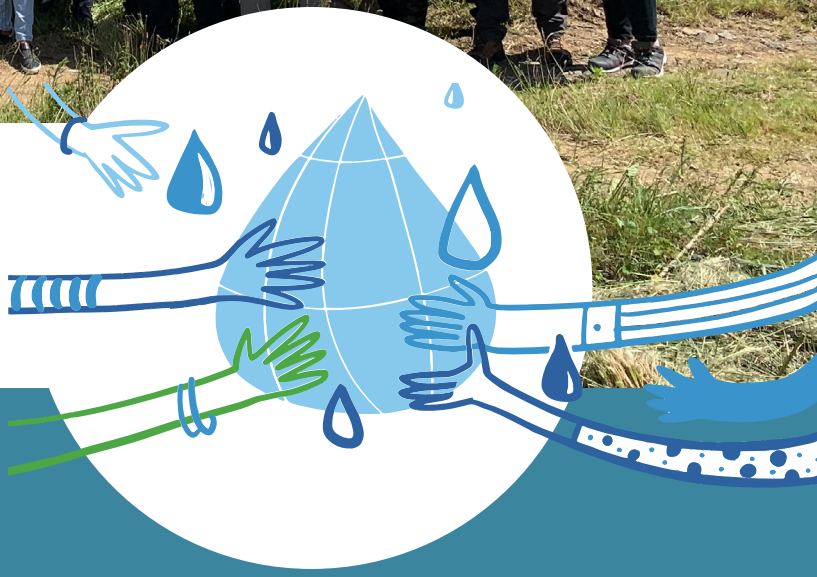
Utility Platform

For strengthening partnerships
of municipal utilities worldwide



Outcome Report 5 – Water Operator Partnership

South African Water Operator Buffalo City Metropolitan Municipality and German Operators Oldenburgisch-Ostfriesischer Wasserverband and Wupperverband

IMPRINT

Published by:
Utility Platform for Strengthening Partnerships of Municipal Utilities Worldwide

GIZ is responsible for the content of this publication.

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Design:
DIAMOND media GmbH, Neunkirchen-Seelscheid

Image on front cover:
Wastewater Treatment plant of Buffalo City Metropolitan Municipality (BCMM) | November 2023 | Photo: OOWV/Wupperverband

On behalf of
German Federal Ministry for Economic Cooperation and Development (BMZ)
Referat G43 Länder und Kommunen

Published: June 2024 in Berlin

BUFFALO CITY METROPOLITAN MUNICIPALITY

OOWV gemeinsam · nachhaltig · transparent

WUPPERVERBAND für Wasser, Mensch und Umwelt

The Utility Platform is financed by the Federal Ministry for Economic Cooperation and Development of Germany (BMZ). The Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) and Engagement Global/ the Service Agency Communities in One World (SKEW) have been implementing it since July 2019. The pilot project is being developed and implemented together with the German Association of Local Public Utilities (VKU) and German Water Partnership (GWP).

Implemented by giz Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) GmbH

and ENGAGEMENT GLOBAL Service für Entwicklungsinitiativen

with its SERVICE AGENCY COMMUNITIES IN ONE WORLD

On behalf of Federal Ministry for Economic Cooperation and Development

In cooperation with German Water Partnership

VKU VERBAND KOMMUNALER UNTERNEHMEN e.V.

About "Utility Platform for Strengthening Partnerships of Municipal Utilities Worldwide"

Context
In many German partner countries, municipal utilities providing public goods and services such as water and waste disposal are in poor economic shape. As a result, their service provision is only unreliable or does not reach the entire population. Due to the war, utilities in Ukraine are finding it particularly difficult to maintain operations, restore destroyed technology and bring new plants up to European Union standards. In the face of climate change, growing cities and digitalisation, utility companies in Germany and its partner countries are facing similar challenges in order to continue providing their services.

Objective
Municipal utilities in cooperating countries have better access to up-to-date, tried-and-tested knowledge and the technical and institutional expertise of German municipal utilities.

Approach
The Utility Platform promotes and supports 28 partnerships between German municipal utilities and operators in Zambia, Tanzania, South Africa, Jordan, Moldova, Ukraine and Albania in the water and waste sector. The platform promotes close exchange on corporate management and on operating and maintaining plants. Technical advice, mutual visits, job shadowing, virtual meetings and the procurement of technology, particularly for Ukraine, form the core of the cooperation between the companies.

The project has also established a logistics hub that dispatches donations and procurements from German utility companies to their Ukrainian counterparts. Appeals for donations by the Association of Local Utilities (VKU) make it possible to deliver needed technical equipment to Ukraine. In addition to the donations, the logistics partner Go Local also transports the goods that are procured for Ukrainian utilities as part of the 16 solidarity operator partnerships.

About the author: Dr Katharina Welle

Dr Katharina Welle is an evaluation specialist with expertise in water, sanitation and hygiene and public health in international development. She is based in Brighton, in the UK, where she works as an independent consultant carrying out evaluations, providing organisational support on theory of change, performance monitoring and learning in the WASH sector and beyond.

