



**INKOMATI-USUTHU**

CATCHMENT MANAGEMENT AGENCY

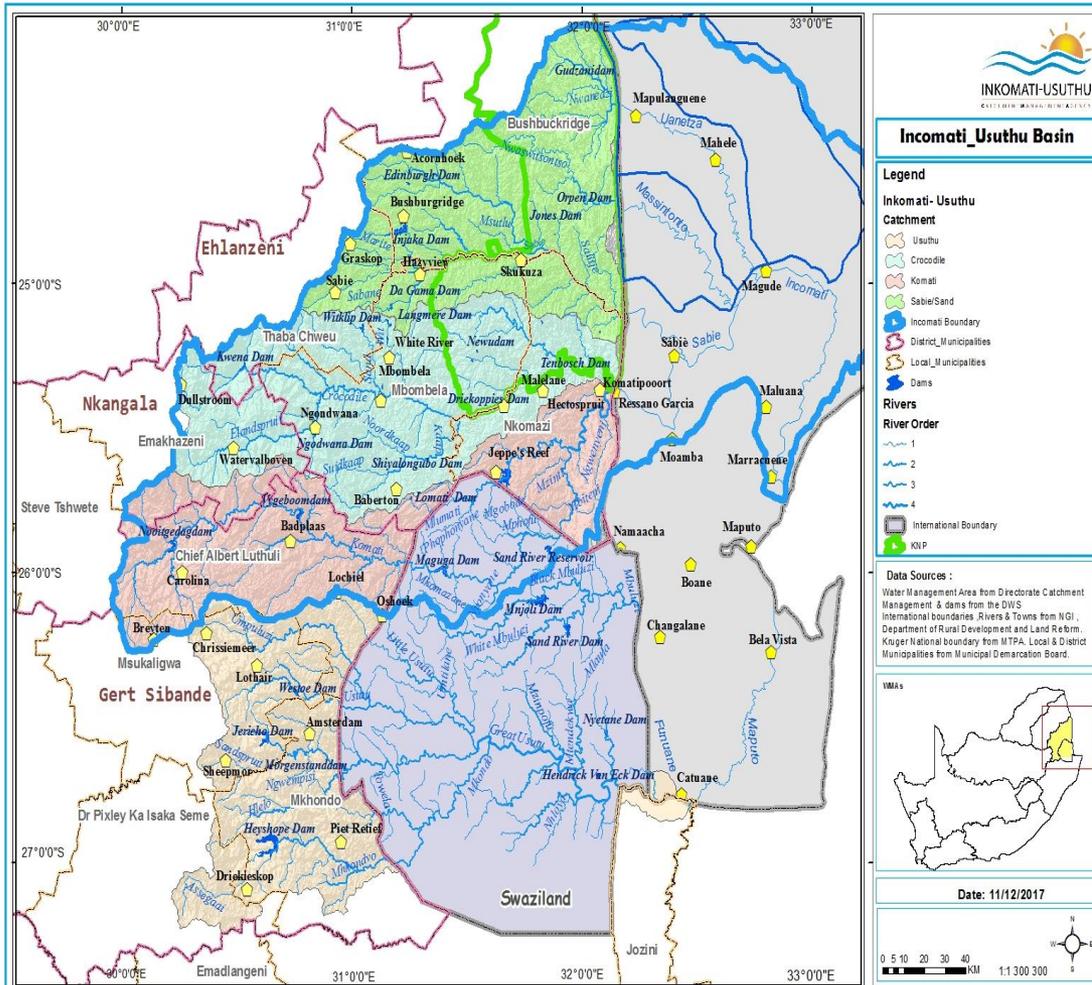


# **Water Quality and Quantity Status Within Inkomati Usuthu WMA**

**Presentation by: Dr T Sawunyama  
(Acting Executive: Water Resources  
Management)**

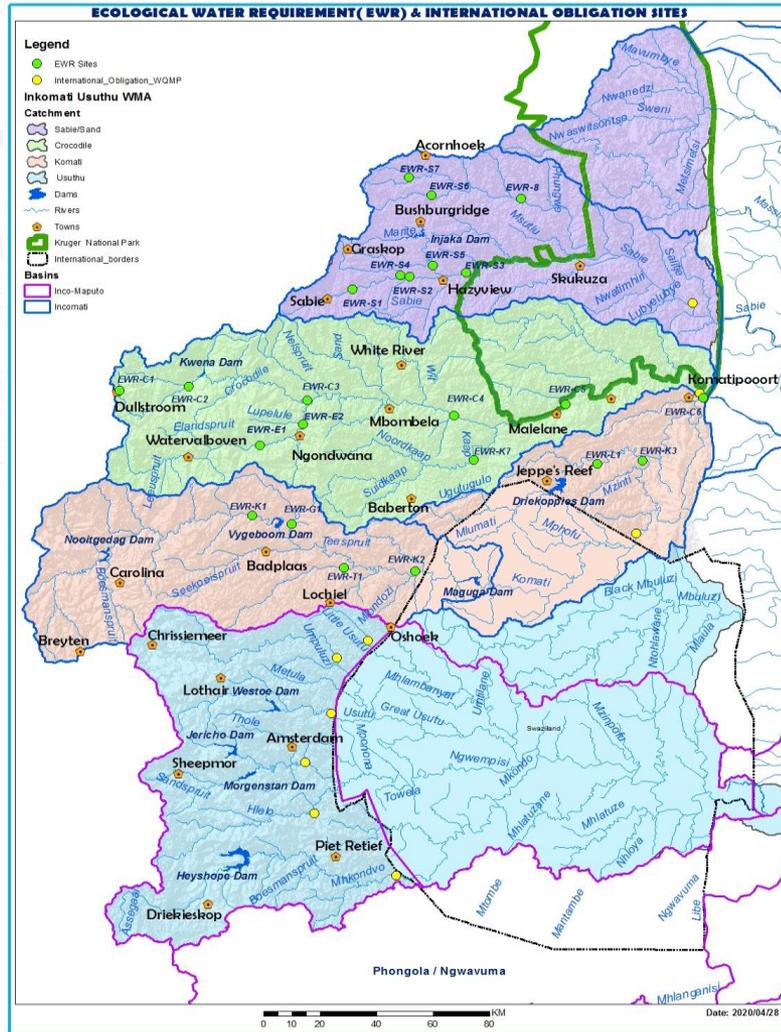
**August 2022**

# INKOMATI-USUTHU WATER MANAGEMET AREA



- ❑ The WMA has four (4) main rivers which form the sub-division into 4-main catchments namely Crocodile, Sabie/Sand, Usuthu and Komati;
- ❑ The IUCMA is geographically wholly located within Mpumalanga Province: 3 Districts and 8 Local Municipalities;
- ❑ The IUCMA is transboundary nature and forms part of the Incomati International River Basin shared between the Republic of Mozambique, the Kingdom of Swaziland and the Republic of South Africa.

# INKOMATI- USUTHU WATER MANAGEMENT AREA



- ❑ The IUCMA currently monitors **269** water quality sites, **31** river flow sites, **25** rainfall sites and **12** groundwater sites within Inkomati-Usuthu Water Management Area (these excludes **45** DWS managed sites).
- ❑ Water Quantity monitoring is done through real time monitoring probes and rainfall gauges.
- ❑ Water Quality status is reported (April 2021-March 2022) on **32** Strategic monitoring sites :
  - Twenty-three (**23**) Ecological Water Requirement (EWR) sites
  - Ten (**10**) International Obligation (IO)
- ❑ Eutrophication monitoring is done through near-real time monitoring on the Cynlakes digital application and the National Eutrophication Monitoring Programme (NEMP) on 10 Major Dams within the WMA.

# Water Quality Status



# EWR SITE(S) COMPLIANCE STATUS: SABIE SAND CATCHMENT

EWR Site	pH		EC (mS/m)		PO <sub>4</sub> (mg/l)		E coli (cfu/100ml)	
	EcoSpec	Results	RQOs	Results	RQOs	Results	RQOs	Results
EWR S-1	6.5 - 8.0	7.3-7.9	30	12.78	0.015	0.015	130	1615
EWR S-2	6.5 - 8.0	7.0-8.0	30	59.78	0.015	<0.010	130	750
EWR S-3	6.5 - 8.8	7.3-8.1	30	11.11	0.015	<0.010	130	1258
EWR S-4	6.5 - 8.0	7.3-8.0	30	16.01	0.015	<0.010	130	197
EWR S-5	6.5 - 8.0	7.4-8.4	30	10.51	0.015	<0.010	130	666
EWR S-6	6.5 - 8.8	6.8-8.4	55	124.99	0.125	0.012	130	1167
EWR S-7	6.5 - 8.8	6.9-7.7	42	9.53	0.125	<0.010	130	682
EWR S-8	6.5 - 8.8	7.3-8.3	42	45.6	0.125	0.015	130	1047

Both EWR S2 and S6 showed elevated salts concentration in July and August due to irrigation return flows but complied throughout the reporting period. The high peaks for July and August resulted in the 95 %tile also being higher than the set RQOs. E. coli is an indication of faecal contamination of the water resources from municipal WWTWs.

# EWR SITE(S) COMPLIANCE STATUS : CROCODILE CATCHMENT

EWR Site	pH		EC (mS/m)		PO <sub>4</sub> (mg/l)		E coli (cfu/100ml)	
	Ecospec	Results	RQOs	Results	RQOs	Results	RQOs	Results
EWR C-1	6.5 - 8.0	7.1-7.8	30	9.7	0.015	<0.010	120	53
EWR C-2	6.5 - 8.0	7.1-7.9	30	13.1	0.025	<0.010	130	787
EWR C-3	6.5 - 8.0	7.4-8.1	30	12.4	0.015	<0.010	130	684
EWR E-1	6.5 - 8.0	7.4-8.1	30	20.5	0.025	0.011	130	775
EWR E-2	6.5 - 8.0	7.2-8.2	55	86.9	0.015	<0.010	130	318
EWR C-4	5.9 - 8.8	7.4-8.0	70	49.2	0.125	0.083	130	1989
EWR C-5	5.9 - 8.8	7.5-8.5	70	47.8	0.075	0.052	130	1027
EWR C-6	5.9 - 8.8	7.2-8.9	70	99.1	0.125	0.041	130	359
EWR C-7	6.5 - 8.8	7.6-8.3	200	69.3	0.125	0.034	130	329

EWR E2 shows elevated salts from the irrigation return flow downstream of Sappi Ngodwana and EWR C6 also shows irrigation return flows with elevated salts concentration from sugar cane farming. E. coli is an indication of faecal contamination of the water resources from municipal WWTWs.

