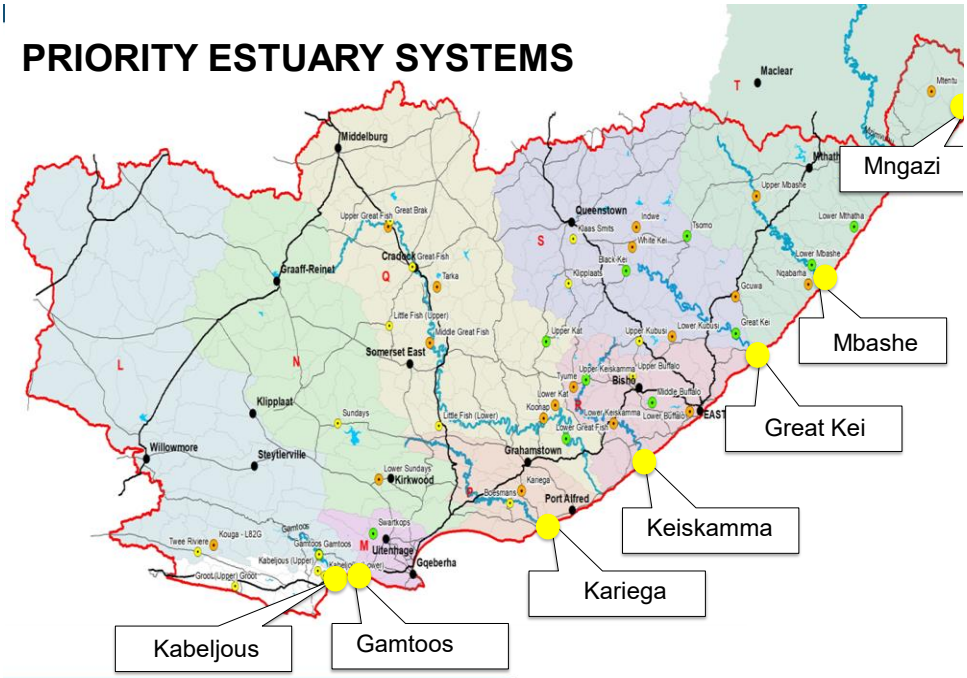
PRIORITY ESTUARY SYSTEMS



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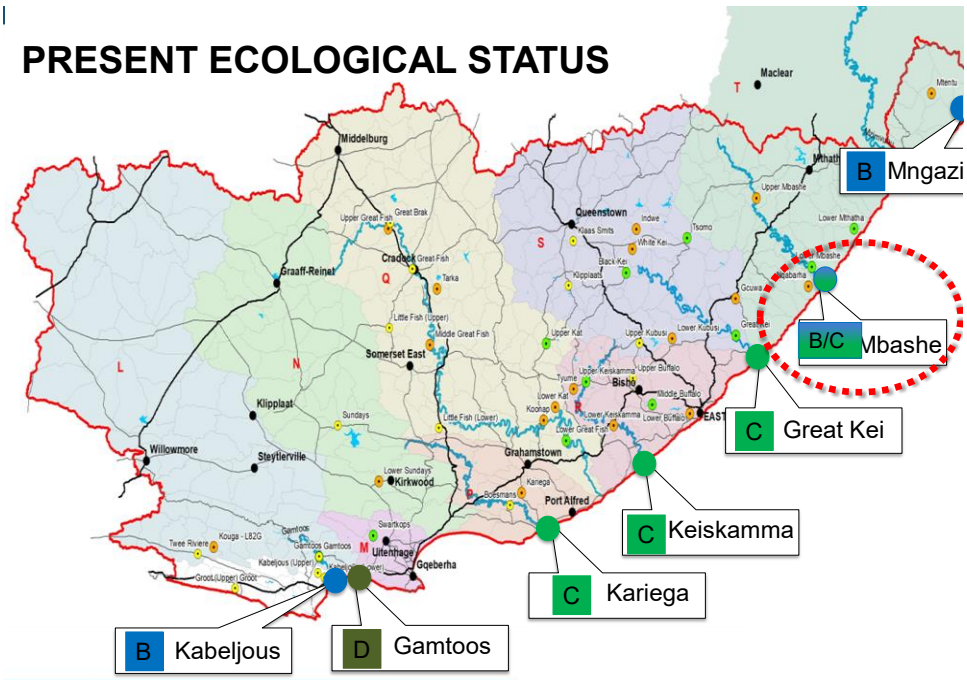
PRESENT ECOLOGICAL STATUS



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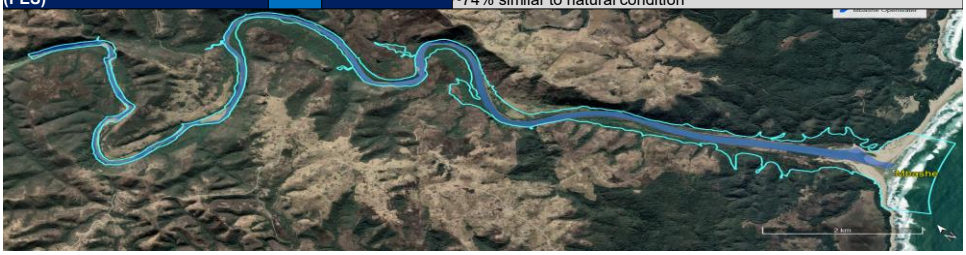
Variable	Mbashe Estuarine health score		
	Score	% attributed to non-flow related impacts	Explanations
Hydrology	68	0%	Flow changes: Increased baseflows reduce salinity and keep the mouth less constricted
Hydrodynamics and mouth condition	78	0%	Estuarine Function Zone: Agricultural activities cause habitat loss
Water quality	63	90%	Water quality: Declining due to agricultural activities in the catchment and estuary
Physical habitat alteration	80	100%	Habitats: Saltmarsh and mangroves degraded by overgrazing and cattle trampling
Habitat health score	**72**		
Microalgae	80	50%	
Macrophytes	80	20%	
Invertebrates	76	17%	
Fish	60	25%	Living resources: Severe over-exploitation (recreational, small-scale and illegal fishing)
Birds	79	20%	Biodiversity: Recreational pressure reduces bird abundance in lower and middle reaches
Biotic health score	**75**		
ESTUARY HEALTH SCORE	**74**		
PRESENT ECOLOGICAL STATUS (PES)	**B/C**		~74% similar to natural condition



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PES	Biodiversity	REC	TEC	nMAR ($X10^6$ m^3)	EWR (% NMAR)
B/C	High	B	B	787	108.5

%ile	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
99	159.58	178.78	147.14	166.59	171.52	244.68	147.93	86.02	82.59	96.80	92.24	143.03
90	54.15	106.87	81.31	69.89	87.74	111.56	78.18	30.68	18.78	19.15	25.80	57.10
80	30.53	61.61	58.58	50.33	58.44	69.96	47.09	22.85	13.50	11.44	10.04	22.20
70	22.45	32.51	40.35	34.16	40.08	57.62	28.70	14.48	10.27	9.40	9.26	14.03
60	19.29	22.72	22.76	25.72	32.63	43.32	23.75	10.22	8.51	8.26	7.96	9.28
50	15.71	17.35	15.77	19.41	27.32	32.34	18.26	8.62	7.57	7.44	7.36	8.18
40	11.00	14.10	10.50	13.94	19.34	23.01	14.30	7.83	7.15	6.79	6.64	7.27
30	8.57	10.70	8.23	9.49	14.44	16.64	11.75	6.92	6.88	6.43	6.17	6.28
20	7.54	8.71	6.06	7.28	10.66	12.65	8.14	6.50	6.35	5.93	5.93	5.98
10	6.29	7.00	5.52	5.69	7.72	10.13	6.92	6.01	5.67	5.45	5.43	5.57
1	4.36	4.66	3.06	2.89	5.04	3.00	4.77	3.55	3.13	3.08	3.12	3.40

- Key interventions to achieve REC:
  - Develop, implement an Estuary Management
  - Reduce fishing pressure
    - Access control, compliance and community engagement
  - Improve water quality
    - Managing nutrient inputs, restoring riparian vegetation
  - Protect riparian, saltmarshes, mangroves and EFZ habitats
    - Limiting cattle trampling, fire and alien vegetation

