

Workshop Report

Lower Olifants River Network LORiN

Inaugural network workshop for the sustainability of
water resources in the lower Olifants River

28/11/2018





Acknowledgements

This document reports on work funded by the United States Agency for International Development, under a USAID Southern Africa grant - RFA-674-12-000016 RESilience in the LIMpopo Basin Program (RESILIM). The RESILIM-O part of the programme is implemented by the Association for Water and Rural Development (AWARD), in association with project partners.

Authors

Dr Sharon Pollard, Hugo Retief and Mulweli Nethengwe

©Association for Water and Rural Development (AWARD)

P O Box 1919
Hoedspruit 1380
Limpopo, South Africa
T 015-793 0503
W award.org.za

Company Reg. No. 98/03011/08
Non-profit org. Reg. No. 006 - 821



Contents

Acronyms	5
Summary	6
1 Welcome and Introductions	7
2 Purpose, agenda and background	9
3 SESSION 1: Overview of water resources situation & management in the Olifants.....	11
3.1 Introduction	11
3.2 Background: Legislative and policy environment.....	12
3.3 Systemic overview of the Olifants River Catchment	14
3.3.1 Biophysical and social characteristics.....	14
3.3.2 Water availability	15
3.3.3 Water quality	17
3.3.4 Questions, comments and discussion.....	19
3.4 Water balance and use	20
3.4.1 Recommendations by DWS 2011 reconciliation study	21
3.4.2 Actions by AWARD and SANParks/ DWS partners	22
3.4.3 Questions, comments and discussion.....	23
3.5 Climate change predictions	24
3.5.1 General impacts.....	24
3.5.2 Potential impacts on water	26
3.5.3 Questions, comments and discussion.....	27
3.6 Institutional arrangements	27
3.6.1 Questions, comments and discussion.....	28
4 SESSION 2: Current issues, challenges and actions for flows and water quality in the low Olifants River	30
4.1 Support through AWARD and SANParks to DWS	30
4.1.1 Overview	30
4.1.2 Summary of AWARD/ SANParks actions and support:	31
4.1.3 Facilitated discussion: challenges and progress.....	32
5 SESSION 3: Facilitated discussion on implications and mitigatory actions	34
5.1 Discussion on key concerns	34
5.1.1 Classification	34
5.1.2 Validation & Verification (V&V)	35
5.1.3 Compliance Monitoring and Enforcement	35
5.1.4 Restrictions and drought declaration.....	36
5.1.5 Monitoring gauges.....	37
5.1.6 Institutional arrangements, forums and Stakeholder engagement	37



5.2 Agreed actions	37
6 Wrap up and closure	40

Appendix A Attendance register

Appendix B Key maps

<i>Figure 1 Photograph of all the LORIN workshop participants</i>	<i>7</i>
<i>Figure 2 Key issue facing the ORC at the start of the RESILM programme (background slide presented by Dr Pollard)</i>	<i>10</i>
<i>Figure 3 Slide showing the chart exported from FlowTracker used to highlight the current situation in terms of flow (blue line) in comparison to the Environmental Water Requirement (EWR) requirement</i>	<i>13</i>
<i>Figure 4 Map of the ORC (including Mozambique)</i>	<i>14</i>
<i>Figure 5 Number of days per month that flows were non-compliant against the 99th Environmental Water Requirement (EWR)</i>	<i>16</i>
<i>Figure 6 Water quality results for Mamba weir plotted against the RQOs</i>	<i>17</i>
<i>Figure 7 Electrical conductivity plotted against discharge from Mamba weir that illustrates an inverse relationship.....</i>	<i>18</i>
<i>Figure 8 Water requirements vs water availability (Mallory 2014). Note that this data does NOT take into account the needs for environmental water requirements suggesting that the date of closure will be earlier</i>	<i>21</i>
<i>Figure 9 Chart depicting the increase in atmospheric carbon content</i>	<i>25</i>
<i>Figure 10 RCPs - Representative Concentration Pathways. We are currently on the RCP 8.5 trajectory... ..</i>	<i>25</i>
<i>Figure 11 Climate change projections depicting the percentage change in mean annual rainfall (source Dr Schultze 2018).....</i>	<i>26</i>
<i>Figure 12 Real example of the system working in the Inkomati (IUCMA) in Crocodile & Sabie. This shows the multiple stakeholders involved in ensuring continued river flow</i>	<i>28</i>
<i>Figure 13 Map of the lower Olifants River Catchment showing where AWARD has installed duplicate gauges</i>	<i>32</i>

<i>Table 1 Participant details (see Appendix 1 for registers)</i>	<i>7</i>
<i>Table 2 Agenda.....</i>	<i>9</i>
<i>Table 3 Mean annual runoff (MAR) simulated at various points in the ORC during the WR2012 studies. MAR is the average amount of water that flows down a particular river, per year. Naturalised flow refers to a flow record that is manipulated to remove human influences that are quantifiable (e.g. consumptive abstraction and effluent discharges) so that we can see what ‘natural flows’ would have been. WR2012 is a database that describe South Africa’s water resources. MCM - Million cubic meters</i>	<i>15</i>
<i>Table 4. Summary of heavy metal toxicity from various studies along the Olifants River. An indication of the potential health impacts is given</i>	<i>18</i>
<i>Table 5 Summary of water use in three sub-catchments of the lower Olifants</i>	<i>20</i>
<i>Table 6 Summary of the water balance for the lower Olifants.....</i>	<i>20</i>
<i>Table 8 Summary of concerns discussed and agreed short-term and longer-term actions</i>	<i>37</i>



Acronyms

AWARD	Association for Water and Rural Development
CBA	Critical Biodiversity Areas
CME	Compliance Monitoring Enforcement
CMF	Catchment Management Forum
CMS	Catchment Management Strategy
DEA	Department of Environmental Affairs
DSS	Decision Support Systems
DWS	Department of Water and Sanitation
EIAs	Environmental Impact Assessments
IAPs	invasive alien plants
IDP	Integrated Development Plan
INWaRDS	Integrated Water Resources Decision Support
IWQMP	Integrated Water Quality Management Plan
IWRM	Integrated Water Resource Management
KNP	Kruger National Park
LEDET	Local Economic Development, Environment and Tourism (Limpopo Province)
LOROC	Lower Olifants River Committee
MAR	Mean Annual rainfall
MCs	Management Classes
MoU	Memorandum of Understanding
NRM	Natural Resources Management
NWA	National Water Act
NWRS	National Water Resources Strategy
ORC	Olifants River Catchment
OCMA	proto-Olifants Catchment Management Agency
RDM	Resource Directed Measures
RESILIM-O	Resiliency of the Limpopo River Basin
RQOs	Resource Quality Objectives
SANParks	South African National Park
SDC	Source Directed Controls
SPLUMA	Spatial Planning and Land Use Management Act
V&V	Validation and verification
WCDM	Water Conservation Demand Management
WMA	Water management Area
WQS	Water Quality Strategy
WUA	Water User Association
WUL	Water Use Licensing
WWTW	Waste Water Treatment Works



Summary

AWARD, together with other partners has been working with stakeholders to support the sustainable management and use of the Olifants River. The last few years of protracted drought have illustrated how vulnerable the lower Olifants River area is in terms of surface water availability. Indeed, the drought has highlighted the fact that in times of low flows and stress, the situation has become critical and unless there is sufficient rainfall, flows will continue to decline and may cease in the main stem.

The lower Olifants is key in a number of ways: it supplies water to large-scale commercial agriculture, domestic supply for Hoedspruit, Phalaborwa, Namagale and surrounds as well as to the mines and industry, the Kruger National Park and Mozambique. Domestic demands for Sekoro-Mametja area and for emerging small-scale agriculture have yet to be taken up. However on a number of occasions (e.g. Jan 2016, Jan 2018, Oct. 2018) a situation was reached where there is insufficient flow to meet current demands. In terms of water resources management, water use exceeds availability in many months of the year and the catchment cannot sustain further increases in uptake. A partnership between AWARD, SANParks and DWS (D:IWRP) has kept the river flowing but this cannot continue indefinitely. Urgent and longer-term action is needed.

Stakeholders need to be involved in an understanding and management of their water resources, together with government and delegated water service authorities. For this reason, AWARD proposed that a network of interested and affected parties that meets regularly to discuss and act on such issues be established. Given this, the meeting provided a background to the current situation from our analysis and consultations, explored the underlying drivers and the potential medium and long-term impacts. Furthermore, the meeting discussed the actions that have been - taken by various stakeholders and the bottlenecks to sustainable management. This formed the basis of several facilitated discussions that are to serve as the basis for looking at migratory measures. For assigned actions please see Table 8.

Key issues of concern and for **immediate action** include:

- 1) Urgent need for compliance monitoring and enforcement (CME) by DWS. Unlawful use is a major issue that compromises water resources protection, local users and downstream allocations including to the Kruger National Park and Mozambique
- 2) Validation and verification (V&V). V&V is needed as a matter of urgency in order to verify unlawfulness and regulate use. The lower Olifants is closed and the Ga-Selati is over allocated.
- 3) Drought restrictions are needed and clear processes and responsibilities in future need to be outlined.
- 4) Institutional arrangements are needed to ensure all water users are affiliated and represented such as through a WUA. Communication on water-related issues is needed.

Priority longer-term actions

- 5) A new reconciliation study that includes climate change scenarios is needed to determine the water balance.
- 6) Integrated operating rules for the Olifants Catchment system is needed.
- 7) Maintenance of monitoring gauge network (satisfactory in the Olifants; very poor in the Letaba).
- 8) Stakeholder engagements that have proper technical expertise and decision-makers present e.g, at CMFs.
- 9) Support and Implementation for WCDM in all sectors.
- 10) Domestic supply to rural areas needs to be finalised.



1 Welcome and Introductions

Dr Pollard the director of the Association for Water and Rural Development (AWARD), welcomed everyone followed by introductions from all participants (see Figure 1 and Table 1). The workshop was attended by 40 participants comprising DWS National (3), DWS Provincial (3), DWS Regional (3), farmers (4), CPA Members (5), AWARD (9), Lepelle Northern Water (4), Local Municipality (2), District Municipality (2) and Independent Stakeholders (5). See Table 1 below for apologies received:



Figure 1 Photograph of all the LORIN workshop participants

Table 1 Participant details (see Appendix 1 for registers)

#	FULL NAME	ORGANISATION/INSTITUTION	POSITION/ INTEREST
1	Flip Roodt	Farmer	Lower Olifants
2	Tommie Landman	Farmer	Lower Olifants
3	Isaac Malatjie	Famer	Lower Olifants
4	Josias Sebuyane	Farmer	Lower Olifants
5	Elphas Mathole	Moletele Communal Property Association (CPA)	PR Officer
6	Given Malope	Moletele Communal Property Association (CPA)	Ex-Officio
7	Herbert Chilome	Moletele Communal Property Association (CPA)	Ex-Officio
8	Japie Mokhawana	Moletele Communal Property Association (CPA)	Ex-Officio



9	Emelda Dilebo	Moletele Communal Property Association (CPA)	Treasurer
10	Kgwerano Mpamonyane	Independent	Law Expert
11	Llandi van der Walt	Komati Group	Group Legal Advice & Co. Secretary
12	Linda Desmet	Phalaborwa Mining Company	Environmental Specialist: Water
13	Caiphus Mukwevho	Tshikovha Environmental and Communication Consultancy (TECC)	Secretary
14	Anri Manderson	Hoedspruit Hub	Founder
15	Dr Eddie Riddell	SANParks	Water Resources Manager
16	Simon Mpamonyane	Lepelle Northern Water	Communication Director
17	Turelo Kgafine	Lepelle Northern Water	Acting Co-ordinator
18	Levy Majadibodu	Lepelle Northern Water	Scheme Manager
19	Mphachoe Motlalepula	Lepelle Northern Water	Regional Manager
20	Mdungazi Nhlamulo	Local Municipality: Ba-Phalaborwa	Technical services: Director
21	Mphahlele Jacob	Local Municipality: Ba-Phalaborwa	Disaster management
22	Thabo Mabulane	District Municipality: Mopani	Assistant Director
23	Albertina Rammalo	District Municipality: Mopani	Water Services Manager
24	Nyalunga Gezepi	DWS: Provincial	Director: Regulation
25	Silo Kheva	DWS: Provincial	Director
26	Johan van Aswegen	DWS: Provincial	Chief Engineer
27	Fikile Guma	DWS: Regional	Provincial Head
28	Kobus Pretorius	DWS: Regional	Area Manager
29	Pieter Viljoen	DWS: National	Scientist Manager
30	J.J. Pretorius	DWS: National	Acting Director
31	Barbara Weston	DWS: National	Scientist Manager
32	Dr Sharon Pollard	AWARD	Executive Director
33	Dr Derick du Toit	AWARD	Assistant Director
34	Dr Cryton Zazu	AWARD	Project Co-ordinator
35	Jan Graf	AWARD	Researcher
36	Hugo Retief	AWARD	Researcher
37	Mulweli Nethengwe	AWARD	Project Officer
38	William Mponwana	AWARD	Research Assistant
39	Silindile Mtshali	AWARD	Research Assistant
40	Joanne Taylor	AWARD	Shared Learning

APOLOGIES



1	Livhuwani Mabuda	DWS: national	Chief director
2	Tendani Nditwani	DWS: Regional	Acting Director
3	Celiwe Ntuli	DWS: Regional	Scientific manager
4	Yakeen Arwaru	DWS: Regional	Director Reserve Requirements
5	Smangele Mgbuba	DWS: Regional	Climate change: Director
6	Mare-tinka Uys	K2C	Director
7	Rananga Thomas	DWS: Regional	Candidate scientist

2 Purpose, agenda and background

Dr Pollard explained that the purpose of the day was as follows:

- a) To address the increasingly precarious situation of water resource availability and quality in the lower Olifants through a proposed network of interested and affected parties;
- b) To identify critical areas for immediate and longer-term action with clear roles and responsibilities.

