



## WWQA Africa Use Cases

### Lake Victoria and Volta Basin

#### Stakeholder Engagement and Product/Service Co-design

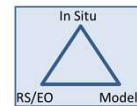
*As part of the: World Water Quality Assessment mandated by UNEP/EA.3/Res.10 – Dec. 2017  
and building on the WWQA Inception Workshop, UNEP/WMO Geneva 28-29 November 2018*



# Africa Use Cases Aims & Objectives

## Aims:

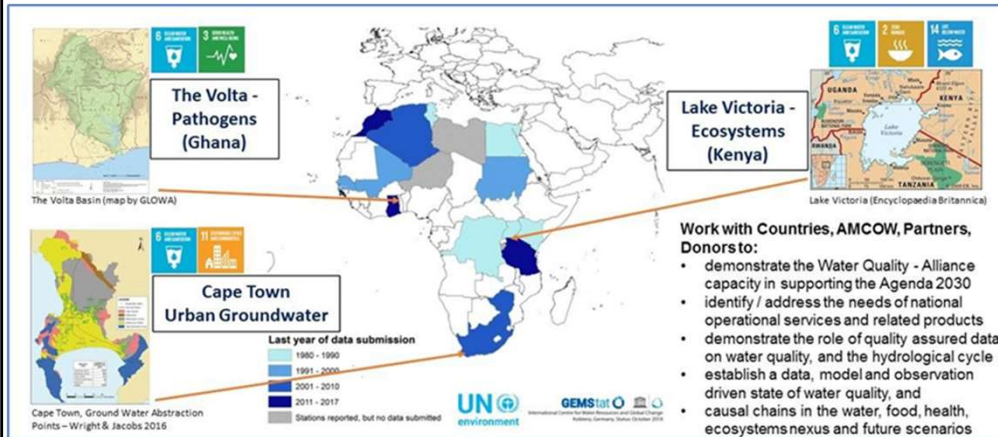
1. Evaluate availability & accessibility of data. Test the **integration of available in-situ, remote sensing-based earth observation and modelling data** to derive water quality baseline
2. Local engagement of WWQA with stakeholders: **Using experience in global challenges to support local solutions**



## Objectives:

1. Link water quality hotspots to **solutions and investment** priorities.
2. **Multi-stakeholder in-country driven process** to identify the key water quality concerns and the need for associated **water quality products & services**
3. Integration of data from in-situ monitoring, remote sensing-based earth observation and water quality modelling (**WWQA triangle approach**)
4. WWQA triangle partners: EOMAP, UFZ, and Ruhr-University Bochum

# Africa Use Cases Locations



# Lake Victoria Basin – Stakeholder Engagement

Stakeholder engagements in Kenya and Uganda. Subsequent virtual workshops (due to Covid-19) organised with riparian fisheries organisations (KMFRI, NaFIRRI and TAFIRI) to discuss water quality products and services to be co-developed to target hotspots.

**Key water quality challenges:**

- Eutrophication
- Algal blooms (incl. cyanobacteria)
- Hypoxia
- Siltation/turbidity affecting fish breeding

**Potential water quality products & services for co-design:**

- Coastal Eutrophication
- Water temperature and stratification dynamics
- Sediment chemistry

