

A Turnaround Plan for Municipal Waste Water Treatment

Ba-Phalaborwa Local Municipality

PROJECT SUMMARY



USAID | SOUTHERN AFRICA

Project partners

The **WaterGroup** is a specialist supplier of scientific and engineering solutions to the water and sanitation industry, and is part of a network of role players from across the water sector in South Africa and internationally. For over a decade the WaterGroup has, and continues to support and contribute to the industry through knowledge and innovative approaches to turn challenges into opportunities.

The WaterGroup has in recent times assisted to compile and implement the following:

- Strategic frameworks (regulation of wastewater quality, wastewater services, water losses)
- Technical assessments and process optimization (treatment facilities, supply networks)
- Water and effluent quality monitoring and compliance systems
- Risk assessment (tool development, site based assessment, facilitation)
- Technical/ managerial support to a variety of municipal, government and industry clients
- Development of technical and enabling materials such as operations and maintenance manuals, asset registers, shapefiles, performance monitoring tools and incident handling protocols
- Identification of projects across South Africa with potential to generate electricity from biogas, and applications for Climate Change funds to execute such projects
- Technical evaluation of new technologies entering the South African market space

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Introduction

The Minister of Water and Sanitation, in her role as Regulator, released the Green Drop Reports of 2013 and 2014 in public space. The reports confirmed that Limpopo did not fare well against the Green Drop Performance Indicators. Mopani District Municipality is one of the Water Services Authorities within the Limpopo Province which impacts on the Olifants River Catchment via the direct discharge of sub-standard effluent to the river and surrounding land. Ba-Phalaborwa Local Municipality is one of the municipalities who provides this essential service within Mopani DM. This Project draws its approach by observing the status and challenges facing the municipalities in terms of its wastewater services.

1. Mopani's WWTWs received an average Green Drop score of 36.9%, which is regarded by the Regulator as 'poor performance with substantial room for improvement' (Figure 1).
2. Mopani's WWTWs received a Risk Ratio of 79.5%, which means that the plants are regarded by the Regulator as 'high risk', i.e. facilities which hold a 'high risk to human and environmental health' (Figure 2).