It was noted that given the technical nature of this meeting it should be seen as supporting the catchment management forum which has a somewhat different purpose.

The programme (Table 2) started with an overview of the policy framework, catchment and status of water resources to ensure that all participants were fully informed. This was followed by key water resources challenges, mitigation options and a discussion of roles and responsibilities and the role of a LORIN Network.

Table 2 Agenda

Items	Time
1. Arrival and tea	09:30 -10:00
2. Welcome and introductions	10:00- 10:15
3. Overview of the Purpose	10:15 -10:30
4. Background: Legislative and Policy environment	10:30 -10:45
5. Systemic overview of the Olifants River Catchment with a focus on the status of water resources and their sustainability in the lower Olifants <ol style="list-style-type: none"> 5.1. Overview of biophysical and social characteristics 5.2. Water quantity 5.3. Water quality 5.4. Water use 5.5. Climate change projections 5.6. Summary of major characteristics, threats and risks and implications 	10:45 -12:00
6. Current issues and challenges for flows and water quality in the lower Olifants River <ol style="list-style-type: none"> 6.1. Key issues and status of IWRM practices for water resources protection 6.2. Summary of AWARDS actions and support 6.3. Facilitated discussion - Challenges and progress 	12:00-13:00



LUNCH	13:00
7. Understanding Implications and actions to mitigate - facilitated discussions	13:30 -14:15
8. The role of a network	14:15-14:45
9. Wrap up and closure	14:45- 15:00

It was noted that it is important for stakeholders to understand and acknowledge the actions that have and are being taken by other stakeholders including the bottlenecks to sustainable management. Dr Pollard made it clear that the day was not a platform to blame each-other but rather to start working together towards solutions: “we are building a constructive and collective way of addressing the current situation”

Dr Pollard went through the items on the agenda, which were then adopted by the participants.

AWARD and RESILIM-O:

Dr Pollard introduced AWARD and the USAid funded program RESILM-O program (Figure 2), which currently supports the work on water resources management and protection and the proposed network. Dr Pollard noted that the RESILM-O program is a seven-year program which ends in 2019. Given this, participants would need to start thinking about network sustainability.



Figure 2 Key issue facing the ORC at the start of the RESILM programme (background slide presented by Dr Pollard)



3 SESSION 1: Overview of water resources situation & management in the Olifants

This section of the report summarises the current situation based on research, analysis and implementation work of AWARD as well as SANParks, in particular:

- Support for governance and institutional arrangements (meetings and engagements with DWS and water users throughout 2017 and 2018)
- Data analysis and inclusion onto a Decision-support System known as INWARDs as well as other tools such as FlowTracker and the Rainfall app
- The use of such tools together with the “de Hoop release model” which has been used, with the support of DWS and SANParks, to ensure continued flows in the lower Olifants. Dr Pollard stressed that releasing water from the De-Hoop dam indefinitely is not a viable long-term solution to the current situation.

It provides background regarding the current situation in the Lower Olifants followed by an exploration of the underlying drivers and the potential medium to long-term impacts.

3.1 Introduction

Dr Pollard presented an overview of the Olifants River Catchment (ORC), transboundary catchment which is shared between South Africa and Mozambique. She pointed out the key challenges (Figure 2):

- Declining water quality and flows are a major concern in the Olifants. Water quality in the upper Olifants is heavily impacted by mining and acid-mine drainage (AMD) as well as WWTW and discharge effluent. Mining effluent continues to effect the entire length of the catchment through the Burgersfort platinum belt and in the Selati before the KNP. The impacts of WWTW and agriculture all also evident. Water quality issues is undoubtedly impacting on human health. Flows in much of the catchment are cause for concern and this is evident here in the lower Olifants where the river could have stopped flowing in recent weeks were it not for the AWARD/SANParks/ DWS intervention (see later).
- Substantive coal mining in the upper catchment which, has major implications for water quality downstream (both lawful and unlawful).
- Further downstream in the middle Olifants, situated in the Groblersdal area is the second largest irrigation scheme in South Africa. The majority of the farmers within this irrigation scheme are accredited by GlobalG.A.P, However, due to water quality issues within the catchment, they are at high risk of losing accreditation which will have major economic implications .
- Waste Water Treatment Works (WWTW). AWARD has compiled a database indicating some 116 Waste Water Treatment Works in the catchment, most of which are non-compliant with Green Drop and contributing to the deteriorating water quality.
- Over half of the lower catchment is former homelands of the apartheid government. Here there are extremely high densities of rural and urban populations as a result of forced removals and water insecurity and huge inequality in terms of water access is high.
- The crocodile deaths in 2011 are indicators of water resource issues (particularly water quality) and the state of the Olifants River Catchment (ORC).



- The ORC is the only system that keeps the Limpopo basin flowing, to the mangrove estuary near Xai_Xai at the coast of Mozambique. Flows from the Olifants maintain the floodplain estuary at Xai-Xai which supports an estimated 65 000 livelihoods. Here salt water intrusion due to reduced flows in the Limpopo is evident. This is exacerbated by loss of mangroves in the 2012 floods.
- In addition to a deteriorating state of the Olifants, there have also been extreme events such as the floods in 2000 and 2012 followed by drought from 2015 to current. The aforementioned has resulted in a loss of mangroves in Mozambique leaving villages at high risk of flood disaster, and to loss of life, crops and cattle. Therefore, it is vital to always remember that whatever happens upstream has an influence on downstream.

3.2 Background: Legislative and policy environment

Dr Pollard stated that it is key to understand the legal requirements that provide a framework for water resources protection in South Africa. These include several national policy documents including the: National Water Act (NWA), National Water Resources Strategy (NWRS) and other tools such as the Reconciliation Strategy for the Olifants River Catchment (ORC) which informs a water resources manager about the water availability and demand.

South Africa has adopted a model of **Integrated Water Resource Management (IWRM)** which holds that water needs to be managed holistically; water cannot be divorced from other components such as land-use; upstream activities impact on downstream water resources (unidirectional impacts); and IWRM needs to be based on a participatory approach involving water users, planners and policy makers at all levels. Supporting IWRM, the NWRS provides key strategic guidance for addressing sustainability such as the implementation of environmental water requirements (or Reserve, see below) and water-conservation demand-management strategies in the face of water stress and climate change. Dr Pollard stressed that all the above-mentioned policies need to talk to each other guiding water resource managers through an IWRM approach.

Institutionally, IWRM is enacted through the establishment of **Catchment Management Agencies (CMA)** for the nine water management areas in South Africa. These are supported by Catchment Management Forums for local-level participation. The CMAs are tasked to develop a catchment management strategy (see App 2) which should guide IWRM in the Water Management Area or WMA in question. We are part of the Olifants-Letaba WMA. The CMA establishment process is very far behind schedule and the Olifants-CMA process has been beset by problems, institutional flux and uncertainty. The proto-CMA has been gazetted 5 years ago, but then dis-established by the former minister Mokonyane with very little clear direction. This process seems to have now been reversed. At that moment regional offices were in the process of handing over activities and suddenly they re-inherited all their duties and mandates.

Box 1: Water resources Protection in South Africa

The Catchment Management Strategy consists of Source Directed Controls (SDC) and Resource Directed Measures (RDM) (see Figure 2). The former relates to the control of water use and Water Use Licensing (WUL) and the latter to water resource protection.

Protection consists of

1. Classification (Class I to IV indicates the state of a catchment from pristine to unacceptable)
2. Reserve determination (or EWRS- see below)



3. Resource Quality Objectives (or RQOs which set 'benchmarks for flow and water quality limits for each river and generally get included in a water use licence)

Environmental Water Requirement (EWR)

The EWR has been set for the ORC. AWARD now uses these as part of the InWARDS DSS and FlowTracker. SANParks uses a system of levels - or thresholds- which prompt different management actions. Dr Pollard displayed some screenshots from the Flow Tracker app to illustrate what an Environmental Water Requirement (EWR) is.

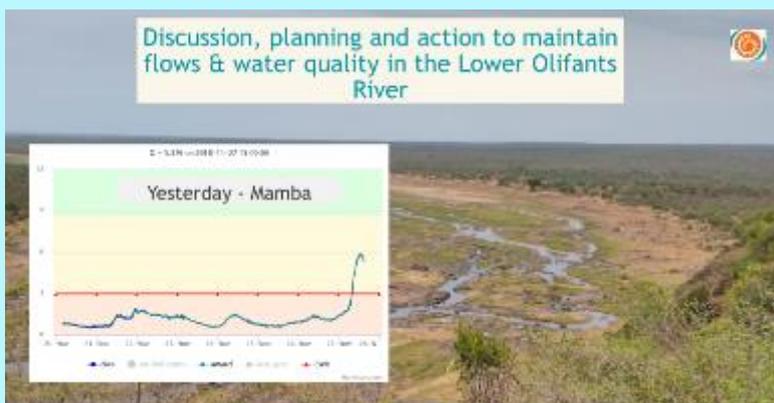


Figure 3 Slide showing the chart exported from FlowTracker used to highlight the current situation in terms of flow (blue line) in comparison to the Environmental Water Requirement (EWR) requirement

Implications of Classification

Once a class of river is determined, it sets the conditions for catchment development with respect to water use. For example, the **Blyde River Catchment is a Class I catchment** (the only one in the ORC) indicating that there should be no further development which may compromise the ecological state. However, there is currently prospecting and illegal mining in the Blyde system.

Dr Pollard then went through the recommendations from the classification study:

- The implementation of the Management Classes (MCs) will require **management of water quality through source directed measures, regulatory and institutional structures.**
- Concerted and regular **monitoring and compliance management** is required to ensure the successful implementation of the MCs.
- Due to the **water resource constraints** in the WMA, the implementation and updating of the Olifants WMA Reconciliation Strategy is central to the implementation of the proposed MCs.
- An **Integrated Water Quality Management Plan** is required.