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ACRONYMS

BCMM	Buffalo City Metropolitan Municipality
BMBF	Bundesministerium für Bildung und Forschung
BMZ	Federal Ministry for Economic Cooperation and Development of Germany
CAM	Coastal Aquifer Management
GWOPA	Global Water Operators' Partnerships Alliance
IFAT	International Trade Fair for Water, Sewage, Waste and Raw Materials Management
LIMS	Laboratory Information Monitoring System
NRW	Non-Revenue Water
OOWV	Oldenburgisch-Ostfriesischer Wasserverband
SDG	Sustainable Development Goal
WOP	Water Operator Partnership
WV	Wupperverband

EXECUTIVE SUMMARY

The Water Operator Partnership (WOP) between Oldenburgisch-Ostfriesischer Wasserverband (OOWV), Wupperverband (WV) and Buffalo City Metropolitan Municipality (BCMM) kicked off in February 2022 and built on an existing twinning arrangement between the municipalities of Oldenburg and Buffalo City. The WOP has developed four work packages on the topics (i) water supply, (ii) wastewater management, (iii) environmental education and (iv) digitalisation. In terms of capacity outcomes, the most noticeable progress has been the growth in knowledge, insights, and skills among staff across the three operators. As the new systems are fully implemented, several impactful outcomes are expected at the operational level within BCMM. For instance, the automated wastewater logbook will provide real-time data, allowing staff to make quick adjustments to the wastewater treatment process and significantly improve the quality of effluents. Internal resources have been allocated to drive system upgrades, and new working routines are gradually being integrated into day-to-day operations. The report looks back at 20 months of collaboration, a comparatively short timeframe for a peer-to-peer partnership to evolve and achieve tangible results in.

WOP Outcomes (Chapter 3)

The WOP resulted in capacity outcomes at individual, operational and strategic level. The table below provides a visual summary of the key outcomes achieved throughout the WOP for each of the work packages (WP). Details on the achieved capacity outcomes can be found in Chapter 3 “Progress towards results by work area”.

Organisational level		Capacity outcome	Work Package 1: Water Supply	Work Package 2: Wastewater Management	Work Package 3: Environmental Education	Work Package 4: Digitalisation
INDIVIDUAL		Enhanced knowledge and skills	See p. 18	6 people, see p. 21	See p. 23	See p. 25
		Increased motivation		See p. 21		
		Applied new knowledge and skills	See p. 18	See p. 21		
OPERATIONAL		Improved data and information				
		Better systems				
		Improved organisational structure				
		Better equipment/ infrastructure		See p. 22		
		Improved management practices				
		Improved working routines		See p. 22		
STRATEGIC		Improved vision, mission, strategy				
		Additional resources		See p. 22		
		Improved external relations				
		More supportive organisational culture				
		Better leadership				
OTHER		Any other Outcomes				

Table 1: Overview of capacity changes based on OOWV-WV-BCMM WOP activities, November 2023

Key Outcomes Achieved

- **Applied new knowledge and skills (WP 1):** Together, staff members of BCMM, OOWV and WV have been working on applying the German concept of protection zones to Bridle Drift Dam. The raw water monitoring within the Dam was reintroduced even at low water levels and the analyses help defining the plan for an upgrade of Umzoniyana Treatment Works.
- **Enhanced knowledge and skills (WP 2):** In BCMM, at the individual employee level, six staff members have been trained on the job on the topic of wastewater treatment routines and are practicing their new work routines. BCMM staff members have obtained new insights about how wastewater process controllers at OOWV and Wupperverband take ownership of their tasks and have taken inspiration from that for changing ways of working back in BCMM. Wastewater process controllers have improved their technical skills through the on-the-job training. Additionally, the improved knowledge and skills based on the training and the online library will help BCMM staff in implementing this project. German WOP participants have also gained skills from working with their colleagues on wastewater-related activities, in particular the set-up of an online training library. In this context, developing a digital wastewater operational training library is highly relevant for German colleagues who have gained knowledge and skills on how to set this up in practice.
- **Better equipment/infrastructure (WP 2):** In terms of operational outcomes, significant improvements in managing the wastewater treatment process are expected once the wastewater quality testing automation has been completed. The instant feedback through automated testing will enable operators to timely adjust treatment in response to test results. External quality checks via Laboratory Information Monitoring System (LIMS) data will provide instant quality assurance of on-site tests and additional parameters that will further support more effective and efficient wastewater treatment at East London.
- **Additional resources (WP 2):** At the management level, there is an indication of a higher level of awareness about the importance of wastewater management, which is supported by additional funding made available for wastewater management in 2023 compared to previous years. BCMM also successfully applied for a research project, aiming at effluent reuse by transforming it into biogas at East Bank wastewater treatment works[1].
- **Enhanced knowledge and skills (WP 3):** As a result of the joint school campaign around World Water Day, German and South African colleagues have a better understanding of each other's approaches to environmental education. South African colleagues have greater awareness of the concepts and resources available to further environmental education in Germany. German colleagues have learned how different approaches are to the topic and to education in other countries and developed a greater appreciation for the progress achieved in Germany.

[1] *The title of the project is "Increasing resource use efficiency in South Africa through water reuse and sustainable energy generation at wastewater treatment plants" (RES4RSA).*

Partnership strength (Chapter 4)

The partnership is viewed as strong and has become even more dynamic since the collaboration began.

Most participants have seen great improvements, with WOP members highlighting the journey of discovering shared goals and refining specific activities within each work package. While some working groups experienced rapid progress, others took a bit more time to find common grounds. This is largely due to the different perspectives brought by OOWV and Wupperverband, as water operators, compared to the BCMM water department, which is part of the broader municipal framework and often needs to consider larger-scale factors.