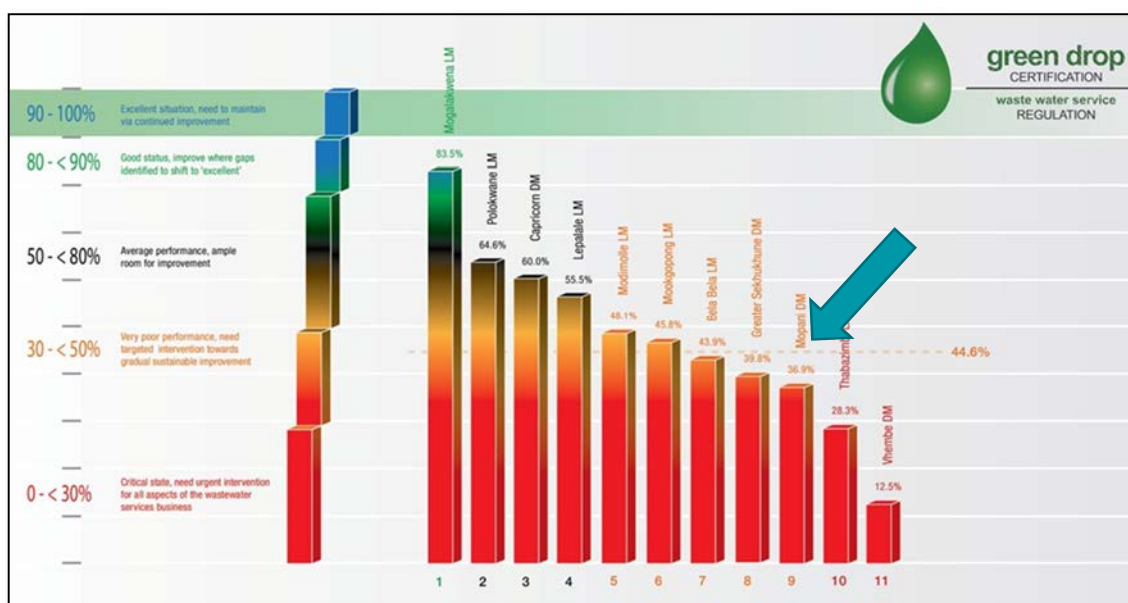


Figure 1: Green Drop performance indicator for 2013-2014

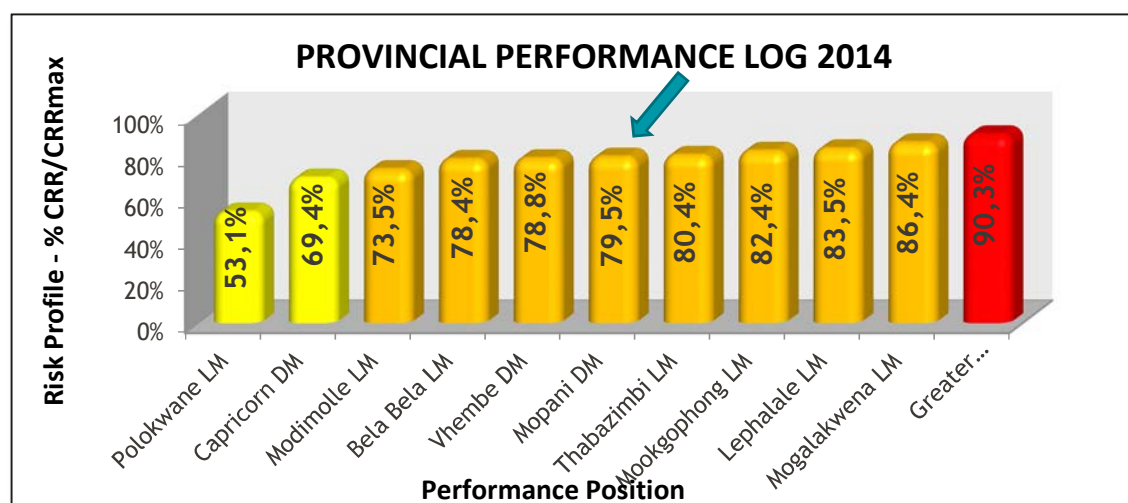


Figure 2: Provincial performance log 2014

Project Purpose

The purpose of this project was to scope a Turnaround Plan which focuses on supporting the most essential aspects of wastewater treatment in the Ba-Phalaborwa Local Municipality. The project was set within the regulatory and performance framework for wastewater treatment in South Africa, as per the Department of Water & Sanitation’s (DWS) requirements. The Green Drop Certification programme is locally and internationally acclaimed to contain best practice principles with regards to wastewater management, and recognizes the technical, financial, social and institutional pillars to deliver an efficient and compliant treatment facility. The Green Drop programme leans on risk- and incentive-based regulation of treatment facilities, and was presented an Honorary Award for Excellence in Environmental Engineering and Science by the American Academy of Environmental Engineers and Scientists in 2011.

Set within the Green Drop philosophy, this Sub-Grant Project was based on a phased approach, starting with the baseline measurement of the performance of the WWTW and final measurement of performance after project implementation. Three wastewater treatment plants were targeted for improvement and capacity building, i.e. the Phalaborwa, Lulelani, and Namakgale wastewater treatment plants.

WWTW #	WSI	WWTW NAME	DESIGN CAPACITY (ML/D)	TECHNOLOGY	% GREEN DROP SCORE (2013)	% CPR RISK RATIO (2014)
MUNICIPAL WWTWs - IN MOPANI DM						
1	Ba-Phalaborwa LM	Phalaborwa	8	Activated sludge, sludge lagoon	22(critical)	73 (high risk)
2		Lulelani	3.5	Biofilters, anaerobic digestion, drying beds, composting	23 (critical)	88 (high risk)
3		Namakgale	6.3	Biofilters, composting	26 (critical)	96 (critical risk)

The collective design capacity of these plants is approximately 18 ML/day and these facilities have been classified by the Regulator (DWS) as ‘critical’ and ‘high risk’ plants.

