SLR Consulting (Africa) (Pty) Ltd

WWQA Africa Use Case Lake Victoria Stakeholder Engagement Expansion

October 2023

1.0 Introduction

1.1 Terms of Reference

The Umvoto Foundation non-profit company (NPC) (hereinafter referred to as "TUF") appointed SLR Consulting (Africa) Pty Ltd (hereinafter referred to as SLR) for consulting support towards the World Water Quality Alliance (WWQA) World Water Quality Assessment ('the Assessment').

Specifically, TUF requested SLR support on the development and application of different stakeholder engagement approaches for Lake Victoria use case.

1.2 Background

The United Nations Environment Programme (hereinafter referred to as "UNEP") having its office at Nairobi, Kenya and represented by its Science Division, convened the World Water Quality Alliance (WWQA) as a voluntary and flexible global multi-stakeholder platform representing experts, practitioners and policy networks with the central aim to support delivery of the World Water Quality Assessment ('the Assessment') following the mandate United Nations Environment Assembly (UNEA) Resolution 3/10 on "Addressing water pollution to protect and restore water-related ecosystems" (UNEP/EA.3/Res.10). UN-Water has outlined that such an assessment should incorporate 1) a baseline assessment of the state of water quality, 2) a scenario analysis of water quality trends to identify dynamic trends over the next 10 to 50 years in water quality, 3) an assessment and analysis of mitigation options available and 4) an assessment and analysis of governance approaches.

As part of the delivery of this mandate, the WWQA will focus on generating and testing a data fusion approach combining different sources of water quality data contributing to the Assessment; horizon scanning, agenda setting and investigating selected priority topics to identify persistent or emerging water quality issues of key environmental and socio-economic concern; and co-designing and operationalizing water quality related services and products, based on a moderated in-country stakeholder driven process.

2.0 Stakeholder Engagement

Stakeholder engagement began in October 2019 and continues to date. This is detailed in the sections that follow.

2.1 Initiation and Continuity

UNEP appointed Andrew Gemmell, a TUF representative, in October 2019 as specialist hydrologist to facilitate the Lake Victoria and Volta Basin Use Cases. Specific to the Lake Victoria Use Case, this included attendance at a conference in Kisumu, Kenya and attendance at an Africa Great Lakes stakeholder workshop in November 2019 in Entebbe Uganda organized by the Great Lakes African Center for Aquatic Research and Education (AGL-ACARE, Figure 2-1).

Key in the success of the Lake Victoria stakeholder engagement process was the involvement of AGLACARE who formalized Advisory Groups for each of the 7 African Great Lakes (Lakes Albert, Edward, Kivu, Malawi/Niassa/Nyasa, Tanganyika, Turkana, Victoria Figure 2-2). These groups meet monthly to discuss lake-specific challenges and opportunities.

Figure 2-1: Lake Victoria Advisory Group, Entebbe, Uganda, 2019

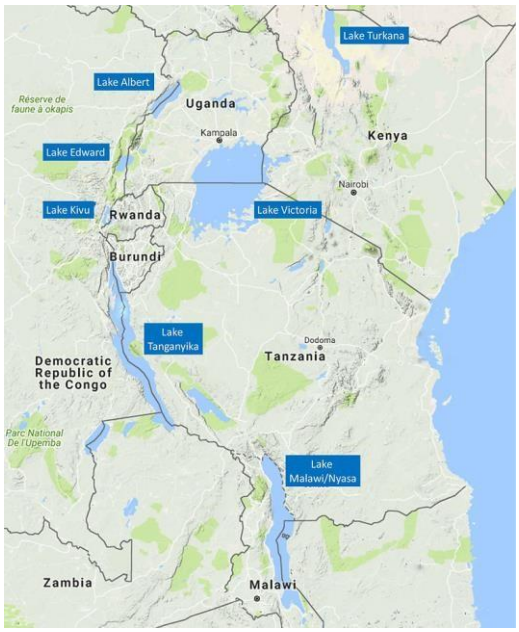

Figure 2-2: Africa Great lakes (AGL-ACARE)

The Lake Victoria Working Group includes representatives from the following:

- Inter-governmental organisations (Lake Victoria basin Commission and Lake Victoria Fisheries Organisation),
- Governmental Fisheries Institutes (Kenya Marine and Fisheries Research Institute (KMFRI), National Fisheries Resource Research Institute (NaFIRRI), and Tanzania Fisheries Research Institute (TAFIRI).
- Academic institutions (University of Eldoret, Nelson Mandela African Institution of Science and Technology, University of Nairobi, Helmholtz Center for Environmental Research, IHE Delft).
- International organisations (IISD, WWF).

WWQA members Mr Andrew Gemmell and Dr Tallent Dadi (Helmholtz Centre for Environmental Research) were nominated in 2019 to the AGL-ACARE Lake Victoria Working Group, with engagement continuing to date.

To introduce the Africa Use Case initiative, Andrew Gemmell of TUF on behalf of the WWQA compiled and sent letters requesting collaboration between WWQA and LVFO. Once these were approved, Andrew Gemmell convened a workshop with key LVFO representatives. This was done online due to the travel restrictions associated with the Covid-19 pandemic.