# EWR SITE(S) COMPLIANCE STATUS : KOMATI CATCHMENT

EWR Site	pH		EC (mS/m)		PO <sub>4</sub> (mg/l)		E coli (cfu/100ml)	
	Ecospec	Results	RQOs	Results	RQOs	Results	RQOs	Results
EWR K-1	6.0 - 8.6	7.6-8.2	50	19.4	0.02	<0.010	130	271
EWR G-1	6.0 - 8.6	7.3-8.3	N/A	30.0	0.02	<0.010	130	288
EWR T-1	6.0 - 8.6	7.6-8.2	N/A	20.4	0.125	0.058	130	1421
EWR K-2	6.2 - 9.0	7.8-8.2	55	20.5	0.02	<0.010	130	386
EWR K-3	6.5 - 8.5	7.3-8.5	85	128.5	0.125	<0.010	130	544
EWR L1	5.7 - 8.3	7.3-8.2	40	24.4	0.075	<0.010	130	552

EWR K3 shows irrigation return flows with elevated salts concentration from sugar cane farming in the Lower Komati area of Tonga and surrounding areas. E. coli is an indication of faecal contamination of the water resources from municipal WWTWs.

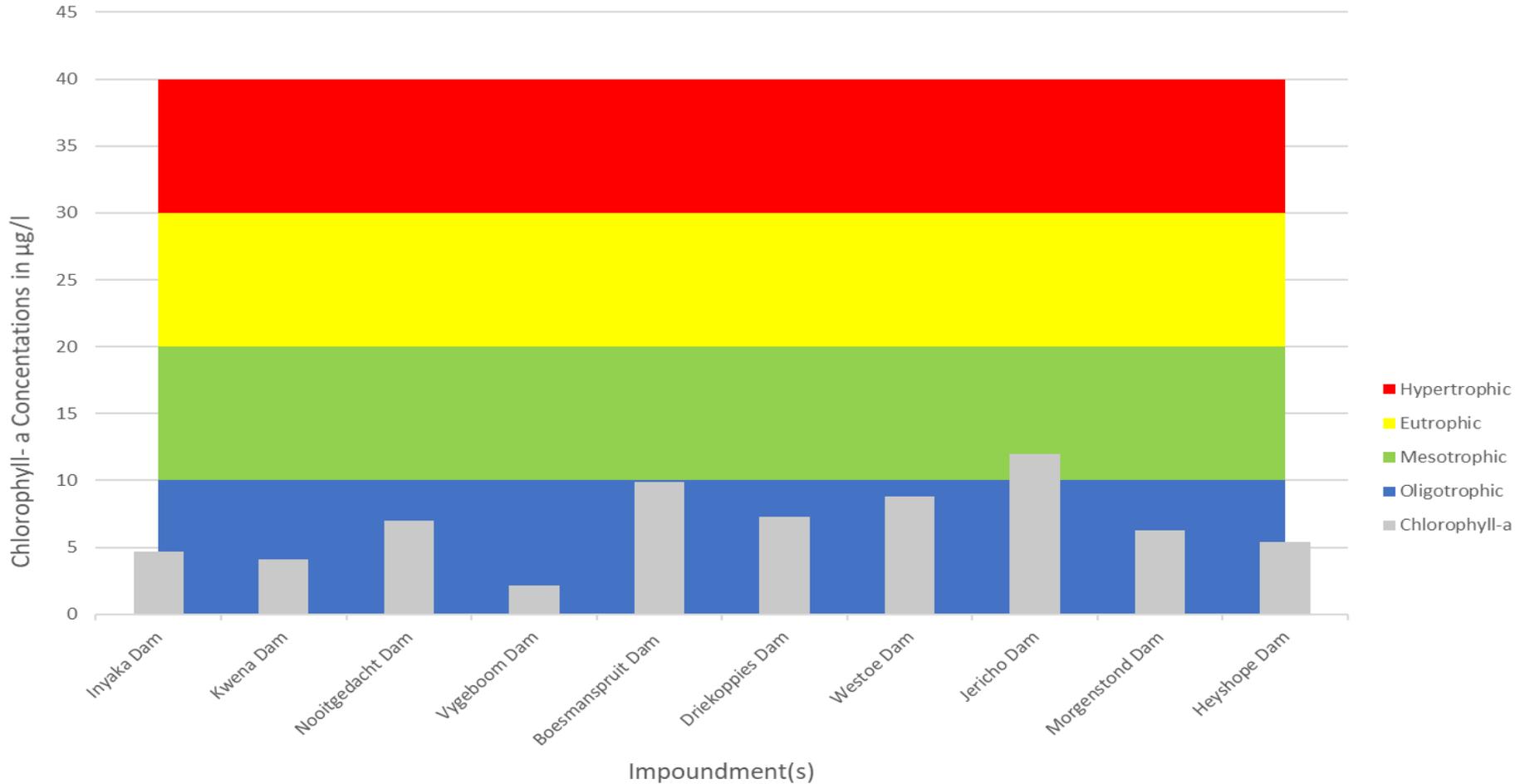


# INTERNATIONAL OBLIGATION SITE(S) COMPLIANCE STATUS: INKOMATI USUTHU WMA

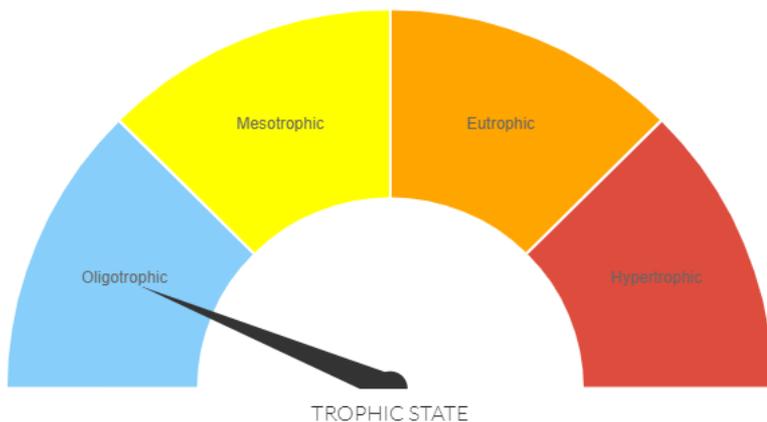
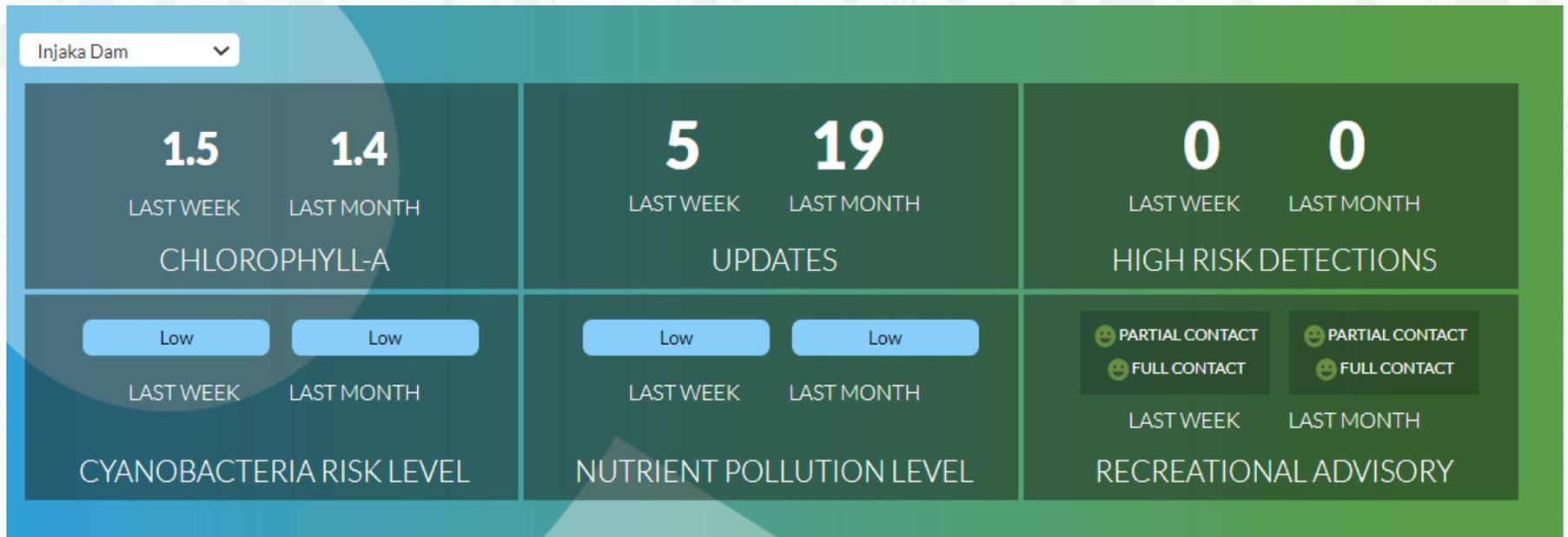
ID code	pH		EC (mS/m)		PO <sub>4</sub> (mg/l)		<i>Faecal Coliforms</i> (cfu/100ml)	
	Limits	Results	Limits	Results	Limits	Results	Limits	Results
SS-51	6.5 – 8.5	<b>7.7-8.3</b>	150	<b>16.5</b>	2	<b>&lt;0.010</b>	2000	<b>828</b>
CRL-39	6.5 – 8.5	<b>7.8-8.2</b>	150	<b>20.5</b>	2	<b>&lt;0.010</b>	2000	<b>277</b>
K-13	6.5 – 8.5	<b>7.3-8.4</b>	150	<b>34.2</b>	2	<b>0.012</b>	2000	<b>1080</b>
K-2	6.5 – 8.5	<b>7.2-8.4</b>	150	<b>93.1</b>	2	<b>0.013</b>	2000	<b>352</b>
U-61	6.5 – 8.5	<b>6.8-7.7</b>	150	<b>7.3</b>	2	<b>&lt;0.010</b>	2000	<b>1155</b>
U-57	6.5 – 8.5	<b>6.9-7.6</b>	150	<b>8.8</b>	2	<b>0.91</b>	2000	<b>738</b>
U-53	6.5 – 8.5	<b>7.0-7.6</b>	150	<b>25.3</b>	2	<b>&lt;0.010</b>	2000	<b>196</b>
U-44	6.5 – 8.5	<b>7.0-8.2</b>	150	<b>11.3</b>	2	<b>&lt;0.010</b>	2000	<b>1417</b>
U-43	6.5 – 8.5	<b>7.1-7.9</b>	150	<b>14.2</b>	2	<b>&lt;0.010</b>	2000	<b>83</b>
U-26	6.5 – 8.5	<b>7.1-8.4</b>	150	<b>20.1</b>	2	<b>0.020</b>	2000	<b>530</b>