3.3 Systemic overview of the Olifants River Catchment

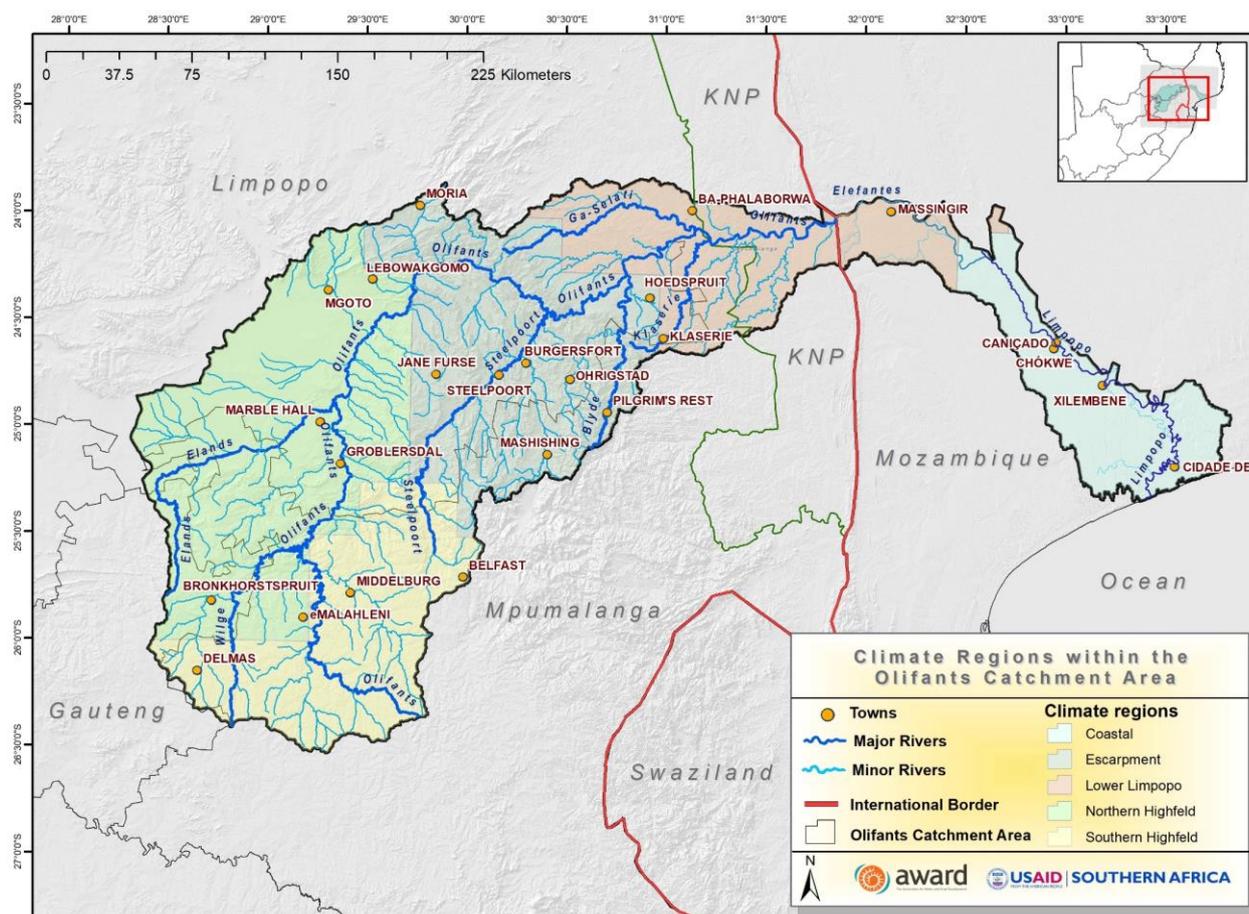


Figure 4 Map of the ORC (including Mozambique)

3.3.1 Biophysical and social characteristics

Dr Pollard presented several slides depicting the biophysical and social characteristics of the ORC, and how they influence water resources. Major activities driving change include: Waste Water Treatment Works (WTTWs), mining, agriculture and land reform.

Key messages	
•	Water quality and declining flows are a major issue throughout the catchment
•	AMD and discharge effluent from mines and WTTWs and disposable nappies are a major concern; unlawful use is also a key issue
•	The lower Olifants river has ‘run out of water’ in terms of surface water. The catchment is closed meaning there is no additional water to allocate.
•	Poor water quality is impacting on human health (E.coli, heavy metal and toxins)



- The **Blyde River Catchment is a Class I catchment** (the only one in the ORC) indicating that there should be no further development which may compromise the ecological state. However increased mining has been noted
- Better management is required

3.3.2 Water availability

Mr Retief presented on the current water availability versus what was available in the past. The WR2012 models suggest that under natural conditions (naturalised) there was more water available than there is today (present day). For instance, the lower Olifants (B72) which represents almost the entire Olifants runoff, is estimated to have **26.5% less runoff today** than under natural conditions. (Table 4). Furthermore, with this prolonged drought we are seeing river flows that have not been recorded historically. It is also important to note that the last present-day runoff simulations were run during the WR2012 study in 2012 (Table 2), if the models were rerun to include the prolonged drought (2015-present) we may see a much larger decrease in runoff.

Table 3 Mean annual runoff (MAR) simulated at various points in the ORC during the WR2012 studies. MAR is the average amount of water that flows down a particular river, per year. Naturalised flow refers to a flow record that is manipulated to remove human influences that are quantifiable (e.g. consumptive abstraction and effluent discharges) so that we can see what 'natural flows' would have been. WR2012 is a database that describe South Africa's water resources. MCM - Million cubic meters

Quaternary	Location	River	Reason for site selection	Naturalised (WR2012)	Present Day
				MAR (MCM)	MAR (MCM)
B11G	Witbank Dam	Olifants	Major Strategic Dam	191.85	181.77
B32A	Loskop Dam	Olifants	Major Strategic Dam	490.28	500.83
B51B	Flag Boshielo Dam	Olifants	Major Strategic Dam	702.60	444.84
B41E	De Hoop Dam	Steelpoort	Major Strategic Dam	119.27	103.53
B60H	Blydepoort Dam	Blyde	Major Strategic Dam	354.56	288.86
B72K	B7H015	Olifants	Inflow to Kruger National Park	1817.71	1332.19
B73J	B73J outlet	Olifants	Outflow to Massingir Dam in Mozambique	2539.16	1884.31



By tracking the compliance of flows with the EWR legal requirement (the benchmark) one is able to get a sense of water stress in the lower Olifants. Mr Retief presented a chart (Figure 5) which represents the number of days where flows were non-compliant with the 99th percentile¹ EWR, which represents the absolute minimum amount flow that should be in the river to maintain its ecological integrity during drought (only). The chart shows that we are potentially on a worse trajectory than that of the meteorological drought of 2015-2016 (Figure 5). The Olifants is predominantly a baseflow system; thus, with the increased temperatures and reduced rainfall we are potentially getting less groundwater recharge and thus less baseflow contributions to surface water. This is potentially further exacerbated by the exponential expansion of irrigated agriculture upstream along the Olifants River.

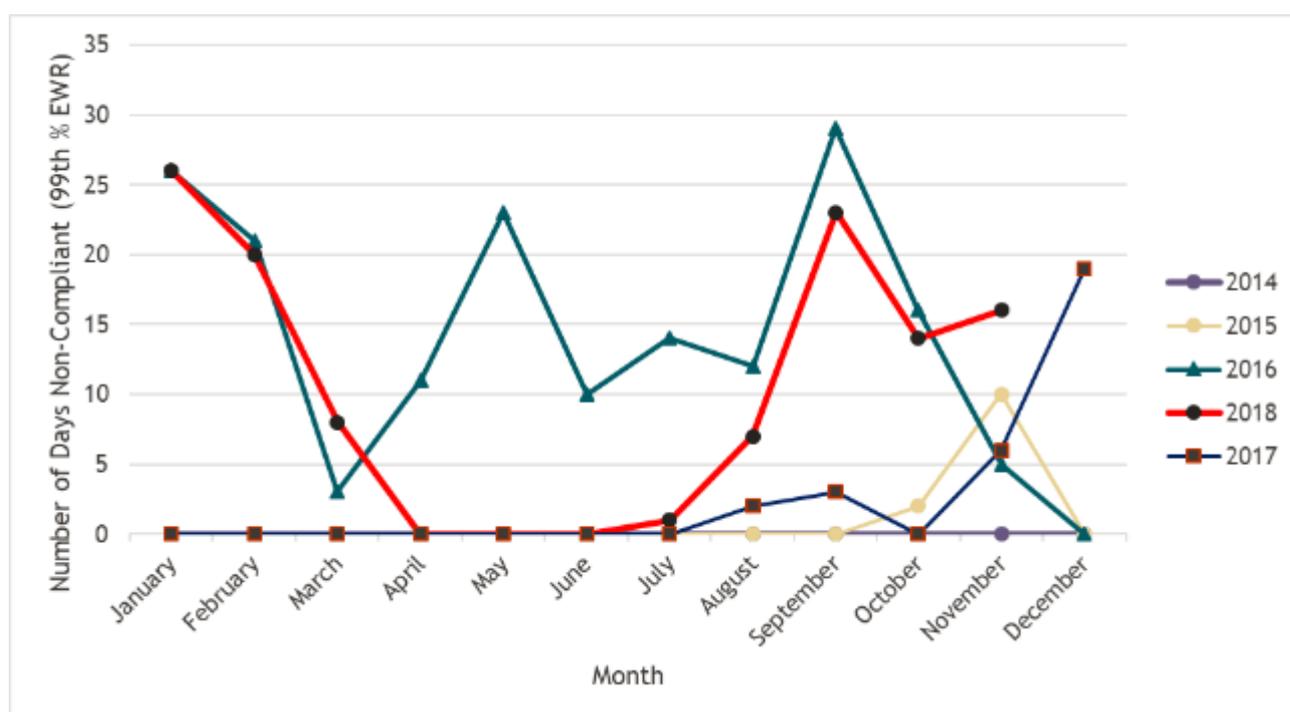


Figure 5 Number of days per month that flows were non-compliant against the 99th Environmental Water Requirement (EWR)

Key messages

- Water quality and declining flows are a major issue throughout the catchment
- The lower Olifants (B72) which represents almost the entire Olifants runoff, is estimated to have **26.5% less runoff today** than under natural conditions.
- Increasing non-compliance at the end of the dry season is evident especially in the last three years

¹ 99 percentile means that about 99% of all flows scored less than the EWR. Very few are compliant (1%)



3.3.3 Water quality

Mr Retief presented several slides illustrating the non-compliance of water quality observed at Mamba weir in the Kruger National Park. Timeseries of observed data were plotted against the RQOs to illustrate the non-compliance (Figure 6). Mr Retief described the importance of understanding the relationship of water quantity and quality, which often has an inverse relationship because of the dilution effect. In other words, the less flow, the higher 'greater the problem'. An example of flow (discharge) and electrical conductivity data is given (Figure 7).

Mr Retief stressed the need for more routine monitoring as currently it is difficult to track trends or compliance due to insufficient data.