The LVFO then reached out to country fisheries research institute Directors at KMFRI, TAFIRI and NaFIRRI to introduce the Africa Use Case initiative. The Directors of KMFRI, NaFIRRI and TAFIRI then nominated fisheries specialists within each of their Institutions to act as focal points.

Workshops, coordinated by Andrew Gemmell and TUF, in collaboration with LVFO, were then held with the key representatives identified by the respective Institute Directors at the KMFRI, TAFIRI and NaFIRRI. Workshops with these individuals were held in August and September 2020 with the aim to

- Re-introduce the concept of the African Use Case concept as it relates to Lake Victoria and how the Alliance can assist.
- Provide examples of what can be achieved through the Alliance.
- Discuss the priority Lake Victoria water quality concerns and hotspots.
- Discuss research and information gaps.

- Begin discussions on water quality data and information products and services to be codeveloped to target hotspots.

2.2 Water Quality Products and Services

The water quality data and information products and services agreed to be co-developed by the riparian fisheries organisations (KMFRI, TAFIRI, NaFIRRI) and WWQA representatives were:

- **Coastal eutrophication assessment**: Available data sources assessed to indicate the potential of coastal eutrophication, including the identification of hot spots and potential seasonal patterns.
- **Water temperature dynamics:** The use of a freely available lake model to simulate temperature dynamics in Lake Victoria to inform the extent of stratification and vertical mixing in the water column using water quality data already provided.
- **Sediment chemistry**: A joint assessment of sediment release of nutrients, turnover, and indication through algae blooms using water and sediment quality data, and synergising with remote sensing data (EOMAP).

Through engagements between 2020 and 2022 the most urgent need identified by in-country Lake Victoria stakeholders was for a tool to assess the potential for coastal eutrophication at the Lake, especially as it relates to fisheries.
Taking this forward, the WWQA members at various organizations and institutes collaborated with key Lake stakeholders to develop a Lake Victoria specific portal within the online GlobeWQ platform[1].

GlobeWQ utilizes the triangle integration approach (Figure 2-3) to inform water quality hotspots, trends & underlying drivers. GlobeWQ includes in situ data from GEMStat, modelled data from the Helmholtz Center for Environmental Research and Ruhr University Bochum, and satellite-based water quality products from EOMAP.

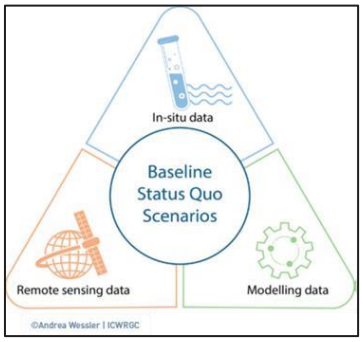

Figure 2-3: WWQA Triangle

Overall, GlobeWQ is an invaluable web tool to synthesize data and information into an easily accessible format that provides real insight towards identifying solutions. The Lake Victoria specific portal has great potential to be taken forward and developed further.