This means that the plants are not complying with legal and best management practices and impact negatively on the receiving water resource and its downstream users.

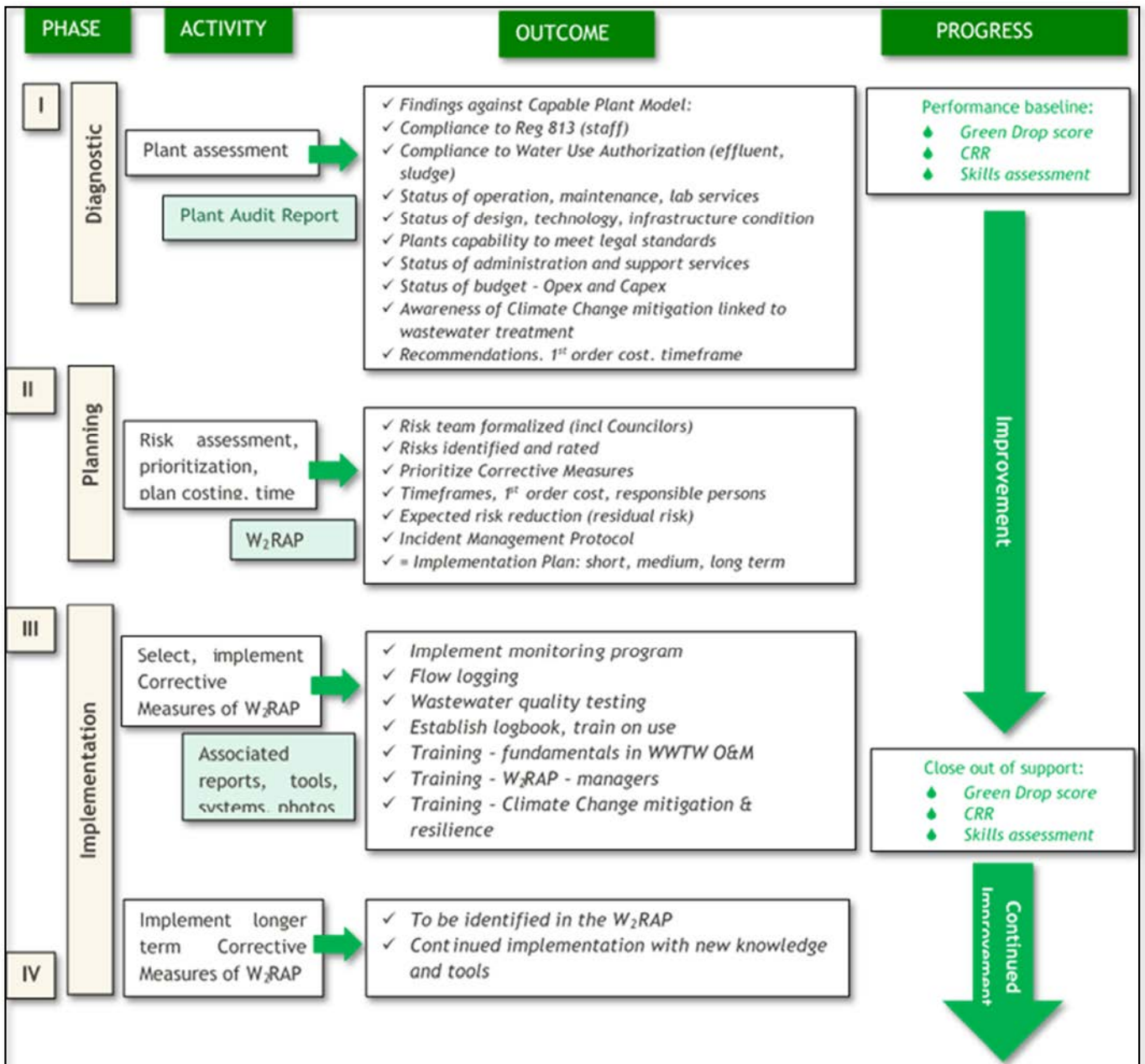
From the table above, it can be seen that the plants’ technology varies from basic to sophisticated, which prompt the importance of operational skill, efficient maintenance and informed decisions to ensure compliant treatment facilities.