In the wastewater management working group, the introduction of a regular meeting schedule and several exchange visits played a key role in fostering strong collaboration. For other groups where collaboration has been less intense, challenges such as identifying clear entry points for collaboration – especially in the digitalisation working group – have been a factor. Additionally, changes within BCMM's systems often require coordination with the wider city administration, adding an extra layer of complexity.

Although finding time to focus on WOP activities and navigating procurement processes have presented challenges, members have a positive outlook and feel confident that they are building great momentum. Trust among the team is strong, and everyone is excited to achieve their shared goals by the end of the pilot phase in June 2024.

1. INTRODUCTION

The German Federal Ministry for Economic Cooperation and Development (BMZ) has set up the 'Utility Platform for strengthening partnerships of municipal utilities worldwide', as a pilot project running from 2019 until 2024. Another project phase will be starting in July 2024, running until June 2027. The initiative supports partnerships between municipal utilities in Germany and its partner countries to support the implementation of the Sustainable Development Goals (SDGs) and the New Urban Agenda. The partnerships of the pilot project follow principles of peer-support with the aim to build capacity on a not-for-profit basis to enable better service delivery. These principles were derived from the Global Water Operators' Partnerships Alliance (GWOPA), which was founded in 2009.

This WOP project is one of nine international WOPs, three solid waste operator partnerships and 16 solidarity operator partnerships with Ukraine documented under the current pilot project. This report summarises the evolution and maturity of the partnership and the outputs and capacity outcomes derived from the partnership in each work package

The following approach was used to identify and document WOP outputs and outcomes and to assess the strength of the partnership. First, WOP operational plans were reviewed and adapted to reflect expected results via an excel-based results reporting format for each thematic work area. Then, project outputs and capacity outcomes were assessed via document and expenditure review, exchanges with WOP coordinators and semi-structured interviews with selected WOP participants. To assess capacity outcomes, an adapted version of the 'Performance and Change Model' by Burke and Litwin (1992) was used. In this report, Capacity Outcome Categories are unpacked into individual, operational and strategic capacity outcomes:

Organisational level		Capacity outcome	Description
INDIVIDUAL		Enhanced knowledge and skills	Availability of human resources and the extent to which they have the required skills and knowledge to accomplish the work they have been assigned to.
		Increased motivation	Proactive tendencies to move towards goals, take needed action and persist until satisfaction is attained.
		Applied new knowledge and skills	Active use of the newly acquired knowledge and skills in daily practices.
OPERATIONAL		Improved data and information	Updated information on the conditions of any part of the water utility system, be it related to physical infrastructure (e. g. pipes), management processes, (e. g. customer database) or otherwise.
		Better systems	Standardised policies, procedures, management and operational information systems and mechanisms that facilitate work.
		Improved organisational structure	Arrangement of functions and people into specific areas and levels of responsibility, decision making authority, communication and relationships to assure effective implementation of the organisation's mission and strategy.
		Better equipment/ infrastructure	Tools and equipment necessary for utility operations and basic infrastructure for the business processes (e. g. water production and distribution).
		Improved management practices	Practices that managers use to mobilise the human and material resources at their disposal and advance the strategy, including managerial behaviour, work etiquette, professionalism, planning, communication and control.
		Improved working routines	The way the tasks are executed daily in consolidated routines.
STRATEGIC		Improved vision, mission, strategy	The vision outlines the company's goal for the future and the values that define it. A mission states how the company will achieve its vision. Strategies are the ways in which the mission and vision will be reached.
		Additional resources	Additional (financial) resources via new acquisition or operational costs savings.
		Improved external relations	Improved communications with external stakeholders and customers. This includes stakeholder relations that the operator has forged and how such networks support the achievement of its strategy.
		More supportive organisational culture	Collection of rules, values and principles that are enduring and guide organisational behaviour.
		Better leadership	Managerial staff providing overall organisational direction and serving as behavioural role models for all employees.
OTHER		Any other Outcomes	

Table 2: Description of capacity outcomes

The **partnership's strength** was assessed using the 'Partnership Health Check' tool categories developed by Prescott and Stibbe (2017). The strength of the partnership was assessed via an interactive session where participants rated and discussed different aspects related to the strength of their partnership. A validation meeting was held to present the documented results to key WOP stakeholders and the draft report was also shared for feedback.

Wastewater Treatment plant of Buffalo City Metropolitan Municipality (BCMM) | 11/2023

Photo: OOWV/Wupperverband

2. THE WATER OPERATOR PARTNERSHIP (WOP)

This section presents the WOP partners Oldenburgisch-Ostfriesischer Wasserverband (OOWV), Wupperverband (WV) and Buffalo City Metropolitan Municipality (BCMM) and tells the history of the partnership.

2.1 WOP Partners

The WOP is coordinated by OOWV, with Wupperverband (WV) actively contributing thematic expertise and support across all work areas, creating a dynamic and mutually beneficial partnership. The international partner organisation is BCMM in the Eastern Cape of South Africa. Box 1 provides a brief description of each partner.

German partner: OOWV is a public enterprise in the North-West of Germany, providing drinking water services to 1 million inhabitants across around 7,500 km². It also provides wastewater services to some of the communes it supplies with drinking water. The municipal company operates 15 water works, 14,600 km of water pipeline, 46 wastewater treatment plants and 4,800 km of sewers.