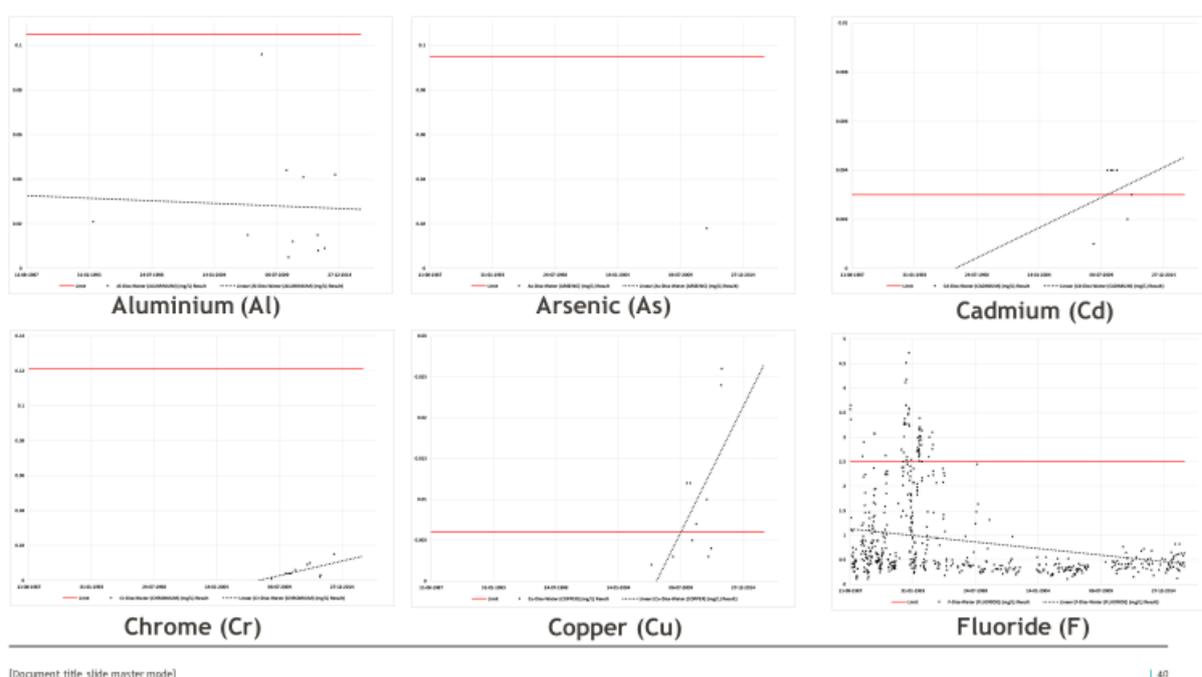


Figure 6 Water quality results for Mamba weir plotted against the RQOs

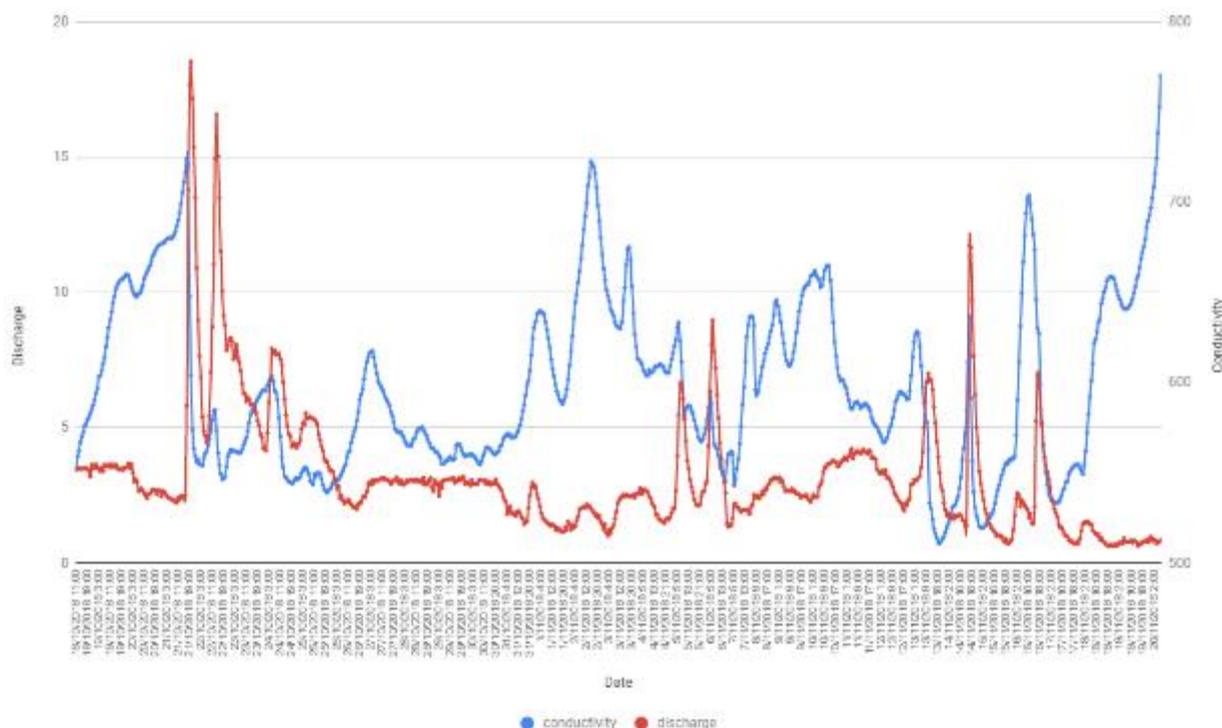


Figure 7 Electrical conductivity plotted against discharge from Mamba weir that illustrates an inverse relationship

Several slides were presented summarising heavy metal toxicity measured by AWARD and CSIR near communities (Botshabelo, Lepelle, Twickenham) and the potential health impacts of the constituent concentrations measured. The slides showed a number of variables (Table 5) exceeding toxic limits having a number of potential health impacts. These are a major concern as these communities rely heavily on rivers as their primary source of water.

Table 4. Summary of heavy metal toxicity from various studies along the Olifants River. An indication of the potential health impacts is given

Site	Variables of concern	Data Source	Potential health impacts
Botshabelo and Lepelle	Al, Sb, As, Be, Cr, Mn, Mo, Ni, Se, Sr, U	CSIR 2014	<ul style="list-style-type: none"> • alzheimer's • increased blood pressure • renal failure • skin lesions • cardiovascular failure • kidney and liver damage • cancers
Moste Middle Catchment	Pb, Cd, Cu	AWARD 2018	<ul style="list-style-type: none"> • lower IQ and hyperactivity • slowed growth • hearing problems • anaemia • gout



Key messages

- Water quality is a major issue throughout the catchment
- Declining flows compound water quality issues
- Water quality has potentially serious implications for human health

3.3.4 Questions, comments and discussion

- **Mr. Mpomoyane (Lepelle):** How is the linkage about what we are saying (this critical information) to municipality IDPs as they are planning for future development, as we cannot plan without knowing the resources, I have benefited from the introductory presentation and I am asking myself where are the real users, the municipalities?
 - **Dr Pollard (AWARD):** It is one of the key issues to talk about later which is around co-operative governance. It has been a constant issue - how do we integrate things across different sectors, planners and users? For example, logistically we are sitting with water resource management in Nelspruit and water supply in Polokwane which is 300 km apart (5 hrs), and we also have the water service authority and water services provider. DWS does need to be engaging the municipalities and for the moment we can assist
 - **Noted as an action item for later discussion & uptake by DWS**
- **Mr. Landman (commercial farmer):** which lab are you using to test the water?
 - **AWARD:** Aquatico Lab Pretoria. However, the German-funded project - IWAGGs - does have lab equipment. Although it is not certified/ accredited it is useful for spot checking. Water quality samples for formal use must be done at an accredited lab which can be expensive.

Key messages

- There are major water quality concerns and non-compliance. This is shown by DWS data and from other sources
- There are major implications for human and biotic health
- Urgent management is needed



3.4 Water balance and use

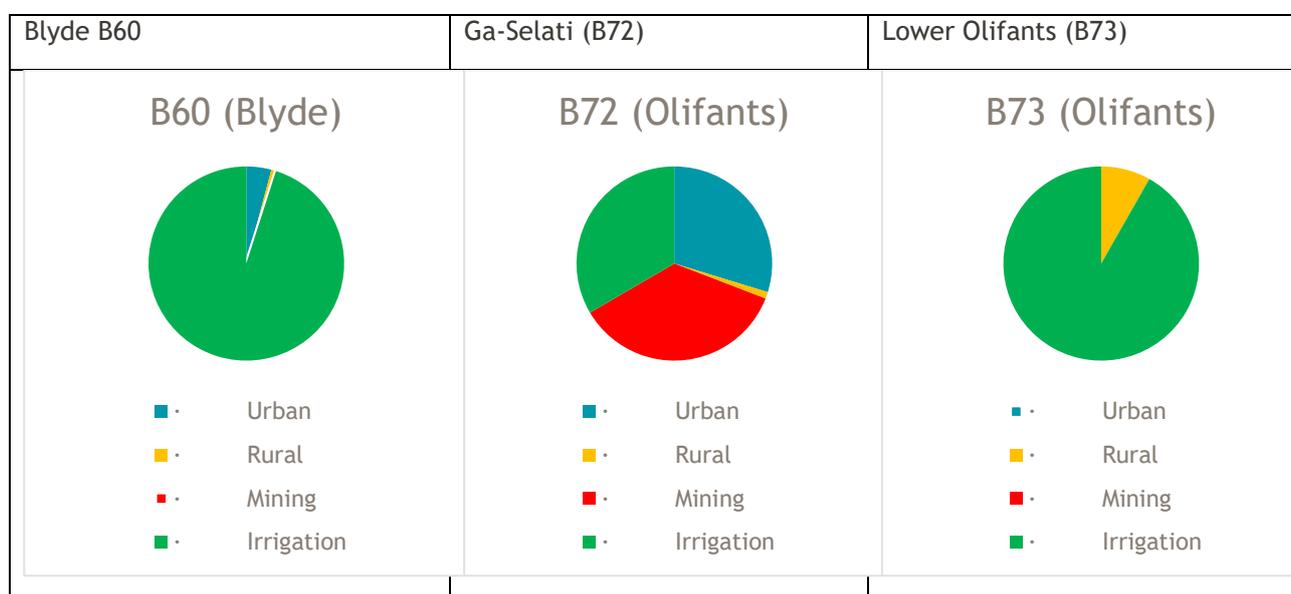
Mr Retief presented several slides showing the water balance (water availability and use) and for the lower Olifants.

Water Use

Water use in the Olifants and Blyde is dominated by agriculture. Water use in the Selati is distributed between mining, agriculture and urban. Despite the massive bulk infrastructure development to Mametja-Sekororo there is still no water being supplied through this schemes. AWARD requested that the DWS-RO raise this with Polokwane and others:

Attn: Action DWS-RO to lead

Table 5 Summary of water use in three sub-catchments of the lower Olifants



Water balance

The water balance for the major sub-catchments of the lower ORC indicates water stress with only the Blyde (B60) having a positive water balance (Table 7). The lower Olifants is effectively closed (with only a small amount of groundwater) whilst the Ga-Selati is over-allocated.

Table 6 Summary of the water balance for the lower Olifants

	B60 (BLYDE)	B72 (GA-SELATI)	B73 (OLIFANTS)
AVAILABLE	157.3	83	6.1
WATER REQUIREMENTS			
• URBAN	5.3	26.7	0
• RURAL	1	1	0.5
• MINING	0	32	
• IRRIGATION	122	30	5.6
SUB-TOTAL	128.3	89.7	6.1
BALANCE	29	-6.7	0



A study commissioned by AWARD shows that the catchment as whole will be out of balance in the year 2030 (see Figure 8).

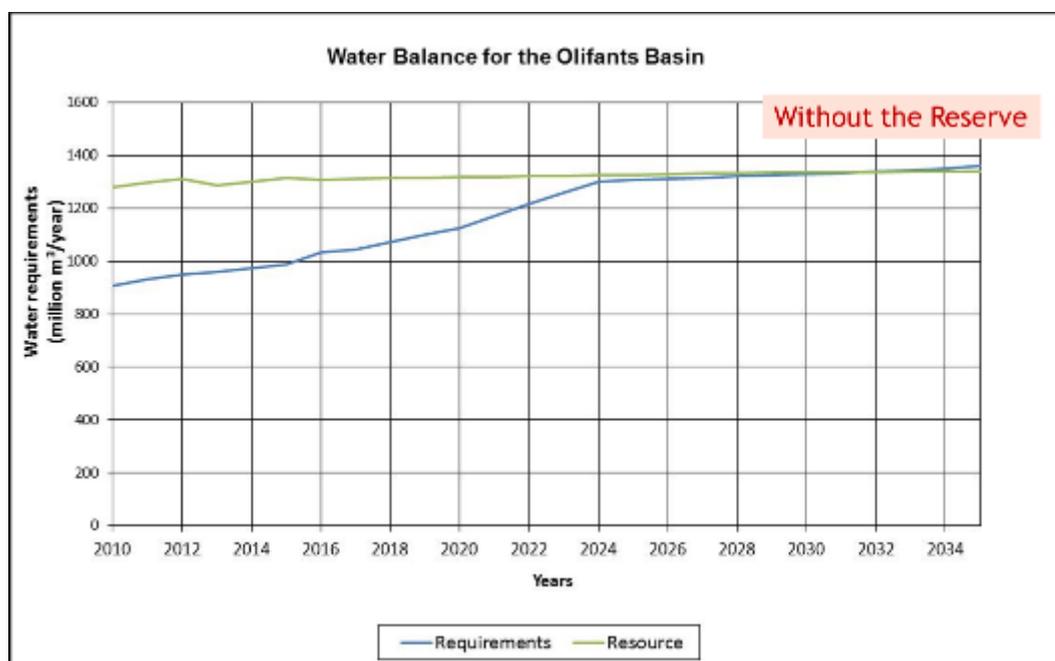


Figure 8 Water requirements vs water availability (Mallory 2014). Note that this data does NOT take into account the needs for environmental water requirements suggesting that the date of closure will be earlier

3.4.1 Recommendations by DWS 2011 reconciliation study

Mr Retief presented a list of actions recommended by the 2011 DWS reconciliation strategy for the ORC to address the water deficit:

Interventions that will reduce water requirements:

- **Water Conservation and Demand Management** for Irrigation, Urban and Mining water Use Sectors
- Eliminating **unlawful water use** phased in over 5 years from 2015.