# NEMP: TROPHIC STATUS OF MAJOR DAMS

## Trophic Status for Dams in the WMA

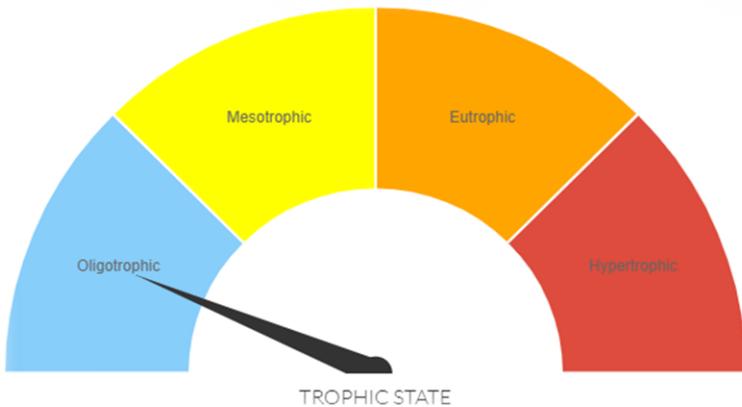
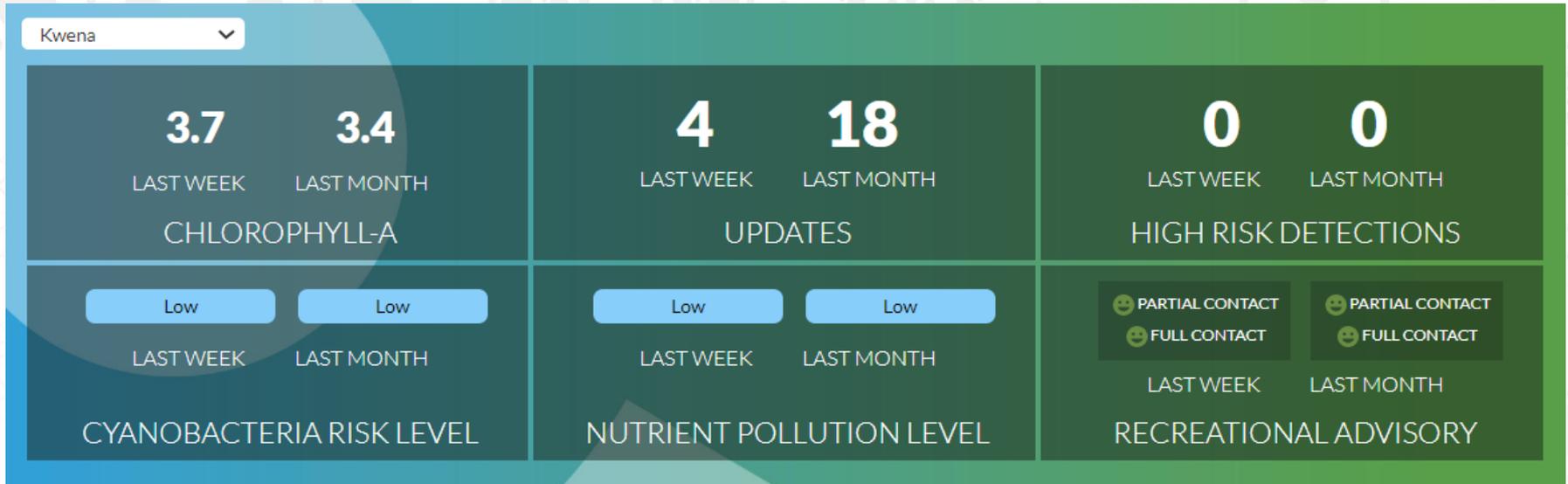


# CYANOLAKES DIGITAL EUTROPHICATION MONITORING: INJAKA DAM



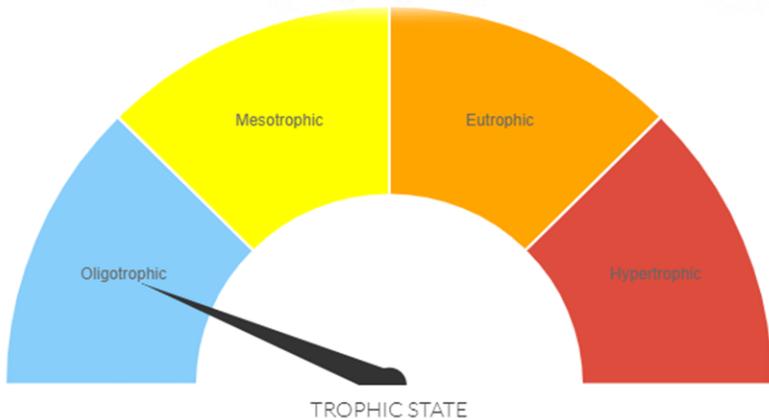
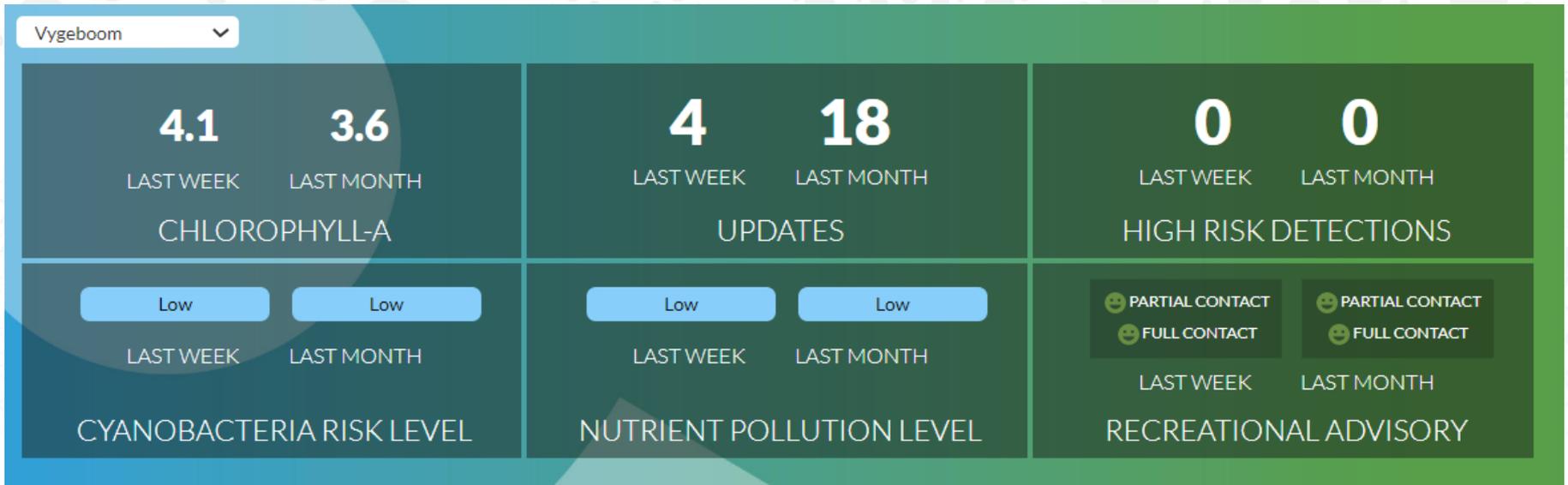
Injaka Dams' trophic status on the 21<sup>st</sup> of July 2022 stands at **Oligotrophic**, meaning it is low in nutrients and not productive in terms of aquatic and animal plant life.

# CYANOLAKES DIGITAL EUTROPHICATION MONITORING: KWENA DAM



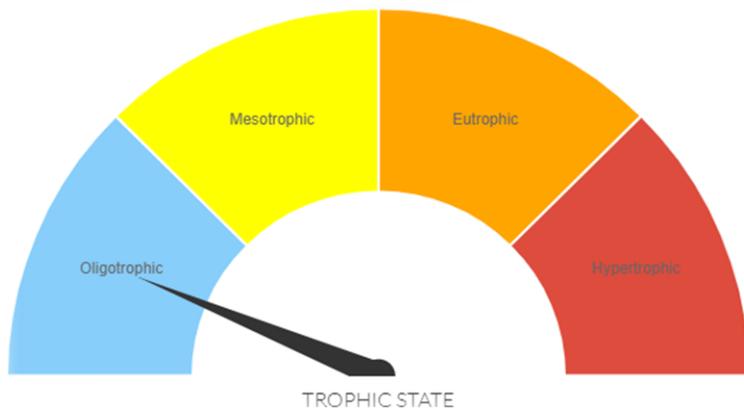
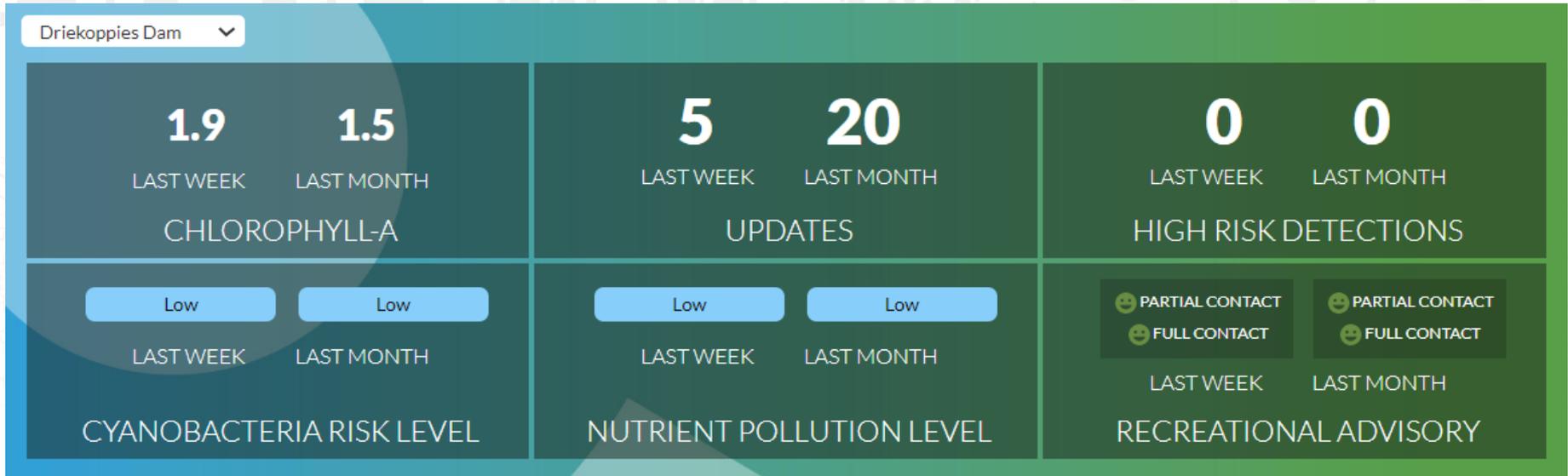
Kwena Dams' trophic status on the 21<sup>st</sup> of July 2022 stands at **Oligotrophic**, meaning it is low in nutrients and not productive in terms of aquatic and animal plant life.