German partner: Wupperverband is another German public enterprise providing raw water supply and wastewater services over a territory of 813 km². WV is also responsible for the development of about 2000 km of rivers and streams as well as for flood protection, 11 wastewater treatment plants and 14 dams.

International partner in South Africa: BCMM is responsible for the water and wastewater services of 840,000 inhabitants across 2,752 km² in the province of Eastern Cape, South Africa. The municipality operates 2 water treatment works, 3555 km of water pipelines, 15 wastewater treatment works and 2442 km of sewers.

The total resource envelope for the WOP is 750,000 Euros. BCMM covers substantial procurements alongside capacity building activities under the partnership. In December 2023, BCMM's planned contribution amounted to approximately 450,000 Euros[2].

2.2 Timeline of the partnership

The collaboration between OOWV and BCMM builds on an existing city partnership arrangement and a previous climate-partnership involving the municipalities of BCMM and Oldenburg. The direct collaboration between the water operators OOWV and BCMM was under the city climate partnership: from 2017 to 2020 partners collaborated via the 'go-CAM' (coastal aquifer management) project with the aim to develop a software tool for integrated coastal aquifer management.

The aim of this WOP is to build on the existing city-twinning to jointly work towards sustainable basic water and sanitation services.

[2] *This includes procurement related to setting up a wastewater logbook, an online training library, contributions to a feasibility study and laboratory equipment.*

Timeline	Key events / developments
October 2021	**First contact established.** OOWV reaches out to BCMM with the idea of developing a WOP building on previous city climate partnership activities.
February – May 2022	**The WOP kicks off.** During a first meeting, initial work plans are drawn up on the topics of water production and distribution, wastewater treatment, environmental education and digitalisation. This is followed by work trips of OOWV and Wupperverband colleagues to East London, South Africa to visit BCMM's facilities, revise thematic areas and refine operational plans.
May 2022	**A counter-visit to Germany.** Three BCMM colleagues visit Germany to attend the International Trade Fair for Water, Sewage, Waste and Raw Materials Management (IFAT), to network with other operators and to understand how drinking water is extracted at 'Kleine Kinzig', near Stuttgart.
June – December 2022	**Digital exchanges take place on all four thematic areas and work packages are adjusted as necessary.** As technical exchanges unfold, various obstacles are encountered, and work plans are adjusted accordingly for two of the four thematic areas. The working group on drinking water realises a lack of water quality data requires drawing up a monitoring plan as a first step to properly understand the situation on the ground. Higher costs than expected for the planned feasibility study also require an adjustment of plans and the identification of additional financial resources; procurement processes in the wastewater group require more time than expected. On the thematic area of environmental education, plans are adjusted to realistic targets, with the focus on a joint campaign across the three partners on water conservation at World Water Day.
January – June 2023	**A flurry of activities continues across working groups.** Various breakthroughs are made, for example, the securing of political support and co-funding from BCMM for a feasibility study aimed to improve water quality at source. On the topic of wastewater, funding is for the necessary licences so that fully automating the testing of wastewater can proceed and significant resources are made available for setting up a wastewater logbook. The environmental education working group carries out school campaigns in March and digital and in-person exchanges continue on various topics related to digitalisation.
March 2023	**BCMM staff learn about ways of working at OOWV and Wupperverband.** Various exposure visits take place related to the thematic working group topics: for example, the environmental education centre at Kaskade showcases the emphasis placed on raising environmental awareness of school age children. A visit of a previously highly intensive pig farm turned into an organic farm illustrates water quality improvement strategies. A visit to a wastewater treatment plant illustrates phosphate reduction and automated water quality sampling.
May 2023	**Another visit of BCMM staff to Germany allows for further networking.** WOP members attend the GWOPA Congress in Bonn and a German WOP network meeting in Berlin; during the trip, further personal exchanges lead to the design of an on-the-job training for wastewater process controllers.
July 2023	**The wastewater working group pilots on-the-job training on wastewater treatment.** Six staff from BCMM participate in a wastewater treatment skill transfer programme organised at OOWV and Wupperverband. It is organised as a 2-week job-shadowing, exposing the process controllers to the different steps in the wastewater treatment cycle. The intention is that, on their return, process controllers make changes to their working routines back home where this is feasible and within their skill level. During the training, videos are taken for developing online training material.
November 2023	**Another visit takes place in East London, South Africa** to understand the new developments towards automating the wastewater treatment process and new work routines, to take decisions on next steps towards setting up the training library, and to investigate raw water quality and drinking water quality management to identify the areas for the planned feasibility study.
April 2024	A second group of process controllers from BCMM travel to Germany to attend a skill transfer programme at Wupperverband.
June 2024	**Four German process controllers visit the pilot wastewater treatment plant East Bank in East London** to support the set-up of procured testing equipment and to continue the peer-to peer exchange between the process controllers.

Table 3: Timeline of WOP activities

3. PROGRESS TOWARDS RESULTS BY WORK AREA

The WOP has four distinct work areas, namely (i) drinking water working on improving water quality at source and the reduction of non-revenue water (NRW), (ii) wastewater treatment focusing on automating on-site and external water quality testing and on trainings around wastewater treatment processes, (iii) environmental education across the three WOP cities / regions on topics of sustainable cities and water conservation and (iv) digitalisation. This section outlines the aims, progress to date on activities, outputs and the outcome, mostly in the form of capacity outcomes as a result of WOP activities for each thematic work area.