Interventions that will increase the water supply:

- Removal of **invasive alien plants (IAPs)** - implemented over 25 years from 2010.
- **Groundwater** development from 2012 over the next 23 years.
- Treatment of **decant** water from existing and decommissioned and rehabilitated coal mines.
- **Sewage water reuse** in Polokwane and Mokopane.
 - **Noted as an action item for later discussion**



3.4.2 Actions by AWARD and SANParks/ DWS partners

The meeting was given an overview of actions taken by AWARD, SANParks and DWS (D:IWRP) to maintain flows in the mainstem of the Olifants River between January 2016 and the present.

AWARD has been focusing on the collaborative development and testing of protocols for responsiveness and action as part of an Integrated decision- Support System (IDSS) for compliance and early warning. An example of this has been efforts to ensure continued flows in the lower Olifants during the drought of 2016 and a number of times since then (Box 2).

Box 2:

An example of co-operative governance: securing environmental flows in the lower Olifants

In response to the crippling drought and non-compliance with environmental water requirements in the lower Olifants, and in support of good, adaptive governance we started work on securing a shift of water use from the Blyde to the De Hoop Dam (currently at 42% capacity) to augment flows in the lower Olifants. If the dam drops below 25% water cannot be abstracted for irrigation, placing 10 000 permanent and seasonal jobs at risk. In response to requests by DWS, and a letter from the Acting Managing Executive of the Kruger National Park and recommending the use of the RESILIM-O model to achieve this, DWS agreed.

A major success for RESILIM-O has been the acceptance of these recommendations and the release of water from the De Hoop Dam – first on the 23rd of September 2016. AWARD has been given the responsibility of monitoring the flows and running the RESILIM-O De Hoop release model when necessary to recommend further releases until we are out of the emergency state. Further releases have been made in 2017 and again in 2018. The dam releases resulted in the Environmental Water Requirement (EWR) being met at Kruger National Park's Environmental Water Requirements site, Mamba Weir – a major success in a time of drought! The health of the river also improved.

In order to help institutionalise the above tools and protocols, training sessions have been run with DWS staff over three modules.

AWARD noted that we cannot rely on De-Hoop Dam all the time. This is merely an interim measure. Thus we need to move to a system that is integrated and dynamic, including moving away from static monthly operating rules. This has been stressed numerous times over 5 years to DWS and is part of their own recommendations.

AWARD has started developing a model that can be a basis for moving towards integrated operating rules and operations. AWARD has multiple models and algorithms running on a server that trigger warnings and inform stakeholders which is intended to spark action taking. Therefore, a real-time system can help bring stakeholders together to move towards keeping the system going.



However, the models used to implement releases need to consider lags in the system (for example number of days it takes for water to reach a different point after releases). Water releases made from Flag Boshielo Dam take up to 9 days to reach Oxford.

Although there are challenges, the Olifants is still one of the better real-time monitored systems in the country and is well-maintained thanks to the small, focused team at DWS.

Att: this needs to be supported and maintained by DWS

All dam releases should be considered as part of the system and these should be managed in an integrated way. This recommendation was made at least 5 years ago.

- **Noted as an action item for later discussion**

3.4.3 Questions, comments and discussion

- **Mr. Graf (AWARD):** As far as I know there is no water allocated for mining in the Blyde?
- **Mrs. Motlalepula (Lepelle):** we would like to clarify this, so far allocation is made from the Blyde and Olifants?.
 - **It was clear that allocations are not well understood.** To try to support DWS, AWARD summarised allocations:
 - **Blyde Dam:**
 - **No allocation for mining**
 - Allocations - domestic water (i.e. Lepelle allocation) for emergency 50MCM/a
 - BWUA from Blyde
 - Allocations per sector
 - Lepelle- mixture from Blyde and from main stem of Olifants River (i.e. from Flag Boshielo Dam and Steelpoort River). They have an emergency allocation from the Blyde for 50 MCM/a. The Lepelle water requirements were meant to be shifted from Blydepoort to De hoop Dam once it was commissioned.
 - KNP- from main stem of river (i.e. from Flag Boshielo Dam and Steelpoort River)
 - Olifants farmers- small allocation from Flag Boshielo and from mainstem
 - The Blyde is a Class I Catchment under DWS assessment and therefore cannot be further developed in ways that impact on water resources
- **Ms. Kgwerano (Environmental lawyer):** Can this not be litigated? Are communities aware of the critical of the problem in terms of the water quality as this is really a major issue?
 - **Dr Pollard (AWARD):** Before going to litigation rather work through a network like this to consider how we can work together. There are cases where progress was only made when a few organisations came together. In terms of letting the community know, it is a DWS responsibility to have stakeholder engagements.
 - **Noted as an action item for later discussion**
- **Dr Riddell (SANParks):** Measurements of water in different points in the river is key. Thus a system gauging network is a critical component in management processes. For example, in the Letaba we are dealing with a crisis due to the fact that the gauging network has deteriorated and not been maintained. As water users, you pay for your water-use licences - and it is important to remember that you are also paying for the infrastructure costs that get damaged. This monitoring network helps us to track losses in the system through a mass balance approach thus informing operations, compliance and enforcement. The system in the Olifants is still fairly good.
 - **Noted as an action item for later discussion**



Key messages

- Water use in the mainstem of the lower Olifants and in the Ga-Selati is close to or **has exceeded availability**.
- The water balance model shows that the catchment will be closed by 2030 - but possibly earlier once EWRs and climate change (as required by policy) are accounted for
- Monitoring is still relatively well-maintained
- There is an urgent need for integrated operating rules

3.5 Climate change predictions

3.5.1 General impacts

See Appendix II for full text.

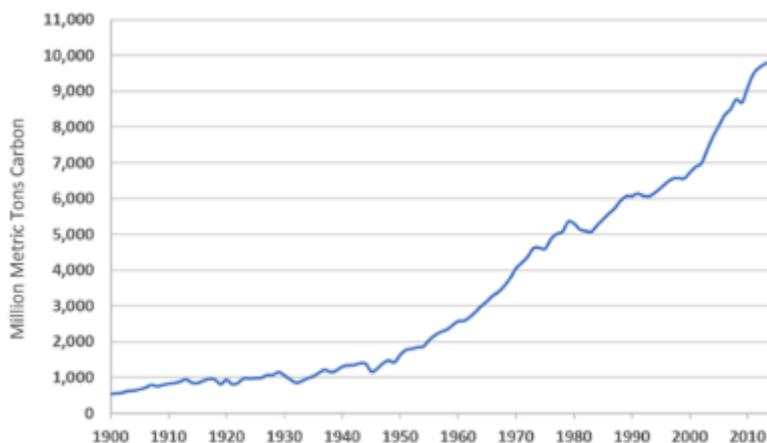
Having given some background on the cause of climate change, Dr Riddell explained that based on CO₂ concentrations (Figure 9), we are currently in a “high scenario” (based on the Representative Concentration Pathways (RCPs - Figure 10)) meaning that we are likely to experience the most severe changes that are projected for temperatures and rainfall. Under this 8.5 RCP Scenario, AWARD and other data indicate that the following are likely:

- Temperatures are expected to increase by 2° C
- Increase in the number of days with maximum temperatures exceeding 36 °C
- Loss of grasslands for livestock
- Uncomfortable conditions thus more air-conditioners needed in homes
- Dryland rain-fed crop will be affected
- Increasing diseases in the lower Olifants, moving from a semi-malaria area to an annual malaria area

Dr Riddell added that statistically there are no significant changes or trends in rainfall-related variables.



Global Carbon Emissions from Fossil Fuels, 1900-2014



Source: Boden, T.A., Marland, G., and Andres, R.J. (2017). [Global, Regional, and National Fossil-Fuel CO2 Emissions](#). Carbon Dioxide Information Analysis Center, Oak Ridge National Laboratory, U.S. Department of Energy, Oak Ridge, Tenn., U.S.A. doi 10.3334/CDIAC/00001_V2017.

Figure 9 Chart depicting the increase in atmospheric carbon content

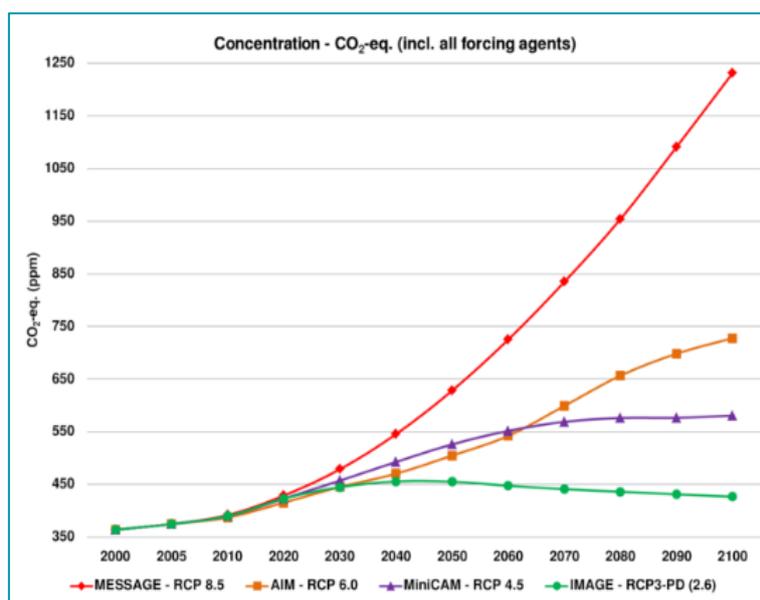


Figure 10 RCPs - Representative Concentration Pathways. We are currently on the RCP 8.5 trajectory

3.5.2 Potential impacts on water

Results compiled by Dr Schultze, indicate that

- The mean annual rainfall (MAP) in the Olifants will change over the next 15 years (either decreasing by 12% or increasing by 4% (dependent on location)). The MAP for the Lowveld is more likely to decrease by 12% (see Figure 11).
- Regarding dry and wet spells, the lower Olifants will experience more dry spells and fewer wet spells
- There will be an increase in evaporation is expected to increase and irrigation requirements of about 12%.
- Dr Riddell stressed that when it comes to the water availability in the system, we are going be the “losers”.
- Dr Pollard (AWARD) added that when planning, it is key to start thinking about climate change impacts on water resources.