The project followed a phased approach:

- **Diagnostic Phase** to verify the status and establish a baseline of the treatment facilities through assessment of the treatment process, infrastructure, budget, risks, staff and skills
- **Planning Phase** to develop a risk-based mitigation plan for turnaround of the plants
- **Implementation Phase** which included short and longer term measures
 - **Short term** focused on capacity building and getting the ‘basics’ right
 - **Longer term** implementation focused on sustainable futures of the plants.



Activities



Adaptive management + resilient ecosystem & people
= improved water security

Results

Skills & Training

- Skills transfer attended by 13 Process Controllers, 2 Supervisors = 90% attendance
- Improvement from Baseline Knowledge Level from 50% to 60% after skills event
- Improvement of Baseline Practical Knowledge Level from 25% to >70% after the skills theoretical and practical events
- Improvement of Baseline Practical Knowledge Level on chlorine and flow measurement from 0-30% to >50% after the skills practical event

Risk Assessment

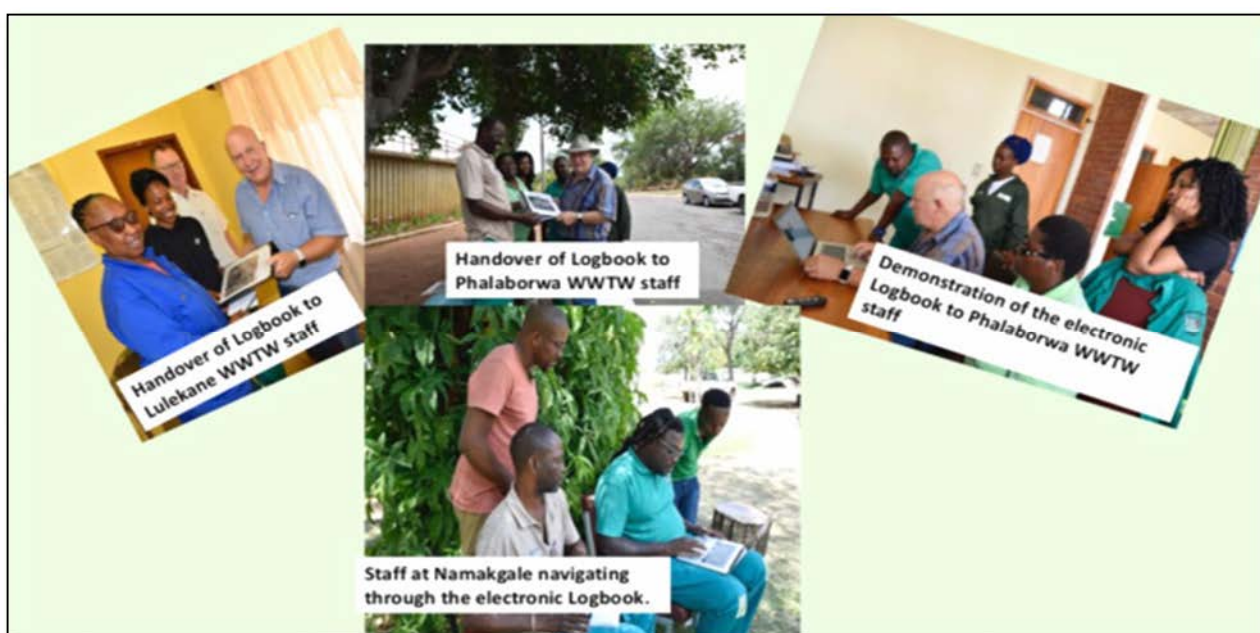
- Completed at three treatment plants
- Identification of the risk during the plant inspection and supported by the chemical and flow data
- Qualitative risk score calculated for each risk, and prioritisation of the various risks according to HIGH, MODERATE, and LOW