3.1 Work Package 1: Water supply

There are two distinct sets of activities underway in relation to water production: improving water quality at source and reducing NRW. The team working on improving water quality has made great strides, focusing on the quality of raw water and working on detailed monitoring plans. They are currently conducting a feasibility study to evaluate the technical and financial viability of several exciting initiatives, including the construction of a raw water intake tower in the dam, a gravity pipeline, and upgrading the Umzoniyana Water Works. Simultaneously, they are developing plans to establish protection zones around the water source. All outputs are on track to be completed by the end of the pilot phase. The team focussing on NRW reduction is taking crucial first steps to identify the causes behind high water losses in the network. This foundational work will set the stage for more targeted interventions moving forward.

Implementation of activities

Improving water quality at source

Challenge: The group is focusing on the reduction treatment costs by improving the raw water quality. Currently, the drinking water quality at Buffalo River presents challenges, leading to increased treatment efforts. By addressing the raw water quality, the group aims to enhance water quality for both consumption and industrial use, ultimately lowering costs and benefiting the community and local industries alike.

Goal: The aim of this working group is to improve the raw water quality for East London by exploring options for achieving higher water quality at the point of abstraction. A first step in this direction and the immediate aim of the working group is to obtain a better evidence base and understanding of options, benefits and costs for improving water quality for production for BCMM.

Progress to date: The group has progressed several parallel streams of activities to achieve this:

- **Establishing an evidence base of current water quality levels at Buffalo River and comparing this with a potential alternative intake within Bridle Drift Dam.** The group is adjusting existing water quality monitoring plans at both locations. To do this, participants developed a list of available water quality points and are currently in the process of identifying monitoring sites and taking the first set of water quality samples at both locations, which will provide the baseline for comparative water quality data and regular monitoring going forward.
- **Developing a concept for water protection zones at Bridle Drift Dam.** In parallel, the group is also exploring options for developing protection zones at the source. German partners have given presentations and organised exposure visits in Germany to showcase the implementation of water protection zones in practice. The group is now jointly developing ideas, including visual models, of where and how water protection zones could be set up at Bridle Drift Dam.

Work trip of OOWV and Wupperverband colleagues to East London, South Africa to visit BCMM's facilities | 05/2022

Photo: Samantha Westphal

- **Understanding the costs involved in changing the water intake from Buffalo River to an alternative pipeline.** A longer-term solution to improving raw water quality for BCMM would be to shift the intake from Buffalo River to Bridle Drift Dam. As a first step, an internal modelling of how the pipeline could run is underway. In parallel, efforts are made to obtain funding and commission a more detailed, feasibility study. BCMM has agreed to raise 50% of the costs for such a study in addition to funding secured from WOP resources, with the exact costs being confirmed.

Reducing Non-Revenue Water

Challenge: Another area of focus within the WOP is addressing water losses in BCMM's network, which were recorded at 37.5% in 2021/22 (BCMM 2023). While water losses are a global challenge, the BCMM team is particularly interested in understanding how Germany has managed to maintain relatively low losses in their networks. Additionally, efforts to raise awareness about the importance of water conservation among the local population are being actively pursued in a separate working group, highlighting a comprehensive approach to sustainable water management.

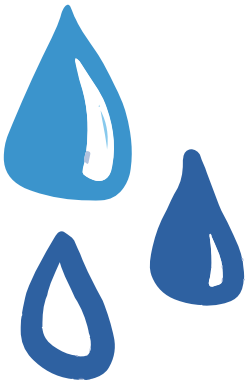
Goal: A second goal related to the drinking water working group is to reduce physical water losses in the network. As a first step, the group is developing a common understanding about the causes and options for remedial actions based on an investigation in a pilot area.

Progress to date: Participants have held virtual meetings where they presented their strategies to analyse and reduce water losses and to develop a common understanding of water losses and how to approach it. The identification of pilot areas is still underway. In addition, the working group is discussing the option of training on leak detection and the borrowing of a leak detection vehicle from a municipality (Kouga) in South Africa.

Outcomes achieved

Individual level

- **Enhanced knowledge and skills:** The main capacity outcomes in November 2023 relate to a better awareness and joint understanding of non-revenue water losses in BCMM for the individuals involved in the activities. Additionally, as a result of the WOP, the colleagues from BCMM and Germany have increased their understanding of the importance of raw water protection.
- **Applied new knowledge and skills:** Together they have been working on applying the German concept of protection zones to Bridle Drift Dam. The raw water monitoring within the Dam was reintroduced even at low water levels and the analyses help defining the plan for an upgrade of Umzoniyana Treatment Works.



3.2 Work Package 2: Wastewater management

The wastewater management working group collaborates on automating its internal and external wastewater testing processes while enhancing staff skills and adapting working routines to align with the new systems. The laboratory information monitoring system (LIMS) is in the process of being set up whilst the internal system, the wastewater logbook set up, is in the process of being procured. The group has developed a concept for a practical online training library and carried out a pilot on-the-job training for wastewater process controllers in Germany and South Africa. New working routines are being gradually piloted at East Bank wastewater treatment plant in line with switching from manual to automatic work processes.