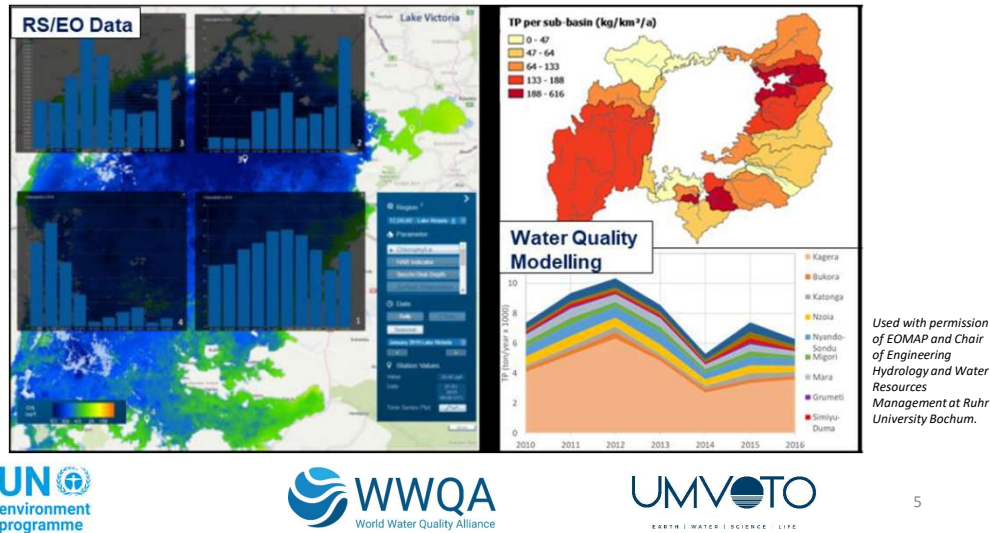


Lake Victoria Fisherman. Photo credit: Andrew Gemmell



## Lake Victoria Basin Products & Services – Coastal Eutrophication

Demand-driven tool being developed to characterize potential of algal blooms to impact fisheries or identify potential links between aquaculture and coastal eutrophication.



This slide shows the coastal eutrophication product and service currently being developed.

Available data sources are being assessed to indicate the potential for coastal eutrophication, including the identification of hotspots and potential seasonal patterns.

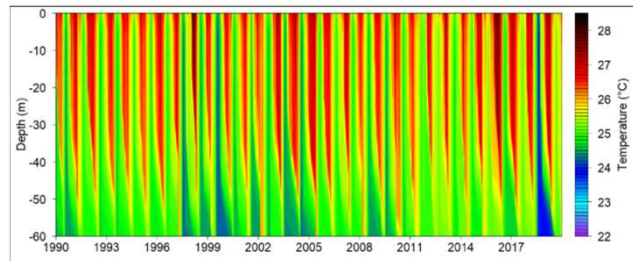
The example shown represents the use of remote-sensed earth observation (provided by EOMAP), and water quality modelling (provided by Ruhr-University Bochum), to complement and validate in-situ measurements of chlorophyll-a as provided by GEMStat and our in-country partners.

The outcomes envisioned include the identification of nutrient hotspots, their drivers, and their temporal and spatial dynamics so that priorities can be defined, and potential management strategies can be efficiently directed.



## Lake Victoria Basin Products & Services – Temperature Dynamics, Sediment Chemistry

**Water temperature and stratification dynamics:** Simulate temperature dynamics (GLM 3.1 model) in Lake Victoria to inform the extent of stratification and vertical mixing in the water column, using data jointly collected under the coordination of the LVFO and provided to Alliance



*Used with permission of Chenxi Mi at Helmholtz Centre for Environmental Research Department of Lake Research*

**Sediment chemistry:** UFZ is collaborating with KMFRI on collected sediment chemistry, water profile physico-chemical quality parameters in the Nyanza Gulf (Kenya) and sediment and water samples near Kampala, Uganda. Discussions are on-going

## Volta River Basin – Stakeholder Engagement

### Stakeholder Engagement:

- Attendance at two conferences in Accra, Ghana in October 2019.
- Coordinated Stakeholder Engagement Workshop in Accra (February, 2020) in collaboration with IESS, University of Ghana. 29 representatives from Burkina Faso and Ghana, including participants from government, academia, NGO/IGOs, the UN RCO, and project partners.

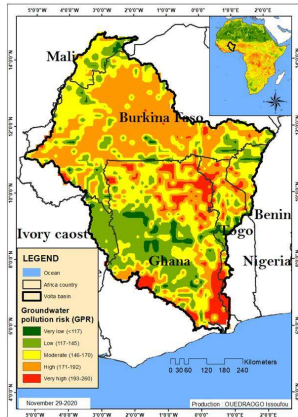
The key **water quality challenges** identified were:

- Poor sanitation resulting in elevated bacterial contamination,
- Mining activities and heavy metal and turbidity impacts,
- Industrial effluent (including plastics and micro-plastics),
- Agricultural runoff of fertilizers and pesticides, leading to increased aquatic alien plants, and water quality impacts to and from aquaculture.
- A further challenge is there is not a consolidated Ghana government department mandated to water quality monitoring, with this role currently split.