Process Audit

- Completed at three treatment plants
- Development of three Process Audit Reports with detail pertaining to each of the plants

Stakeholder / Municipal Engagement Events

- Meeting with Phalaborwa and Mopani Management and the LWI contractor to discuss the business process and the new plant at Phalaborwa which is not functional
- Workshop with the Mayor and Mayoral Committee, as well as Technical Managers
- WRP project manager delivered findings on the water loss status and opportunities in Phalaborwa based on the high water losses which ends up depleting the capacity of the sewage works and the high night flows

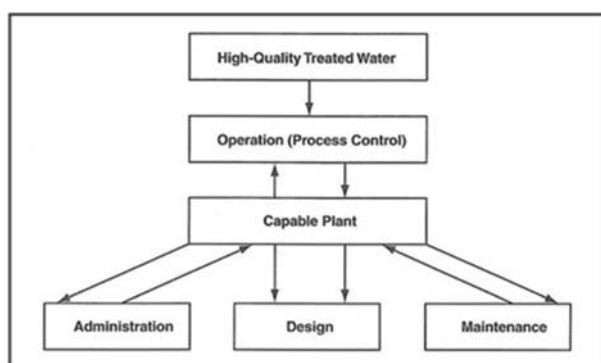


Recommendations

The technical problems of the Ba-Phalaborwa plants cannot be attributed to Process Controller or technician competency issues, rather the problems are related to the root causes of poor maintenance, lack of systems and monitoring, a dysfunctional SLA between Mopani District Municipality and Ba-Phalaborwa Local Municipality, and underlying institutional issues.

For any improvement of the effluent produced by the three plants, a functional Service Level Agreement (SLA) has to be in place, defining in detail the responsibilities of the WSA and WSP. If the SLA corner stone is ignored, no return on investment will be received on any intervention in the Wastewater business.

It is however foreseen that the introduction of awareness concepts and basic knowledge components (limited at this stage) into different levels of the organisation, will act as a positive catalyst for a more effective turn-around when Management, Maintenance, Mechanical and Electrical issues at the Wastewater Treatment Works has been dealt with.



With a functional SLA in place, the relevant Water Services Institution has to ensure that with regard to process control, Process Controllers and other related human resources, **the following actions are budgeted for and implemented:**

- Renovate site laboratories at Lulekane and Phalaborwa and re-establish the site laboratory at Namakgale. As a start, the Phalaborwa laboratory may act as a central laboratory, providing there is transport available between the sites, every shift
- Equip the site laboratories with instrumentation and the correct reagents / consumable
- Train at least three Process Controllers on how to do the different tests required by the specific process control requirements of each plant
- Implement the suggested monitoring programmes, logbooks, compliance monitoring programme and data logging systems
- Implement the Workplace Skills Development plan recommended in this report
- Appoint an external water specialist as coach to assist the relevant role players to implement knowledge and skills correctly



award

The Association for Water and Rural Development

AWARD is a non-profit organisation specialising in participatory, research-based project implementation. Their work addresses issues of sustainability, inequity and poverty by building natural-resource management competence and supporting sustainable livelihoods. One of their current projects, supported by USAID, focuses on the Olifants River and the way in which people living in South Africa and Mozambique depend on the Olifants and its contributing waterways. It aims to improve water security and resource management in support of the healthy ecosystems to sustain livelihoods and resilient economic development in the catchment.