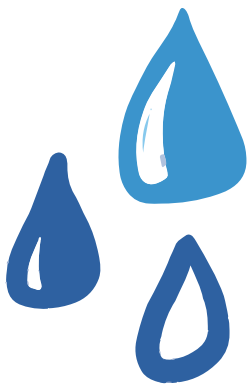
Implementation of activities

Challenge: Currently, wastewater testing processes in BCMM are manual, resulting in a delay of three to four weeks for receiving sampling results. While this delay limits the ability to make real-time adjustments to the treatment processes, the good news is that steps are being taken to automate these systems. By enhancing automation, BCMM will be able to respond more quickly, improve treatment effectiveness, and ensure consistent compliance with wastewater quality standards, reducing the risk of fines and promoting better environmental outcomes.

The challenge faced by wastewater process controllers lies in the need for a more comprehensive skill set to effectively manage the complex processes involved in wastewater treatment. Currently, many controllers are trained only in specific sub-processes, which can limit their ability to understand and oversee the entire treatment cycle. This fragmented knowledge can hinder their capacity to respond to issues that arise across different stages of the process, ultimately affecting the overall efficiency and effectiveness of wastewater treatment. To address this challenge, there is a need for more holistic training that equips process controllers with a complete understanding of the wastewater treatment system, enabling them to perform their roles with greater competence and coordination.

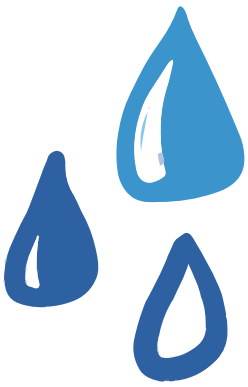
Goal: The aim of the wastewater working group is to automate the wastewater treatment testing. This will reduce time taken to analyse data and document data and will enable better quality assurance of wastewater monitoring data. In parallel to the introduction of automation, the working group aims to improve the process controller skills by piloting on-the-job training and developing online training material. A key focus for improvement is enhancing the skill sets of wastewater process controllers to ensure effective treatment. By providing comprehensive training, staff can gain a better understanding of the entire wastewater treatment cycle, enabling them to perform their tasks with greater expertise and confidence. This holistic approach will empower the team to contribute more effectively to the overall process, leading to better treatment outcomes.

In the spirit of the WOP, a related aim was to foster personal exchanges between wastewater treatment operators in Germany and BCMM, so they get to know each other's realities and ways of working.



Progress to date: A number of parallel activities are currently underway in the wastewater treatment working group. Funding has been secured by BCMM to automate internal and external water quality monitoring and service providers are being procured to carry out the related works. A round of on-the-job training has been completed, new work routines are being established, and online training materials are being produced for two out of 12 wastewater training modules.

- **Establishing an on-site wastewater monitoring system (a wastewater logbook), which provides daily water quality data to staff:** BCMM has obtained the necessary licences and secured the necessary funding (the equivalent of 300,000 Euros) for setting up an automated wastewater logbook. A service provider is in the process of being procured by BCMM. The first activity will be to install sensors at the East Bank wastewater treatment plant, which has been selected as a pilot site. After that the service provider will purchase computers, install a customised software and provide ongoing software maintenance.
- **Automating external laboratory water quality test workflows by upgrading the already existing Laboratory Information Monitoring System (LIMS):** This electronic monitoring system provides additional data and enables quality assurance of data analysed on-site; BCMM had purchased and installed the LIMS software prior to the WOP but had not completed its configuration due to budgetary constraints. Under the WOP, the working group identified the technical gaps in the existing system and the costs for upgrading it. BCMM has appointed a service provider to complete the configuration with WOP funding.
- **Developing a suite of training materials for wastewater treatment operations:** Currently, staff members implementing specific wastewater management steps do not have an overview of the process as a whole and no sufficient understanding of work routines related to the technical upgrades being undertaken. They mostly carry out manual tasks. The partners are therefore developing a digital library of video training materials to illustrate the tasks required to implement automated testing and how to adjust wastewater treatment in response throughout the cycle. The partners have developed an overall concept with the ambition to develop training modules along the whole cycle going forward. For the duration of the WOP, partners are concentrating on two out of 12 modules. This material is currently under development, including video material taken during the on-site training described below.
- **Piloting on-the-job training for wastewater process controllers at OOWV and Wupperverband:** In parallel to developing online training materials, six BCMM staff participated in a 2-week on-the-job training from 16 until 29 July 2023. New routines that do not need a technical upgrade such as holding daily morning meetings are already being tested at East Bank wastewater treatment plant. The developments were jointly evaluated during a follow-up visit of German WOP partners to BCMM in November 2023. Further training rounds are planned for 2024.



Partners from BCMM and OOWV are jointly working on a pump at Oldenburg sewage treatment plant during on-the-job training | 07/2023

Photo: OOWV

Outcomes achieved

Individual level

- **Enhanced knowledge and skills:** In BCMM, at the individual employee level, six staff members have been trained on the job on the topic of wastewater treatment routines and are practicing their new work routines. BCMM staff members have obtained new insights about how wastewater process controllers at OOWV and Wupperverband take ownership of their tasks and have taken inspiration from that for changing ways of working back in BCMM. Wastewater process controllers have improved their technical skills through the on-the-job training. Additionally, the improved knowledge and skills based on the training and the online library will help BCMM staff in implementing this project. German WOP participants have also gained skills from working with their colleagues on wastewater-related activities, in particular the set-up of an online training library. In this context, developing a digital wastewater operational training library is highly relevant for German colleagues who have gained knowledge and skills on how to set this up in practice.
- **Increased motivation:** Furthermore, practical exchanges on wastewater management during the on-the-job training, motivated staff across the German operators in their work. Experiencing different ways of working enables staff members to critically reflect their own ways of working back home.
- **Applied new knowledge and skills:** At BCMM, first shifts in working routines have been introduced: a daily morning meeting has been established amongst site staff to fine tune operations on a daily basis. Exchanges are also planned between different wastewater treatment sites within BCMM.