# CYANOLAKES DIGITAL EUTROPHICATION MONITORING: VYGEBOOM DAM



Vygeboom Dams' trophic status on the 21<sup>st</sup> of July 2022 stands at **Oligotrophic**, meaning it is low in nutrients and not productive in terms of aquatic and animal plant life.

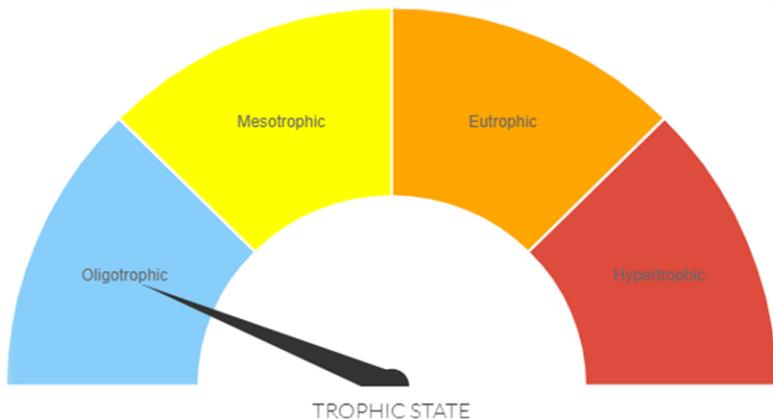
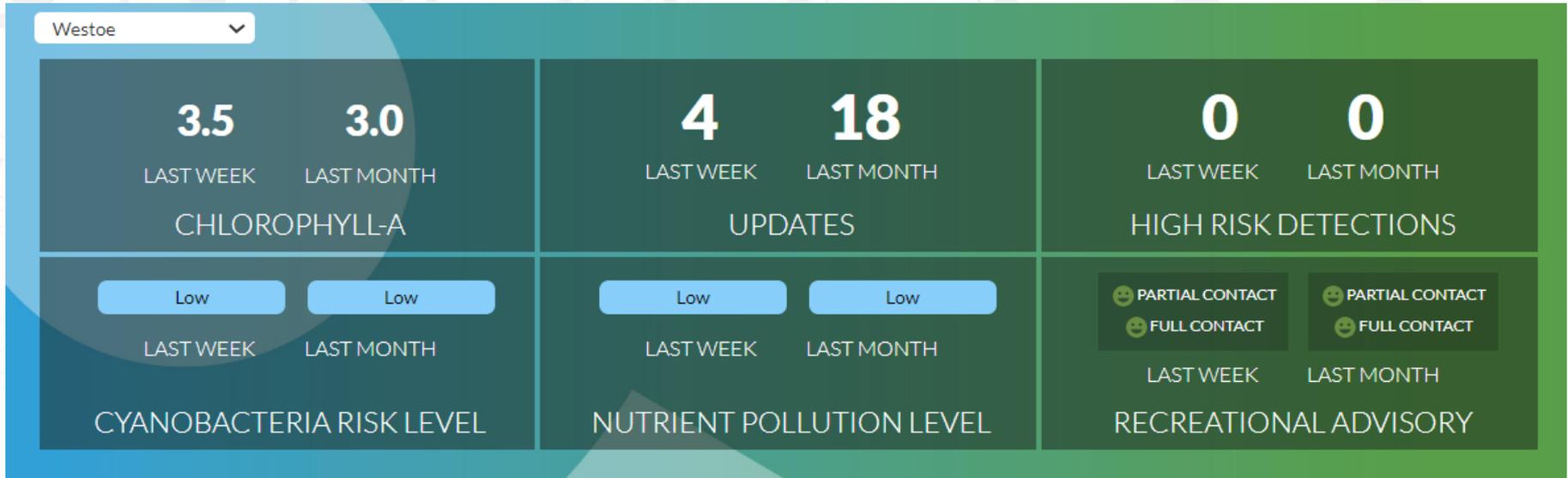
# CYANOLAKES DIGITAL EUTROPHICATION MONITORING: DRIEKOPPIES DAM



Driekoppies Dams' trophic status on the 21<sup>st</sup> of July 2022 stands at **Oligotrophic**, meaning it is low in nutrients and not productive in terms of aquatic and animal plant life.



# CYANOLAKES DIGITAL EUTROPHICATION MONITORING: WESTOE DAM

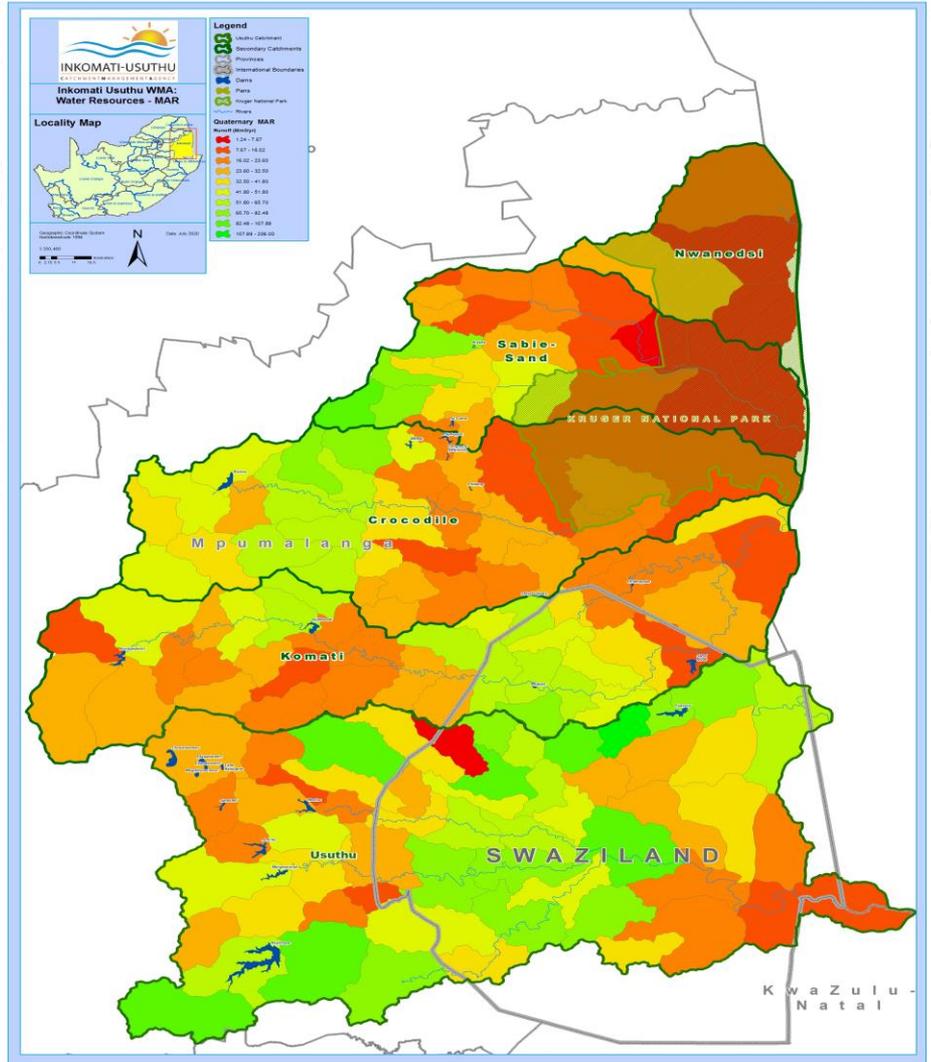
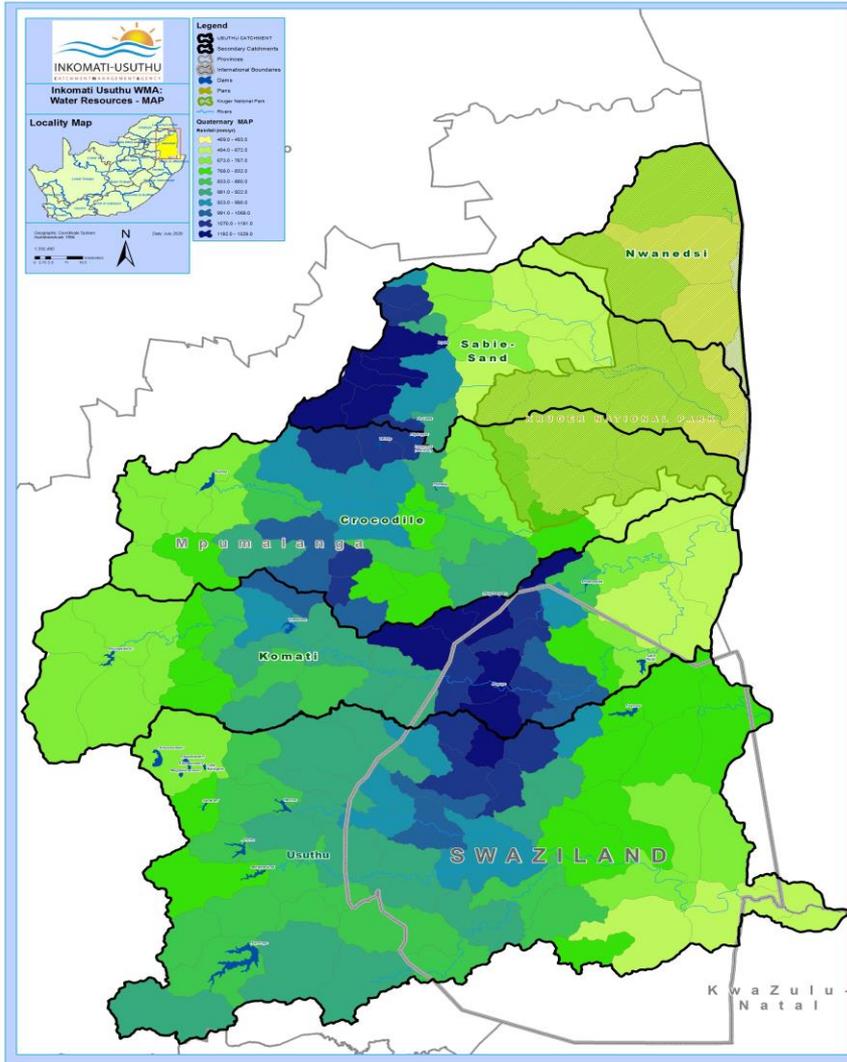