○ Noted as an action item for later discussion

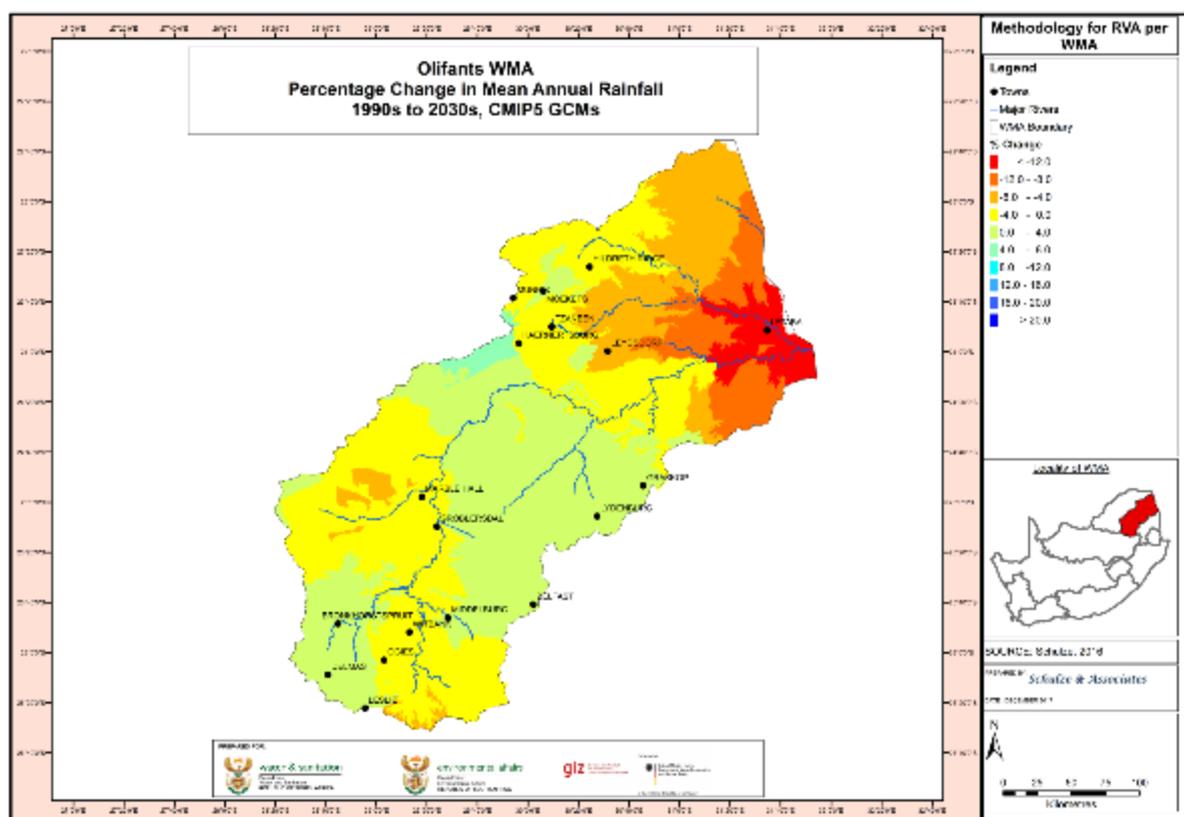


Figure 11 Climate change projections depicting the percentage change in mean annual rainfall (source Dr Schultze 2018)



3.5.3 Questions, comments and discussion

- **Mr. Landman (Commercial farmer):** From an agriculture point of view, technology and agricultural practices have changed due to climate change. We are now using different tools and new practices to reduce evaporation.
 - **Dr Riddell (SANParks):** We need to be looking at networks and technologies in order to be able to cope and adapt to climate change. Within this network, we need to share ideas. For example AWARD has a project on agroecology and lessons could be shared.
 - **Mr. van Aswegen (DWS):** We have our colleagues from the Netherlands who have a project on sub-surface drip irrigation systems. The project focuses on preventing evaporation and is currently supporting South African commercial and small-scale farmers.
 - **Dr Pollard (AWARD):** This all relates to water conservation demand management. In this regard, for example, AWARD and Hoedspruit Hub are doing agroecology for small scale farmers around Mametja area. The Western Cape has been more progressive in terms of agricultural adaptation measures.
- **Mr. Kheva (DWS):** The economic impact of this is worrying.
 - **Dr Riddell:** In South Africa, hydrology costs have not been linked to the economic costs, there is a gap.
 - **Dr Clifford Holmes (AWARD):** The National Water Resource Plan (NWRP) is responsible for developing national strategies and procedures for the reconciliation of water availability to meet national social and economic development objectives.
- **Mr. Mabulane (Mopani District Municipality):** The challenge we have in the water sector is that we are operating in silos. He explained that at a recent workshop, the water component was poorly considered. At a recent summit regarding the water board it was clear that all plans included water but there was no integrated planning for one resource. I am sitting now with a plant that is not operating because there are no resources.
 - **Dr Riddell (SANParks):** I don't have a direct answer, but the national water and sanitation master plan will touch on breaking those silos between water resources and water services management. This network is an opportunity to start breaking those silos at a local level.

Key messages- climate change and water

- Climate change is predicted to result in higher temperatures and protracted dry spells in the Olifants
- This will impact on water resources
- This needs to be taken into consideration in planning and implementation as a matter of urgency. So far it has not been a focus except for some small and/or individual efforts.

3.6 Institutional arrangements

Dr Riddell stated that this is not the first meeting of concerned stakeholders and provided a short history.

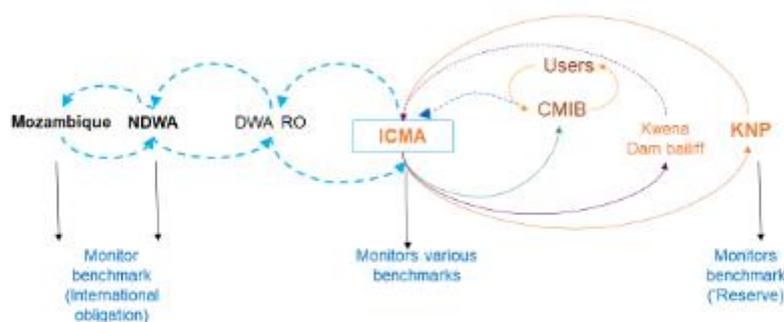
- Following concerns about the low-flow management after the 1990 drought, the Kruger Park formed the Inter-departmental Committee whose portfolio has broadened over the past 20 years.
- The Olifants River Forum from the 90s closed in 2018 due to corporate diversification and duplication with other forums.



- In 2000 the OLLI forum - a Lowveld River coordination Forum - was initiated with a strategic Lowveld rivers management focus. It was useful but lost traction.
- During the 2015 -2016 drought, an ad-hoc Lower Olifants River Committee (LOROC) was developed although continuity is a challenge.
- Currently we have Catchment Management Forums (CMFs) administrated by DWS. They function to some degree but have a more general mandate than solving operational issues. At times there are no minutes or the DWS staff are unable to answer questions posed by stakeholders

- **Att: DWS stakeholder engagement to address this**

Dr Riddell used the feedback loop diagram depicted in Figure 12 below as an example of a functional governance system in the Crocodile River. This is what we need to try to build here.



Adapted from Pollard and du Toit, 2011.

Figure 12 Real example of the system working in the Inkomati (IUCMA) in Crocodile & Sabie. This shows the multiple stakeholders involved in ensuring continued river flow

3.6.1 Questions, comments and discussion

- o **Mr. du Toit (AWARD):** We need to acknowledge that forums do exist and people need to know their roles and responsibilities.
- o **Mr. Mukwevho (Tshikovha environmental):** There should be recommendations about how water gets allocated, the plans need to also focus on water infrastructure especially in rural areas.
 - o **Noted as an action item for later discussion**
 - o **Dr Pollard (AWARD):** What we are seeing in the Olifants is new water-users sometimes take an environmental impact assessment (EIA) as a go-ahead to use water. In fact, that is not a water-use authorization. LEDET or MTPA is required to send those EIAs to the Nelspruit regional office to assess water-related issues. We see comments on EIAs that impacts on water will be “zero to moderate”. We question the expertise of making such a conclusion without evidence, nor consultation with the OCMA or the regional office.
- o **Mr. Viljoen (DWS):** We are not sitting with technical problems; we have the technology to solve the problem including water-quality models, operating rules, FlowTracker app on our phones which instantly shows the severity of the situation. But this alone doesn’t solve anything - it is an institutional and political will problem. We need buy-in from all the levels - from the council to everyone using the



resources and in management. We now have a Green Drop scoring system for municipalities to try and encourage them to improve but very few are improving. With that said I can only see co-operative governance as solving these issues.

- **Dr Pollard (AWARD):** The institutional flux that has characterized the past year has not been helpful. Firstly, there were several changes that happened regarding the OCMA (tardy processes and disestablishment) and the processes around the dis-establishment of Water Use Associations. We saw functions were also being revoked from the IUCMA which left management and water-users confused and disillusioned with DWS. Recently the dis-establishment of the proto-OCMA after the regional office was ready to do a handover has impacted our work and meant that the regional office had to take back more work. The NWA clearly provides for a catchment-based approach. We have heard that the CMAs are back on track (as published in the city press) but have received no communication from DWS. This has caused an immense amount of confusion, disillusion and with-it ineffectiveness in some cases which has opened a space for unregulated water use in some areas.
 - **Mr. du Toit:** Due to the fact that there is a sense that nothing is going to happen, people are deciding to do whatever they want because they know the state of things. For example, municipalities (such as in the upper catchment) develop shopping malls with little care as to where they discharge their waste. This is building a culture of unlawful water-use, waiting to see if one is caught and then going to litigation.
 - **Mr. Viljoen (DWS):** In some provinces, the IDP is not going to be approved without a section on water services which speaks to water quality and quantity, I am not sure whether that is happening in all municipalities.
 - **Dr Pollard (AWARD):** South Africa has the best policies and tools to do this right, but it's when is not happening, that questions are raised as to who gets held accountable and how does it get regulated.

Key messages - institutional arrangements

- There has been a great deal of institutional flux (e.g. OCMA and other forums) which has headed to negative consequences
- New water use is not properly planned, authorised or regulated in the lower Olifants
- We have sufficient technology - it now needs political will and action.
- The IDP water services section needs to reflect issues of water quantity and quality



4 SESSION 2: Current issues, challenges and actions for flows and water quality in the low Olifants River

Having a greater understanding of the situation, this session aimed to provide participants with an overview of actions that have been taken to address flow and water quality issues and the challenges that have been faced.

4.1 Support through AWARD and SANParks to DWS

4.1.1 Overview

Dr Pollard gave an overview of the work that has been done. It was noted that AWARD has provided support in other river systems such as the Inkomati-Usuthu Catchment Management Agency (IUCMA). When RESILIM-O started in 2014, the proto- CMA for the Olifants (OCMA) was being established and both SANParks and AWARD played an active role in this process. Following a multi-directorate meeting with DWS, AWARD also received a letter of endorsement to support work focused on IWRM, water resources protection and long-term sustainability.

In terms of water security, we noted that in 2005 the river stopped flowing for 78 days despite the fact that it was not in a 'dry cycle' and a similar situation has developed in the last three years. This pointed to potential management issues. This clearly meant that flows in the Olifants were not complying with or meeting the environmental water requirements - or Reserve- as required by law. Participants were reminded that this is the first step in water resources planning. It was then apparent that there was no real-time, integrated system for monitoring flows that would allow a manager to respond immediately to declining flows or water quality and AWARD proposed the development of such a tool. Both the OCMA and SANParks welcomed this as they were also finding the lack of real-time monitoring to be a major constraint in being able to act rapidly and effectively.

From this AWARD developed a suite of tools including the aforementioned FlowTracker app and the desktop-based decision-support system (INWARDS). These are integrated with DWS tools such as the IWQM System.

During the 2015-2018 drought, AWARD put these tools to the test. They worked with SANParks and DWS National (D: IWRP) to model and ensure releases from de Hoop Dam instead of from the Blyde. Not only did this reduce the enormous pressure for the Blyde users but benefitted users in Phalaborwa and surrounds, Lepelle Northern Water, the municipality, mines and of course the KNP.

It was noted that the river nearly stopped flowing in January 2016 and 2018 - at the height of the rainy season- and two weeks ago. But with our small AWARD/SANParks/ IWRP (DWS) network for governance and the tools of AWARD, the river continued to flow albeit at a very low level.



4.1.2 Summary of AWARD/ SANParks actions and support:

1) Governance:

- a. **KNP and Olifants CMA (until late 2017)**- We have been working with SANParks (KNP) and the OCMA and DWS to support governance and IWRM for the ORC This has involved developing a decision-support system, undertaking water quality and quantity monitoring and analysis, the development of an early warning system, training, compliance monitoring and drought mitigation. With the aforementioned institutional uncertainty that developed in late 2018, AWARD and SANParks then had to switch to working with the DWS Nelspruit Regional Office.
- b. Working with other partners such as KNP, Lepelle and DWS has been useful in keeping the Olifants River flowing.
 - i. **Drought actions**- As described above. Conditions between 2016 and 2018- the worst drought on record - imposed many risks which AWARD and SANParks tried to mitigate. Dr Riddell noted that this drought was different compared to previous drought events due to the increased number of hot days (i.e. higher temperatures).

2) Tools:

- a. INWARDS DSS used to integrate all data available for a catchment and includes an early warning system. Designed to support planning, compliance monitoring of water use and new water use applications
- b. FlowTracker app, Designed to track flow in real-time and to track compliance against the Reserve or environmental water requirements (EWR)
- c. rainfall app. Designed to collect rainfall data from citizens, particularly in the absence of SAWS rainfall data and to illustrate variation across a landscape
- d. We hope also to develop informative billing and test it.