Operational level

- **Better equipment/infrastructure:** In terms of operational outcomes, significant improvements in managing the wastewater treatment process are expected once the wastewater quality testing automation has been completed. The instant feedback through automated testing will enable operators to timely adjust treatment in response to test results. External quality checks via Laboratory Information Monitoring System (LIMS) data will provide instant quality assurance of on-site tests and additional parameters that will further support more effective and efficient wastewater treatment at East London.
- **Improved working routines:** After a period of introducing and establishing the automated testing and improved work routines across all 15 treatment plants, BCMM expects significant improvements of its Key Performance Indicators related to effluent quality.

Strategic level

- **Additional resources:** At the management level, there is an indication of a higher level of awareness about the importance of wastewater management, which is supported by additional funding made available for wastewater management in 2023 compared to previous years. BCMM also successfully applied for a research project, aiming at effluent reuse by transforming it into biogas at East Bank wastewater treatment works[3].

[3] *The title of the project is "Increasing resource use efficiency in South Africa through water reuse and sustainable energy generation at wastewater treatment plants" (RES4RSA).*

Employees from OOWV and BCMM jointly viewing facilities during a visit in Buffalo City Metropolitan Municipality, South Africa | 12/2023

Photo: OOWV

3.3 Work Package 3: Environmental education

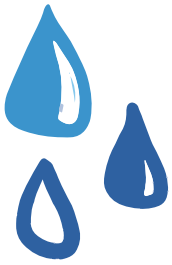
The environmental education working group has carried out a first joint school campaign on world water day at the three operator locations. While additional activities are in the pipeline, the momentum is building for future outreach.

Implementation of activities

Challenge: With the acceleration of climate change and related changes in weather patterns and water availability, the topic of environmental education is highly relevant for all WOP partners. Of particular interest across the utilities is how to raise awareness about the need for water conservation and water protection. Partners also found that there are very different levels of awareness about water conservation between Germany, where environmental education concepts are well established and part of the school curriculum, and South Africa, where this topic is at a different stage of development and still evolving.

Goal: The higher-level goal is a more knowledgeable community on the topic of water conservation, with school children and municipal staff across WOP partner cities and ward-level change agents in deprived neighbourhoods in Buffalo City Metro as target populations. During the duration of the WOP, the immediate aim is to jointly plan and implement a first set of intercultural environmental education activities across the three WOP cities / regions.

Progress to date: The group had originally drawn up a very ambitious workplan, which was revised several times over the last 1.5 years to align it with the availability of group members to implement activities, which fall outside their daily responsibilities. The following has been achieved:



- **A joint water conservation campaign at World Water Day in a school class in East London, Oldenburg and Wuppertal;** The group developed a workshop concept around the topic of 'sustainable cities' touching on several SDGs, including SDG 6 (water and sanitation). When working together, differences in environmental education engagement emerged. Whilst the German operators have established relationships with specific schools, BCMM colleagues have no such established relationships or educational experience. As a result of the different starting points amongst partners, the classroom activity in East London was adjusted to teaching about water conservation and the direct exchange took place between pupils in Wuppertal and Oldenburg.
- **Development of a municipal water conservation campaign across the three WOP cities:** This topic has not yet been advanced during this period; the group plans to develop a specific aim and operational plan going forward.
- **Joint video on 'our common water':** The idea is to explain the water cycle based on the realities in all the WOP cities, Oldenburg, Wuppertal and East London. The group has instructed an external provider to develop a detailed concept.

Outcomes achieved

Individual level

- **Enhanced knowledge and skills:** As a result of the joint school campaign around World Water Day, German and South African colleagues have a better understanding of each other's approaches to environmental education. South African colleagues have greater awareness of the concepts and resources available to further environmental education in Germany. German colleagues have learned how different approaches are to the topic and to education in other countries and developed a greater appreciation for the progress achieved in Germany.

Partners from BCMM and OOWV during a job shadowing in Oldenburg, Germany about environmental education | 03/2023

Photo: OOWV

3.4 Work Package 4: Digitalisation

The digitalisation working group has completed its exchanges without identifying additional topics for further collaboration for now, the groundwork laid in these discussions will likely spark future ideas.

Implementation of activities

Challenge: The move towards digitalising work processes represents a shared challenge and opportunity across the WOP partners. However, at the start of the WOP, there was little understanding of how much partners had advanced in their respective processes and where collaboration would be most fruitful.

Goal: The goal of the working group is to carry out several exchanges on topics relevant to digitalisation in their respective companies and to identify areas for further collaboration.

Progress to date: After an introductory meeting, which identified potential areas for further exchanges, partners have held meetings on four topics, namely:

- **Digitalisation strategies:** A workshop took place where all partners presented their company's digitalisation strategies and progress and identified commonalities and differences between them. The workshop brought to light that all partners are in the process of reviewing their digitalisation strategies but that there are no immediate topics for further collaboration between them.
- **Data management:** German partners presented their approaches to data management, and some ideas were developed for improvements at BCMM. However, any changes to the system will need to involve the municipality rather than just the water department, thereby leading to more complexity and the need to identify external funding.