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SUMMARY OF WETLAND RESERVE

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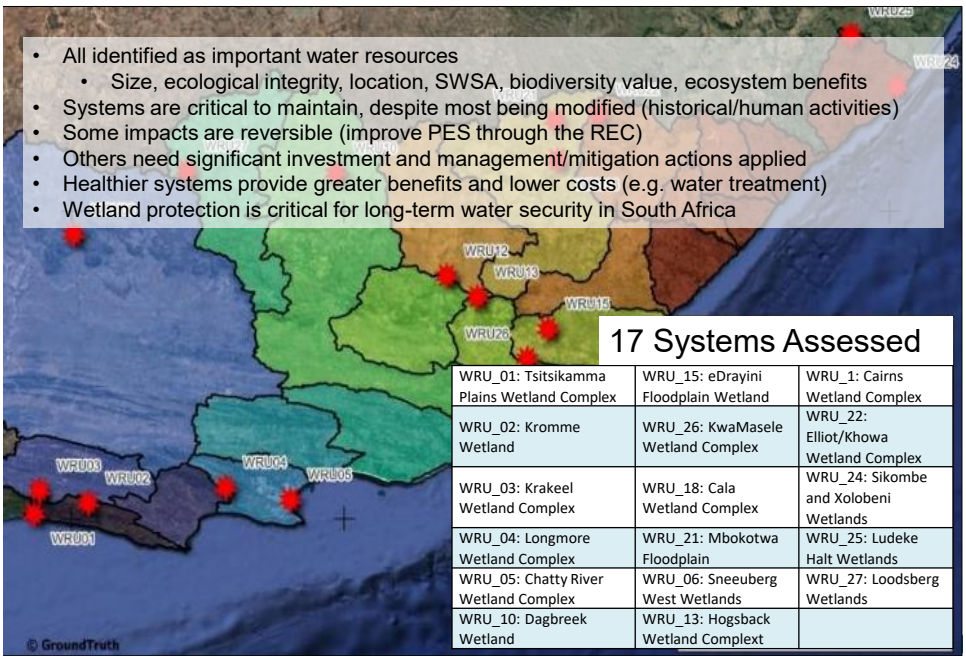
PRIORITISED WETLAND SYSTEMS

- All identified as important water resources
  - Size, ecological integrity, location, SWSA, biodiversity value, ecosystem benefits
- Systems are critical to maintain, despite most being modified (historical/human activities)
- Some impacts are reversible (improve PES through the REC)
- Others need significant investment and management/mitigation actions applied
- Healthier systems provide greater benefits and lower costs (e.g. water treatment)
- Wetland protection is critical for long-term water security in South Africa



17 Systems Assessed

WRU_01: Tsitsikamma Plains Wetland Complex	WRU_15: eDrayini Floodplain Wetland	WRU_1: Cairns Wetland Complex
WRU_02: Kromme Wetland	WRU_26: KwaMasele Wetland Complex	WRU_22: Elliot/Khowa Wetland Complex
WRU_03: Krakeel Wetland Complex	WRU_18: Cala Wetland Complex	WRU_24: Sikombe and Xolobeni Wetlands
WRU_04: Longmore Wetland Complex	WRU_21: Mbokotwa Floodplain	WRU_25: Ludeke Halt Wetlands
WRU_05: Chatty River Wetland Complex	WRU_06: Sneeuberg West Wetlands	WRU_27: Loodsberg Wetlands
WRU_10: Dagbreek Wetland	WRU_13: Hogsback Wetland Complext	

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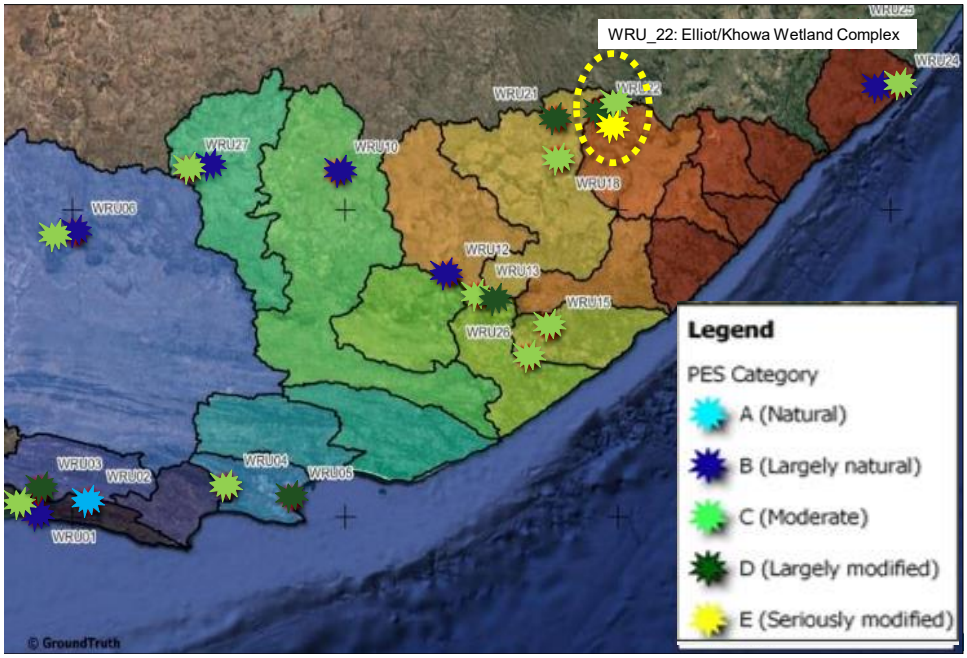
PRIORITISED WETLAND SYSTEMS



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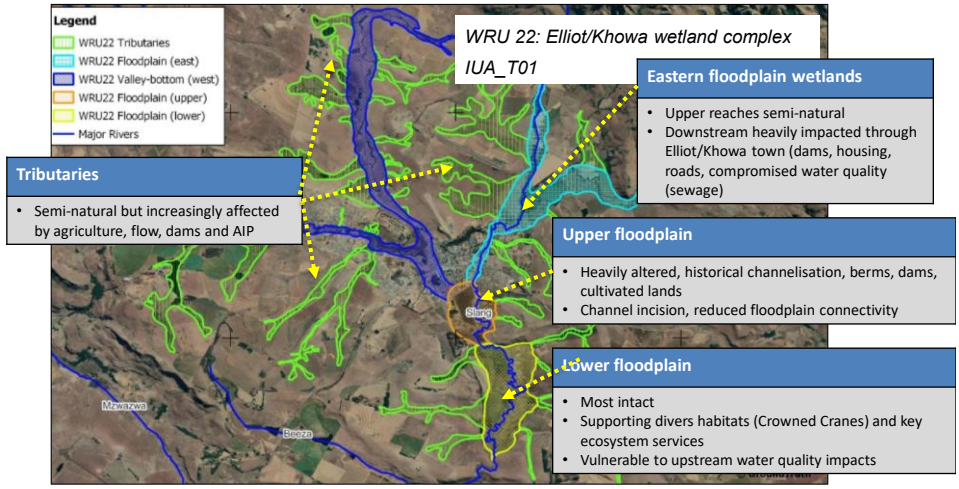
PRESENT ECOLOGICAL STATUS



- Wetland complex through Elliot/Khowa
- Part of upper Mbashe headwaters
- 5 HGM units assessed to distinguish intact and degraded areas
- Pressures: agriculture, urban in-system impacts resulting in wetland degradation

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PRESENT ECOLOGICAL STATUS

IUA_T01: WRU 22: Elliot/Khowa wetland complex

Channelled valley-bottom (west)

PES Assessment	Hydrology	Geomorphology	Water Quality	Vegetation
Impact Score	4.3	2.1	6.1	5.9
PES Score (%)	57%	79%	6%	41%
Ecological Category	**D →**	**C →**	**E ↓**	**D →**
Combined Impact Score	4.5			
Combined PES Score (%)	55%			
Combined Ecological Category	**D →**			

Approach applied to all 5 wetland HGM units separately to reflect differences in impacts and ecological integrity

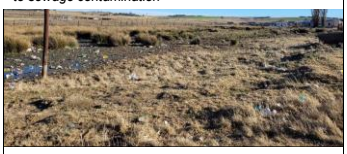
HGM Type	PES	EIS	Key ecosystem services provided	REC
Hillslope Seep (Tributaries))	D	C	Streamflow regulation, Grazing	C / D
Floodplain (east)	D	A	Flood attenuation, Streamflow regulation, Biodiversity	C / D
Channelled valley-bottom (west)	D	A	Water quality enhancement, Grazing, Flood attenuation	C
Floodplain (upper)	E	A	Biodiversity, Water quality enhancement, flood attenuation	D
Floodplain (lower)	C	A	Biodiversity, Flood attenuation, Water quality enhancement	B

Determining the REC: PES, EIS, land use/landcover (all wetlands detrimentally affected by water quality (i.e. raw sewage discharge)

WATER IS LIFE - SANITATION IS DIGNITY

Intact portion of the channelled valley-bottom wetland associated with the floodplain wetland.