3) Training OCMA/ DWS staff (CME) on IWRM and Decision Support Systems (DSS)- 3 modules

- 4) **Gauges**- AWARD has paid for and installed duplicate flow monitoring gauges (Figure 13). This has allowed us to operate in near real-time and was very useful when DWS gauges were down particularly in 2018
- 5) **Equity and redress**: A key issue that is often left out of the picture is the Mametja-Sekororo area. With a population of about 70-80 000, there is an allocation to the area that still needs to be met. However, despite a major bulk supply scheme being built, it is still not operational, and we have been unable to get any clarity on why this might be so. It is noted that people thus still don't have access to potable water and depend on boreholes or water vendors. Water use from the Olifants puts them at a potential health risk. Moreover, the more that additional water is taken up by new developments, the more difficult it will be to meet these needs from the Olifants.

6) WWTW -

- a. We have developed a database of all WWTWs in the ORC;
- b. collaborative turnaround plan for Ba-Phalaborwa for their three WWTW.

- 7) **WCDM** (Water Conservation and Demand Management). We have undertaken a study with WRP on water use (which is almost the highest in the country), water loss within Phalaborwa and Hoedspruit and have developed a strategy with the municipality to address this.



- 8) **Disaster Management** - We have worked with the Disaster Management Centres to plan for flood preparedness with the district and the two-local municipalities.

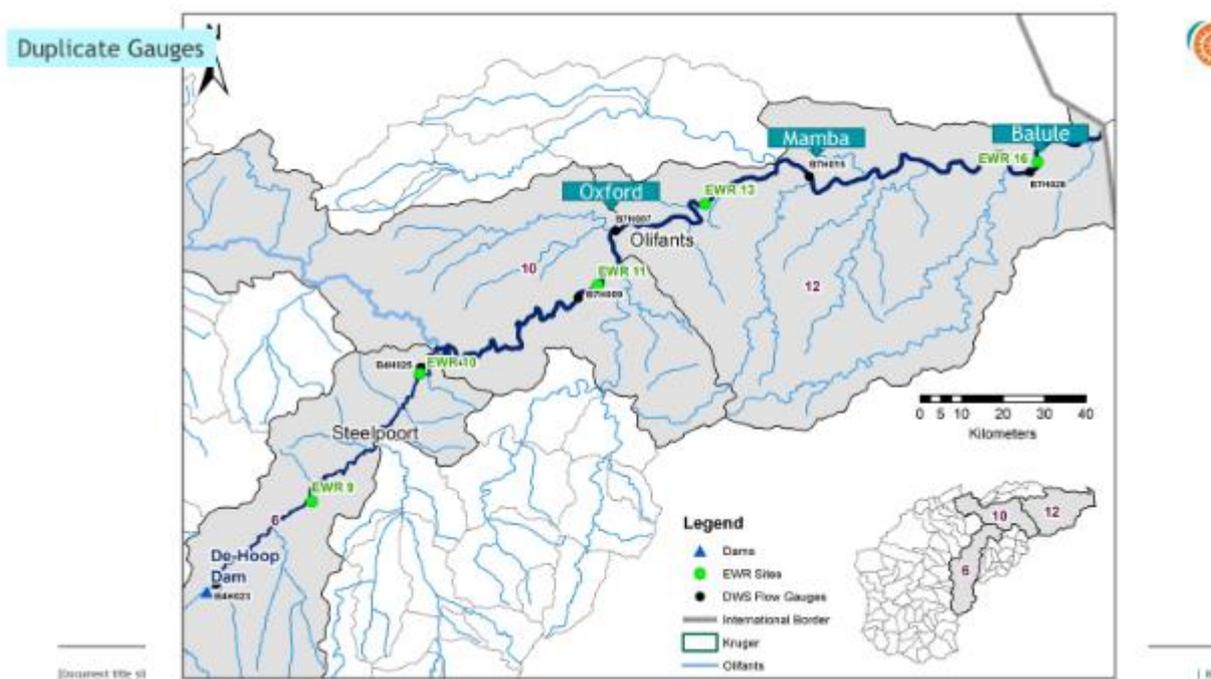


Figure 13 Map of the lower Olifants River Catchment showing where AWARD has installed duplicate gauges

4.1.3 Facilitated discussion: challenges and progress

Challenges that are faced in the lower Olifants include expansion of irrigated agriculture with no available water to allocate and no water use licences (WULA) in some cases. This can be due to the approval of EIAs that are taken as a water use licence or as a green light to go ahead with the development. Other challenges include non-compliance of mines and WWTW.

- **Mrs. Weston (DWS):** One of the main challenges we have is the destruction of wetlands hence where is the Department of Mineral and Energy? And one of the key things is to raise a flag regarding new developments to protect our wetlands and estuaries.
 - **Dr Pollard (AWARD):** Agreed this is particularly true in the upper Olifants where wetlands used to be widespread. The focus here is on LORiN and the challenges being faced in the lower Olifants. Wetlands are less represented here but those of the upper reaches play an important role in regulating flow and water quality in the middle and lower reaches.
 - **Mrs. Weston (DWS):** Agreed. The network cannot focus on the lower Olifants only as some issues are having to do with other parts of the catchment.
- **Dr Pollard (AWARD):** Blyde sub-catchment is designated as a Class I. How does that get shared to municipalities and other sectors?
 - **Mrs. Weston (DWS):** We spend a lot of money on stakeholder engagement. We have a huge database but, in most cases, very few people attend stakeholder meetings.
 - **Dr Pollard (AWARD):** Therefore, the local network may be a better way of involving stakeholders before involving a bigger group. Nonetheless DWS needs to engage municipalities directly as



part of the LUP process and IDP development.

- **Mr. Mabulane (Mopani District Municipality):**
 - The involvement of our disaster management needs to be strengthened because it is the national departments responsibility to declare an event as a disaster before district municipalities can take any measures.
 - He asked if AWARD can explain why some pump stations go into a dry river.
 - **Dr Pollard (AWARD):** Some of those rivers used to be perennial but stopped flowing after water use exceeded availability. This is the case in the Ga-Selati
 - **Mr. du Toit (AWARD):** It is an institutional issue where certain things are not priorities. An example would be issues around WWTWs and their impacts on the system.
 - **Mr. Mabulane (Mopani District Municipality):** The *polluter pays principle* used to be effective some years ago - what has happened now?
- **Dr Mwaka:** Agreed that water is a shared resource and people impacted are in the lower Olifants. However separation of the lower and upper might create a situation where the upper can now defend themselves against the lower.
 - **Dr Pollard (AWARD):** This meeting does not preclude a meeting for the broader context. However our model is to start in sub-catchments and then bring users together once they are better informed. Also the drought and unlawful use (abstraction and pollution) is a particularly pressing issue in the lower catchment.
- **Mr. Viljoen (DWS):** The problem is multi-layered. Looking at mining, they are often not regulated by the time have started mining, we regulate the service plan. He was uncertain if DWS should comment on IDPs and SPLUMA.
- **Mr. Majadibodu (Lepelle):** Sedimentation at the barrage is the major problem currently.

The workshop broke for lunch from 13:00 to 13:30



5 SESSION 3: Facilitated discussion on implications and mitigatory actions

This session started at 13.30. A number of participants left, and others joined the proceedings.

This session aimed to consolidate discussions and questions from the previous sessions into an action plan with clear roles and responsibilities. To start, space was made for any other concerns.

The following points were raised in moving towards a better managed catchment.

- 11) **Validation and verification (V&V)**. Dr Pollard stressed that V&V is needed as a matter of urgency in order to verify unlawfulness and regulate use (see discussion below).
- 12) A new **reconciliation study** that includes climate change scenarios is needed to determine the water balance.
- 13) Moving to **integrated operating rules**
- 14) **Urgent need for compliance monitoring and enforcement (CME) by DWS**
- 15) More stakeholder engagements that have proper technical expertise and decision-makers present
- 16) Support and Implementation of **WCDM**

5.1 Discussion on key concerns

5.1.1 Classification

Mrs. Weston brought to attention that within a Class I catchment like the Blyde, there are potentially different Recommended Ecological Categories (REC) such as A/B, which would influence the approval of a water use license. Thus, while the catchment may be a Class 1, some water uses may be allowed. Mr Viljoen added that the National Water Act (NWA) does not allow the class to be changed; thus, the policy objective is to maintain or improve the state of water resources in the catchment. While some activities may be allowed, Mr Graf raised concerns regarding the 15-20 proposed gold mining developments in the upper Blyde Catchment (Class I), which will place the Blyde under huge stress especially since there seem already to be “fly-by-night” operations. Mr du Toit shared Mr Graf’s concern stressing that the fly-by-night operations can’t be regulated. Based on the concerns raised above it is recommended that the Department of Water Affairs investigate the mining developments within the upper Blyde catchment, especially in the context of the NWA policy objective of maintaining or improving the Class and/or Recommended Ecological Category (REC).

Recommended Action item: DWS to investigate mining developments in the upper Blyde



5.1.2 Validation & Verification (V&V)

A number of participants asked for an explanation of V&V. To clarify this, Dr Mwaka explained that V&V is a process of validating what a water user has registered as their water use during **the registration period (1998)**. If water use does not fall into the registration period a new licence must be applied for. If there is any dispute it is followed by verification and thereafter by compulsory licensing (rectifying, then enforcement).

AWARD has included a summary from DWS in this report (Box 1) since it was clear that some in the room did not know about V&V.

Box 1

Validation and Verification

Users were required to register water use during the registration period (1998). If valid this is called Existing Lawful Use.

Verification is the process to check the volume of water registered by existing users and its lawfulness under previous legislation, so as to certify the extent of **Existing Lawful Use (ELU)**. DWS checks if in fact the registered use was accurate (**validation**) and that the volume of water use you registered was lawful (**verification**).

This is considered ELU until compulsory licencing is done for a catchment when all users will be called on to re-apply for a licence. *However, a registration certificate does not mean that the water use is lawful (DWAF 2006)*

Individuals can also apply for verification at any time if they want to have their water use certified (for example, if they want to sell a property). The DWS will issue a certificate of verification to confirm the status of existing lawful use.

If water users have made any changes to the volume of water they registered in 1998, they must re-register their water use,

Water users cannot trade water without re-registration and approval

5.1.3 Compliance Monitoring and Enforcement

An important component of water use is a Water User Licence (WUL) which comes with certain conditions. These include Resource Quality Objectives (or RQOs) which are benchmarks (or standards) for flow and water quality. A water user must comply with these.

An important component after V&V (see above) is **compliance monitoring and enforcement (CME)**, of both water users through licence conditions. This is normally done through DWS and/or a CMA. Dr Pollard noted that AWARD and SANParks have taken action around implementing the RQOs. Mr Retief added that cooperation with DWS has been integral towards implementation and furthermore, there are plans to train Mr Thomas Rananga from DWS to run the various models in the future. Dr Riddell added that there is both capacity and tools to implement, there just needs to be the will. Adding to this, Mrs Weston suggested that strategies around compliance need to be devised. Mr Mabulane stressed the importance of V&V, since ensuring sustainability of water resource can't be done without knowing water availability.



Mr Roodt, a concerned and affected farmer, noted that 5 years ago the Olifants River stopped flowing where he farms. He then approached a number of new developments upstream regarding their water abstraction and if they had the required licenses. The response he received from them was that there was no law regarding their abstraction. Acknowledging that De Hoop Dam cannot be expected to release indefinitely, and the low rainfall forecasts presented by Dr Pollard, Mr Roodt asked how we could control the unlawful water use as it is impacting them. In addition, he added that they had been in contact with the regional DWS regarding the concerns of the new developments and were told that V&V needed to be done. Following from these discussions some of the farmers took it upon themselves to pay a consultant to do the V&V. Despite taking these steps, the unlawful use has not been resolved, with one of the development potentially utilising 79% of the lower Olifants water allocation when operational. Mr Roodt stressed they had used private consultants to do the V&V as they could see nothing was going to be done by the regional office. He added that there is a fear that once the development is fully operational, they will not be able to stop the water abstraction. Mr Roodt finished by asking the regional representatives what the next step would be after their V&V? Dr Pollard stressed that V&V was a top priority.