Westoe Dams' trophic status on the 21<sup>st</sup> of July 2022 stands at **Oligotrophic**, meaning it is low in nutrients and not productive in terms of aquatic and animal plant life.

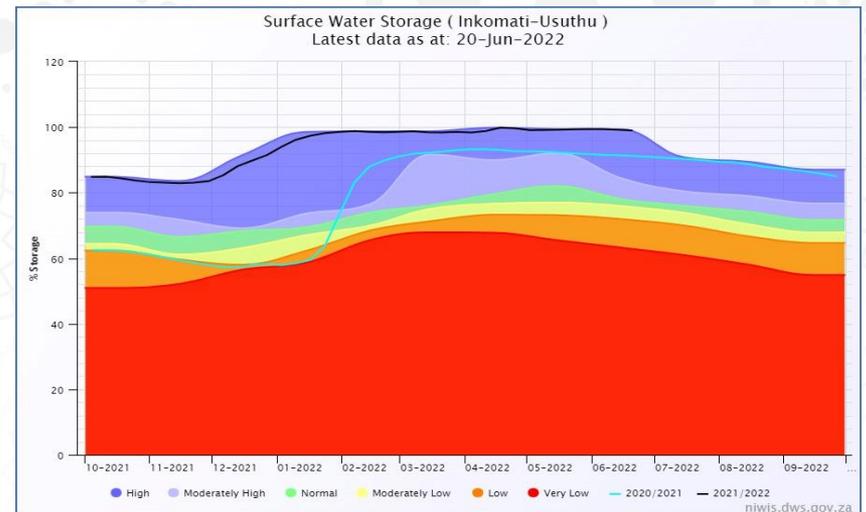
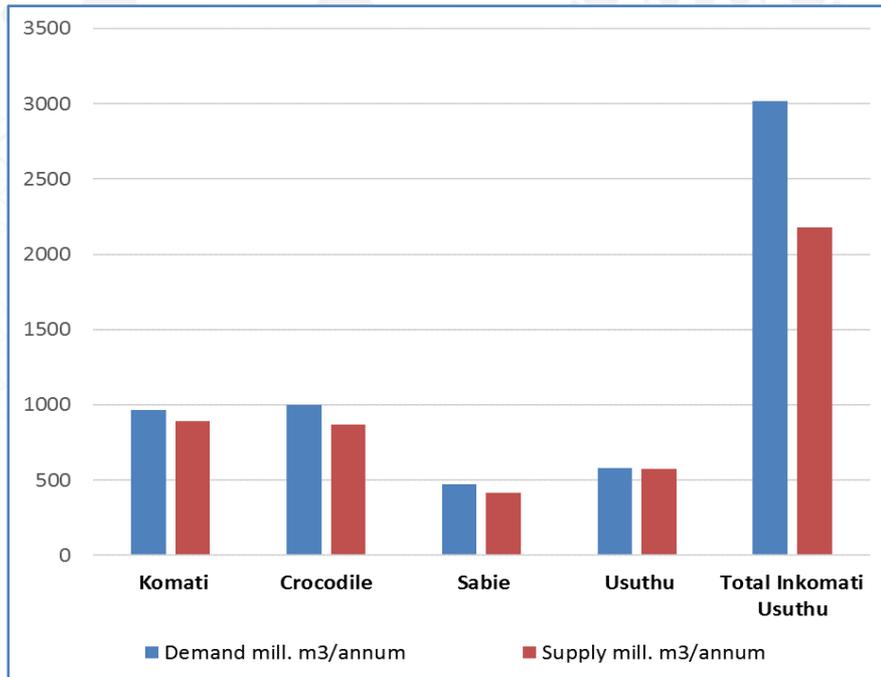
# Water Quantity Status



# DISTRIBUTUION OF MEAN ANNUAL RAINFALL AND MEAN ANNUAL RUNOFF IN THE WMA



# SURFACE WATER RESOURCES STATUS

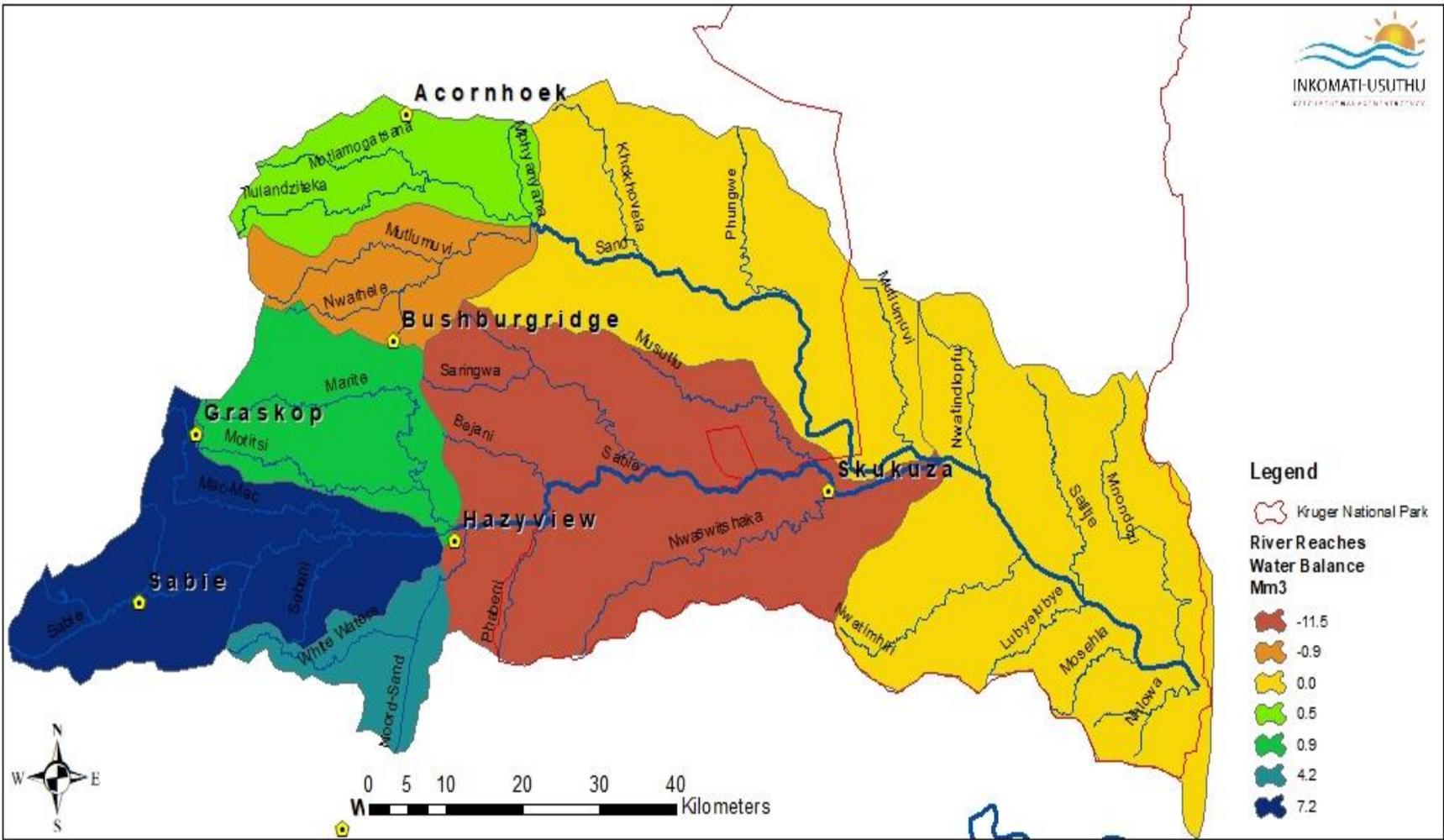


- The WMA water resource status is high (rivers and dams levels) compared to the three previous hydrological years and no water use restrictions were implemented to all sectors in the previous financial year as most dams reached 100.0 % full