Solid waste and die - back of wetland vegetation due to sewage contamination



Surcharging manhole with the sewage being directed towards the wetland

Incised floodplain channel constrained by geological controls (north) and a flood protection berm (south)

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PRESENT ECOLOGICAL STATUS

IUA_T01: WRU 22: Elliot/Khowa wetland complex

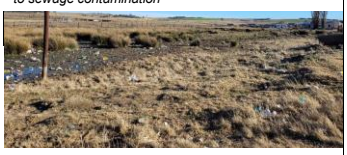
HGM Type	PES	REC
Hillslope Seep (Tributaries))	D	C / D
Floodplain (east)	D	C / D
Channelled valley-bottom (west)	D	C
Floodplain (upper)	E	D
Floodplain (lower)	C	B

- Measures to meet the REC:
  - Address/control contaminated water inputs (i.e. raw sewage from overflowing manholes and non-functional WWTWs)
  - Improve water quality, as current PES water quality scores range from D to E for most units
  - Manage AIPs to reduce ecological degradation
  - Improve agricultural practices, especially within floodplain systems
  - Protect lower floodplain dynamics by prohibiting AIP encroachment, cultivation, and intensive grazing

WATER IS LIFE - SANITATION IS DIGNITY

Intact portion of the channelled valley-bottom wetland associated with the floodplain wetland.

Solid waste and die - back of wetland vegetation due to sewage contamination



Surcharging manhole with the sewage being directed towards the wetland

Incised floodplain channel constrained by geological controls (north) and a flood protection berm (south)

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SUMMARY OF GROUNDWATER RESERVE

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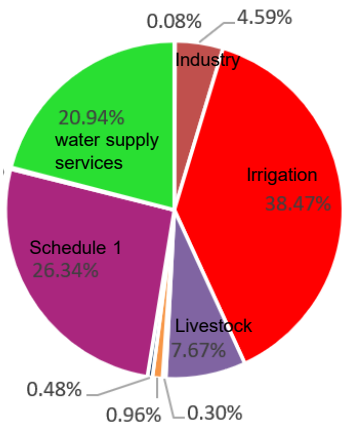
GROUNDWATER USE

- Registered groundwater resources: 4,266
  - 3,727 boreholes
  - 539 springs
- Total registered groundwater use: 154.52 Mm³/annum
- Groundwater use by sector:
  - Irrigation: 38% (largest user)
  - Schedule 1: 26%
  - Water supply services (mainly municipalities): 21%
  - Other sectors (aquaculture, livestock, industry, mining, power generation and recreation): ~15%



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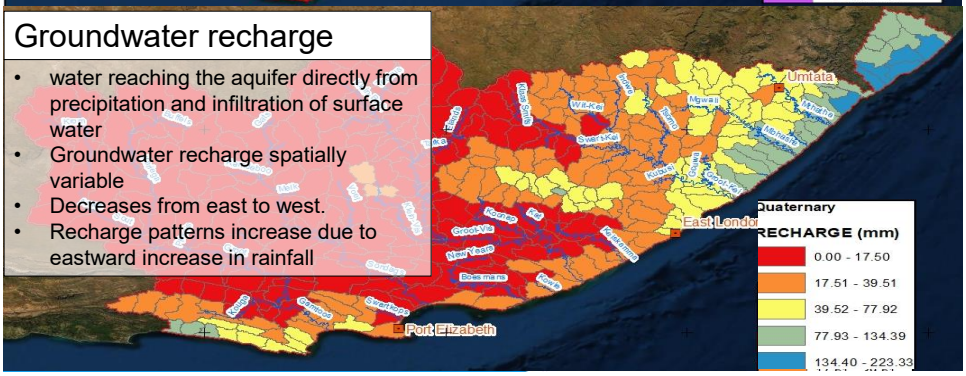
Groundwater quality

- Quality is generally good.
- Poorer quality (coastal and arid western areas)
- Elevated nitrates/nitrates - agricultural activities.
- Sulphates elevated (west)
- Treatment is required in some areas for domestic use.

Groundwater recharge

- water reaching the aquifer directly from precipitation and infiltration of surface water
- Groundwater recharge spatially variable
- Decreases from east to west.
- Recharge patterns increase due to eastward increase in rainfall



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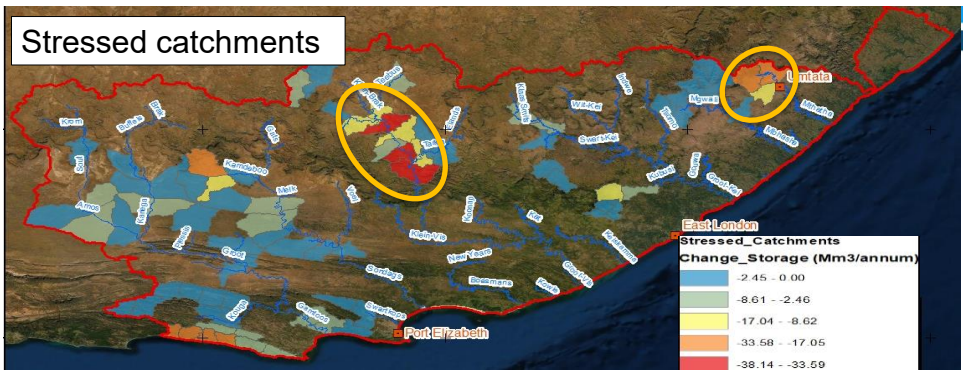
Stressed catchments



- Several stressed quaternary catchments have been identified in the area where the estimated groundwater use exceeds the estimated groundwater recharge
  - Ultimately has an effect on basic human needs and baseflow requirements
- Most stressed quaternaries are low to moderately stressed
- The highly stressed areas are parts of the Karoo, southern coast and Mthatha area.

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GROUNDWATER PRESENT ECOLOGICAL STATUS

- Available groundwater and other relevant data from DWS
  - Time series groundwater levels (Hydstra)
  - Time series groundwater quality (mainly WMS) – limited
  - Groundwater Abstraction (mainly WARMS)
  - Flow data (WR, 2012)

- The available Groundwater Recharge and Use data were used to quantify the Stress Index (WRC, 2012)

SI index expressed as either a **surplus** or **deficit** per quaternary catchment

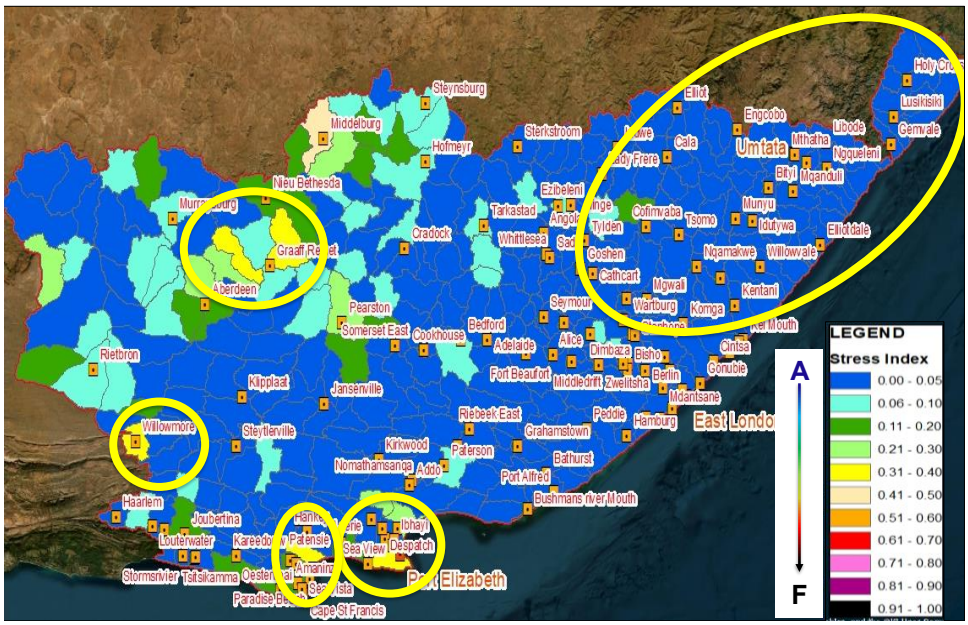
Stress Index (SI) = GW_{use}/Re

Where:

Re = Recharge

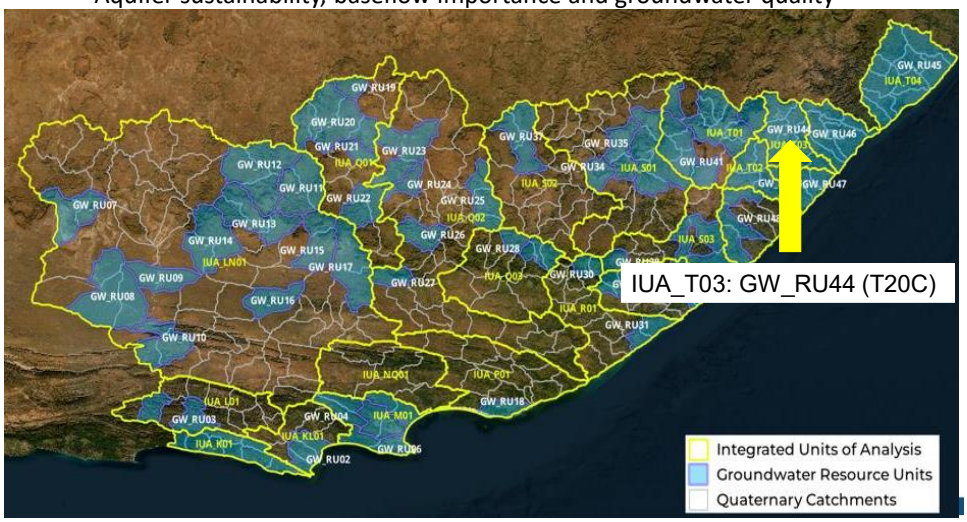
GW_{use} = Groundwater Use

STRESS INDEX DISTRIBUTION IN THE CATCHMENT



GROUNDWATER RESERVE

- 17 prioritised groundwater systems selected on:
  - Over-extraction risks and pollution pressures
  - Aquifer sustainability, baseflow importance and groundwater quality



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GW QUANTITY RESERVE

Quat	Total Population	Recharge[1] (Mm3/a)	BHN[2] (Mm3/a)	Groundwater Component of Baseflow[3,4] (Mm³/a)	Reserve[5] (Mm³/a)	GW Use (Mm³/annum)	Stress Index Value	Stress Index Category
T20B	49645	39.02	0.0099	16.40	16.41	160376	0.0041	A
T20C	109351	20.37	0.0088	10.08	10.09	113072	0.0056	A
T20D	152158	20.11	0.0186	7.72	7.74	469445.8	0.0233	A
T20E	61989	25.23	0.0186	9.00	9.01	10000	0.0004	A
T20F	57247	26.76	0.0107	8.82	8.83	166750	0.0062	A
T20G	-	26.49	0.0000	8.16	8.16	0	0.0000	A

[1]***Recharge:*** *water reaching the aquifer directly from precipitation and infiltration of surface water.*
[2]***Basic Human Needs:*** *The minimum water supply standard necessary for household life and hygiene, currently set at 25 l/p/d for persons with informal supply.*
[3]***Baseflow*** *(streamflow sustained by GW)* ***and so the*** [4]***Groundwater component of baseflow*** *is the contribution from the adjacent aquifer, excluding short-term subsurface flows.*
[5]***The Reserve:*** *constitutes the sum of the groundwater baseflow required by EWR plus the Basic Human Needs (BHN) Reserve.*

GW QUALITY RESERVE

Chemical Parameter	Unit	Quaternary T20C			
		No. of Samples	Ambient GW quality or median[1]	BHN Threshold[2]	Groundwater Quality Reserve[3]
pH	–	6	7.70	5.0 – 9.5	6.93 – 8.47
Electrical Conductivity	mS/m	6	120.00	<150	132.00
Calcium as Ca	mg/l	6	74.85	<150	82.34
Magnesium as Mg	mg/l	6	34.55	<100	38.01
Sodium as Na	mg/l	5	145.30	<200	159.83
Potassium as K	mg/l	5	2.52	<50	2.77
Chloride as Cl	mg/l	6	167.90	<200	184.69
Sulphate as SO_4	mg/l	5	16.60	<400	18.26
Nitrate and Nitrite as N	mg/l	6	1.06	< 10	1.17
Fluoride as F	mg/l	6	0.28	<1.5	0.31
				Water quality class	Class 1

[1] Median value (calculated from population of samples in QC).
[2] Upper limit of Class I water quality (DWAF et al 1998).
[3] The median plus 10% for the Groundwater Quality Reserve.

Chemical Parameter	Assigned Water Quality Class Based on the South African Water Quality Guideline Domestic Use Limits[1]				
	Units	Class 0 (TWQR)[2]	Class I	Class II	Class III
pH	pH Units	6 - 9	5 - 6 & 9 - 9.5	4 – 5 & > 9.5 - 10	< 4 or > 10
Total Dissolved Solids	mg/l	0 - 450	450 - 1000	1000 - 2450	> 2450
Electrical Conductivity	mS/m	0 - 70	70 - 150	150 - 300	> 370
Calcium as Ca	mg/l	0 - 80	80 - 150	150 - 300	> 300
Magnesium as Mg	mg/l	0 - 30	30 - 70	70 - 100	> 100
Sodium as Na	mg/l	0 - 100	100 - 200	200 - 400	> 400
Chloride as Cl	mg/l	0 - 100	100 - 200	200 - 600	> 600
Sulphate as SO_4	mg/l	0 - 200	200 - 400	400 - 600	> 600
Nitrate as N	mg/l	<6	6 - 10	10 - 20	>20
Flouride as F	mg/l	0 - 1	1 - 1.5	1.5 - 3.5	> 3.5
Faecal coliforms	counts/100ml	0	0 - 1	1 - 10	> 10

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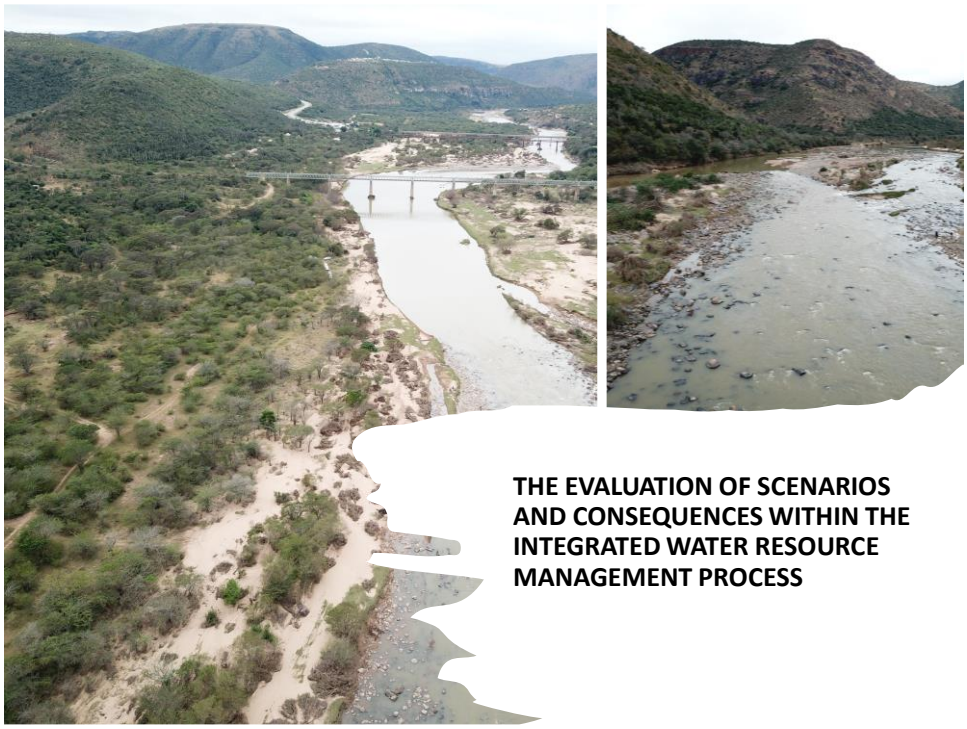

THE EVALUATION OF SCENARIOS AND CONSEQUENCES WITHIN THE INTEGRATED WATER RESOURCE MANAGEMENT PROCESS

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SCENARIOS AND CONSEQUENCES

The integrated steps for Classification, Reserve and RQOs will be guided by the "Development of Procedures to operationalise Resource Directed Measures (DWS, 2017).