[1] https://www.globewq.info/platform.html

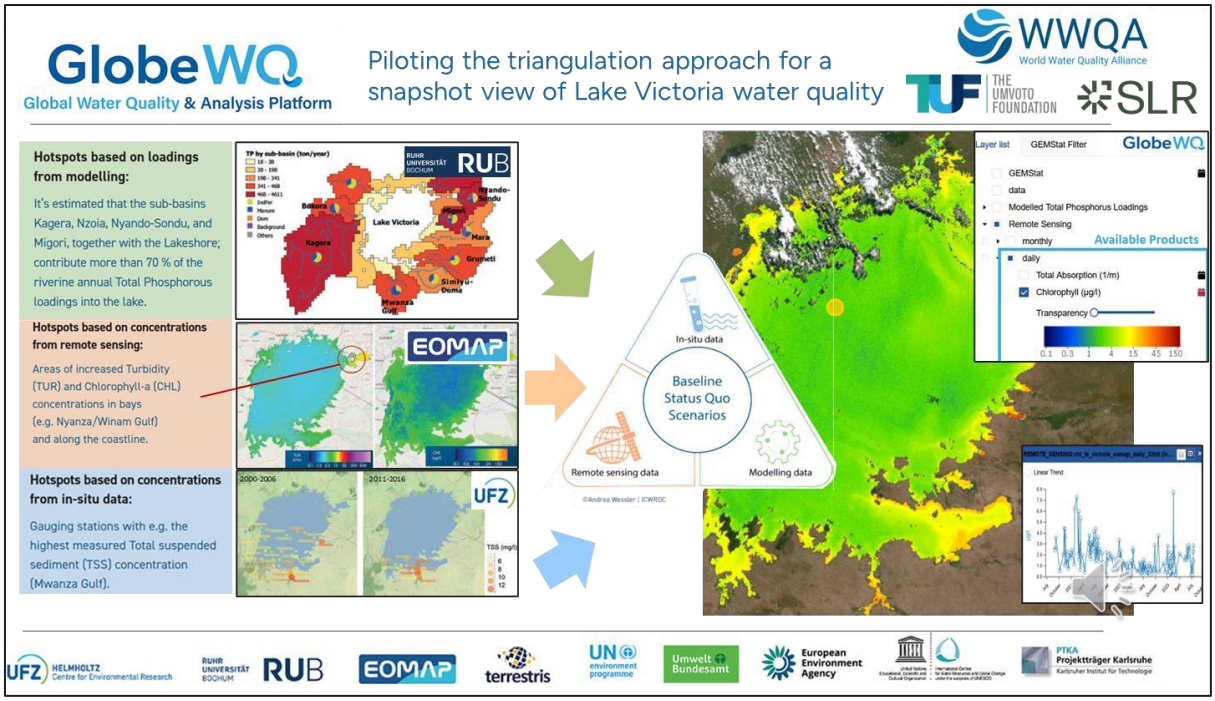

Figure 2-4: GlobeWQ Lake Victoria Portal overview

2.3 Africa Great Lakes Advisory Group Survey

One cannot manage what is not measured, so an identification of the challenges and opportunities to promote better water quality data sharing was assessed as part of this assessment.

Further, a focus on only in situ water quality measurements has limitations in both temporal and spatial resolution.

- Routine monitoring (e.g., monthly) at a lake may not always be possible based on limitations in staff, funding, equipment etc.
- Further, there are limitations to where measurements at the lake may be made (including transboundary limitations, the practical/financial limitations to how many samples can be obtained, etc.).

As a result, innovative solutions were needed to fill in water quality data gaps at Lake Victoria. As a result, the workshop sessions explored issues around data sharing and the Triangle concept (Figure 2-3). As a result, an online survey was sent to representatives of each of the 7 Africa Great Lakes Advisory Groups.

2.3.1 Approach

To define the opportunities to benefit the data providers an online survey was sent to representatives of each of the AGL-ACARE convened Africa Great Lakes Advisory Groups. This included the following questions:

- In your opinion, what are the primary organizations/institutions that collect and store water quality data for the Lake (e.g., government/inter-governmental/research/NGO's/Private etc.)
- What water quality parameters are you most interested in at the Lake and why? (e.g., phosphate to assess eutrophication impacts on fisheries) Question 3: In your opinion, what are the key gaps in water quality data and information at the Lake, and why?
- What do you feel are the limitations to sharing of water quality data amongst other scientists? (e.g., funding, trust, training, software, sharing protocols, etc.)

- What do you feel are the limitations to sharing of water quality data from the Lake to existing data/information platforms? Examples are the African Great Lakes Information Platform (https://www.africangreatlakesinform.org/) and GEMStat ("The Global Freshwater Quality Database" https://gemstat.org/).
- In your opinion, what opportunities exist to improve the Lake water quality data sharing (both among scientists, and to shared platforms)?
- What tool/platform do you use (if any) to store/visualize water quality data (e.g. Excel, Tableau, an internet tool, etc.)
- How reliant are you on each of the following for water quality measurements at the Lake (very low/low/medium/quite high/high)
    a) Scientist measurement (in situ such as temperature, or lab measurement of water quality)
    b) Automatic measurement devices (e.g. sensor installed on buoy)
    c) Earth observation (e.g. satellite imagery)
    d) Model results (water quality)
    e) Citizen Science

2.3.2 Survey Outcomes

There were 42 responses from each of the African Great Lakes (AGL's) - predominantly from universities and fisheries. The survey was opened to all lakes to determine commonalities in challenges and opportunities in water quality data sharing.

Based on the responses, various methods were used to visualise the data. This included the use of Word Clouds: the more a specific word appeared in the responses, the bigger and bolder it appears in the word cloud.

- The responses for each of the 7 lakes is Figure 2-5. This indicated 36% of respondents represent Lake Victoria.
- Figure 2-6 outlines what the primary organizations/institutions are that collect and store water quality data for the Lake of interest. These were predominantly research organisations from universities and government institutes (e.g., KMFRI, TAFIRI, NaFIRRI).
- Figure 2-7 outlines the water quality parameters that respondents are most interested in at the Lake of interest. Although there were responses from each of the lakes, the primary parameters were associated with eutrophication and associated parameters (phosphate, nitrogen, and the indicators like oxygen and chlorophyll). In addition, temperature was identified as being of importance.
- Figure 2-8 outlines limitations that respondents find to sharing of water quality data. This included funding, trust, software/platforms, protocols and trainings. This confirms limitations identified through this projects historical (2019 to 2022) stakeholder engagements.
- Figure 2-9 outlines the tool/platform that respondents use to store/visualize water quality data. This was dominated by using excel (which it should be noted is not considered appropriate as a database since it is not relational).
- Figure 2-10 outlines the reliance that respondents have on which data types (scientist measurement**,** automatic measurement devices, earth observation, model results, citizen science). This indicated almost proportional reliance on each of the five data types.