- **Data science:** This topic e.g. machine learning, time series analysis or the use of artificial intelligence, is of common interest to the operators and specific entry points such as the analysis of weather data were discussed. However, the implementation of changes would need to involve changes in the wider city administration system and would require additional funding.
- **Integrated asset management:** Partners presented their approaches and progress on asset management and discussed options for collaboration. From this, it emerged that partners are all along the journey of establishing integrated asset management systems but there are no immediate entry points for learning from each other. The German company, Gelsenwasser, which has made greater strides on the topic, was invited to present its state of the art. Lessons from this are taken up by the companies individually, with BCMM being further advanced than its German WOP partners.

Outcomes achieved

Individual level

- **Enhanced knowledge and skills:** There is now a common understanding of where each partner stands on the topics of digitalisation, data management, data science and digital asset management. There is the potential for further collaboration on data management and data science questions with a general constraint that, at BCMM, any changes made to the system would need to be implemented across the municipal administration and therefore requires involving a wider set of stakeholders. This would potentially require external resources to implement. On the German side, the exchanges with BCMM on digitalisation have led to further exchanges amongst German partners and increased networking on specific topics.

Partners from OOWV and BCMM are jointly working in the wastewater laboratory at Oldenburg waste water treatment plant | 07/2023

Photo: OOWV

4. PARTNERSHIP STRENGTH AND LESSONS LEARNED

This section documents the WOP participants' perceptions on the evolution and overall partnership strength based on an assessment of partnership categories. Most of the contributions are based on inputs from the wastewater management working group who were best represented at the feedback meeting and in interviews.

Partnership design

Overall, there was a sense of strong partnership between the three organisations, particularly amongst the working groups that met regularly, e.g. the wastewater management working group. Most workshop participants felt that the partnership had strengthened over the last 20 months and that it had taken some time to find each other. Members explained that, compared to the start, their joint project goals were becoming increasingly clear, that processes had strengthened and that individuals involved in the WOP felt highly motivated. Not all working groups have developed at the same pace. The wastewater management working group worked more intensely than some other groups. Different factors play into this, such as having the committed counterpart from each organisation on the individual topic and the ability to develop strong personal relationships along the way. Some topics are also more difficult to tackle because the water and sanitation department in Buffalo is part of the wider city administration. When it comes to digitalisation, for example, any changes would need to be applied to the administration as a whole rather than the department, which requires a higher level of financial resources and engagement with stakeholders beyond the sector technical staff.

In terms of the overall set-up of the WOP, participants reflected that engagement was time consuming and hard to put into practice at times because many activities need to happen outside normal working hours. In that context, everyone noted that there was still a gap in attitudes within the organisations whereby working group members strongly appreciated the value of the partnership whilst this was not yet necessarily shared amongst their management.

Roles and responsibilities

Roles and responsibilities have become clearer over time. In the wastewater management group, it took a while for the members to develop a common vision of what they wanted to jointly accomplish and fine-tuning was needed on specific aspects of the work i.e. training materials and the wastewater logbook.

Meeting processes

Having regular meetings helped the wastewater management group, which at the end started to include all working groups and became a WOP exchange to understand each other better. There was a reflection from some participants that whilst meetings were productive, follow-up actions were sometimes not clearly assigned to specific organisations.

Work processes

When it comes to work processes, some delays occurred due to the WOP activities discussed and agreed amongst partners between meetings, the difficulty to finding time to carry out tasks and identifying the necessary financial resources, as well as working through OOWV's and BCMM's administrative processes e.g. related to procurement. A lesson learned in this context is the need to adjust ambitions to realistic targets in line with the budgeting and procurement timelines of all partner organisations.

Communication and transparency

The language barrier has sometimes affected communication and there was initial apprehension about this amongst partners, for example, prior to the on-the-job training of BCMM wastewater process controllers in Germany. Nevertheless, partners found that they managed to overcome communication barriers when they worked in person and on side on topics, they are deeply familiar with during the training process.

Trust and transparency

Participants of the wastewater working group reported that they had developed strong levels of trust amongst each other over time. The different exchange visits were crucial in building trust. The group now feels that the strong levels of trust amongst the core group allows new people to join the working group and build the relationship further. A lesson learned in this context is that a partnership needs time to evolve and to develop a relationship of trust and understanding for each other's ways of working. Small steps are important at the start.

Resources

Resourcing the partnership has at times been an issue. As already mentioned, a key challenge has been to carve out time for WOP activities outside working hours and in between visits, which led to the slow down and revision of some specific projects within work packages. The group working on environmental education, for example, adjusted its operational plans several times to specific tasks that could be accomplished within the time period.

The OOWV delegation and project partners during their work visit in Buffalo City Metropolitan Municipality, South Africa | 05/2022

Photo: Samantha Westphal

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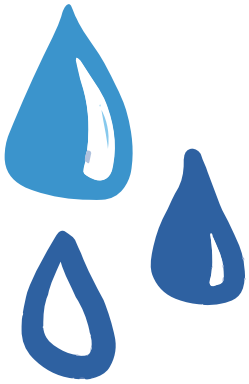

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Thank you to all employees from Oldenburgisch-Ostfriesischer Wasserverband, Wupperverband and Buffalo City Metropolitan Municipality who contributed to this publication via interviews, photos, editing etc.!

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