INTEGRATED FRAMEWORK

1. Delineate and prioritise RUs and select study sites
2. Describe status quo and delineate the study area into IUAs
3. Quantify BHN and EWR
4. Identify and evaluate scenarios within IWRM
5. Determine Water Resource Classes based on catchment configurations for the identified scenarios
6. Determine RQOs (narrative and numerical limits) and provide implementation information
7. Gazette Water Resource Classes and RQOs
8. Gazette the Reserve

GAZETTED STEPS FOR CLASSIFICATION, RESERVE AND RQOs

CLASSIFICATION	RESERVE	RESOURCE QUALITY OBJECTIVES
1. Delineate IUAs and describe status quo	1. Initiate the BN and EWR assessment	1. ID water users within each resource management unit
2. Link the socio-economic and ecological value and condition of the water resources	2. Determine EcoRegions, delineate RU, select study sites (align with Step 1)	2. Determine present state pe water user
3. Quantify EWRs and changes in non-water quality EGSA	3. Determine reference condition, PES and EIS of study sites	3. Determine desired water quality per user
4. Determine an ecologically sustainable base configuration scenarios	4. Determine BHN and EWR (align Step 3)	4. Determine water user specifications
5. Evaluate scenarios within IWRM	5. Determine operational scenarios and its socio-economic and ecological consequences	5. Determine water quality requirements
6. Evaluate scenarios with stakeholders	6. Evaluate the scenarios with stakeholders (align Step 6)	6. Gazette and implement
7. Gazette and implement the class configuration	7. Design an appropriate monitoring programme	
	8. Gazette and implement the Reserve	

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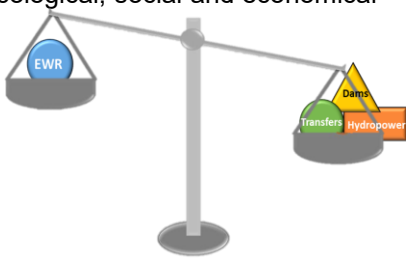
SCENARIOS AND CONSEQUENCES

- Scenarios, in context of water resource management and planning, are plausible definitions (settings) of all the factors (variables) that influence the water balance and water quality in a catchment and the system as a whole;
- Each scenario represents an alternative future condition;
- Generally, reflects a change to the present condition;
- Such analysis enables a comparison of different scenarios, helping to choose the preferred one (where REC is met);
- Various models to predict changes in all ecological, social and economical components are assessed
- The process requires a wide range of trade-offs to be evaluated
- Final outcome: set of desired characteristics for use and ecological condition for each of the water resources
- Aids in the recommended classes/IUA for ministers' consideration.



REC not met – lower the TEC or trade-off?

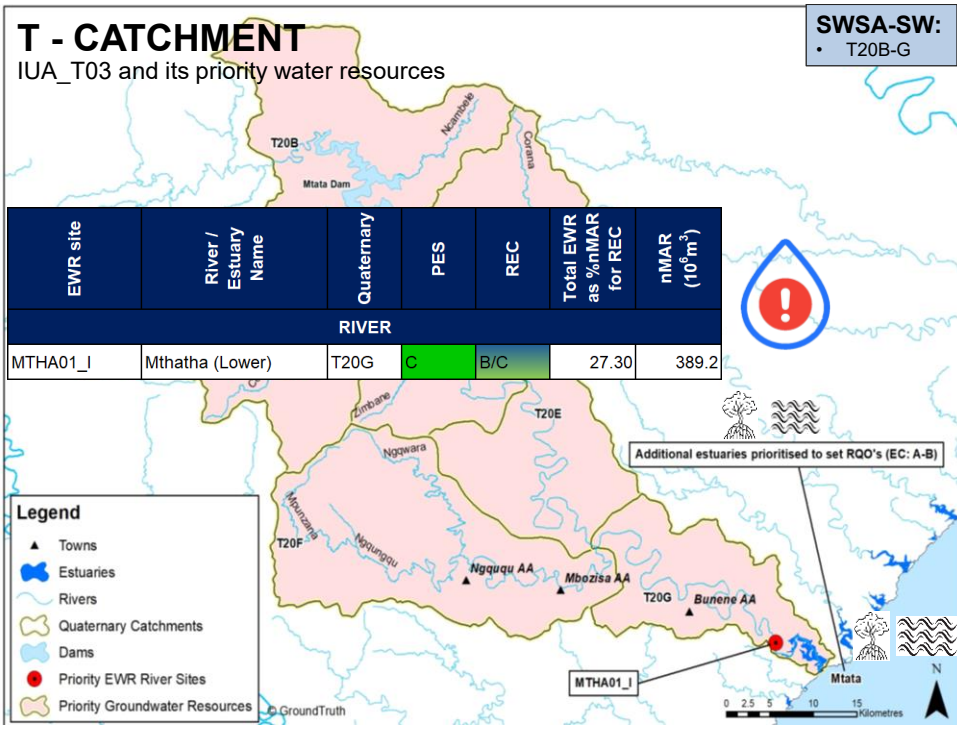
OPERATIONAL SCENARIOS

Scenario 1 (Sc1) **Present Day Demands**	• Sc1a (without EWR): modelled flows in water resource and supply to users without EWR • Sc2b (with EWR): where the EWR for REC for water resource is included into the models and prioritised to ensure the flows are provided to meet ecological needs
Scenario 2 (Sc2) **Medium Term (2030)**	• Sc2a (without EWR) • Sc2b (with EWR)
Scenario 3 (Sc3) **Long Term (2050)**	• Sc3a (without EWR) • Sc3.1a (intervention alternative scenario without EWR) • Sc3b (with EWR) • Sc3.1b (intervention alternative scenario with EWR)
Scenario 4 (Sc4)	• Water quality considered and predicted. Only selected IUAs where water quality was identified to be of concern and/or the driver of the ecological state
Scenario 5 (Sc5)	• Climate change considered and predicted (Algoa)

T - CATCHMENT

IUA_T03 and its priority water resources

SWSA-SW:
- T20B-G



EWR site	River / Estuary Name	Quaternary	PES	REC	Total EWR as %nMAR for REC	nMAR (10^6m^3)
RIVER						
MTHA01_I	Mthatha (Lower)	T20G	C	B/C	27.30	389.2

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SCENARIOS AND CONSEQUENCES FOR IUA_T03

Sc.	Scenario descriptions	Code	Description
Sc1	Present Day Demands *(Forestry, irrigation)*	Sc1a	Sc1a (without EWR)
		Sc1b	Sc1b (with EWR - rivers)
Sc2	Medium Term (2030) *(Domestic growth - Mthatha, GW developments re-use of water)*	Sc2a	Sc2a (without EWR)
		Sc2b	Sc2b (with EWR - rivers)
Sc3	Long Term (2050) *Domestic growth - Mthatha, GW developments re-use of water, hydropower increase (90 million m^3/yr)*	Sc3a	Sc3a (without EWR) - high water use demand
		Sc3b	Sc3b (with EWR - rivers) - high water use demand
		Sc3a.1	Sc3b (with EWR - rivers) - low water use demand
	Sc3.1: domestic growth, hydropower (132 million m^3/yr)	Sc3b.1	Sc3b (with EWR - rivers) - low water use demand
		Sc3c	Sc3b (with EWR, no freshets/ floods - rivers) - high water use demand
		Sc3*	Sc3b (with EWR, with freshet=15cumec - rivers) - high water use demand
Sc4	Water quality	Sc4	The future water quality depends on Sc1b (current status)

IUA		Resource	EWR site	REC	Ecology	Socio-economics
No.	Code				Motivation	Motivation
18	IUA_T03	River	MTHA01_I (Mthatha (Lower))	B/C	Sc3b is recommended to provide the necessary flows and habitats for the aquatic biota at all the EWR site. However, the revised EWR to reduce the freshet and flood requirements resulted in a TEC of a C category.	There are no economic trade-offs when the EWR is implemented in this IUA.

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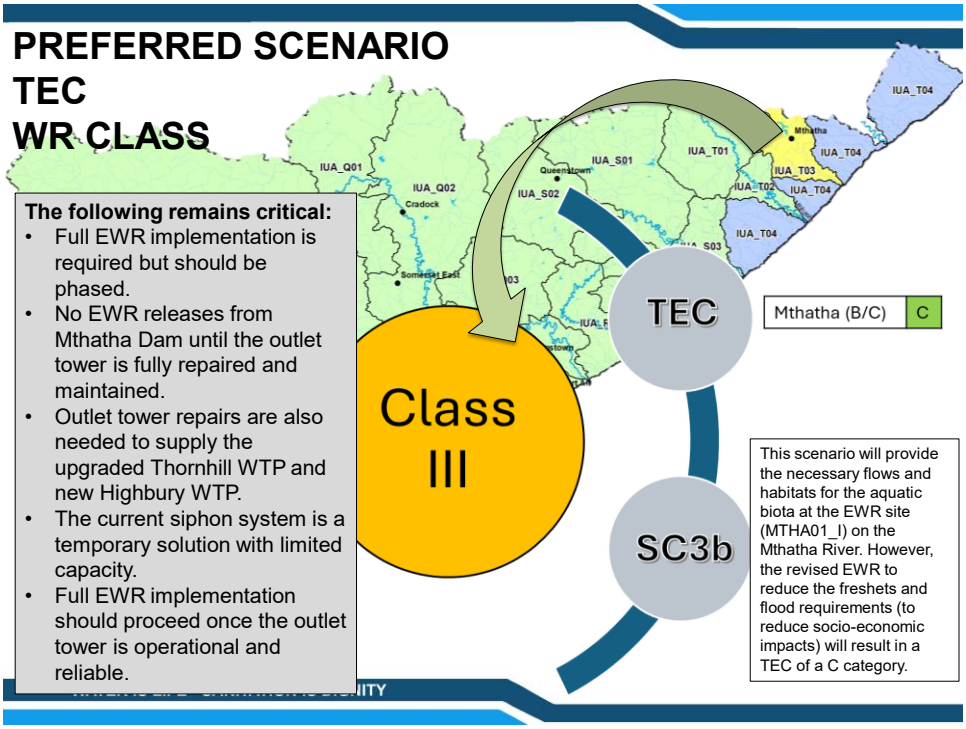
PREFERRED SCENARIO
TEC
WR CLASS



The following remains critical:

- Full EWR implementation is required but should be phased.
- No EWR releases from Mthatha Dam until the outlet tower is fully repaired and maintained.
- Outlet tower repairs are also needed to supply the upgraded Thornhill WTP and new Highbury WTP.
- The current siphon system is a temporary solution with limited capacity.
- Full EWR implementation should proceed once the outlet tower is operational and reliable.