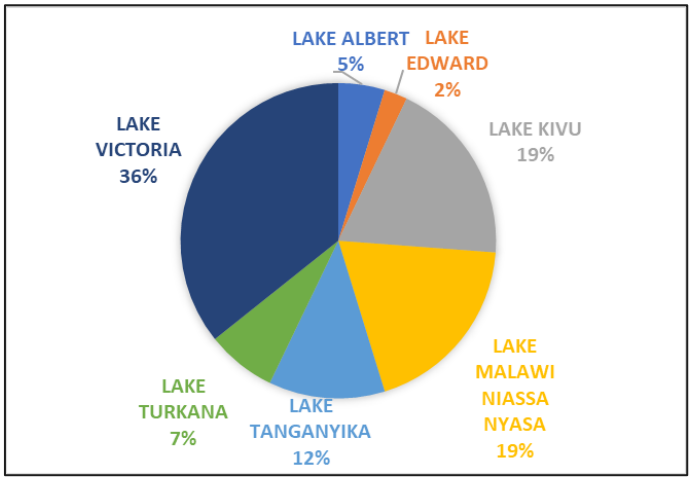

Figure 2-5: Proportion of the 42 respondents from each of the 7 AGLs

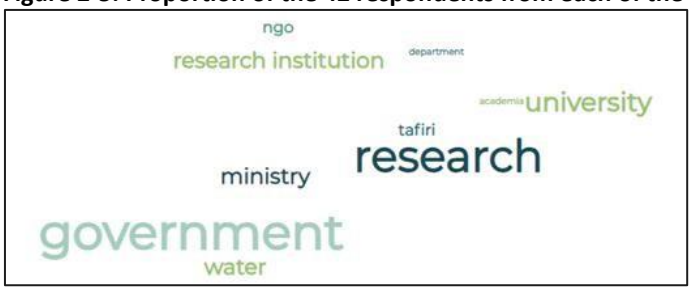

Figure 2-6: Primary organizations that collect and store AGL water quality data

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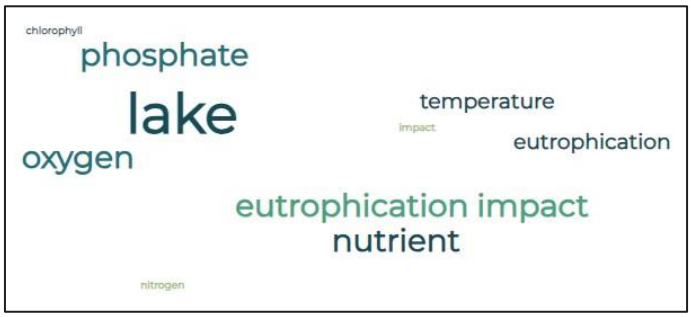

Figure 2-7: What AGL water quality parameters are respondents most interested in

Figure 2-8: Limitations to sharing of AGL water quality data

Figure 2-9: Tool/platform used to store/visualize AGL water quality data

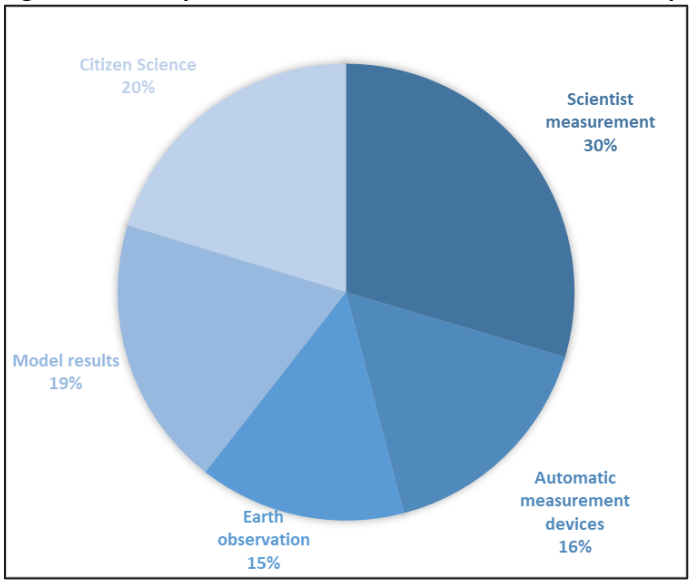

Figure 2-10: Reliance on which data types at the AGL

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2.4 Nairobi, 2023 Workshop

Workshops were held on 18th and 19th September at the WWQA Nairobi conference after the days sessions. This was convened by Andrew Gemmell (representing TUF) and AGL-ACARE (Stephanie Smith and Ted Lawrence).

The goal of the 2-hour workshops was to grow multi-stakeholder engagement for African Great Lakes monitoring, including the following discussion points that we aimed to address:

- How we, as stakeholders, are working to address water quality challenges.
- Introduce survey outcomes *(Who is collecting data? What data is being collected? What data is missing? How to improve data sharing?).*
- Build mutual benefit between those who have data, and those who need data. What are the challenges and opportunities to collaboration. In differing amounts, we all have data, and all need data. Sharing this will promote investment and benefit the environment.
- Develop a shared vision for AGL water quality data sharing that builds and expands on the success of the Lake Victoria Use Case.

The **Session Outcomes Aspiration** was that we will have the beginning of a road-map to work together towards the common goal of improving lake water quality. This includes:

1. Future vision for how we can better collaborate to address the existing challenges
2. Action items, responsibilities, and deadlines

The agenda is summarised below:

- **Day 1 (18th Sept, 18H00-20H00).**

Aim: Initiate multi-stakeholder engagement by developing a shared vision, introducing survey outcomes, and challenges and opportunities. Develop a shared vision for shared AGL water quality data collaboration.