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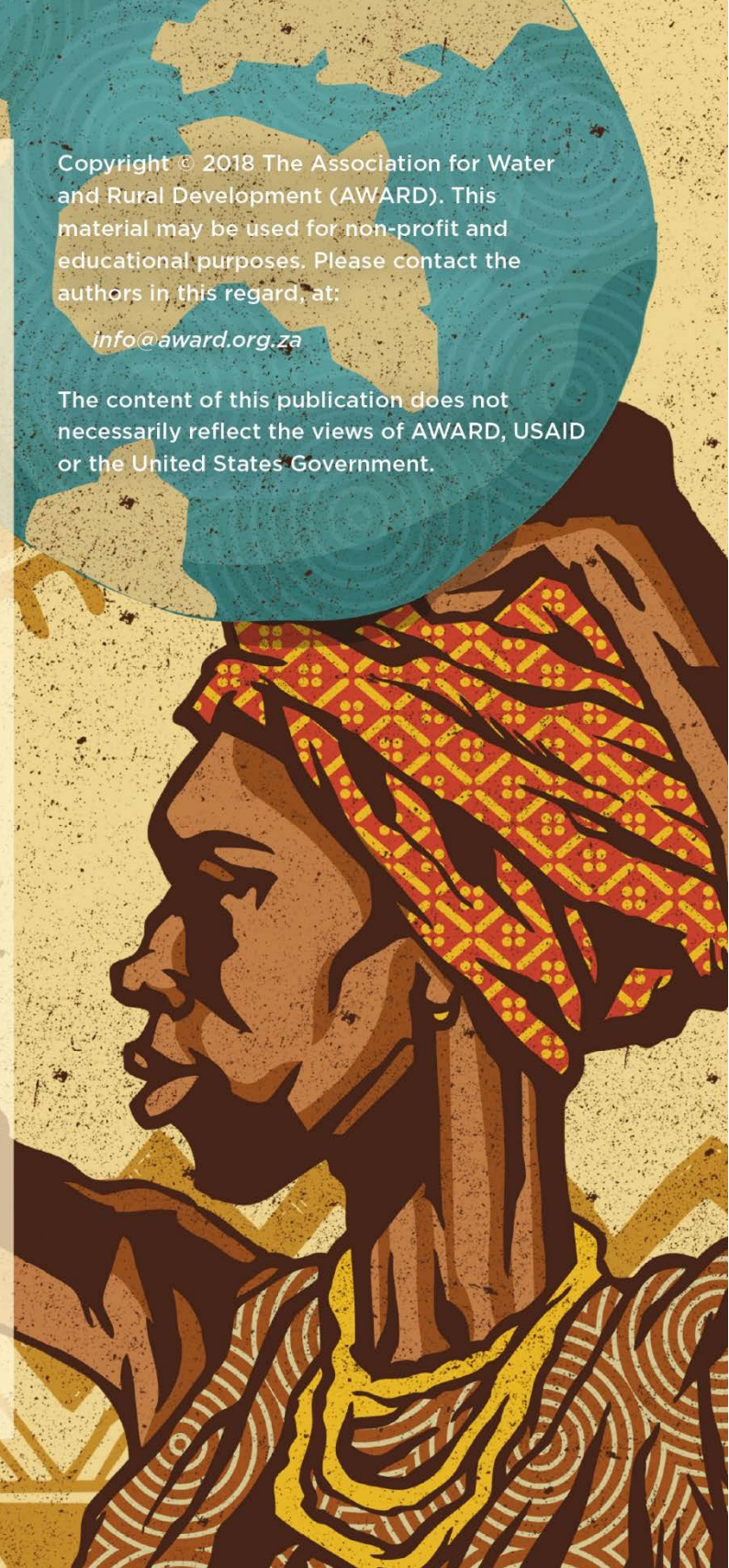
About USAID: RESILIM-O

USAID: RESILIM-O focuses on the Olifants River Basin and the way in which people living in South Africa and Mozambique depend on the Olifants and its contributing waterways. It aims to improve water security and resource management in support of the healthy ecosystems that support livelihoods and resilient economic development in the catchment. The 5-year programme, involving the South African and Mozambican portions of the Olifants catchment, is being implemented by the Association for Water and Rural Development (AWARD) and is funded by USAID Southern Africa.

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