This scenario will provide the necessary flows and habitats for the aquatic biota at the EWR site (MTHA01_I) on the Mthatha River. However, the revised EWR to reduce the freshets and flood requirements (to reduce socio-economic impacts) will result in a TEC of a C category.

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PROPOSED WATER RESOURCES CLASS PER INTEGRATED UNIT OF ANALYSIS (IUA)

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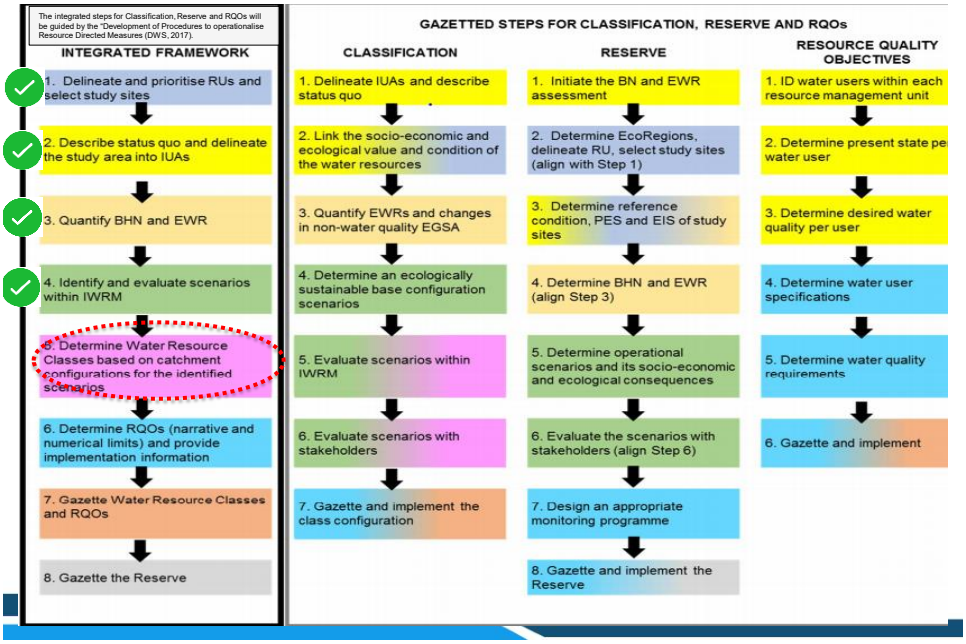
WATER RESOURCE CLASSES



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PROPOSED WATER RESOURCE CLASSES

Class	Description of use	EC	Description of resource
Class I	Minimal use	A-B	Minimally altered
Class II	Moderate use	C	Moderately altered
Class III	Heavy used	D	Heavily altered

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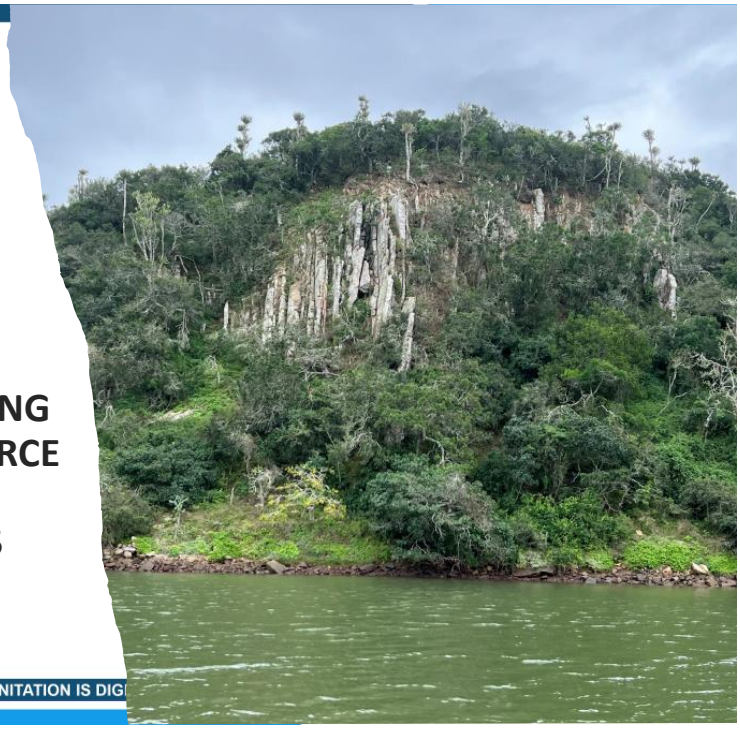
DETERMINING THE RESOURCE QUALITY OBJECTIVES



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RESOURCE QUALITY OBJECTIVES

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RESOURCE QUALITY OBJECTIVES

- RQOs defines the desired condition for all water resources by setting measurable targets for water quantity, quality, habitat, and biota - ensuring sustainable use and protection of the resources.

RQOs closely aligned with Sustainable Development Goals (SDG)

  - Particularly, SDG 6
  - Aims to ensure the availability and sustainable management of water and sanitation for all
- The alignment can be summarised as follows:
  - ***Water Quality (SDG 6.3):*** Sets benchmarks to reduce pollution, manage chemicals, and reuse treated wastewater.
  - ***Water Quantity (SDG 6.4):*** Supports sustainable withdrawals and prevents water scarcity.
  - **Ecosystem Protection (SDG 6.6):** Safeguards and restores aquatic ecosystems.
  - **Integrated Management (SDG 6.5):** Central to Integrated Water Resource Management (IWRM).
  - **Monitoring & Accountability (SDG 6.1, 6.2, 6.a):** Provides measurable targets to enhance governance and ensure equitable access.

Criteria for setting Resource Quality Objectives

- Simple, easily measured, understood, applied
- Use existing information where possible
- At appropriate scale and must detect change
- Comparable, repeatable, defensible
- May be drivers or response indicators
- Narrative and/or numeric
- Meaningful in terms of the Act

- RQOs cannot/do not:
  - Be applied to an individual licence
  - Replace the need for other monitoring programmes
  - Include every available indicator of resource quality
  - Be considered as absolute “truths”

COMPLETED PRIORITISED RESOURCE UNITS

- Presented in detail to stakeholders at the June 2026 TTG meetings
- Overall, 229 priority Resource Units (RUs) were identified across the study area
  - Initial identification following the delineation of the IUAs
  - Revised and refined during the Resource Quality Objectives (RQOs) phase
  - RQOs were developed for these priority RUS for rivers, dams, wetlands, estuaries, GW

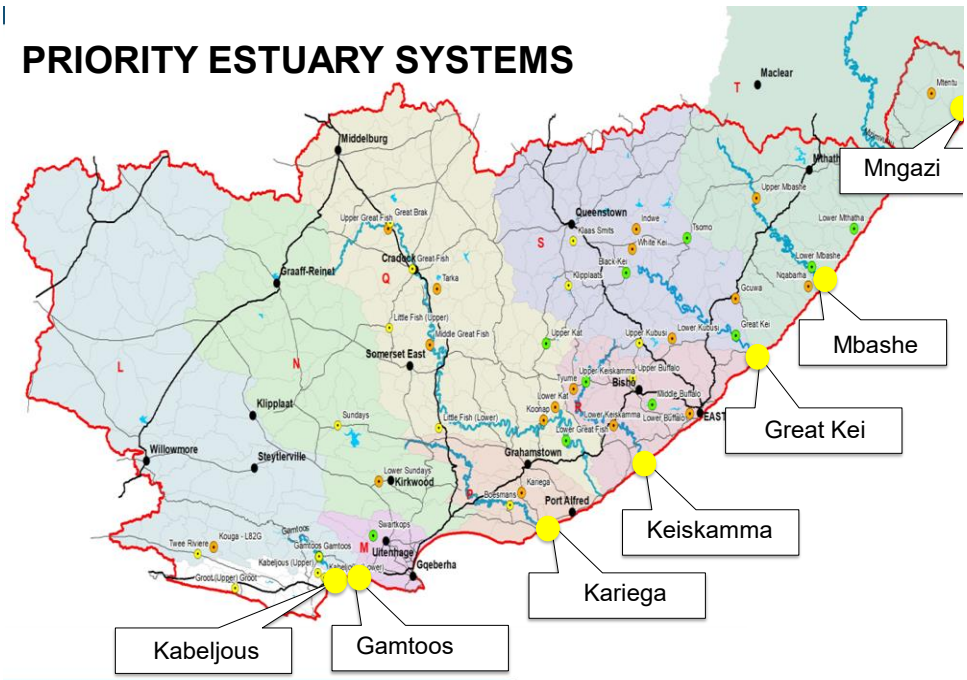
Priority Rivers

- 145 river RUs
  - Prioritised using the DWS evaluation tool that assessed key land-use activities and their impacts on water resources.
  - This informed the targeted selection of indicators and the development of practical, implementable RQOs.