- o Welcome:
- Goals, outcomes and agenda
- Introductions o Survey Highlights and Opportunities o Create Current and Future Scenarios (Breakout sessions):
- Status Quo
- Data collection (which/how), audience, outputs, use
- Limitations to sharing water quality data amongst other scientists and to existing platforms?
- o Future Needs
  - Survey info and existing platforms
  - Data collection (which/how), audience, outputs, use
  - Recommendations to integrate survey info and existing platforms o Report Back
- o Next Steps

- **Day 2 (19th Sept, 18H00-20H00):**

Aim: To finalize a draft action plan to promote data sharing for healthy African Great Lakes and communities

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- o Welcome and recap of Day 1
  - Present and discuss idea for integrated future scenario
  - Data Discussion
  - Data assets, use, sharing to existing platforms, limitations, challenges, we have vs. what we want. Ensure our plans will close this gap
  - Working with WWQA Workstreams o Map Next Steps
  - Define steps
  - By when? 1–3 year timeframe
  - By whom? Name entity and person
  - What are funding sources to support this work?
- o Wrap up
  - Share individual/collective next steps
  - What's our accountability plan?
  - Plan report out to conference

The workshop participants are summarized in the table below (includes both online and in-person attendees), with a photo of the discussions in Figure 2-11.

As part of the sessions, an overview of the three WWQA Africa Use Cases was given. Specific to the Lake Victoria Use Case, details were provided for the WWQA Triangulation method, the stakeholder engagement to date, a practical presentation of the three platform examples (GEMStat, GlobeWQ, AGL-Inform), and details on the GlobeWQ project progress and outcomes. To spark discussion, the survey outcomes (Section 2.3) were presented.

Table 2-1: Workshop participants

Name	Organisation
Alice Hamisi	African center for Aquatic Research and Education
Baraka Sekadende	TAFIRI
Christian Schmidt	Helmholtz Centre for Environmental Research - UFZ
Dr Frank Masese	University of Eldoret and African Center for Aquatic Research and Education (ACARE)
Elizabeth Wanderi	Lake Turkana Advisory Group
Emma Tebbs	King's College London
Igor Chernov	WMO
Jean N Namugize	Nile Basin Initiative Secretariat
Kenneth Irvine	IHE Delft, The Netherlands
Marie-Claire Dusabe	Justus Liebig University
Mary Nantongo,	Rubirizi District Local Government, Fisheries Officer
Maxon Ngochera	Malawi Ministry of Natural Resources and Climate Change
Mr Joseph Chombo	Department of Fisheries
Ms. Joyce Ikwaput Nyeko	AGL-ACARE
Ms. Namakau Muyumbana	University of Zambia
Muthoni Velma Njeri	4REVS AFRICA
Nynke Hofstra	Water Systems and Global Change Group, Wageningen University
Philipp Bauer	EOMAP
Philipp Saile	International Centre for Water Resources and Global Change, Federal Institute of Hydrology

Riziki W. Jacques	Institut Supérieur Pédagogique de Bukavu (ISP-Bukavu)
Stephanie Smith	African Center for Aquatic Research and Education
Ted Lawrence	African Center for Aquatic Research and Education
Zephaniah Migeni	African Center for Aquatic Research and Education
John Malala	Kenya Marine and Fisheries Research Institute (KMFRI) Lake Turkana Station

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Name	Organisation
Nathalie Nzigire	Centre de Recherche en Hydrobiologie (CRH-Uvira), Uvira, RD Congo
Lucyphine Kilanga	Coordinator of Tanzania Women Fishworkers Association (TAWFA)

Figure 2-11: Nairobi 2023 workshop in-person attendees

2.4.1 Data Collection and Processing Process

As part of the workshop discussions, we wanted to understand the data process from the start to end (sampling planning, to final recipient of information products). This identified the following steps:

1. Sampling planning (where, how, why?)
2. Sampling Procedure
    a. Protocols for collection (sample method and requirements for accuracy, etc.). This may include cross-boundary standards based on existing standard operating procedures (SOPs) (e.g., bottle requirements, limit cross-contamination, preservative)
    b. Lab accreditation, standardisation, (duplicates, lab comparability etc.)
    c. Generate a standard data/metadata format protocol (e.g., that is used by GEMStat, or LVBC if available)
3. Collecting historical data (internal)
4. Requesting/receiving other scientist data (external)
5. Compiling data

6. Integration of data collection/analysis/reporting within AGL region
7. Input data into database/dataset
8. Analyze data
9. Quality assurance/quality control (QA/QC) of data (e.g., GEMStat method)
10. Mapping of data
11. Data to Information
12. Make recommendations

It was noted that the process typically stops at above. The following additional steps were discussed:
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- River loadings (nitrogen, phosphorus, faecal coliforms, pesticides, etc.) associated with catchment changes (farming, alternative fertilizer use, deforestation etc.).
- A need to tie in social data, economics, health, fish data, aquaculture (Water-Energy-FoodHealth-Ecosystems (WEFH) Nexus).
- A systems approach to monitoring (e.g., assessing eutrophication hotspots) as opposed to single parameters (e.g., nitrate).
- Improved sharing between scientists/institutes.
- Data and information sharing with funders and decisionmakers, communities, universities, schools, children.
- A need for data to generate funding.
- A need to refine/improve/expand on work completed. Implement actions. Monitoring Success. This supports continual improvement.