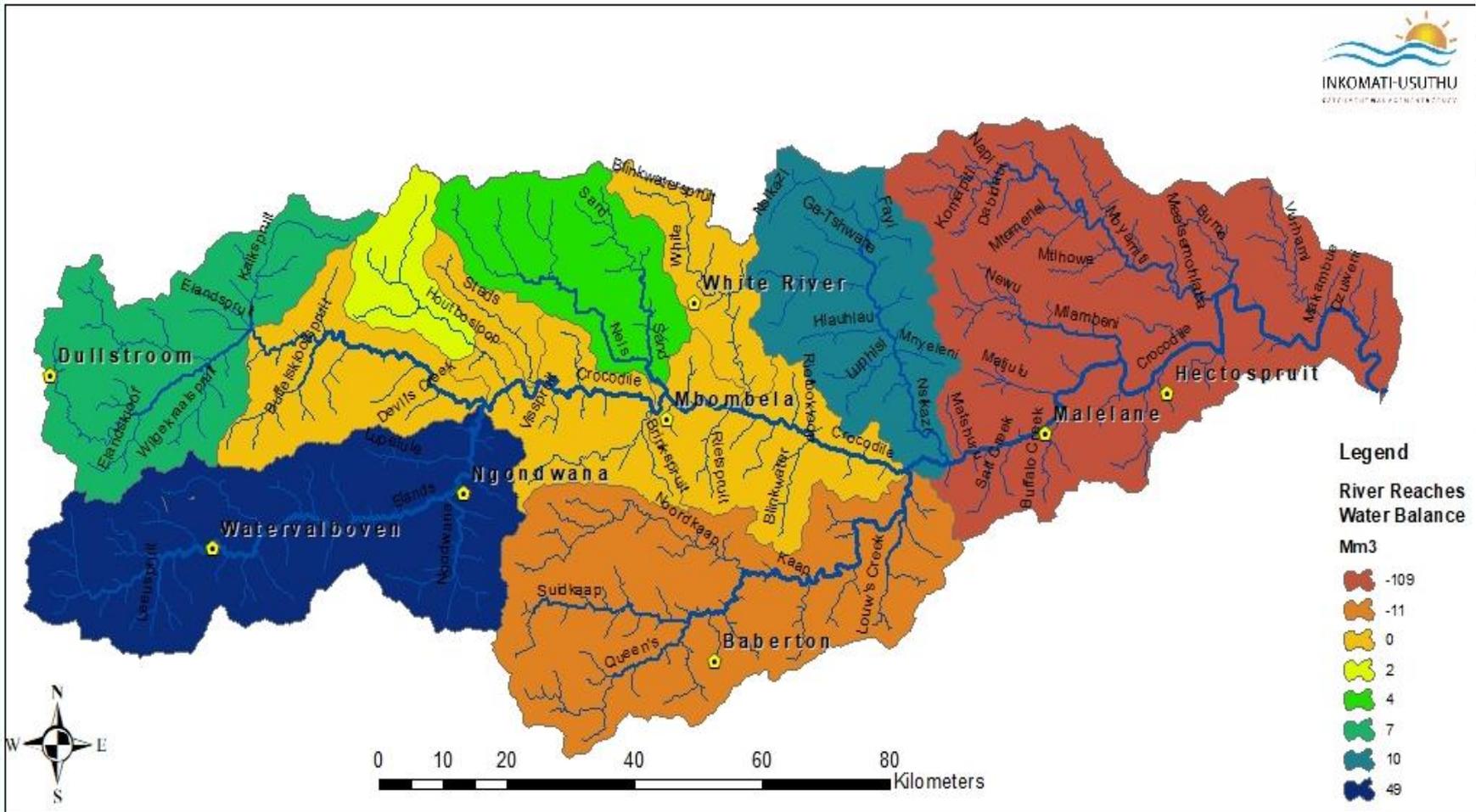
# SURFACE WATER RESOURCES STATUS

## SABIE-SAND CATCHMENT WATER BALANCE



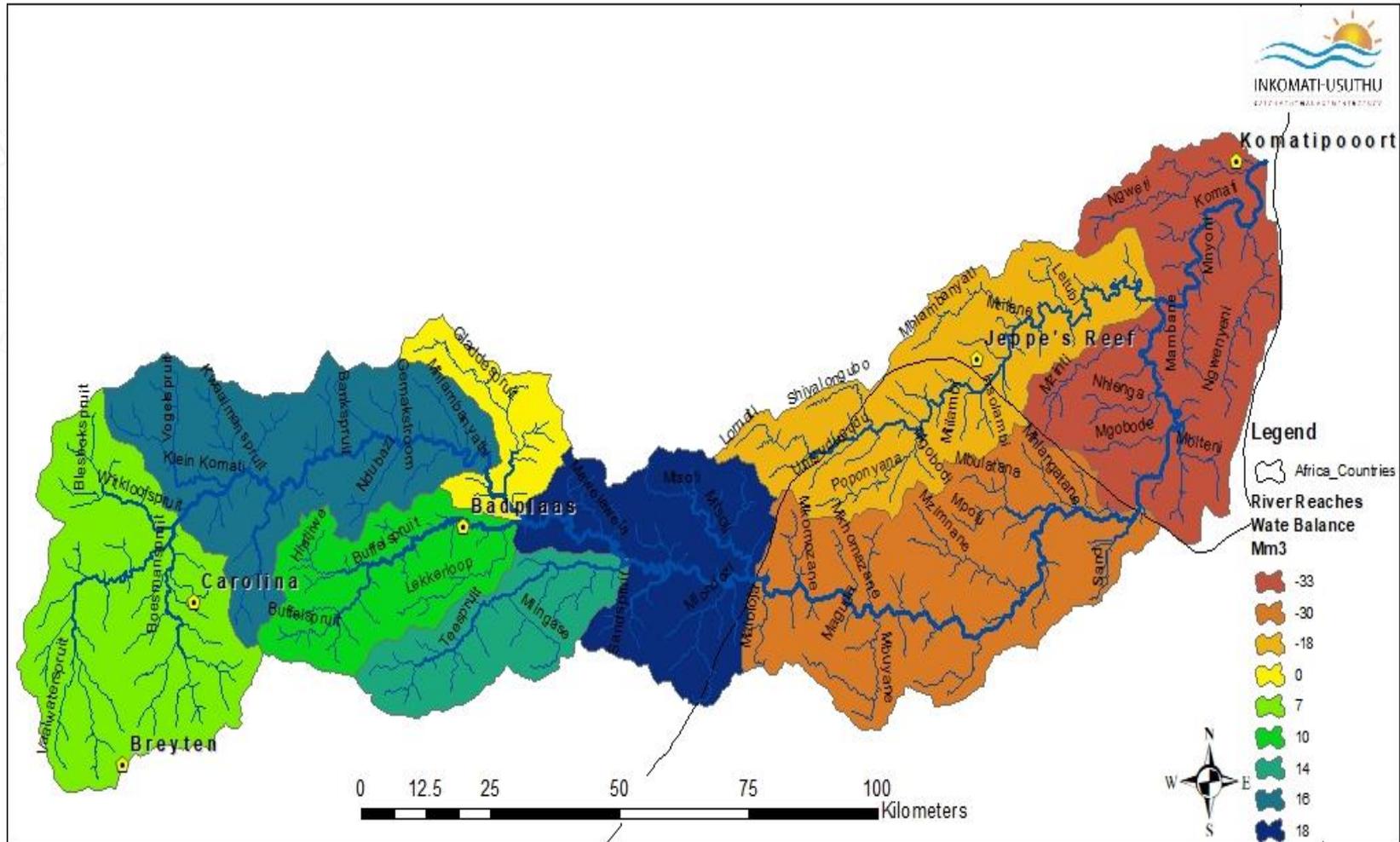
# SURFACE WATER RESOURCES STATUS

## CROCODILE CATCHMENT WATER BALANCE



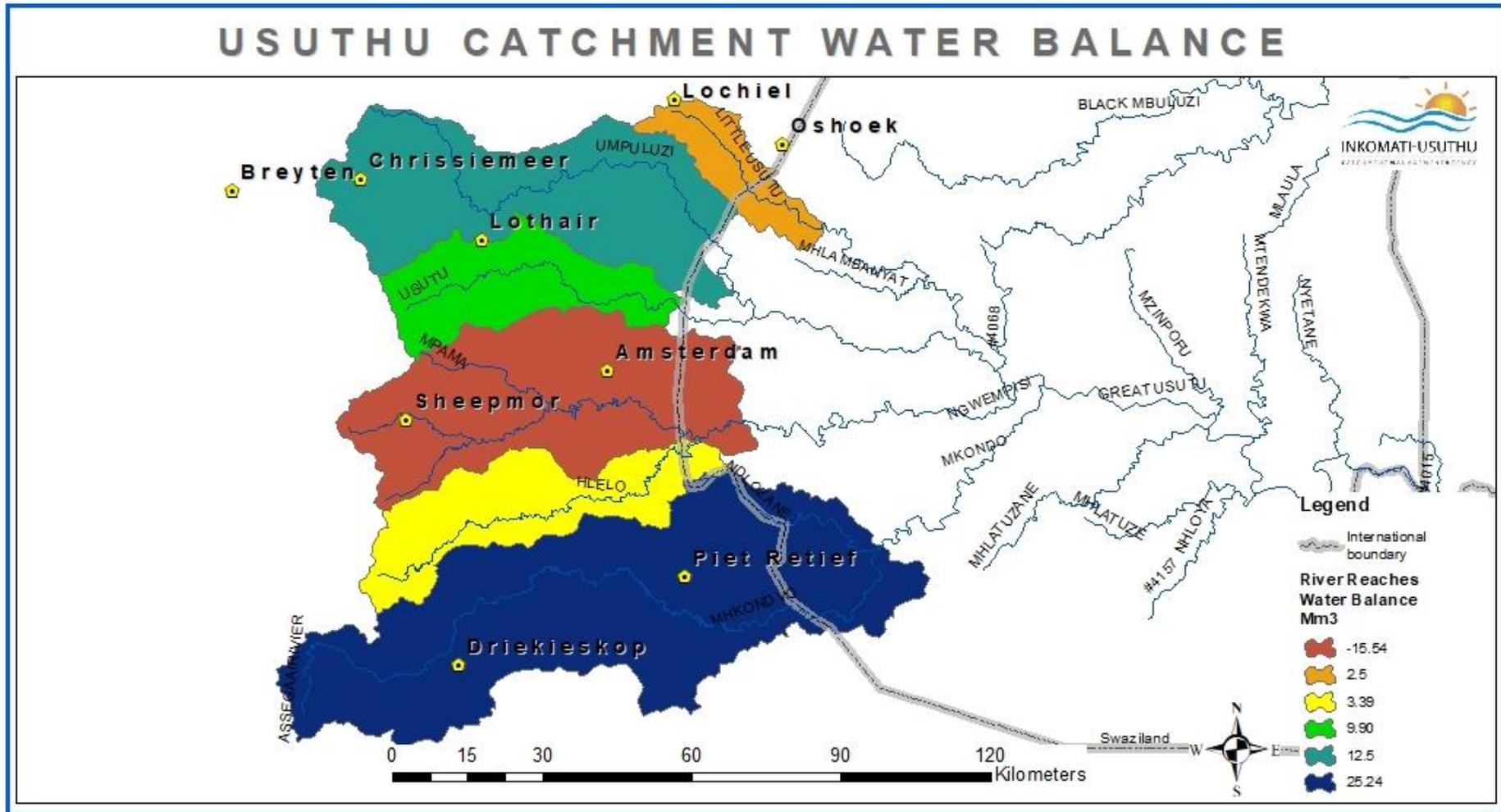
# SURFACE WATER RESOURCES STATUS

## KOMATI CATCHMENT WATER BALANCE



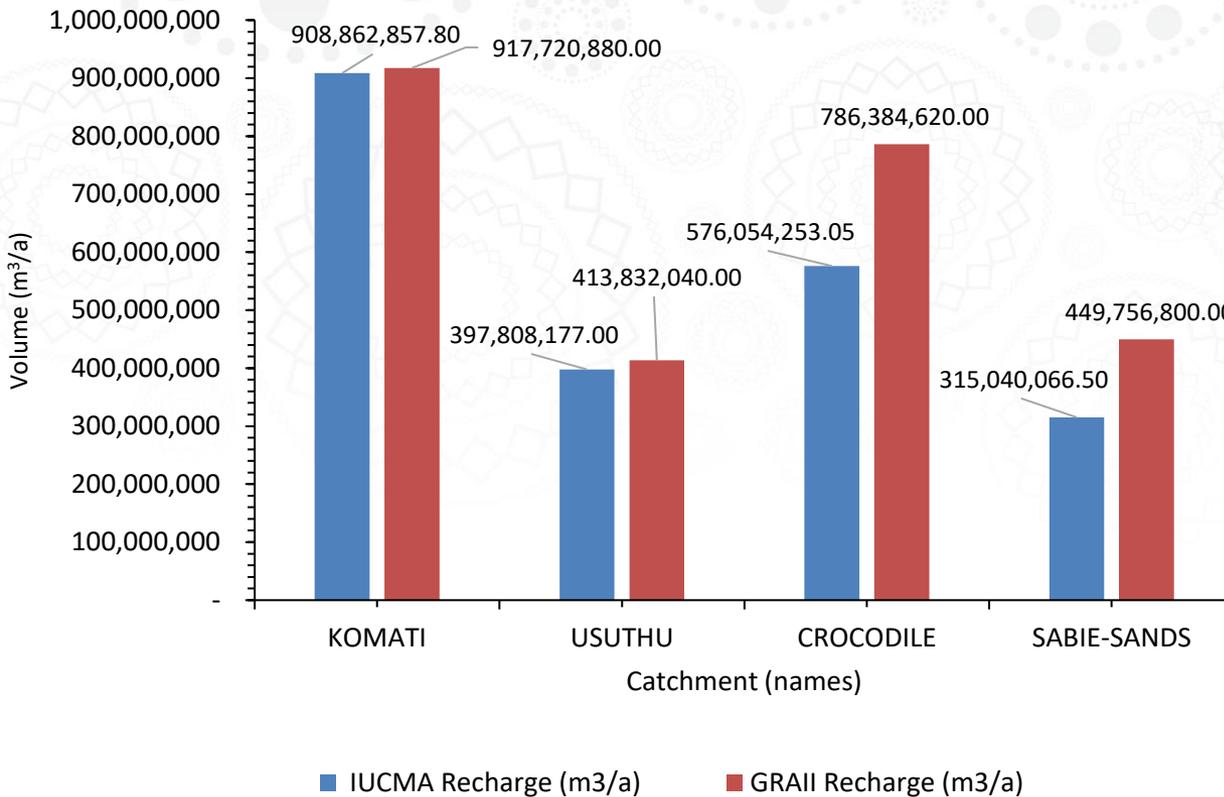
INKOMATI-USUTHU  
CATCHMENT MANAGEMENT AGENCY