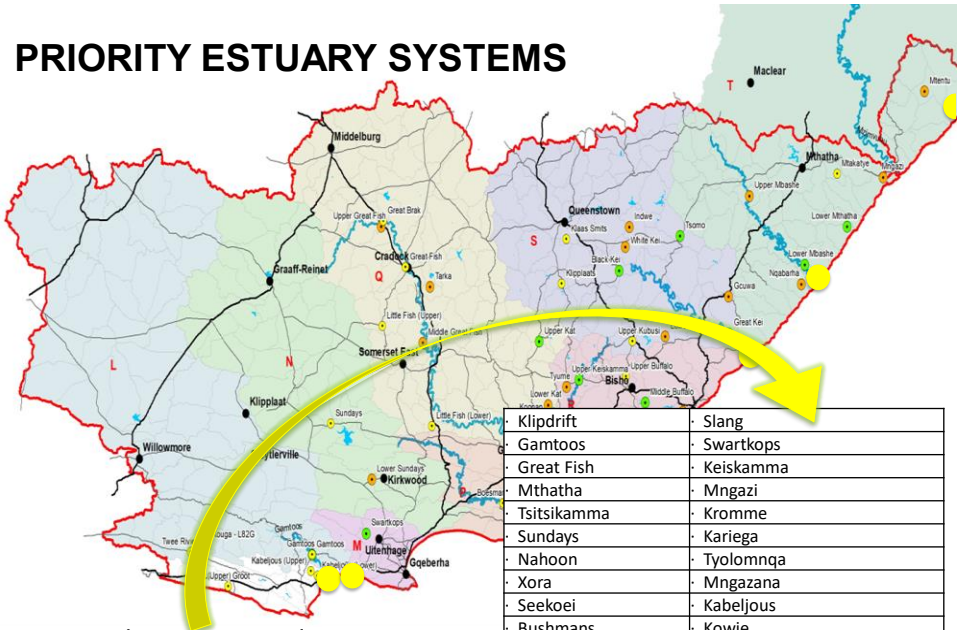
Priority Dams

- 24 key dams prioritized
  - Significant landscape, dependency or water quality importance
  - Focusing on dams influenced by surrounding activities, critical to water resource management.

PRIORITY ESTUARY SYSTEMS



PRIORITY ESTUARY SYSTEMS



Total: 26 prioritised estuary RU

· Klipdrift	· Slang
· Gamtoos	· Swartkops
· Great Fish	· Keiskamma
· Mthatha	· Mngazi
· Tsitsikamma	· Kromme
· Sundays	· Kariega
· Nahoon	· Tyolomnqa
· Xora	· Mngazana
· Seekoei	· Kabeljous
· Bushmans	· Kowie
· Great Kei	· Mbashe
· Mzintlava	· Msikaba
· Mtentu	· West/East Kleinemonde

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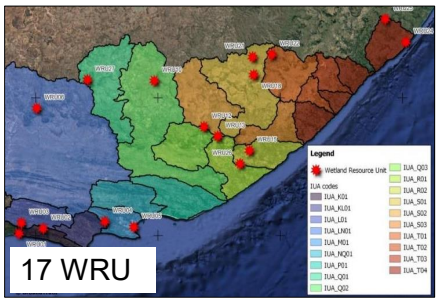
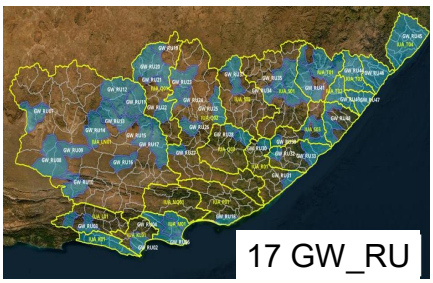
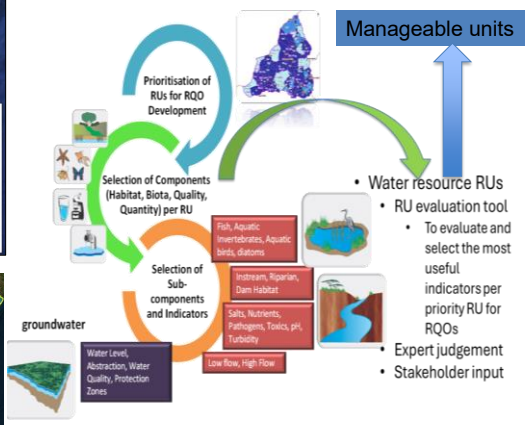
PRIORITISED WETLAND AND GW



17 WRU



17 GW_RU



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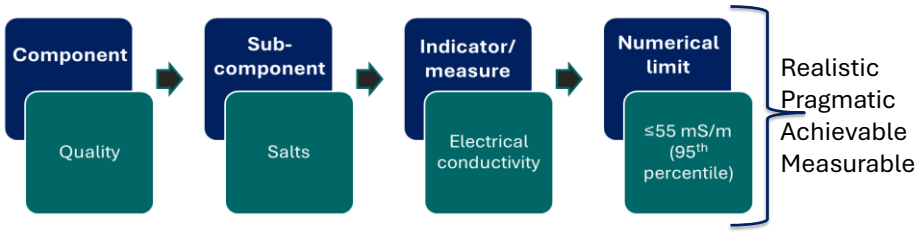
RESOURCE QUALITY OBJECTIVES PER RU

- For setting the RQOs:
  - Components – sub-components – indicators – numerical limits



- Based on:
  - Activities that impact on water resources
  - User requirements
- Protection of the resource

SUB-COMPONENTS FOR WHICH RQOs HAVE BEEN SET

Dams	
Quantity	Dam level
	Dam operating rules
	Reduction in live storage
Quality	Clarity/ Sechi Disc Indication
	Cyanobacteria
Vegetation	Alien aquatic plant species
	In-channel Phragmites sp./reeds

Rivers	
Component	Sub-component
Quantity	Low Flows
	High Flows
Quality	Nutrients
	Salts
	System variables
	Toxics
	Pathogens
Habitat	Geomorphology
	Riparian vegetation
	Integrated Habitat (instream and riparian)
Biota	Fish
	Macroinvertebrates
	Diatoms

Estuaries	
Component	Sub-component
Hydrodynamics	Mouth condition
	Abiotic states
Quality	Salinity
	Dissolved inorganic nitrogen
	Dissolved inorganic phosphate
	Water clarity
	Dissolved oxygen
	Toxic substances
	Pathogens
Habitat	Intertidal
	Subtidal
	Substrate type
Biota	Microalgae
	Macrophytes
	Macroinvertebrates
	Fish
	Birds

Groundwater
Quantity (abstraction)
Aquifer water level
Water quality
Protection zones

Wetlands	
Components	Sub-components
Quantity	Water inputs
	Water distribution and retention
Quality	Nutrients
	Salts
	System variables
	Toxics
	Microbial determinants
Habitat	Present Ecological State (PES)
	Geomorphology
	Wetland vegetation
Biota	Fish
	Plant species
	Mammals
	Birds
	Amphibians & reptiles
	Periphyton
	Aquatic invertebrates
	Diatoms

RESOURCE QUALITY OBJECTIVES

ALL WATER RESOURCES
R CATCHMENT

IUA No.	IUA Code	River	Dams	Estuary	Groundwater	Wetlands
11	IUA_R01	✓	✓	✓	✗	✗
12	IUA_R02	✓	✓	✓	✗	✓