2.4.2 Challenges and Opportunities to Data Sharing

A Mural[2] online workspace was used for virtual collaboration using virtual "sticky notes". We explored the current and future state of water quality monitoring through workshopping the following questions:

- Those Who Collect Data:
  - + What is **collected** and by whom? ○ + How is it **used** and by whom?
  - + What is **produced** using the data?
- Those Who Need Data:
  - + What data is **provided** from AGL region? ○ + How is it **used** and by whom?
  - + What is **produced** using the data?

Through this process, it was noted that there was alignment from the observations in this workshop and the outcomes of previous workshops. Specifically, there was alignment on funding, shared database(s), protocols/ policies, mutual benefit, training.

In addition to these, there was a need identified in the workshop to more data and alternative data types and a need for Data to Action (see Table 2-2 and described in Section 2.4.3). **Table 2-2: Water Quality Data Sharing opportunities**

Challenge	Opportunity

[2] app.mural.co

Funding	• Memorandums of Understanding for sharing government data • Long-term sustainable investment. • Donor-funded projects to better allow data sharing. Avoid use of funder-specific databases
Shared database(s)	• Common (transboundary) data-management system. This could be owned/operated by data providers or use existing platforms (GEMStat/ GlobeWQ/ AGL-Inform). • Data sharing restrictions (as per **GEMStat – open/limited/restricted use**) • Automated data processing and validation
Protocols/ policies	• Standardised protocols/policies for data/ metadata/ information sharing across borders / institutions (e.g., **GEMStat / IGRAC protocols**) • Standardised data types and formats that allows for better collaboration between organisations/ institutions/ countries

The Umvoto Foundation

Challenge	Opportunity
Mutual Benefit	• Ensure data ownership/ recognition. Trust-building for data sharing. Benefit to data provider. • Tackle the "north-south" divide
Training	• In-country capacity building in the data collection, data analysis, & data management. • Provision of hardware/software and training
Data to Action	• More/different data still needs to be collected (to be directed by problem)Data analysis & visualisation tool(s) (GEMStat) • Information tools (AGL-Inform) • Hotspot identification (GlobeWQ) • Communication & collaboration (between scientists, countries, organisations…) • Capacity building/education, • Government decision & policy tool • Link water quality to fish catch/health data

With regards to **funding**, this was noted to be limited and short-term. Further, data providers stated a need for payments for data (at times a limitation, including that UN-affiliated organisations not being able to pay for data). As a result, the opportunities to address the funding limitation and enhance sharing included:

- Memorandums of Understanding between UN organisations that may need data and government institutions (e.g. KMFRI, TAFIRI, NaFIRRI) to be able to share government data without payment.
- Long-term sustainable investment.
- Donor-funded projects to better allow data sharing. Avoid use of funder-specific databases

There are various **shared database/platform options**. Data providers outlined a need for the following:

- Common (transboundary) data-management system. This could be owned/operated by data providers or use existing platforms (GEMStat/ GlobeWQ/ AGL-Inform).
- Data sharing restrictions (as per GEMStat – open/limited/restricted use)
- Automated data processing and validation

Transboundary water resources makes data sharing difficult. As a result, there was noted a need for **standardised protocols/ policies**:

- Standardised protocols/policies for data/ metadata/ information sharing across borders / institutions (e.g., GEMStat / IGRAC protocols).
- Standardised data types and formats that allows for better collaboration between organisations/ institutions/ countries.

Mutual benefit was discussed – where there is benefit not only to those receiving/using data, but also those organisations that collect and share data. This included a need for

- Data ownership/ recognition.
- Trust-building for data sharing.
- Benefit to data provider.

Training and capacity building was discussed, including:

- In-country capacity building in the data collection, data analysis, & data management.
- Provision of hardware/software and training

Data to Action was added to the challenges during the Nairobi workshop, with the outcomes of this discussion outlined in the following Section.

2.4.3 Data to Action Conceptualisation

With "blue sky" thinking, the question was posed "*what is needed to make a true data to action tool*?". Further, "*what would make the perfect monitoring programme (unlimited funding)?*".

Based on these discussions the following was concluded:

1. **Data** should be collected with an end-point change/improvement identified (**Action**). For example what data to collect to assess fish kills?
2. Longitudinal to link in WEFH Nexus) factors (e.g., socio-economic factors, fisheries, health, etc.) to compare water quality to water quality impacts to these. Needs long term, comparable, high-quality data by well-trained scientists that are funded.
3. Data Justice, transparency, availability, democratization of data.
4. Data to information to easily-digestible snapshot. Thresholds and triggers to drive extra monitoring, early-warning system, actions .
5. Link drivers (e.g., nitrate) to impacts (e.g., eutrophication) to further impacts (e.g., sick people) to solutions (e.g., holistic catchment management).
6. Simple science-policy-society interface communication to drive change (short, image-full, colourful, action/outcome driven materials).
7. Community engagement in the progress to get buy-in
8. Communication of recommendations
9. Assessment of primary, secondary and tertiary water quality drivers (e.g., increased nitrate, causing increased chlorophyl-a, causing decrease in oxygen and fish deaths).
10. Increased use of citizen science
11. Target stakeholders in the right medium (perhaps less science, more art, music, sport, social media, etc.).