# SURFACE WATER RESOURCES STATUS



# GROUND WATER RESOURCES STATUS

Groundwater Recharge Inkomati-Usuthu WMA

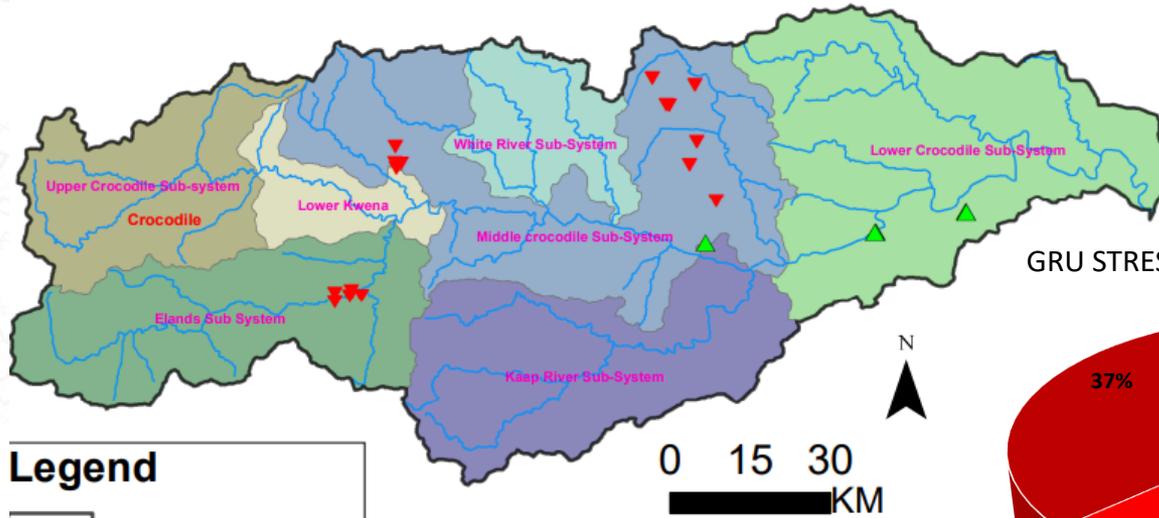


Since 2006 estimates (GRA II), groundwater recharge has dropped by approximately:

- **9 Mm<sup>3</sup>/a** for Komati,
- **16 Mm<sup>3</sup>/a** for Usuthu,
- **210 Mm<sup>3</sup>/a** for Crocodile,  
**135 Mm<sup>3</sup>/a** Sabie-Sand.

# GROUND WATER RESOURCES STATUS

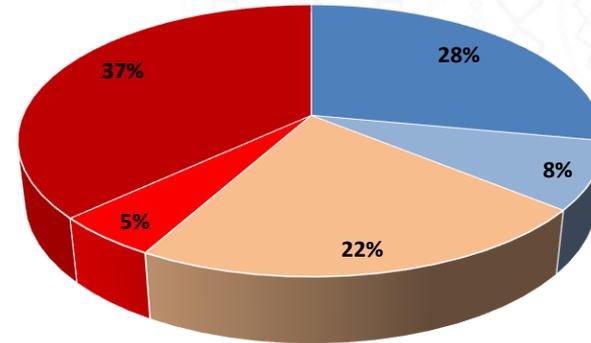
Crocodile Catchment GW monitoring borehole: Long term GW levels trend