- Mrs Nyalunga responded to Mr Roodt saying that from the regulation side they would need to do an investigation and issue a notice followed by a directive; if non-compliance persists a criminal case would be opened. She added that it was communicated to all farmers that a metering system needs to be installed to regulate water use. Mr Roodt acknowledged that meters were required but stressed that the sediment in the Olifants River erodes the meters in a short space of time and that magnetic meters are expensive.
 - Dr Pollard suggested that to address the concerns raised roles and responsibilities need to be assigned (see Table 8):
 - Mrs Weston suggested that a formal complaint should be submitted
 - Mr Roodt added they are trying to get an irrigation board (actually a water user association) together. The proposal is that all farmers join the existing BWUA
 - Mr Guma said that they would investigate the unlawful development. He asked how many potential cases of unlawfulness are known.
 - AWARD responded that about nine cases need to be examined in the lower Olifants that they know of but that examination of water use needs to be done for all users. V&V is needed urgently.
 - Mr Guma requested his staff to follow-up on lawful use as a matter of priority.
- Unlawful use is compromising water security in the lower Olifants. Flows are not compliant with the EWRs nor RQOs. This impacts on locally and downstream.
- Dr Pollard suggested that interventions should also include inspection and interaction with LEDET and MTPA concerning EIAs (see above conversation) as - when they apply for agricultural expansion - the clearing has already been done.

• Act: DWS RO

5.1.4 Restrictions and drought declaration

With the current situation of low rainfall and high temperatures, Dr Pollard asked when and by whom drought status will be declared. Dr Mwaka responded saying that DWS will assess the hydrology then prioritise sectoral restrictions. He added that DWS is experiencing a number of challenges due to the different observed rainfall patterns.

- Mrs Motlalepula from Lepelle Northern Water stressed that they rely on restrictions from DWS for them to be able to restrict sectors like mining. In addition, she said that they are dealing with a number of illegal connections and DWS need to intervene.



- Mr Mabulane shared the same concerns indicating that there is no communication between DWS, local municipalities and water users regarding restrictions, information about restrictions should be shared by the DWS. Mr Mpamonyane reinforced the concerns stating a disaster such as a drought can only be declared once the DWS declares it. While declaring a drought and restricting the users are key, Mr du Toit stressed the need for water conservation and demand management. Dr Pollard agreed that water conservation and demand management is needed however this is a medium to long-term solution.
- Water restrictions are generally always only enforced on the agricultural sector. Other sectors need to come to the party as well. This platform needs to look into restricting Urban and Mining.
 - Dr Beason Mwaka says that all sectors need to be restricted

5.1.5 Monitoring gauges

Dr Pollard stressed that one of the major concerns emerging for compliance monitoring is that the DWS is likely to shut down secondary gauges. She added that a strategy needs to be developed to avoid this. Mr Viljoen responded saying that in the new DWS water quality strategy more monitoring sites have been requested.

5.1.6 Institutional arrangements, forums and Stakeholder engagement

The three Catchment Management Forums (CMFs) are administered by DWS. They function to some degree but have suffered due to a number of challenges. The house noted that at times there are no minutes or the DWS staff are unable to answer questions posed by stakeholders. DWS needs to engage municipalities (as WSA and WSPs) to provide technical and policy background.

The current users in the lower Olifants need to be part of a water user association. This particularly applies to users along the main stem of the Olifants River. DWS needs to take this forward.

There are concerns that Mametja- Sekororo is not receiving domestic water.

The dis-establishment of the Olifants CMA has led to institutional uncertainty and disillusionment. Moreover, restrictions on many DWS staff have exacerbated the problem. Clarity on the way forward must be given.

5.2 Agreed actions

The following table summarises immediate and longer-term actions.

Table 7 Summary of concerns discussed and agreed short-term and longer-term actions

Issue of concern and short description	Activity/Practice	Immediate actions	Longer term actions
Resource Directed Measures (water resources protection)			
<p><i>Compliance</i> <i>Are we keeping our rivers flowing at the assurance levels required?</i></p> <p><i>Where does the monitoring role lie and joint responsibility?</i></p>	Compliance monitoring	<ul style="list-style-type: none"> • There is a need to start setting targets for all critical gauges (i.e. integrated operating rules) and not entirely relying on just Oxford. <ul style="list-style-type: none"> ○ Action: AWARD and KNP • Van Rooyen’s Operational Model for implementing the Reserve could be used for the entire Olifants. <ul style="list-style-type: none"> ○ Action: AWARD and DWS 	<ul style="list-style-type: none"> • Integrated operating rules need to be established <ul style="list-style-type: none"> ○ Action: DWS • There is a need for an operational division for the Olifants, like in the IUCMA. <ul style="list-style-type: none"> ○ Action: DWS: Mr Kheva



Issue of concern and short description	Activity/Practice	Immediate actions	Longer term actions
		<ul style="list-style-type: none"> According to Mr Kheva, DWS is currently planning to get a hydrologist for the regional office. <ul style="list-style-type: none"> Action: In the interim Mr Thomas Rananga from national DWS could support the regional office. 	
	Actions in the event of non-compliance	<ul style="list-style-type: none"> Action: AWARD and KNP to inform DWS. <ul style="list-style-type: none"> Action: DWS Regional Office must take action 	<ul style="list-style-type: none"> National, Regional and Stakeholder-based response guided by thresholds of potential concern <ul style="list-style-type: none"> Action: DWS must engage stakeholders
Source Directed Controls (water use)			
<p>WUL how do we ensure water use within the limits of availability? Current experiences and issues</p> <ol style="list-style-type: none"> Expansion of irrigated agriculture and the lack of available water Drought situation - clearly no more water to allocate in the Assurance of supply an issue EIAs- lack of engagement with DWS; being used as a WULA Lawfulness needs to be established Validation and verification WCDM Discharge effluent WWTW and mines Non-compliance in other areas 	Lawful uses and CME	<ul style="list-style-type: none"> V&V is a priority (establish lawfulness) <ul style="list-style-type: none"> Action: DWS/Consultant DWS needs to establish how they control lawful users and regulate unlawful users. The process is well understood² but is not being implemented. <ul style="list-style-type: none"> Mr Guma committed that DWS will take action on the unlawful water use <ul style="list-style-type: none"> Action: DWS- Mrs Nyalunga DWS regional to follow up on the directives that have been issued to the farmers in the lower Olifants <ul style="list-style-type: none"> Action: DWS- Mrs Nyalunga DWS RO to investigate the mining in the Blyde River Catchment and Steelport (Anglo). <ul style="list-style-type: none"> Action: Mrs Nyalunga and Mr Kheva 	<ul style="list-style-type: none"> After V&V water allocation reform (if over-allocated) <ul style="list-style-type: none"> Compulsory licensing Enforcement Water balance and recon will be a longer-term initiative <ul style="list-style-type: none"> Action: DWS - Mr Guma
	Obligations to meter agricultural use	<ul style="list-style-type: none"> Legally all farmers must monitor what they are abstracting, thus the installation of flow meters need to be addressed urgently. <ul style="list-style-type: none"> Action: DWS- Mrs Nyalunga and Farmers 	
	EIAs and WULS	<ul style="list-style-type: none"> EIAs: DWS Regional office to follow up with LEDET in regard to what is happening, why are EIAs being approved while water hasn't been taken into account? <ul style="list-style-type: none"> Action: DWS - Mr Kheva AWARD to support DWS with reviewing the EIAs for lower Olifants expansion 	

² Notice is issued, they must respond if DWS is not satisfied they will issue a directive then take it to criminal court



Issue of concern and short description	Activity/Practice	Immediate actions	Longer term actions
		<ul style="list-style-type: none"> ○ Action: AWARD - Dr Pollard and Mr Retief 	
	Restrictions	<ul style="list-style-type: none"> • Drought Water restrictions on all sectors required. See planning and Ops below 	
	Stakeholder engagement	<ul style="list-style-type: none"> • Investigate the options of the Olifants farmers joining the Blyde WUA <ul style="list-style-type: none"> • There are 9 farmers on the Lower Olifants <ul style="list-style-type: none"> ○ Action: DWS - Mr Guma • CMFs need greater technical competence <ul style="list-style-type: none"> ○ Action: DWS 	<ul style="list-style-type: none"> • DWS needs to facilitate these farmers to join a WUA. The recommendation is to join the Blyde WUA <ul style="list-style-type: none"> ○ Action: DWS • Note there are a few farmers downstream of Oxford Gauge
		<ul style="list-style-type: none"> • Local Municipalities to implement restrictions <ul style="list-style-type: none"> ○ Action: TBD 	<ul style="list-style-type: none"> • WCDM needs to be implemented by Municipalities and Lepelle <ul style="list-style-type: none"> ○ Action: TBD
Planning and Ops			
<ol style="list-style-type: none"> 1. Recon done but needs updating 2. V&V 3. Integrated Operating rules 4. Disaster Management - declaring drought 5. Land-use Planning 	Integrated Operating Rules	<ul style="list-style-type: none"> • DWS regional to develop a platform for interim operating rule establishment <ul style="list-style-type: none"> ○ Action: Dr Mwaka • AWARD to check what van Rooyen has developed <ul style="list-style-type: none"> ○ Action: AWARD 	
	Drought declaration	<ul style="list-style-type: none"> • National DWS will assess the hydrology then prioritise sectoral restrictions <ul style="list-style-type: none"> ○ Action: Dr Mwaka • Regional DWS to communicate restrictions to stakeholders and enforce. Acknowledged by Mr Kheva <ul style="list-style-type: none"> ○ Action: Mr Kheva 	<ul style="list-style-type: none"> • The Olifants needs to have a system developed to restrict the system as a whole • Action: Dr Mwaka to revert to the committee regarding how we can move forward to developing system based operating rules to restrict the users • District municipality noted that there is an issue of communication regarding initiatives like farmers restricting themselves <ul style="list-style-type: none"> ○ Action: Cross-sectoral communication
	Monitoring network maintenance		<ul style="list-style-type: none"> • There needs to be a strategy to keep real-time monitoring system operational (e.g. ensuring enough budget is allocated). Currently, this is well maintained in the Olifants as the DWS National team has been very proactive. However, the system is collapsing in the Letaba. <ul style="list-style-type: none"> ○ Action: DWS - Mr Kheva to facilitate
	Land-use Planning	<ul style="list-style-type: none"> • SPLUMA is neglected completely and it's the first line of accountability and a way of regulating development <ul style="list-style-type: none"> ○ Action: DWS needs to attend land use planning meetings 	<ul style="list-style-type: none"> • DWS use to have a committee that will advise and inform municipal land-use planning <ul style="list-style-type: none"> ○ Action: DWS - Mr Kheva



Issue of concern and short description	Activity/Practice	Immediate actions	Longer term actions
	Future of LORIN	<ul style="list-style-type: none"> Use tangible outcome (e.g. regulating the farmers) to drive for the LORIN to continue 	
6.	Shared calendars	<ul style="list-style-type: none"> Put together a shared calendar of all events and all stakeholders <ul style="list-style-type: none"> Action: TBD CMF and Operational Committee need to talk to each other <ul style="list-style-type: none"> Action: KNP - Dr Riddell AWARD to invite Lepelle to MORIN <ul style="list-style-type: none"> Action: AWARD 	<ul style="list-style-type: none"> DWS catchment forum teams need capacitation
Operations & maintenance	Ran out of time		
Institutional arrangements			
WUAs			
OCMA			

6 Wrap up and closure

In closing Dr Pollard asked stakeholders whether the lower Olifants network initiative will be useful in terms of water resources protection and IWRM, below are the answers from stakeholders:

- **Mrs. Weston (DWS):** Ensure relevant people attend the network meetings otherwise it is no of use for the network if the decision-makers are not part of the meetings.
- **Mr. Viljoen (DWS):** it will be useful as most of the time decisions makers might not be aware about certain things happening in the ground. Also noted concerns that there are other forums and committees already.
- **Mr. Kheva (DWS):** The effectiveness of the Catchment Management Forum (CMF) must be checked
 - **Dr Riddell (SANParks):** The CMF have a broader mandate, but can be effective. They are less technical in nature
 - **Mr du Toit (AWARD):** The only thing that is pulling the CMF backwards is the administrative side it will be more effective if those who are administrating are capacitated.
- **Mr. Viljoen (DWS):** We should try hard for councils and local municipalities to be part of such networks.