2.4.4 Platform Options

The interactive workshop discussed data storage, data visualisation, and information products. This included:

- The **Global Freshwater Quality Database GEMStat** provides scientifically-sound data and information on the state and trend of global inland water quality.
- The **GlobeWQ Platform** integrates data from in-situ measured, remote sensing based and water quality models (data triangulation) to inform about water quality hotspots, trends as well as the underlying drivers. There are existing synergies between the Africa Use Cases and the UNEP GEMStat and the GlobeWQ workstream. Thus far, GlobeWQ has included GEMStat and remote sensing data for Lake Victoria. The current and future additional stakeholders will be exposed to the GlobeWQ Platform to enhance the current and future benefits of such a platform, specifically in a Lake coastal eutrophication assessment via the use of in situ (and citizen science), remote sensing and water quality modelling. GEMStat and the GlobeWQ platform aim to bridge the global scale water quality assessment and user-tailored water body and river basin scale information needed by regional authorities. However, geospatial platforms such as GlobeWQ are only relevant if they are being used and updated with recent data.
- **African Great Lakes Information Platform (African Great Lakes Inform**) provides access to spatial data; information on past, present and future projects; and all aspects of the adaptive management process. This includes a theme specific to Lake Victoria; however, notable is a current absence of water quality data.

These three platforms each have their benefits and limitations.

- In situ data has a high acceptance, useful for ground-truthing for other methods. However, there may be limited spatio-temporal coverage (e.g., point measurements that may have limited frequency).
- Remote-sensed earth observation is near real-time with a high spatio-temporal coverage. However, there are a limited number of possible water quality parameters able to be measured from space (e.g., can measure temperature, algal blooms, water turbidity, but not measure chemistry like phosphate). Also needs validation with in situ data.
- Water quality modelling allows predictions and scenarios, enhanced spatially and temporally continuous information and allows forecasting to the future. However, only as good as the input data

Each data type serves a purpose to synergise with the other to better provide a holistic outcome. This is represented in Figure 2-12. The flow being as such:

- Water quality data is collected in field (e.g. water temperature) or via laboratory testing (e.g. nitrate).
- Water quality data is entered into a dataset (e.g. Microsoft Excel).
- In situ data is then sent to a data processing and visualisation platform (e.g. GEMStat).
- In situ data has limitations with regards to spatial and temporal resolution. There is thus a need for the WWQA triangle methodology to use satellite imagery and water quality modelling to enhance the water quality information. As a result, GlobeWQ incorporates GEMStat data, as well as satellite imagery and water quality modelling.
- Based on this detailed information, information products (e.g. water quality reporting, policy briefs, etc.) can be developed and stored appropriately (e.g. at a platform at AGL-Inofrm).
- This allows improved understanding of Sustainable Development Goal progress.
- Ultimately, one can only manage what is monitored, and by extension investment is best unlocked once the problem is properly understood and summarised in a format digestible by funders.

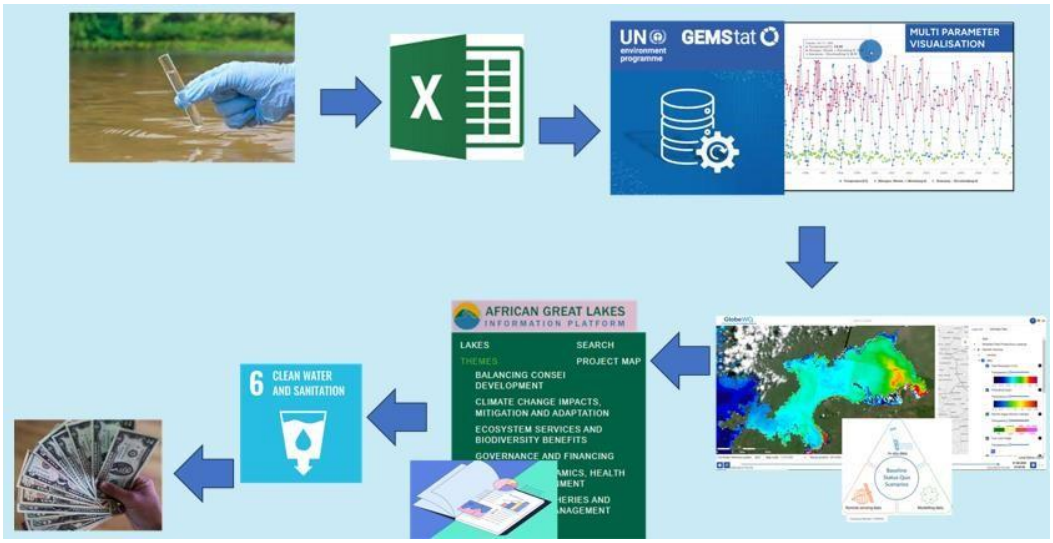


Figure 2-12: Platform Synergies

2.4.5 Way Forward

There are 7 guiding WWQA pillars, under which there are 16 current WWQA workstreams.