## Legend

- Crocodile Catchment
- BH Water Level trend
- BH Water Level trend
- Rivers

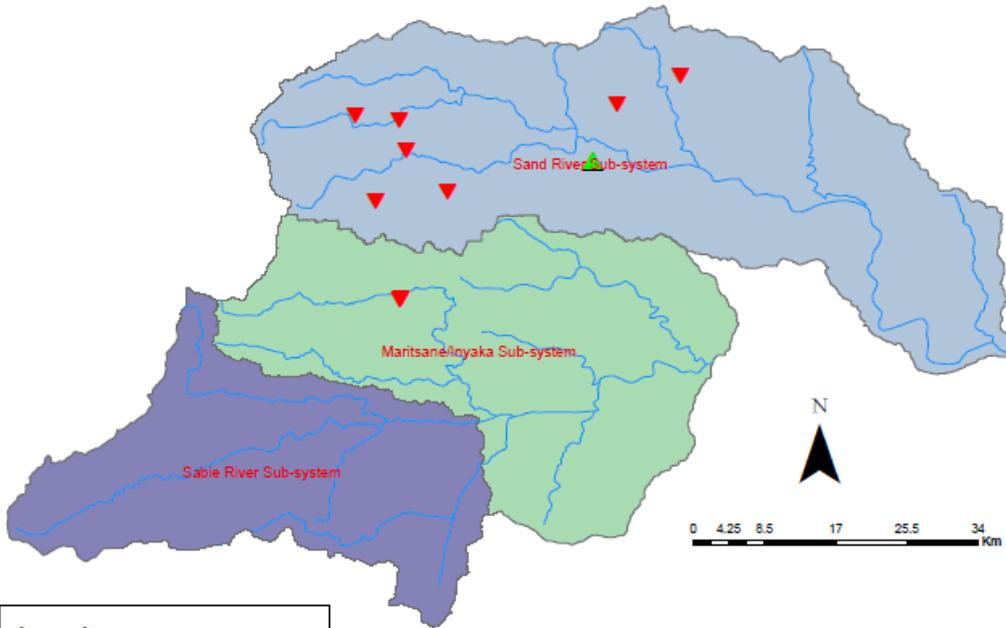
GRU STRESS CATEGORIES FOR CROCODILE



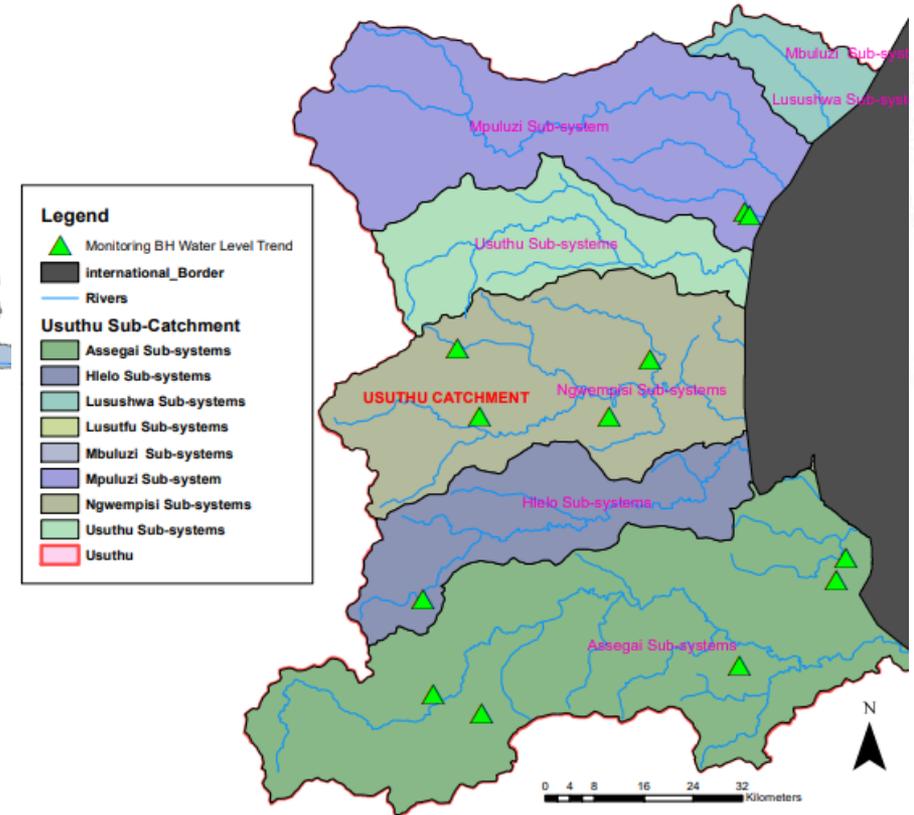
- Unstressed - A (<math><0.05</math>)
- Slightly Stressed - B (0.05-0.20)
- Moderately Stressed - C-D (0.20-0.65)
- Highly Stressed (0.04-0.65) - E
- Critically Stressed - F (>0.95)

# GROUNDWATER RESOURCES STATUS

Sabie-Sand GW Monitoring Boreholes: Long term water levels trend



Usuthu GW Monitoring Boreholes: Long term GW level trend



**Legend**

- ▲ Monitoring BH Water Level Trend
- International Border
- Rivers

**Usuthu Sub-Catchment**

- Assegal Sub-systems
- Hlelo Sub-systems
- Lusushwa Sub-systems
- Lusutfu Sub-systems
- Mbuluzi Sub-systems
- Mbuluzi Sub-system
- Ngwempisi Sub-systems
- Usuthu Sub-systems
- Usuthu

**Legend**

- ▲ Up
- ▼ Down
- Rivers

**Sabie-sand Catchment Sub-systems**

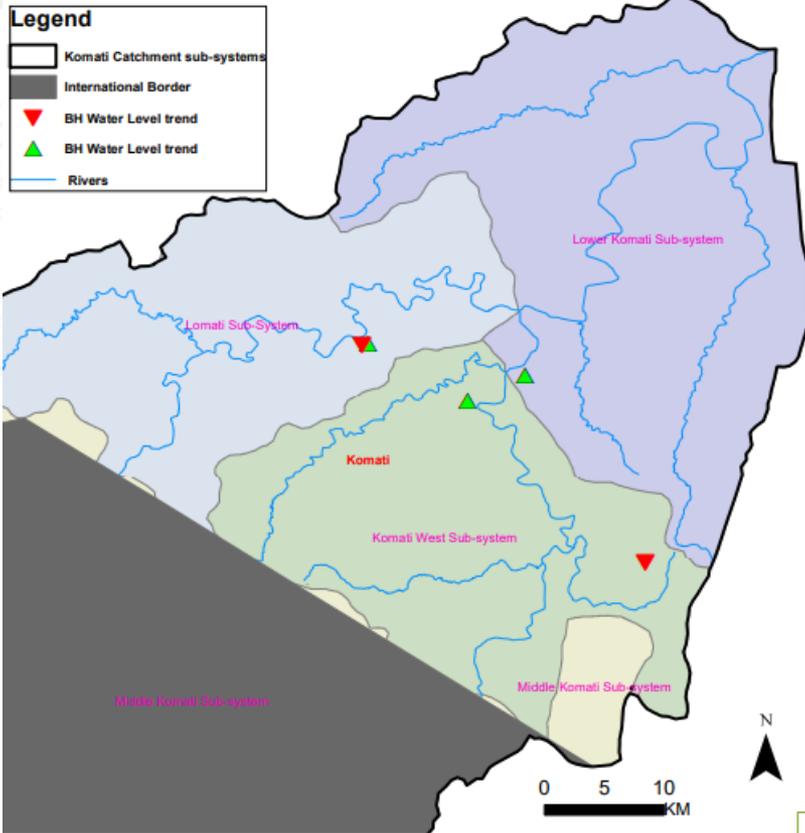
- Maritsane/Inyaka Sub-system
- Sabie River Sub-system
- Sand River Sub-system

July 2022

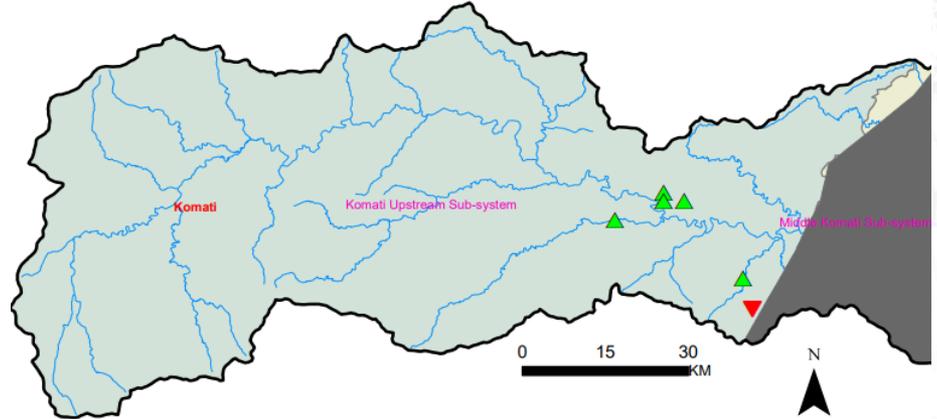


# GROUND WATER RESOURCES STATUS

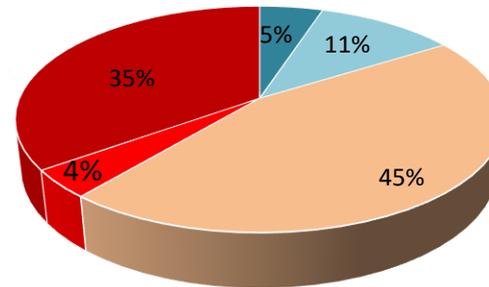
Lower Komati Sub-catchment GW monitoring BHs: Long term GW level trend



Upper Komati Sub-catchment GW monitoring BHs: Long term GW level trend



GRU STRESS CATEGORIES FOR KOMATI CATCHMENT



- Unstressed - A (<0.05)
- Slightly Stressed - B (0.05-0.20)
- Moderately Stressed - C-D (0.20-0.65)
- Highly Stressed (0.04-0.65) - E
- Critically Stressed - F (>0.95)

# DISASTER MANAGEMENT FOR FLOODS, DROUGHTS AND POLLUTION INCIDENTS

IUCMA Water Early Warning - Data Analyses and Reporting Engine

**Dashboard**

- Info
- About



## IUCMA Water Early Warning

Data Analyses and Reporting Engine

version: 4.1.8122.6215

**Module :** PostgreSQL

Web uploads enabled.

File based indicators enabled.

FloodWatch indicators disabled.

Latest Assessments

Floods



Drought



Water quality



**Basin : IUCMA**

Assessment approved : 4/19/2022 1:47:15 PM

Upper Komati	All Clear
Crocodile	All Clear
Sabie-Sand	All Clear
N'wanetsi	All Clear
Upper Usuthu	Flood Watch
Lower Komati	All Clear

**Basin : IUCMA**

Assessment approved : 4/19/2022 2:12:54 PM

Upper Komati	Normal Conditions
Crocodile	Normal Conditions
Sabie-Sand	Normal Conditions
N'wanetsi	Normal Conditions
Upper Usuthu	Normal Conditions
Lower Komati	Normal Conditions

**Basin : IUCMA**

Assessment approved : 4/4/2022 4:53:34 AM

Upper Komati	Water Quality Watch
Crocodile	All Clear
Sabie-Sand	All Clear
N'wanetsi	Not assessed
Upper Usuthu	Not assessed
Lower Komati	Not assessed

Dashboard

- Floods
- Droughts
- Water Quality
- Communication
- DARE configuration
- User administration

# CONCLUSIONS & RECOMMENDATIONS

## Water Quality:

- Water Quality in the WMA is generally good but punctuated by microbial (*E. coli*) pollution and salts (electrical conductivity) indicated non-compliance at various sites.
- Eutrophication status for all the dams within the WMA is good
- It is recommended that the land use activities impacting on water resources quality be efficiently controlled through Source Directed Controls (SDC) as per the provision(s) of the National Water Act No 36 of 1998.

# CONCLUSIONS & RECOMMENDATIONS

## Water Quality:

- It is also recommended that the water users:
  - ✓ Address poor operation and maintenance of WWTW's and its associated infrastructure i.e., Sewer pump stations, manhole.
  - ✓ Implement long term solution to resolve noncompliant i.e., Infrastructure Investment in Wastewater treatment and disposal facilities by water users.
  - ✓ Provide sustainable and adequate waste management and sanitation services to urban and rural settlement by Municipalities.

# CONCLUSIONS & RECOMMENDATIONS

## Surface water:

- ❑ Crocodile system is over allocated, and experiences significant water shortages during dry years. The other systems Komati (surplus in the Upper Komati, but not Lower Komati), Sabie-Sand and Usuthu Systems are in balance, but future water needs cannot be met with current surface water sources of water.

## Groundwater:

- ❑ Groundwater development in the Sabie-Sand and Crocodile catchments should be controlled while it should be promoted in the Komati and Usuthu catchments, hence communication is key.



**THANK YOU**