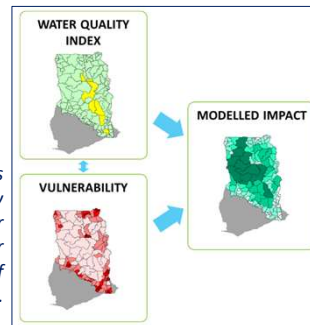
# Volta River Basin – Products & Services

Ongoing development of in-country partnerships and collaboration with The Ghana National Disaster Management Organization (NADMO) and University of Fada N'Gourma, Burkina Faso:



University of Fada N'Gourma, Burkina Faso proposed a groundwater quality assessment based on the DRASTIC vulnerability mapping method and remote sensed data (Ouedraogo et al. 2016).

NADMO: Tool that translates poor water quality severity (measured through a water quality index) into poor water quality impact (vulnerability of affected populations).





# Africa Use Cases – Way Forward

- In situ data of limited spatial and temporal resolution exacerbated by concerns around data sharing by data owners; thus, a need to use **alternative data sources** (RS/EO, modelling, citizen science)
- Ongoing development of in-country partnerships and collaboration, including more recent **in situ data** and **expansion of stakeholder network**
- Options for integrating triangle data into a **single dataset**. Possible learnings from **Cape Town Use Case**
- A promotion of the **trust** in sharing data by in-country stakeholders, including trust in data shared to platforms such as GlobeWQ & GEMStat
- In-country **capacity building** in the collection and assessment of data



With regards to the way forward for the Africa Use Cases, these are summarized as follows:

- In situ data was of limited availability, and what was available had limited spatial and temporal resolution.
- This limited data availability was exacerbated by concerns around data sharing by in-country data providers.
  - A lack of funding
  - The need for more effective science-policy interface
  - A “north-south” divide
  - Shared data is used without permissions
  - A lack of data sharing policies/protocols
  - A need for a common data-management system
  - Project-specific databases that are not maintained beyond a project horizon
  - Capacity building in modelling and RS/EO, as well as data storage, processing and analysis.
- We continue our requests for in situ measured data to validate the satellite imagery and water quality modelling results. This includes both the Lake Victoria and Volta Basin use cases. Any in situ data that can be shared will be welcome.
- There is a need for ongoing development of in-country partnerships and collaborations to identify additional stakeholders beyond the riparian Fisheries institutes. Once this is understood the process of negotiating more recent measured in situ data from the larger stakeholder pool can begin. Should Alliance members be aware of in-country stakeholders with a need for water quality products and services in the Lake Victoria Basin and Volta River use case areas, these would be of benefit to the process.
- To augment the in situ data, there is a need to use alternative data sources such as RS/EO, and WQ modelling and citizen science. The in situ data can be used to validate the data from these additional sources
- Useful would be for Alliance members to share their experiences on the root causes for the lack of data sharing by water quality data holders so that we can add this to our experience and work towards solutions to enhance data sharing going forward
- There is also a need to increase the trust in existing platforms (like GEMStat and GlobeWQ). An option is to place the existing data received on the platforms to show what is possible with the platforms, and to show how data-sharing permissions can protect the data ownership. This includes aspects of capacity building to show the value of such platforms in water resource management
- The objective of the Africa Use cases was the integration of the “magic triangle” of data . However, this data fusion was difficult in practice due to challenges such as different parameters, scales, and durations amongst others. As a result, there was more a focus on the capabilities of methods rather than a fusion. This integration of the outcomes and co-dependencies of the three data types was successfully facilitated as part of the Cape Town Use Case. It is proposed to include these learnings from Cape Town at other locations.



**THANK YOU**

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