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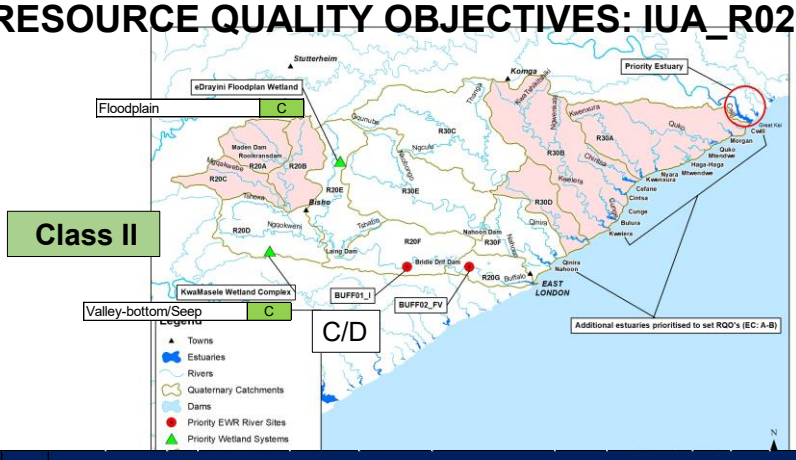
RESOURCE QUALITY OBJECTIVES: IUA_R02



IUA No.	IUA Code	PRIORITISATION OF RESOURCE UNITS FOR ALL WATER RESOURCES FOR RQOs												
		Rivers				Dams		Estuaries	Groundwater		Wetlands			
		RU No.	SQ Reach	Quat	River	RU No.	Dams	Estuaries	RU	Groundwater	RU	Quats	Wetlands	
12	IUA_R02	12.1	R20A-07788	R20A	Buffalo	12.6	Laing	Nahoon, Great Kei, Qinira (Quinirha), Kwelera (Kwelerha), Bulura (Bulurha), Cunge, Cintsa, Cefane,Kwenxura (Kwenxurha), Nyara (Nyarha), Imtwendwe (Mtwendwe), Haga-haga, Mtendwe, Quko, Morgan, Cwili	X		WRU15	R20E	eDrayini Floodplain Wetland	
		12.2	R20E-07775	R20E	Yellowwoods	12.7	Rooikrantz				WRU26	R20D	KwaMasele Wetland Complex	
		12.3	Not digitised (	R20E	KwaNkwebu	12.8	Bridledrift							
		12.4	R20F-08045	R20F	Buffalo	12.9	Nahoon							
		12.5	R20B-07915	R20B	Buffalo	12.10	Maden							

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RESOURCE QUALITY OBJECTIVES: RIVERS AND DAMS

RU No.	SQ Reach	Quat	River	Rationale	Component: Quantity: Low Flows	Quantity: High Flows	Quality: Nutrients	Quality: Salts	Quality: System variables	Quality: Toxics	Quality: Pathogens	Habitat: Geomorphology	Habitat: Riparian vegetation	Habitat: IHI	Biota: Fish	Biota: Aquatic macroinvertebrates	Biota: Diatoms
12.1	R20A-07788	R20A	Buffalo	*Same ecoregion, same RQOs as Priority RU 12.5*													
12.2	R20E-07775	R20E	Yellowwoods	*Biological data available to set RQOs*												X	
[illegible]	Not digitised (sub-set of above RU)	[illegible]	[illegible]	*Selected following discussions with DWS regarding transfers with reference to Sandelia*											X		
12.4	R20F-08045	R20F	Buffalo	*All indicators . EWR site BUFF01_I*	X	X	X	X	X	X	X	X	X		X	X	X
12.5	R20B-07915	R20B	Buffalo	*Selected according to the RU evaluation tool. Node BUFF03_FV*					X					X		X	X

IUA	RU No.	Dams	Quantity: Dam operation and levels	Quantity: System (dam) operating rules	Quantity: Reduction in live storage	Quality: Clarity/ Secchi Disc Indication	Quality: Cyanobacteria	Vegetation: Alien aquatic plant species	Vegetation: In-channel Phragmites sp./reeds
IUA_R02	12.6	Laing Dam	X			X	X	X	X
	12.7	Rooikrantz Dam				X	X	X	X
	12.8	Bridledrift Dam	X			X	X	X	X
	12.9	Nahoon Dam	X			X	X	X	X
	12.1	Maden Dam					X	X	X

Examples of RQOs

RU 12.4 Buffalo River | RU 12.8: Bridledrift Dam | Nahoon Estuary

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RESOURCE QUALITY OBJECTIVES: WETLANDS

WRU26: KwaMasele Wetland
Valley-bottom/Seep
PES/REC: C

Component	Sub-Component	Indicator	Narrative RQO
Habitat	Ecological Condition	Desktop and field verified PES category based on a Level 1B WET-Health assessment undertaken for the KwaMasele Wetlands.	The PES of the wetland complex should not fall below the REC of C.
Habitat	Wise-use	Extent of the subsistence farming lands and grazing in the wetland in relation to the extent recorded in the baseline assessment	Describe in much more detail the impacts that cattle grazing, and agriculture are currently having on the wetland. The extent of subsistence farming should be managed to ensure it does not increase above the extent mapped in the baseline assessment, and that wise-use practices have been adopted to ensure the REC category of C is maintained.
Biota	Vulnerable *Arctotis debensis*	A sustained population of *Arctotis debensis*	Maintain the population of *Arctotis debensis* in the wetlands through the establishment of formal protection of the KwaMasele wetland, especially in terms of encroachment of the wetland by human settlement and cultivation.

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RESOURCE QUALITY OBJECTIVES: GROUNDWATER

IUA_T03

GW_RU44 (T20B; T20C;T20D; T20E; T20F; T20G

Component	Sub Component	Indicator/Measure	Narrative RQO	Numeric RQO
Quantity and Aquifer	Abstraction	Allocations	Existing users to comply with allocation schedules including GA, Schedule 1, and licence conditions. New users are to remain within the allocable groundwater volume.	Q <Average recharge per hectare
	Stress	Abstraction and allocation	Currently not stressed.	Q <Current surplus
	Water Level	Time series drawdown in monitoring boreholes (monthly)	Drawdown in monitoring boreholes should not exceed peak drawdown or not exhibit declining trends over 5 years and exceed the 75th percentile drawdown.	peak drawdown <4.2 m 75th percentile drawdown <3.6 m
	Protection Zone	Other water users	The radius of influence should not intersect any other protection zone	-
Quality	Quality	Time series water quality (Quarterly / Bi annual)		-
		Nutrients	Long term trend should not exceed the 75th percentile or the TWQR for domestic use (in brackets) if higher for Compounds of Concern	NO_3/ NO_2 <1.1
		Salts		EC <132 (70)
		Sulphates		SO_4 <21 (200)
		Other		Na <148 (100) Cl <212 (100) F < 0.4 (1) Mg <38 (30) Al <1.09 (0.15) Fe <0.43 (0.1)
Ecological	Baseflow Component	Dry season flow	Protection zones for watercourses are required to protect the ecological reserve. Groundwater flow reversal to be prevented near water courses. Dry season flow not to exhibit declining trend for more than 5 years.	-

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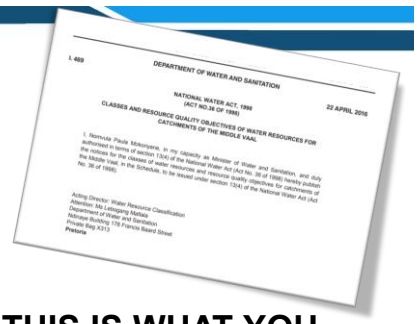
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DEPARTMENT OF WATER AND SANITATION

NATIONAL WATER ACT, 1998
(ACT NO.36 OF 1998)

22 APRIL 2016

CLASSES AND RESOURCE QUALITY OBJECTIVES OF WATER RESOURCES FOR CATCHMENTS OF THE MIDDLE VAAL

I, Nomvula Paula Mokonyane, in my capacity as Minister of Water and Sanitation, and duly authorised in terms of section 13(4) of the National Water Act (Act No. 36 of 1998) hereby publish the notices for the classes of water resources and resource quality objectives for catchments of the Middle Vaal, in the Schedule, to be issued under section 13(4) of the National Water Act (Act No. 36 of 1998).

Acting Director: Water Resource Classification
Attention: Ms Lebogang Matlala
Department of Water and Sanitation
Private Bag X313
Pretoria

IMPORTANT TO NOTE THAT THIS IS WHAT YOU WILL SEE TABULATED WITHIN THE DRAFT GAZETTE TEMPLATES THAT WILL GO ON PUBLIC REVIEW

- **SW RESERVE**
- **GW RESERVE**
- **WATER RESOURCE CLASS AND RQO's**

THANK YOU!

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All study reports can be accessed from the DWS website: https://www.dws.gov.za/RDM/WRCS/