The principal pillars of the WWQA:

1. Data to Action
2. Source to Sea
3. The Water-Energy-Food-Ecosystem-Health Nexus (WEFE+H)
4. Citizen Engagement
5. Development Programme of long-term citizen science
6. Inter-regional science-sustainability diplomacy
7. An efficient Emergency Response Capacity

The 16 WWQA workstreams are:

1. Baseline World Water Quality Assessment
2. Ecosystems
3. Friends of Groundwater
4. Global Scenarios Ecosystem Health
5. Capacity Development Consortium
6. Citizen Science for SDG 6.3.2
7. Africa Use Case
8. Water-ForCE
9. Towards an African Water Quality Program (AWaQ)
10. GlobeWQ STI Platform development
11. Scenario Analysis for World Water Quality Assessment
12. Global Wastewater Initiative
13. Global Environment Monitoring System for Freshwater
14. Plastics
15. Social Engagement Platform
16. Youth

There was a need identified to synergize with other WWQA workstreams and projects, including:

- **Global Water Quality & Analysis Platform (GlobeWQ**) (see Section 2.4.4).
- **The African Lake Remote Sensing (ALReS) Network** as a collaboration between King's College London, African Center for Aquatic Research and Education (ACARE), Regional Centre for the Mapping of Resources for Development (RCMRD), and Kenya Marine and Fisheries Research Institute (KMFRI).
- **Water-ForCE**[3] is a project defining the future of inland water services for Copernicus. Dedicated to develop the roadmap for the water component for the future Copernicus services. Addressing the current disconnects between remote sensing and in situ observation research, delivering clarity in terms of the needs and expectations of the public and private sectors of the core Copernicus Program and the wider research and business innovation opportunities.
- The 'Towards a **Pan-African Water Quality Program (PAWaQ)**' workstream has direct links to the "Africa Use Cases" and the "Capacity Development workstreams". It aims to develop a framework of a Pan-African Water Quality Program (PAWaQ) by responding to the request of the African Ministers' Council on Water (AMCOW) for supporting the design of a Pan African Water Quality Program to accelerate the water security agenda in Africa. It will achieve this by carrying out research on innovations that could

[3] https://waterforce.eu/

be included to advance water quality management in Africa and will stitch these into the design of a new framework for the monitoring and management of water quality.

2.4.6 Future Funding

There was a general discussion on what we can produce to provide to funders as a Proof of Concept ("Business Plan"), this includes:

1. A one-pager pamphlet of the Lake Victoria Use Case and successes of the stakeholder engagement process.
2. Explore synergies with other workstreams that are solutions driven.
3. Highlight the full cost of pollution (e.g. rather than high phosphate, rather a holistic view that this causes eutrophication which reduces fish catches, water treatment cost, causes health impacts, reduces tourism, etc.).
4. Sustainable funding - longitudinal study/permanence.
5. Income generation strategy - how to add value to the data (e.g., could we split provision of free data vs paid information).
6. Sustainable project to catalyse long-term activities.
7. Capacity building in country to better solve solutions.

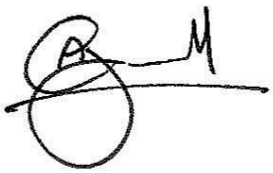
3.0 CONCLUSION

The Lake Victoria use case is an example of what can be achieved with strong in-country stakeholder networks, defined stakeholder needs, a bottom-up approach that meets the identified needs, and the WWQA experience in global challenges to support local solutions. The following are the key actions to take this forward:

- Continued assessment of challenges and limitations to data sharing. This would be via more direct lines of questioning with the AGL-ACARE advisory groups for each of the lakes. This will be through an online survey, then workshopped in October 2023. This will be via a hypothetical scenario:
  - **Background:** You are requested to share data to an online platform such as the Global Freshwater Quality Database GEMStat (https://gemstat.org/). The data would remain your property. Further, your data can be shared with any level of restriction as per below GEMStat (restricted, limited, open).
- **Question 1:** Hypothetically, if you were requested to share the following data tomorrow to a platform such as GEMStat, what would stop you from being able to share water temperature, nitrate and fish biomass/stocks (these three options selected to represent in situ measurements, laboratory results, and fish data).
- **Question 2:** What would you want to see in a data sharing platform that would make you use it at least monthly in your decision making?
- Continued collaboration with AGL-ACARE and the lake-specific advisory groups.
- Conclude which **water quality platform(s)** meet the Lake Victoria stakeholder needs and can be used as a shared repository. This may include platforms such as **GEMStat, GlobeWQ and AGLInform.**
- Continue to assess and address challenges to data sharing.
- Develop a larger concept within WWQA framework to present to **funders**. This includes the use of the proven Lake Victoria methodology to **expand** the **stakeholder engagement process** and **product development** at Lake Victoria and to other Great Lakes.

Yours faithfully

SLR Consulting (Africa) (Pty) Ltd



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